

FINAL TECHNICAL REPORT

For the study entitled:

SOCIOECONOMIC BASELINE DATA COLLECTION, RESOURCE USE MAPPING, AND RAPID SOCIAL APPRAISAL

In support of the:

CENTRAL COAST MPA BASELINE DATA COLLECTION PROJECT

Prepared for:

**CALIFORNIA SEA GRANT PROGRAM
STATE COASTAL CONSERVANCY (SCC),
OCEAN PROTECTION COUNCIL (OPC), AND
CALIFORNIA DEPARTMENT OF FISH AND GAME (CDFG)**

Prepared by:

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La Jolla, California 92037

January 2010

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Central Coast Marine Protected Area Socioeconomic Baseline Report

1.0 Introduction

The following pages constitute a comprehensive report on the Central Coast MPA Socioeconomic Baseline Data Collection Project. The project has been undertaken for California Sea Grant as one element of a multi-disciplinary research and monitoring program designed to advance the prospective benefits of California's Marine Life Protection Act (MLPA). The MLPA Initiative is being administered collaboratively by the California Coastal Conservancy, the Ocean Protection Council, California Department of Fish and Game, and the California Sea Grant Program.

Information resulting from this and related biophysical research projects will be used to assess and monitor a wide range of human, marine biological, and physical oceanographic effects and outcomes associated with the recent establishment of a network of Marine Protected Areas (MPAs) along the Central Coast of California. The project reviewed in this report is focused especially on pertinent human dimensions of this new network of MPAs. Emphasis is applied to description and analysis of human activities that are most likely to: (1) affect the marine environment in and around the new MPAs, and (2) be affected by MPA-specific regulations. Commercial fishing, various forms of marine-based recreation, and the people who engage in these activities along the Central Coast are, therefore, the natural subjects of focus throughout this report. The following pages draw from the large socioeconomic database that has been compiled during the course of the project to provide:

- a) Detailed description of long-term trends and current conditions in commercial and non-consumptive marine industries and activities along the Central Coast;
- b) In-depth discussion of the range of physical-environmental, economic, and regulatory challenges encountered by the participants over time, and the strategies typically undertaken to meet them;
- c) Spatial and narrative analysis of the implications of these processes for marine resources and resource user groups across the region, with special attention to MPA-induced changes that have thus far been observed or reported among those groups; and
- d) A methodological template and set of indicators useful for monitoring the long-term biological and socioeconomic effects of MPAs established through the MLPA throughout the Central Coast and elsewhere in California.

As summarized in this report, primary source data collection, compilation of archival data, data analysis, narrative description and explanation, and initial development of a practical monitoring

framework have been completed for purposes of this project by Impact Assessment, Inc. (IAI). IAI is a research firm specializing in human dimensions research and analysis of marine fisheries and related social and economic factors and processes around the coastal zone of the United States and abroad.

1.1 Administrative Background

As mandated by the MLPA, the California Department of Fish and Game (CDFG) has formalized a strategy for adaptively responding to changes associated with implementation of the new networks of MPAs along the California coastline. This strategy is provided in the MLPA *Adaptive Management, Monitoring, and Evaluation Framework*, which delineates criteria for assessing the biophysical and socioeconomic effects of the MPAs and the efficacy of the overall program. Central to this requirement is baseline documentation of biophysical and socioeconomic conditions in and around the MPAs, against which MPA-induced changes can be measured and evaluated.

Recommendations for documenting trends and conditions associated with the new MPAs are provided in the document titled *A Policy Framework for Baseline Data Collection*. The framework was designed by the MLPA Blue-ribbon Panel of experts to incorporate: (a) an integrated data collection structure; (b) criteria for selection of key assessment and monitoring variables; (c) cross-cutting research themes; (d) interrelated biological and social variables for assessment and monitoring; and (e) temporal and spatial dimensions of monitoring and impact assessment. The framework specifies the importance of an appropriate sampling strategy, clarity in identification of MPA impacts, and development of an effective Geographic Information System (GIS). Panel members envisioned the GIS as an essential tool for depicting and monitoring spatial elements of baseline conditions and MPA-related changes over time.

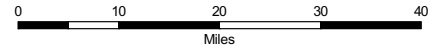
The California MLPA Initiative is being implemented in five phases. The first network of MPAs addressed by the current report was formally established in Central California in September 2007. Implementation of additional portions of the statewide network of MPAs will subsequently occur along the North Central, Southern, and Northern coastal regions of California, and in the San Francisco Bay. Planning processes for these networks are in progress throughout the state.

Map 1-1 below depicts the location of the MPAs recently established along the Central Coast. Table 1-1 below describes the general regulatory conditions for each reserve. Additional discussion of spatial closures and other fishing regulations is provided in Chapters Seven and Eight of this report.

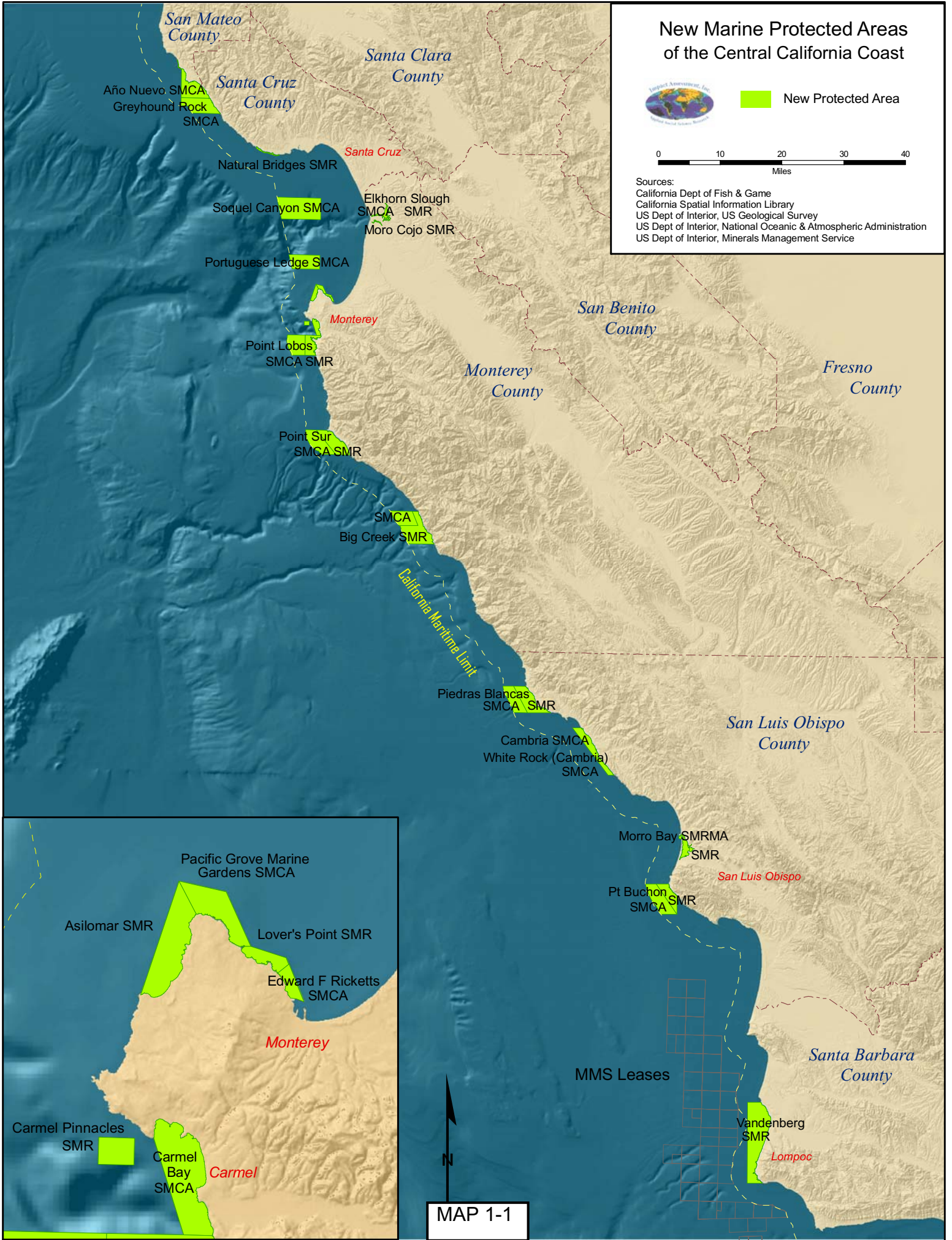
New Marine Protected Areas of the Central California Coast



New Protected Area



Sources:
 California Dept of Fish & Game
 California Spatial Information Library
 US Dept of Interior, US Geological Survey
 US Dept of Interior, National Oceanic & Atmospheric Administration
 US Dept of Interior, Minerals Management Service



MAP 1-1

Table 1-1 Regulatory Parameters of the Central Coast MPAs

County	Marine Protected Area	Regulations
San Mateo	Año Nuevo SMCA ¹	No commercial or recreational take with exception of commercial hand harvesting of giant kelp.
Santa Cruz	Greyhound Rock SMCA	Allows recreational take of squid, salmon, giant kelp (by hand), and finfish (other than salmon) by hook and line from shore only. Allows commercial take of salmon, squid, and giant kelp (by hand).
	Natural Bridges SMR	No recreational or commercial take allowed.
Monterey	Elkhorn Slough SMR	No recreational or commercial take allowed.
	Elkhorn Slough SMCA	Allows recreational take of finfish (by hook and line) and clams adjacent to CDFG wildlife area. No commercial take allowed.
	Moro Cojo Slough SMR	No recreational or commercial take allowed.
	Soquel Canyon SMCA	Allows recreational and commercial take of pelagic finfish.
Monterey	Portuguese Ledge SMCA	Allows recreational and commercial take of pelagic finfish.
	Edward F. Ricketts SMCA	Allows recreational take of finfish by hook and line. Allows limited commercial take of kelp (by hand) north of 36° 36.83' N.
	Lovers Point SMR	No recreational or commercial take allowed.
	Pacific Grove Marine Gardens SMCA	Allows recreational take of finfish. Allows limited commercial take of kelp (by hand).
	Asilomar SMR	No recreational or commercial take allowed.
	Carmel Pinnacles SMR	No recreational or commercial take allowed.
	Carmel Bay SMCA	Allows recreational take of finfish. Allows limited commercial take of kelp (by hand).
	Point Lobos SMR	No recreational or commercial take allowed. Current rules at Point Lobos Reserve (State Park Unit) limiting diving access do not apply to new areas in this MPA.
	Point Lobos SMCA	Allows recreational take of salmon, albacore. Allows commercial take of salmon, albacore, and spot prawn.
	Point Sur SMR	No recreational or commercial take allowed.
	Point Sur SMCA	Allows recreational and commercial take of salmon and albacore.
	Big Creek SMR	No recreational or commercial take allowed.
	Big Creek SMCA	Allows recreational take of salmon, albacore. Allows commercial take of salmon, albacore, and spot prawn.
San Luis Obispo	Piedras Blancas SMR	No recreational or commercial take allowed.
	Piedras Blancas SMCA	Allows recreational and commercial take of salmon and albacore.
	Cambria SMCA	Allows all recreational take. No commercial take allowed.
	White Rock (Cambria) SMCA	No recreational take allowed. Allows limited commercial take of kelp.
	Morro Bay SMRMA	No recreational or commercial take allowed south of 35° 19.70' N. Allows recreational take of finfish, commercial storage of bait fish, and aquaculture by permit in all other areas.
	Morro Bay SMR	No recreational or commercial take allowed.
	Point Buchon SMR	No recreational or commercial take allowed.
Point Buchon SMCA	Allows recreational and commercial take of salmon and albacore.	
Santa Barbara	Vandenberg SMR	No recreational or commercial take allowed.

¹ SMR= State Marine Reserve; SMCA = State Marine Conservation Area; SMRMA= State Marine Recreational Management Area.

1.2 Overview of MLPA Socioeconomic Research Goals and Objectives

As stated in the solicitation for the project described in this report, one of the important goals of the MLPA Initiative is to enable description and analysis of biophysical and human conditions and factors associated with the new MPAs. Regarding pertinent social factors and the relationship of human activities to biophysical changes in and around the MPAs, the solicitation specifically called for descriptive assessment of:

“changes in recreational and commercial fishing and non-consumptive uses, not only as part of the evaluation of social and economic impacts, but also to determine if displacement of fishing activity is increasing biological impacts outside of the MPAs.”

In addition to needs for information about purely biophysical effects, California Sea Grant is therefore also interested in understanding: (1) how the new spatial regulations will affect persons who used or use areas in and around what are now protected reserves, and (2) how such persons might affect the marine ecosystems of which the new MPAs are integral components.

Because both of these information needs require in-depth understanding of MPA-relevant social conditions and human activities prior to establishment of the reserves, a central goal of the current study was to provide such baseline information to the sponsor. This information can then be used to configure the framework of variables and indicators needed to monitor interaction between humans, the MPAs and associated resources, and the encompassing marine ecosystems. As described below, a research methodology was developed to meet these goals through documentation of relevant trends and conditions and analytical isolation of socioeconomic effects and changes in human activities in and around the reserves.

1.3 Rationale and Methods

MPAs are increasingly used as means for protecting, conserving, and/or improving the status of marine resources. Such regulation is generally intended to benefit the larger marine ecosystems of which protected areas and associated resources are integral parts. We assert that human beings are also integral and essential components of marine ecosystems, and that the penultimate goals of ecosystem sustainability and biodiversity are ideally configured to gauge and prioritize human experience and values above all else.

The reasons for this are clear. Humans are highly sentient apex predators in the trophic hierarchy of marine ecosystems, and humans can alter marine ecological conditions through individual and/or collective action or inaction. Humans can also cooperatively participate in the development and enactment of policies designed to improve the condition of marine ecosystems, and they are adaptable recipients of problems resulting from those policies or lack of policies. Finally, humans can benefit from the improvement of marine ecosystems of which they are an essential part.

Given the pivotal role of humans in this context, a truly effective MPA implementation process invariably requires data that heighten and integrate understanding of social-environmental interactions. Our research approach is therefore unapologetically anthropocentric. It is designed

to enable comprehensive assessment of the social and economic effects of the MPAs while also augmenting biological research and monitoring through description and analysis of human activities in and around the reserves.

Note that the MLPA is designed to maximize ecosystem benefits primarily through the management of commercial fishing activity in specific locations. Given this emphasis, we have developed an approach that is appropriately focused on description of the historic and contemporary nature of commercial fishing and on assessment of the response of fishery participants to the new network of MPAs. We have also developed a parallel approach for documenting and assessing recreation-oriented uses of the marine environment prior to and following establishment of the MPAs.

The overarching project goal of developing valid and comprehensive documentation and analysis of all manner of marine resource use patterns in and adjacent to the MPAs was met along the Central Coast by satisfying six related research objectives. These were as follow:

- (1) Conduct preliminary fieldwork throughout the study region immediately before and following formal establishment of the new network of MPAs so as to enable documentation of initial social-behavioral response to the new regulatory regime and to inform development of a valid, timely, and effective approach to MPA socioeconomic research in the region;
- (2) Develop an effective research design to guide documentation of historic and contemporary patterns of fishing and other uses of the marine environment in and adjacent to the areas that are now MPAs;
- (3) Re-enter the field to continue establishing strong rapport and trusted confidence with public officials, user group representatives, and others with an interest in the process and outcome of the new network of MPAs;
- (4) Systematically identify social networks of commercial and recreational fishing experts and persons highly knowledgeable of non-consumptive uses of the marine environment; consult with such persons and with public officials to develop a thorough understanding of spatial and temporal aspects of resource use patterns within and adjacent to the new MPAs;
- (5) Use primary and secondary source spatially oriented fisheries data, and new ethnographic data to document, describe, and explain patterns of use of the marine environment prior to and following establishment of the new protected areas; follow the basic rationale of pre- and post-measurement of change in the social sciences (Campbell and Stanley 1963) to analytically parse the human effects of the newly established MPAs from other sources of change; and identify variables useful for indicating MPA-specific changes in a monitoring framework;
- (6) Report and present study findings in a manner that is useful for resource managers and others involved in the MLPA process in California; generate

recommendations for: (a) effective research interaction with fishery participants, and (b) a cost-effective methodology through which to follow and analyze long-term social and economic sequelae and biophysical correlates of the MLPA implementation process in the State of California.

The essential element of this approach required extensive use of social network sampling methods. This involves systematic identification of highly knowledgeable persons for purposes of interviewing, mapping work, and other forms of social research. In this case, we identified and conducted in-depth interviews with hundreds of fishery participants and public officials known to be highly knowledgeable of trends in commercial and non-commercial uses of the ocean areas within and adjacent to each of the newly designated MPAs. Interviews were focused on the specifics of historic and recent use of the areas, and on the socioeconomic implications of the new system of reserves.

It should be noted that the geographic area covered by this project is quite large, and that the descriptive and analytical depth of the project was inevitably limited by the human and fiscal resources available to conduct social research in this vast area and report its findings in a timely manner. The success of this project was therefore based on efficient application of methods and resources. Additional discussion of our methodological approach is provided in the following section and in Chapter Seven of this report.

1.4 The Setting and its Relationship to Our Approach

An ethos and an economy of dependence on the sea linger along the Central Coast of California. But many coastal residents increasingly engage in the complex market economies and cultural preferences typical of the urban populations that burgeon and sprawl north and south of the study area. Values and motives associated with marine recreation, conservation of natural resources, and visual aesthetics increasingly supersede a culture of work on the sea, at the docks, and in the plants and factories where seafood has been processed and the accoutrements of the commercial fishing industry have been manufactured for well over a century.

Today, the historic waterfronts of towns and cities along the Central California coast are now often valued for residential development potential or as an attraction for tourists rather than for their capacity to enable maritime commerce. And while seafood remains in high demand, it is typically acquired at restaurants or grocery stores rather than directly from the sea or from one's fishing kin, as in years past. The majority of cargo vessels and ships now travel directly to San Francisco or Los Angeles, where goods are offloaded and shipped by truck back to historically significant points of transshipment at Morro Bay, Monterey, and Santa Cruz.

These are neutral observations about the changing nature of life along the Central Coast. We emphasize that the intent of this report is not to idealize history or to advocate a return to the values or lifeways of the past. The report rather objectively describes the context in which persons involved in the use of marine resources have reacted, are reacting, and will likely react to changes in the way those resources are formally managed. We believe that the best indication of such reaction, and hence the most valid analysis of the human and physical effects of the new

system of MPAs, is enabled through objective consultation with three interrelated sources of information. These are: (a) the historic and recent record as provided in published and unpublished literature; (b) fisheries and other archival data regarding marine resources and the manner and extent of their use over time; and (c) persons formerly or currently involved in the pursuit and/or use or conservation of marine resources across the region.

Inasmuch as it can be determined, the **historical record** is a particularly valuable source of understanding in this context. It provides a chronology of social, economic, and environmental changes that have individually and cumulatively influenced the course of marine fisheries and non-consumptive uses of the marine environment across the study region. Such changes include important environmental events such as the periodic El Nino-Southern Oscillation (ENSO), fluctuating macro-economic changes such as national or regional periods of growth or recession, cultural shifts in attention to environmental conservation (Downs 1972), and fisheries-specific changes, such as new market opportunities or widespread incorporation of new aids to navigation or fishing technologies.

When used and interpreted appropriately, **fisheries data** can provide a valid account of long-term trends in participation and production in the marine fisheries harvest sector. Such information can be analyzed vis-à-vis historical events and processes to identify factors that have had a constraining or enabling effect on fishery participants over the course of time. Such analysis may ultimately be useful in predicting reaction to future changes. Similarly, data regarding non-consumptive use or perception of the marine environment can indicate collective involvement and interest in marine recreational activities and businesses, and these trends can also be considered in light of larger economic, sociocultural, and political processes.

Finally, **direct consultation** with persons who are highly knowledgeable of the fisheries and resources can serve to validate posited correlations between historical events and commercial and recreational activities on the ocean. In-depth interviews and observation of fishing-related activities also provide insight into the nature and salience of regulatory effects in the current socioeconomic context and the cumulative effects of prior social and environmental change.

As such, the baseline that forms the central content of this report is not merely a static picture of conditions in the contemporary moment. It is rather a more complete and dynamic record of the social, economic, and biophysical events and processes that have preceded and conditioned contemporary life along the Central Coast. The baseline may therefore be used to analytically parse the social and economic effects of the new system of MPAs from historic and contemporary social and environmental processes and other source of change.

For those involved in commercial fishing activities along the Central Coast, the contemporary status of the industry is quite challenging. Fleets throughout the region have steadily diminished in recent decades as many participants struggle with and ultimately surrender to economic challenges, competing interests on the waterfront, regulatory strictures, fluctuation in the abundance of the resources, lack of replacement by new generations of prospective fishermen, and other compelling factors. Such conditions are increasingly common for participants in small-scale fisheries around the world (McGoodwin 1992), and as is the case elsewhere, those who persist in commercial fishing are typically highly seasoned, economically savvy, and increasingly dissatisfied with the state of the industry.

Spatial restriction of commercial fishing activities is the latest in a long series of physical-environmental and anthropogenic events and processes to which certain participants in the region's commercial fishing industry have adapted over time. Much of this baseline report is dedicated to description of those changes, to analysis of the ways in which fishermen have adapted to them, and to the range of implications of those strategies. As history and analysis of current trends so clearly indicate, some participants will continue to seek out ways to land and market seafood in a profitable manner despite challenges associated with the establishment of the new system of MPAs or other regulatory processes implemented in Central California.

On the other hand, historical precedent and field data discussed later in this report make clear that certain participants probably will *not* successfully adapt to the newest regulatory strategy. That is, when encountered in combination with one or more of the above-mentioned challenges, strictures on fishing in historically productive areas and other regulations have led or are leading some operators to leave the industry.

The ongoing context of challenges, including those resulting from fishing regulations, is tending to winnow participation in Central Coast commercial fisheries to those who are most prepared for and adaptive to ever-changing conditions. Thus, while the establishment of MPAs is likely to affect the overall nature and extent of commercial fishing activities, it does not fully avert pressure on the resources. Rather, it displaces at least some of that pressure to adjacent and other areas as per the adaptive strategies of the operators, with as-yet uncertain implications for resources beyond the designated boundaries of the reserves.

This situation is of direct relevance to assessment of both the socioeconomic and biophysical effects of the newly established MPAs. From a biophysical perspective, while the potential effects of displacing fishing pressure to adjacent areas are not well known, the subject remains a critically important and germane dimension of inquiry in the assessment of MPAs. Moreover, because the evolving nature and location of fishing-specific pressure on the resources is related to the interests, values, capacities, and behaviors of participants in the fleets, the biophysical and socioeconomic elements of the MLPA assessment process are clearly and inextricably related.

It will be impossible to develop an adequate understanding of the biophysical benefits and implications of the newly established system of MPAs without clearly understanding the manner and extent to which fishermen shift their energies to other fishing grounds. This, in turn, requires detailed understanding of the options available to fishers, options which are fundamentally conditioned by the long history of regulatory change in the region and by changing environmental conditions, evolving fishing knowledge and technology, and fluctuating social, cultural, and economic conditions in and apart from the fishing industry. The following pages provide descriptive analysis of each of these dimensions of life along the Central Coast and, thus, a means for valid assessment of change in future years.

1.5 Overview of the Study Region

Overview. The Central Coast study region includes the towns, cities, coastal zone, and nearshore waters of the five Central Coast counties of San Mateo, Santa Cruz, Monterey, San Luis Obispo,

and Santa Barbara. The region extends across 350 miles of undulating and rugged seacoast from Pigeon Point in San Mateo County to Point Conception in Santa Barbara County. The coastal zone itself is the terminus of 11 major watersheds which drain some 9,900 square miles of inland mountain ranges, expansive valleys, river systems, and estuaries (CDFG 2005). The state jurisdiction waters encompass 1,100 square miles of ocean, ranging from the shoreline shallows to offshore canyons, some of which are nearly 800 fathoms in depth. There are numerous coastal towns and cities in the region, and extensive pastoral and agricultural areas. Ports of particular significance include Half Moon Bay, Santa Cruz, Moss Landing, Monterey, Morro Bay, Avila, and Santa Barbara.

Principal Marine Geologic and Bathymetric Features. The majority of nearshore waters along the Central Coast lie above the continental shelf which, in this region, varies from approximately one to 28 miles in width. The shelf is widest in the north between Santa Cruz and Pigeon Point and in the south between Morro Bay and Point Conception. A smaller percentage of the nearshore zone lies above the continental slope. Although some 90 percent of shelf and slope substratum is soft bottom, a very important part of the marine zone is comprised of sandstone and shale beds, rocky reef, coldwater coral, rocky pinnacles, granitic outcroppings, and submarine canyons (Guerrero et al. 1996; Monterey Bay Aquarium Foundation 1999; Eittreim et al. 2002, Starr et al. 2002; and CDGF 2005). Much of this zone has long been of great significance to the region's fishing fleets.

The bathymetry and substratum composition of the nearshore zone vary significantly across the region. The ocean bottom is highly complex in the Monterey Bay region and along the coastline of Big Sur. Areas north of Monterey are characterized by extensive rock and mixed bottom habitats, while many areas to the south of Big Sur are characteristically soft bottom habitats. The composition of rocky reefs also varies. The northern half of Monterey Bay to Pigeon Point is characterized by sandstone and shale beds. A central zone from the southern end of Monterey Bay to Point Sur is characterized by granitic outcroppings. Finally, the area south of Point Sur is characterized by greenstone, serpentinite, and argillite, and greywacke (Guerrero et al. 1996).

Estuaries are critically important in biological terms. Major estuaries along both the northern and southern portions of the study area support extensive eelgrass beds, as are found at Elkhorn Slough and Morro Bay. Large and continuous sandy beaches are situated along Monterey Bay, Estero Bay, and San Luis Obispo Bay. In contrast, the Big Sur coastline from Carmel River to San Carpoforo is very narrow and characteristically steep and rocky (Alt et al. 2000). The Santa Lucia Mountains descend sharply into the Pacific Ocean here, creating one of the steepest coastal slopes in the continental United States. Estuaries and beaches are few and diminutive.

Coastal Climate and Habitats. The Central California climate varies extensively between the coast and inland areas. Along the coast, annual average temperatures range from the low 40s to the high 70s. Temperatures in the inland valleys can surpass 100° in summer. Precipitation averages around 19 inches per year, but certain areas such as Big Sur and Monterey are typically wetter. Winter storms and associated swells can be prodigious. Large ground swells are propagated by low pressure systems in the North Pacific, while wind swells radiate from nearby storms.

Variation in terrain, altitude, climate, and other factors indicate a variety of coastal habitats. Sagebrush, short grass, and low chaparral characterize the low-lying inland topography. A diversity of sheltered and unsheltered shoreline habitats includes coastal salt marshes, mudflats, eelgrass beds, tidal channels, sandy and gravel beaches, sand spits, coastal dunes, cypress groves, redwood forests, sheer cliffs, and rocky headlands. Four major rivers, innumerable small streams, and two major estuaries connect the land-sea zone. Less than five percent of the coastline contains manmade riprap or seawalls (CDFG 2005).

Offshore and Littoral Currents. The principal currents in the study region are generated by the clockwise-flowing Central Pacific gyre and counterclockwise-flowing Alaskan gyre (see Chelton 1982 and Chavez 1998 for in-depth studies of the California current system). The northerly-flowing Davidson Current is a warm water current occurring along the shelf-slope break. It is predominant in the winter months. The southerly-flowing California Current is a cold water current. It typically occurs between 90 to 130 miles off the shelf-slope break and is dominant in the warmer months. The presence of these currents is associated with biological diversity in the marine zone. Strong convergence occurs at Point Conception, creating an important biogeographic boundary (Starr et al. 2002; NOAA 2004).

There are three important seasons in the marine zone. Cold nutrient-rich waters rise to the surface episodically during early spring and summer. These events vary in intensity between years and as influenced by coastal features such as headlands, bathymetric characteristics, and latitude. Sites of significant upwelling include Davenport, Point Sur, and Point Conception. A period of light winds and calm seas occurs between August and November. Finally, winter storms occur from November through March (Starr et al. 2002). These seasons and conditions have variable effects on commercial and recreational uses of the ocean across the region.

In addition to seasonal variation in oceanographic conditions, the Central Coast region is also affected by periodic ENSO events, which bring trade winds and relatively warm sea surface temperatures to the region. These events and long-term shifts in the position of the Aleutian Low can affect the distribution of species (Lenarz et al. 1995; McGowen et al. 1998; Beamish et al. 1999) and, by extension, the conduct of marine fisheries in the region.

The Earliest Inhabitants. Members of the Quiroste, Rumsen, Salinen, and Chumash tribal groups were the earliest known inhabitants of the Central Coast. Archaeological evidence indicates that the northern groups were living in the region at least 5,000 years ago and the southern groups at least 8,000 years ago (Terrell 1995). Indigenous groups interacted across the coastal region for millennia, undoubtedly developing and communicating extensive knowledge of the region's abundant marine and terrestrial resources. Shell middens indicate reliance on a wide variety of resources (Terrell 1995). The arrival of Spanish explorers in the mid-1500s signified the beginning of what is known as the California Mission Period. Spanish missionaries sought to convert indigenous tribal peoples to Catholicism with varying degrees of success (Rawls 1984).

Use of the Marine Environment by European Settlers. Beginning in the late 1700s, Russian, British, and American fur traders sailed along the coastline of California as far south as Santa Barbara seeking the pelts of sea otters (Terrell 1995; Gordon 1996). Elephant seals, sea lions,

and whales were hunted for blubber. From the mid-1800s through the turn of the 19th century, ports along the Central Coast served the whaling industry; most of the major harbors in the study region were initially developed as whaling stations. Settlers gradually engaged in fishing and farming. A commercial fishing economy developed over time, and numerous immigrant groups were involved, including: Japanese, Portuguese, Chinese, Sicilians and mainland Italians, and Norwegians (Lydon 1984; McKibben 2006).

Important Changes in Commercial Fisheries in the Region. Commercial fishing fleets have long pursued a many species along the Central Coast. These include: coastal pelagic species such as squid, sardine, mackerel, and anchovy; finfish species such as Chinook salmon, albacore, sablefish, thornyhead, Dover sole, California halibut, rockfish, sanddab, cabezon, grenadier, lingcod, shark, white sea bass, mackerel, butterfish, kelp greenling, jacksmelt, and surfperch; and invertebrate species such as spot prawn, Dungeness crab, rock crab, shrimp, and urchin.

The nature and levels of productivity of Central Coast fisheries have changed significantly over the course of time. The changes relate to both natural-environmental and human factors. Readers are referred to Leet et al. (2001) and Starr et al. (2002) for extensive discussion of fisheries in the study area.

During the first half of the 20th century, commercial fishermen in the region were typically using lampara nets and purse seines to target Pacific sardines and mackerel for canning and reduction. After the collapse of the sardine fishery in the 1950s, the same gear was used to harvest squid and anchovies. By the 1970s and through the 1990s, trawl fisheries had become popular and groundfish were commonly targeted. Salmon trolling grew in popularity in the 1960s and 1970s. This fishery fluctuated in conjunction with periods of abundance and scarcity until the present. Use of gillnets for nearshore and deepwater rockfish was popularized in the 1970s but was increasingly regulated over time. Hook-and-line gear was often used in the 1990s as use of net gear was increasingly regulated. Trap, pot, and long-line gear increased in popularity beginning in the early 1980s. The use of long-line gear declined in the mid-1990s in association with various new regulations. Stick gear emerged in the 1990s for use in the new live-fish fishery.

In recent years, dramatic changes in vessel, gear, engine, and marine electronics technologies have significantly influenced the course of marine fisheries in the region. Vessels have become more durable and modern engines have increased the range and efficiency of commercial operations. Technological advances in remote sensing and communications electronics have enabled vast improvements in the degree of precision and efficiency in navigating the ocean and successfully pursuing seafood. Research institutions in the region have significantly advanced understanding of Central Coast fisheries and the ocean environment in which they are conducted.

Marine Recreation and Tourism. Ocean-based tourism and recreation have become increasingly significant to the economy of the Central Coast (Runyan 2004). Diving, sportfishing, whale-watching, surfing, tow-in surfing, and other ocean activities have grown in popularity, with implications for support businesses and services and general economic conditions across the coastal zone. Currently every major habitat zone described above is utilized for some type of recreational activity: swimming and sunbathing at sandy beaches; diving at kelp beds and reefs; bird watching and wildlife viewing around intertidal zones,

estuaries, and beaches; kayaking, surfing, and shoreline angling in the nearshore zone; and boating and boat-based angling farther offshore (LaFranchi et al. 2005). Southern Monterey and Carmel Bays are some of the most popular spots for marine recreational activities along the entire California coastline. Even with its relatively limited access, the rugged Big Sur region draws visitors from around the country.

Population Change in Select Towns, Cities, and Counties along the Central Coast. While growth was common but not universal between the most recent Census counts in communities along the Central Coast, the population of the entire region has grown by about eight percent since 1990. This is suggestive of growth in rural areas and cumulative growth in specific coastal towns and cities. Community and county population trends are depicted in Table 1-2 below.

Table 1-2 Population Trends for Select Towns, Cities, and Counties along the Central Coast

County	Community	Year		Total County Population	
		1990	2000	1990	2006
San Mateo	El Grenada	4,426	5,742	649,623	705,499
	Half Moon Bay	8,886	11,842		
	Pacifica	37,670	38,390		
Santa Cruz	Capitola	10,171	10,003	229,734	249,705
	Santa Cruz	49,040	54,593		
	Soquel	9,188	5,081		
	Watsonville	31,099	44,265		
Monterey	Carmel	4,239	4,081	355,660	410,206
	Castroville	5,272	6,724		
	Marina	26,436	25,101		
	Monterey	31,954	29,674		
	Moss Landing	N/A	300		
	Pacific Grove	16,117	15,522		
	Salinas	108,777	151,060		
Seaside	38,901	31,696			
San Luis Obispo	Arroyo Grande	14,378	15,581	217,162	257,005
	Atascadero	23,138	26,411		
	Avila	N/A	797		
	Cambria	5,382	6,232		
	Cayucos	2,960	2,943		
	Grover Beach	11,656	13,067		
	Los Osos	14,377	14,351		
	Morro Bay	9,664	10,350		
	Nipomo	7,109	12,626		
	Pismo Beach	7,669	8,551		
	San Luis Obispo	41,958	44,174		
Santa Barbara	Carpentaria	13,747	14,194	369,608	400,335
	Goleta	N/A	55,201		
	Guadalupe	5,479	5,659		
	Isla Vista	20,395	18,344		
	Lompoc	37,649	41,103		
	Santa Barbara	85,571	92,325		
Vandenberg	5,971	5,802			
Regional Total				1,821,787	2,022,750

N/A = Not available; Source: U.S. Census Bureau 1990, 2000, 2006

1.6 Overview of Regulations Affecting Fishery Participants in the Study Region

Prior to the passage of the Fisheries Conservation and Management Act (FCMA) in 1976, most marine fisheries in the United States were only minimally regulated. With the exception of trawling closures and bag limits implemented in the 1950s and 1960s, access to marine resources was open to all, and fishing activities were naturally regulated by biophysical, economic, and socio-demographic factors. Since 1976, however, governance has become extensive, and our domestic marine fisheries are now some of the most regulated fisheries in the world.

Changing environmental conditions and technological advances have long had significant effects on marine fisheries throughout the Central Coast region. But formalized regulation of marine fisheries has had truly profound effects on those participating in the region’s fisheries. While interview data suggests that the new network of MPAs is affecting fishery participants across the region in a variety of ways, these effects are only the most recent outcomes of a growing list of regulatory constraints. This section provides tabulated chronological description of important marine fisheries regulations that have affected and continue to affect fleets in the study area, and, hence, some insight into the cumulative effects and implications of an ever-evolving regulatory structure for fishery participants over time.

Most management measures designed to conserve or improve the status of marine resources do so by limiting fishing effort and capacity. The most common management measures include: limited entry programs; limits on the size and quantity of landings; gear restrictions; and time and area closures. Table 1-3 below identifies some of the overarching management measures that have significantly affected commercial and recreational fishing activities in the study region since 1976. This is followed by Table 1-4, which describes regional MPAs in existence prior to the MLPA. Finally, we provide Tables 1-5 and 1-6, which depict regulations affecting specific commercial and recreational fisheries conducted in and around the new MPAs.

Table 1-3 Overarching Regulations Affecting Marine Fisheries in the Study Area

Year	Regulation	Jurisdiction	Region Affected	Implications
1976 1996 2007	The Fisheries Conservation and Management Act (Public Law 94-265) Reauthorized and amended as the Magnuson-Stevens/Sustainable Fisheries Act (SFA) in 1996; Reauthorized again in 2007.	Federal	Nationwide	Designated the area between 3 and 200 miles offshore as an Exclusive Economic Zone (EEZ), which excluded foreign fleets, enabled the expansion of the U.S. fleet, and created eight regional fishery management councils.
1990	Proposition 132 (The Marine Resources Protection Act)	State	Point Arguello to the Mexican border, and in waters within 1 mile around the Channel Islands.	Implemented in 1994, Prop. 132 prohibited gill and trammel nets within designated State waters (0-3 nautical miles from CA coastline).
1992	Monterey Bay National Marine Sanctuary (MBNMS)	Federal	Includes 5,322 square miles of ocean along 276 miles of shoreline. Stretches from Rocky Point in Marin County to Cambria in San Luis Obispo County.	The MBNMS permanently bans oil exploration and other impacts to the seabed. Though some MPAs were established in the Sanctuary decades ago (see following table), many fisheries and recreational activities were largely unregulated in the MBNMS until implementation of the MLPA in 2007. A need for MPAs in the federal waters of the Sanctuary was determined by NOAA in 2008.

1994	Groundfish Restricted Access Program (Limited Entry Program)	Federal	Entire West Coast (CA, OR, WA)	The program restricted the number of vessels allowed to target groundfish in order to better align the fishery with the available harvest. Some permits were reserved for open access.
1995	Limited Entry Program: Dungeness Crab	State	CA State Waters	New vessels were prohibited from entering the fleet without first acquiring the license of a retiring boat.
1996	Magnuson-Stevens/Sustainable Fisheries Act (SFA) reauthorized and amended	Federal	Nationwide	U.S. fisheries policy moved toward conservation and sustainability of marine fisheries.
1997	Limited Entry Program and Moratorium: Squid	State	CA State Waters	This ban restricted the number of vessels in the fishery and instituted a 3-year moratorium on entry into the squid fishery (beginning in 1998). It also established a \$2,500 permit fee for catcher vessels and light boats to fund research, and gave CDF&G regulatory control of the fishery during the moratorium.
1998	Marine Life Management Act (MLMA)	Federal	CA State Waters	Delegated authority over commercial fisheries from the State Legislature to the CFGC and CDF&G; shifted management focus from species to ecosystem-based. Each species or species group will eventually have its own FMP with the objective of restoring depressed resources and ecosystems to Optimum Yield (OY).
1998	Nearshore Fisheries Management Act	State	CA State Waters	Gave the CFGC and CDF&G the authority to develop and adopt management plans for current recreational and commercial fisheries in state waters (within three miles of shore), as well as identify and manage emerging fisheries (i.e., fisheries not currently regulated). It also established minimum sizes for several species of rockfish, cabezon, and lingcod, and established a nearshore fishery permit.
1998	Finfish Trap Limit	State	CA-OR border to Pt. Arguello	Prohibits finfish traps in waters within 750 feet of any pier, breakwater, or jetty. It also limits finfish traps to 50 in designated State waters.
1999	The Marine Life Protection Act (MLPA) of California (CFG Code Section 2853)	State	CA State Waters	Permits the establishment of MPAs to protect marine resources.
1999	Nearshore Fishery Regulations	State	CA State Nearshore Waters	Required nearshore permits of all commercial fishermen; implemented size limits for 10 species of nearshore fisheries, including some rockfish.
1999	Limited Entry Program: CPS Finfish Fishery	State	South of Pt. Arena	This program limited CPS finfish entry, effective January 1, 2000.

2000	Nearshore Rockfishes FMP	State	CA State Waters	Commercial catch of nearshore rockfishes limited to an average of below 1,000 lbs/month; general recreational bag limits decreased from 15 to 10 individuals, with the use of no more than 2 hooks per line.
2001	Cowcod Conservation Areas (CCA) established	State	Southern CA	Closes 4,300 sq. miles of offshore banks in southern California to cowcod and bocaccio fishing; seasonal closures and depth restrictions also adopted.
2002	Rockfish Conservation Area (RCAs) Commercial Plan	State	CA State Waters	RCAs established for commercial groundfish trawl and non-trawl gears with fishing restricted by region, season, and depth. A formal restricted access program for nearshore rockfish was also adopted and required a Deeper Nearshore Permit statewide.
2002	California Nearshore Fishery Management Plan (NFPM)	State	CA State Nearshore Waters	Requires commercial fishermen to buy permits to fish in nearshore waters. In the South-Central Coast Region (Point Año Nuevo - Point Conception) the NFMP allows 60 permits and 13 trap endorsements. Unless the fisherman has a trap endorsement, the fishery is limited to line gear.
2003	Essential Fish Habitat Conservation Areas (EFHCAs)	State	Entire West Coast (CA, OR, WA)	The EFHCAs closed areas of the continental shelf from Washington to Mexico to most fishing.
2003	Federal Groundfish Permit/Boat Buyback Program (NMFS)	Federal	Entire West Coast (CA, OR, WA)	Removed 92 vessels and 240 permits from West Coast (34 percent of the CA fleet).
2006	Pacific Coast Groundfish FMP & Essential Fisheries Habitat (EFH), Amendment 19	Federal	Entire West Coast (CA, OR, WA)	This amendment both defines EFH and prohibits groundfish fishing in 3 EFH areas: bottom trawl closed areas, bottom contact closed areas, and a bottom trawl footprint closure. The bottom trawl closed areas are closed to all types of bottom trawl fishing gear. The bottom trawl footprint closure closes areas in the EEZ between 700 fathoms and 1,094 fathoms, which is the outer extent of the groundfish EFH.
2006	Essential Fish Habitat Conservation Areas	State	Point Sur to Point Conception	Established 3.8 million acres of no-trawl zones.
2007	California MLPA Initiative: Central Coast Region	State	Pigeon Point to Point Conception	Established 29 new MPAs: 13 of which are no-take SMRs; the remaining 15 SMCAs and 1 SMRMA permit some landings. The MPAs cover approximately 204 square miles, or about 18%, of State waters within the Central Coast region. The no-take MPAs account for about 7.5 percent of waters in the study region.

Table 1-4 Central Coast Marine Protected Areas in Existence Prior to the MLPA

Pre-existing MPAs	Year Established	County	Implication
Vandenberg MRPA Ecological Reserve	1994	Santa Barbara	No Commercial or Recreational Take Permitted.
Pismo Invertebrate Reserve	1977	San Luis Obispo	Recreational fishing is allowed only for Finfish. Commercial fishing is allowed for finfish, lobster, abalone, and crab.
Atascadero Beach Clam Preserve	1985	San Luis Obispo	No clams may be taken; all other commercial and recreational fishing is permitted.
Morro Beach Clam Preserve	1985	San Luis Obispo	No clams may be taken; all other commercial and recreational fishing is permitted.
Pismo Beach-Oceano Pismo Clam Preserve	1985	San Luis Obispo	No clams may be taken; all other commercial and recreational fishing is permitted.
Point Lobos State Reserve	1960	Monterey	First permanent MPA in the U.S.
Point Lobos Ecological Reserve	1973	Monterey	No Commercial or Recreational Take Permitted.
Carmel Bay Ecological Reserve	1976	Monterey	Recreational fishing allowed for finfish only. Commercial fishing is prohibited.
Hopkins Marine Life Refuge	1984	Monterey	No commercial or recreational take permitted.
Pacific Grove Marine Gardens Fish Refuge	1984	Monterey	Both commercial and recreational fishing are permitted.
Big Creek MRPA Ecological Reserve	1994	Monterey	No commercial or recreational take permitted.
James V. Fitzgerald Marine Reserve/State Marine Park	1969	San Mateo	Recreational fishing only for abalone, rockfish, lingcod, surfperch, monkey-faced eel, rock eel, white croaker, halibut, cabezon, kelp greenling, and smelt. Finfish can be taken only by hook-and-line or spearfishing. Commercial fishing permitted only by holders of species-specific CDFG permits; to 1,000 feet offshore, only the following invertebrates may be taken: lobster, abalone, crab (Didier 1998).

Table 1-5 Principal Commercial Fishing Regulations by Fishery and MPA

Fishery	Primary Gear Type	MPA*	Regulatory Environment
California halibut	Trawl, hook-and-line, gill and trammel net	AN, GR, SC, LP, PG, AS, CB, MB, PBU, V	<p>Area closures - Pre-1950: no trawling within 3 miles of shore; 1994: gill nets in state waters prohibited; 2006: Essential Fish Habitat.</p> <p>Depth restrictions - Gill net restrictions vary by location).</p> <p>Seasons - No trawling March 15 to June 15.</p> <p>Individual quotas - Since 1995.</p> <p>Minimum size limits.</p> <p>Gear regulations - Minimum mesh size, maximum net length.</p>
Dover sole, thornyhead, and sablefish	Bottom trawl, longline (thornyheads and sablefish), gill nets (sablefish), trap (sablefish)	SC, PL	<p>Area closures - Pre-1950: no trawling within 3 miles of shore; 1994: gill nets in state waters prohibited; 2006: Essential Fish Habitat.</p> <p>Federal permit- 1994: required for trawl limited entry, trawl open access, fixed gear limited entry, and non-trawl open access.</p> <p>Three tiered system - 2000: Type of permit and target species determines quota limit.</p> <p>Annual quota limits - Statewide since 1983.</p> <p>Individual quota limits - Since 1983.</p> <p>Minimum size limits - Since 1983.</p> <p>Trip landing and frequency limits.</p>
Dungeness crab	Trap	AN, GR, PL, PS, PB, PBU, V	<p>Restricted access – 1995: Vessel-based permit system introduced.</p> <p>Season- Mid November to end of June.</p> <p>Minimum size limits.</p> <p>Gear restrictions - Minimum mesh size and availability of escape port.</p> <p>Sex - Only males may be harvested.</p>
Flatfish (Pacific sanddab, petrale sole, rex sole)	Bottom trawl	AN, GR, SC	<p>Area closures- Pre-1950: no trawling within 3 miles of shore; 1994: gill nets in state waters prohibited; 2006: Essential Fish Habitat.</p> <p>Harvest limits - Coast-wide, two month basis.</p> <p>Federal permit - Required outside of RCA (trawl limited entry, trawl open access, fixed gear limited entry, or non-trawl open access) since 1994.</p> <p>Gear restriction - Small footrope trawl gear is required shoreward of the RCA.</p>
Chinook salmon	Troll hook and line	AN, GR, SC, PTL, PS, BC, PB, PBU	<p>Restricted access - 1983: Vessel-based permit system.</p> <p>Seasons - Based on pre-season forecasts of abundance.</p> <p>Minimum size limits (since 1977)</p> <p>Gear regulation (single point barbless hooks, no more than six fishing lines per vessel)</p> <p>Species - No Coho salmon may be taken.</p>

Lingcod	Hook-and-line, Trawl, Gill net, Trap	AN, SC, PL, AS, CP, CB, PTL, PS, BC, PB, PBU, V	Area closures - Pre-1950: no trawling within 3 miles of shore; 1994: gill nets in state waters prohibited; 2006: Essential Fish Habitat. Federal permit – 1994: Required for: trawl limited entry, trawl open access, fixed gear limited entry, and non-trawl open access. Harvest/monthly landing limits: Early 1990s. Size limits. Gear regulations - Small footrope trawl gear is required shoreward of the RCA.
Market squid	Purse seine, Drum seine, Brail	AN, GR, ER, PG, AS, CP, CB, PTL, PS, BC, PB, C, PBU, V	Moratorium on new vessels - 1997-2000. Restricted access - Since 2005. Harvest limits - State-wide. Weekend closures - Since 1999. Gear restriction - Wattage limit on light boats; light boats prohibited above Pigeon Point.
Nearshore rockfish, cabezon, and kelp greenling	Hook-and-line, Stick gear, Handline, Trap	AN, GR, ER, LP, PG, AS, CP, CB, PTL, PS, BC, PB, C, PBU, V	Area closures - Pre-1950: no trawling within 3 miles of shore; 1994: gill nets in state waters prohibited; 2006: Essential Fish Habitat. Restricted access - 2002. Required permit - Allows take of only: black-and-yellow, China, gopher, grass, and kelp rockfishes; cabezon, greenlings, California scorpionfish, and California sheepshead. Required deeper nearshore fishery permit - (For nearshore species not named above.) Seasons - Variable closed season. Weekend closures. Total harvest limits – 2001. Individual quota limits - Monthly. Trip limits - For two month periods. Minimum size limits - Varies by species. Gear restrictions – 1997: Vessels fishing within one mile of shore are limited to 150 hooks per vessel and 15 hooks per line. Weekday prohibitions - For some species.
Pelagic wetfish, other than squid	Purse seine, Drum seine	AN, GR, SC	Restricted access - Since 2000. Harvest limits- 1998: Coast-wide. Based on stock assessment.
Shelf rockfish	Bottom trawl, Midwater trawl, Longline, Hook-and-line, Gill net	AN, GR, SC, PL, PTL, PS, BC, PB, PBU, V	Area closures - Pre-1950: no trawling within 3 miles of shore; 1994: gill nets in state waters prohibited; 2006: Essential Fish Habitat. Federal permit 1994: Required for: trawl limited entry, trawl open access, fixed gear limited entry, and non-trawl open access. Harvest limits - Annual. Trip limits - Two months. Total closure - Trawl gear: cowcod; Fixed gear: canary and yellow eye rockfishes, and cowcod. Gear restrictions – 1994: prohibits gill net use in state waters; requires small footrope trawl gear shoreward of the RCA.

Slope rockfish and grenadier	Bottom trawl, Set longline	SC, PL, PTL, BC	<p>Area closures -Pre-1950: no trawling within 3 miles of shore; 1994: gill nets in state waters prohibited; 2006: Essential Fish Habitat.</p> <p>Federal permit - 1994: Required for: trawl limited entry, trawl open access, fixed gear limited entry, and non-trawl open access.</p> <p>Harvest/monthly landing limits - Early 1990s.</p> <p>Other - Rockfish must be sorted by species or species group prior to weighing.</p>
Spot prawn	Trap	SC, PL, PS, PTL, BC, PB	<p>Restricted access fishery – 2003: 3-tier structure determines number of traps permitted and harvest limit.</p> <p>Seasons - Closed north of Pt. Arguello May 1 to July 31.</p> <p>Gear restrictions - 2003: Trawl gear prohibited; trap limits determined by tiered permit.</p> <p>Other - No by-catch permitted.</p>

*AN = Año Nuevo SMCA, GR = Greyhound Rock SMCA, SC = Soquel Canyon SMCA, PL = Portuguese Ledge SMCA, ER = Edward F. Ricketts SMCA, LP = Lover’s Point SMR, PG = Pacific Grove Marine Gardens SMCA, AS = Asilomar SMR, CP = Carmel Pinnacles SMR, CB = Carmel Bay SMCA, PTL = Pt. Lobos SMCA/SMR, PS = Pt. Sur SMCA/SMR, BC = Big Creek SMCA/SMR., PB = Piedras Blancas SMR/SMCA, C = Cambria SMCA, MB = Morro Bay SMR/SMRMA, PBU = Pt. Buchon SMR/SMCA, V = Vandenberg SMR..

Table 1-6 Principal Recreational Fishing Regulations by Fishery

Fishery	Regulatory Environment
Rockfishes, cabezon, and kelp greenling	<p>Area closures (Emergency area closure in 2001; RCA closure since 2004 with variable boundaries). In 2007, 40 fathoms and deeper were closed.</p> <p>Seasonal closures (since 2000) with harvest limits. In 2007, the season for rockfishes, cabezon, and kelp greenling was closed January through April and December for boat-based anglers only. All groundfish, with the exception of lingcod, are open to divers; spearfishing and shore angling year around.</p> <p>Bag limits (pre-1970 and reduced in 2000). In 2007, 10 in combination.</p> <p>Species limits. In 2007, 1 cabezon; 2 kelp or rock greenling.</p> <p>Complete closure (of canary, cowcod and yellow eye).</p> <p>Minimum size limits (since 2000). Currently size limit depends on species – 15 inches for cabezon, 12 inches for greenling, and 10 inches for bocaccio.</p> <p>Gear restriction (since 2001). No more than two hooks on one line.</p>
Lingcod	<p>Area closures (RCA since 2004. Boundaries are variable). In 2007, 40 fathoms + closed.</p> <p>Seasonal closures (since 2000) and harvest limits. In 2007, the season was closed for boat-based anglers January through April and December; closed for divers and shore-based anglers January through March and April.</p> <p>Monthly restrictions.</p> <p>Minimum size limit (established in 1981 at 22 inches). In 2007, 24 inches in length.</p> <p>Bag limit. In 2007, 2 lingcod.</p> <p>Gear restriction. In 2007, no more than two hooks and one line.</p>
Chinook salmon	<p>Bag limits (pre-1980s). In 2007, two salmon.</p> <p>Minimum size limits (pre-1980s). In 2007, 20 inches</p> <p>Gear restriction. In 2007, no sinkers or weights exceeding 4 pounds; no more than 2 single-point, single-shank barbless hooks; no more than 1 rod per angler when trolling; no more than 2 single-point, single-shank barbless circle hooks and no more than 1 rod per angler when mooching. Circle hooks required when mooching with bait (since 1997).</p> <p>Management zones.</p> <p>Seasons (pre-1980s) with harvest guidelines. In 2007, April 7 through October 7.</p>

California halibut	Bag Limit (since 1957, limit variable). In 2007, 22 inch. Minimum size limit (since 1957, limit variable). In 2007, 3 north of Pt. Sur, 5 south of Pt. Sur.
Pacific sanddabs	Gear restriction. No more than 12 #2 or smaller hooks and up to 2 pounds of weight may be used from January through April and December in all depths, and from May through November in depths greater than 40 fathoms.
Leopard shark	Season (outside of Elkhorn Slough season as is applied to rockfish, cabezon and kelp greenling for boat-based anglers; otherwise open all year). Minimum size limit (since 1991). In 2007, 36 inches. Bag limit (since 1991). In 2007, 3 leopard shark.
Gaper and Washington clams	Bag limit (since at least 2001). In 2007, 10 of each species; in Elkhorn Slough, 12 total.
Red abalone	Closed (since 1997).
Pismo clams	Season (closed May through August in Santa Cruz and Monterey counties only). Bag limit. In 2007, 10 clams. Size limit. In 2007, 5.0 inches north of and 4.5 inches south of San Luis Obispo/Monterey County line
Dungeness crab	Seasons. In 2007, December 3, 2007-June 30, 2008. Bag limits. In 2007, 6 if fishing on CPFV, 10 otherwise. Trap limits. In 2007, 60 if fishing on CPFV. Size limits. In 2007, 6 inches in San Mateo, Santa Cruz and Monterey counties if fishing from CPFV; 5 ¾ inches otherwise.
Surfperch	Bag limits. In 2007, total permissible for all five species (not including shiner surfperch) is 20, with no more than 10 of any single species. Minimum size limits. In 2007, 10.5 inches for redbtail surfperch. Gear restrictions (limits on hook and line gear since 1996).
Yellowtail	Bag limit. In 2007, 10 yellowtail and 20 finfish total. Minimum size. In 2007, 24 inches.
White sea bass	Bag limit (since 1937, reduced in 1978). In 2007, 3 white sea bass and 20 finfish total. Minimum size (since 1937). In 2007, 24 inches.
Kelp bass	Size limit. In 2007, 12 inches. Bag limit. In 2007, 10 total of kelp bass, barred sand bass and spotted sand bass.

1.7 Organization of the Report

Following this introductory chapter, the baseline description is organized geographically, focusing on marine activities that have occurred or are occurring in or adjacent to the new MPAs. The study area includes ports on the fringe of the Central Coast so as to address persons/fleets traveling or formerly traveling to use what are now MPAs.

Chapter Two provides overview discussion of key socio-demographic and socioeconomic trends and conditions in each of the study counties. This is provided as context for understanding and analyzing the relative importance of fishing and other marine-related industries across the region.

Chapter Three describes the principal ports in the study region, as needed to understand local and regional involvement in extractive and non-extractive marine activities and industries. Relationships with the new network of MPAs and adjacent ocean areas are emphasized.

Chapter Four describes the principal commercial fisheries of the Central California coast. This chapter provides yet a finer level of descriptive detail regarding the principal commercial use of

the marine environment, and the principal categories of users affected by newly designated MPAs. A variety of economic, environmental, and regulatory challenges and adaptive solutions are discussed.

Chapter Five is descriptive of the history and contemporary status of the Central Coast charter and sportfishing fleets. This discussion emphasizes the known effects of regulations that have recently induced significant change in the region's recreational rockfish fishery.

Chapter Six describes the manner and extent of the principal marine recreational activities occurring across the study region. These activities tend to vary geographically and thus the discussion is organized in large part based on variation noted between the northern and southern study zones and in the intermediary Big Sur region. The intent of this chapter is to document historical and contemporary patterns of recreational use so as to facilitate monitoring and assessment of prospective changes induced by the new MPAs.

Chapter Seven describes specific historical and contemporary relationships between the various user groups and the areas that are now protected reserves. This discussion is an important outcome of the study in that it documents how the ocean areas in question were used prior to establishment of the MPAs, as well as prior use-related challenges and solutions. The chapter thereby provides a base of understanding against which MPA-related effects can be identified and assessed vis-à-vis other forms and sources of change.

Chapter Eight is the final chapter of the report. It describes MPA effects observed and reported to date, and it provides summary conclusions of utility for a socioeconomic monitoring framework. The framework is advanced as a means for valid and comprehensive assessment of interactions between humans and the MPAs along the Central Coast and elsewhere in California now and in the years to come. The chapter revisits the utility of the project methodology and analytical approach and its potential for use in other settings. References and appendices follow.

2.0 Socioeconomic and Demographic Overview of the Study Counties

U.S. Census data indicate that the population of the Central Coast has grown rapidly in recent years, and that extensive economic growth has occurred in the region's tourism and recreation sectors. But of significance to the present study, the seafood harvesting and processing sectors are in a relative state of decline (Kildow and Colgan 2005). As an important component of our baseline description, this section of the report describes recent macroeconomic and demographic trends for the five study counties of San Mateo, Santa Cruz, Monterey, San Luis Obispo, and Santa Barbara (Map 2-1). It must be noted that these data were compiled just prior to the national recession, and that trends of economic growth documented in many areas at mid-decade would soon be reversed, and in many cases significantly so.

Demographic Overview. In 2006, the Census Bureau's American Community Survey indicated 2,022,750 persons were then residing in the Central Coast region. This figure was up significantly from 1990, when the Census enumerated 1,821,787 residents. As of 2006, over 75 percent of residents were Caucasian and over 30 percent were Hispanic.¹ The following tables present figures for select demographic indicators for the five study counties and region in total (Tables 2-1 and 2-2). Data for California and the nation as a whole are included as benchmarks for comparison.

Table 2-1 Select Demographic Factors for the Central Coast Region: 2006

County	Population	% White	% Black	% Asian	% Hispanic*	% Other**
Santa Barbara	400,335	77.8	2.0	4.4	38.2	11.2
San Luis Obispo	257,005	84.5	1.8	3.1	13.3	10.5
Monterey	410,206	64.4	3.1	6.9	51.5	27.0
Santa Cruz	249,705	85.8	1.0	4.2	28.3	9.0
San Mateo	705,499	61.3	3.2	23.3	23.0	12.2
Central Coast	2,022,750	74.7	2.2	8.3	30.9	11.4
California	36,457,549	59.8	6.2	12.3	35.9	21.7
United States	299,398,485	73.9	12.4	4.4	14.8	9.2

* Persons of Hispanic origin may be of any race; total population percentages therefore exceed 100

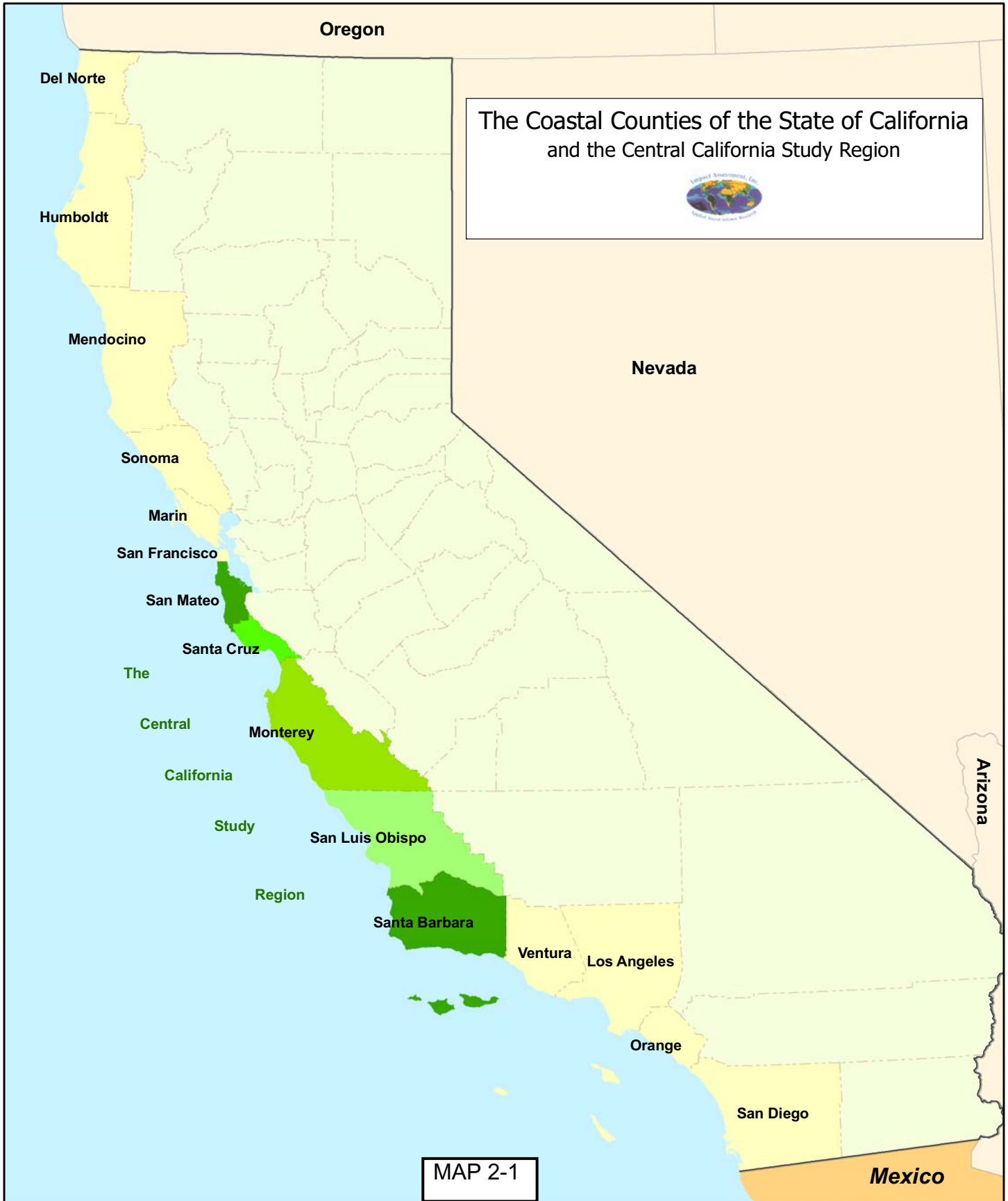
**Combines American Indian, Alaska Natives, Native Hawaiian, other Pacific Islanders, other Race, and Two or More Races. Source: U.S Census Bureau 2006

Table 2-2 Select Economic Characteristics for the Central Coast Region: 2006

County	Age 65+ (%)	BA + Degree (%)	Median Household Income (\$)	Per Capita Income (\$)	Persons below Poverty Level (%)	Civilian Unemp. Rate (%)	Median Home Value (\$)	Median Contract Rent (\$)
Santa Barbara	12.8	30.4	53,477	27,476	16.3	5.5	685,700	1,151
San Luis Obispo	14.3	31.1	50,209	27,506	13.6	5.3	581,000	1,044
Monterey	9.9	23.6	55,045	24,012	10.8	10.4	685,100	1,012
Santa Cruz	10.4	35.9	62,193	31,890	11.6	7.5	717,100	1,168
San Mateo	13.0	44.2	77,914	40,051	7.4	4.8	814,700	1,327
Central Coast	12.0	33.0	59,767	30,187	11.9	6.7	696,720	1,140
California	10.8	29.0	56,645	26,974	13.1	6.6	535,700	1,029
United States	12.4	27.0	48,451	25,267	13.3	6.4	185,200	763

Source: U.S Census Bureau 2006

¹ Persons of Hispanic origin may be of any race; total population percentages therefore exceed 100.



2.1 San Mateo County

Overview. San Mateo County is adjacent to the Pacific Ocean, northwest of Santa Cruz County and southeast of San Francisco County (Map 2-2). The county encompasses 741 square miles, including 292 square miles of water and a 50-mile coastline. The Año Nuevo SMCA is located at the extreme southwestern tip of San Mateo County. This newly implemented MPA is six miles southeast of Pigeon Point and 18 miles northwest of Santa Cruz. The James V. Fitzgerald Marine Reserve/State Marine Park, established in 1969, is also located in San Mateo County.

Population Trends. San Mateo is small but densely populated (about 1,575 persons per square mile). The 2006 interim census enumerated 705,499 residents, making it the most populous of the five study counties. Per the year 2000 census, the populations of the principal coastal communities were: El Granada (5,742), Half Moon Bay (11,842), and Pacifica (38,390). Between 1990 and 2006, the county population increased by eight percent, while housing growth was stable at about four percent.

Although 61 percent of San Mateo County residents are Caucasian, this is the most ethnically diverse county of the five study regions (Figure 2-1). Hispanics and Asians each comprise 23 percent of the total population,² an increase of six and five percent, respectively, from the 1990 Census. Of the 44 percent of residents who reported speaking a language other than English at home, 42 percent spoke Spanish and 58 percent spoke another language (U.S. Census Bureau 2006a).

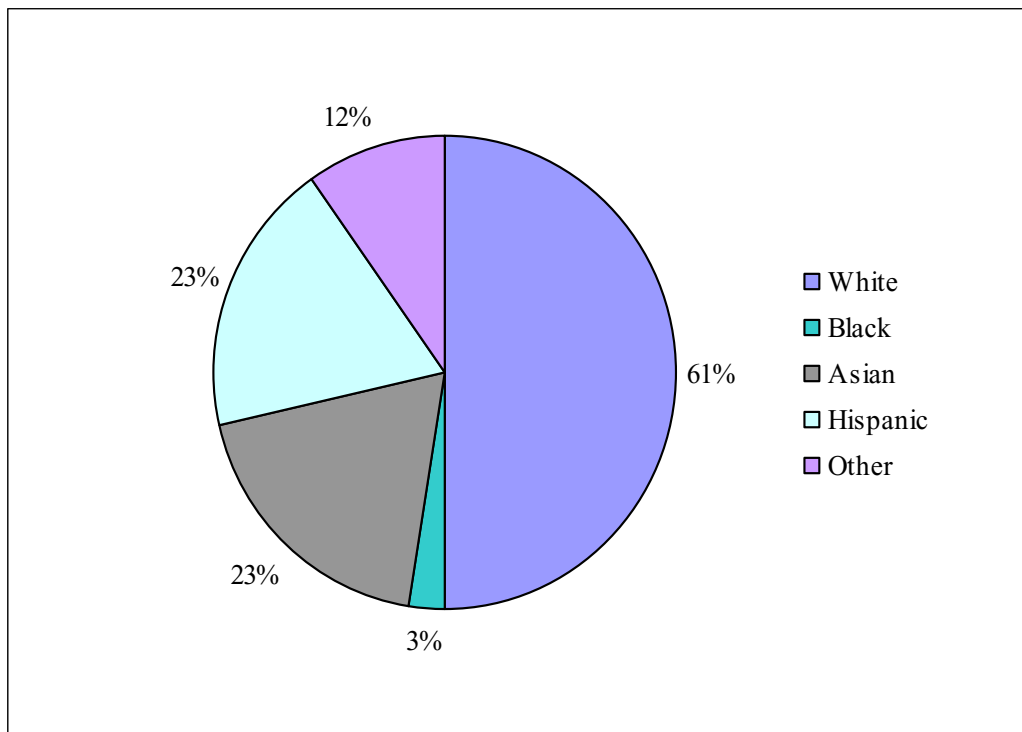


Figure 2-1 Principal Racial Groups in San Mateo County: 2006 (U.S. Census Bureau 2006)
Note: Persons of Hispanic origin may be of any race; total population percentages therefore exceed 100

² Persons of Hispanic origin may be of any race; total population percentages therefore exceed 100.



MAP 2-2

Table 2-3 Select Demographic Factors (values expressed as percents): San Mateo County, 2006

San Mateo County				
Language other than English Spoken at Home	Speaks English less than "Very Well"	BA degree or higher	Persons below poverty level	Civilian Unemployment Rate
43.6	17.6	44.2	7.4	4.8
State of California				
Language other than English Spoken at Home	Speaks English less than "Very Well"	BA degree or higher	Persons below poverty level	Civilian Unemployment Rate
42.5	13.9	29.0	13.1	6.6

Source: U.S. Census Bureau 2006a.

Economic Trends. Without exception, San Mateo County ranks higher than any of the other study regions on all economic well-being indicators considered here (Table 2-3; Figure 2-2). Both median household income (\$77,914) and per capita income (\$40,051) surpass state averages of \$56,646 and \$26,974, respectively. Individual poverty rates (7.4 percent) and civilian unemployment levels (4.8 percent) also are lower than the State average of 13.1 percent and 6.6 percent, respectively. Residents have achieved relatively higher levels of education: 44 percent have Bachelor of Arts degrees or higher and 17 percent have graduate or professional degrees (U.S. Census Bureau 2006a). San Mateo County also has the distinction of having the highest median home value (\$814,700) of all 3,141 counties or county-equivalent administrative units in the U.S (U.S. Census Bureau 2004).

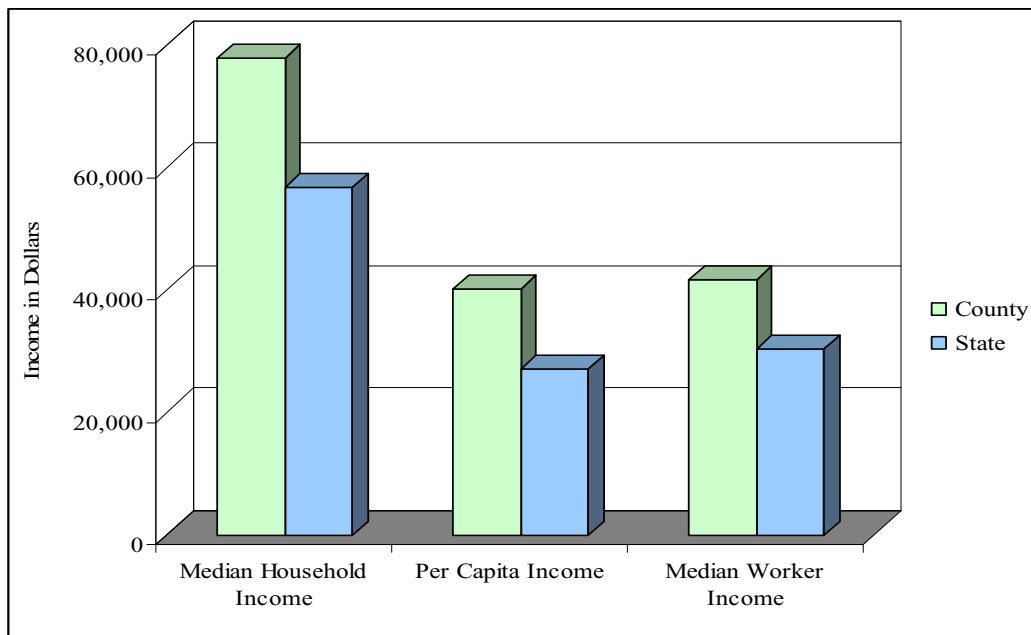


Figure 2-2 Select Economic Characteristics for San Mateo County and State of California: 2006
(U.S. Census Bureau 2006b)

Employment Trends. The leading employment sectors in San Mateo County in 2006 were educational services, health care services, and social assistance (19 percent of the workforce), and professional, scientific, management, and administrative and waste management services (16 percent). Government is also an important sector, providing jobs to 13 percent of the labor force

(Figure 2-3). Visa International Service Association, the College of San Mateo, and San Mateo Medical Center are among the county’s largest employers (State of California 2007).

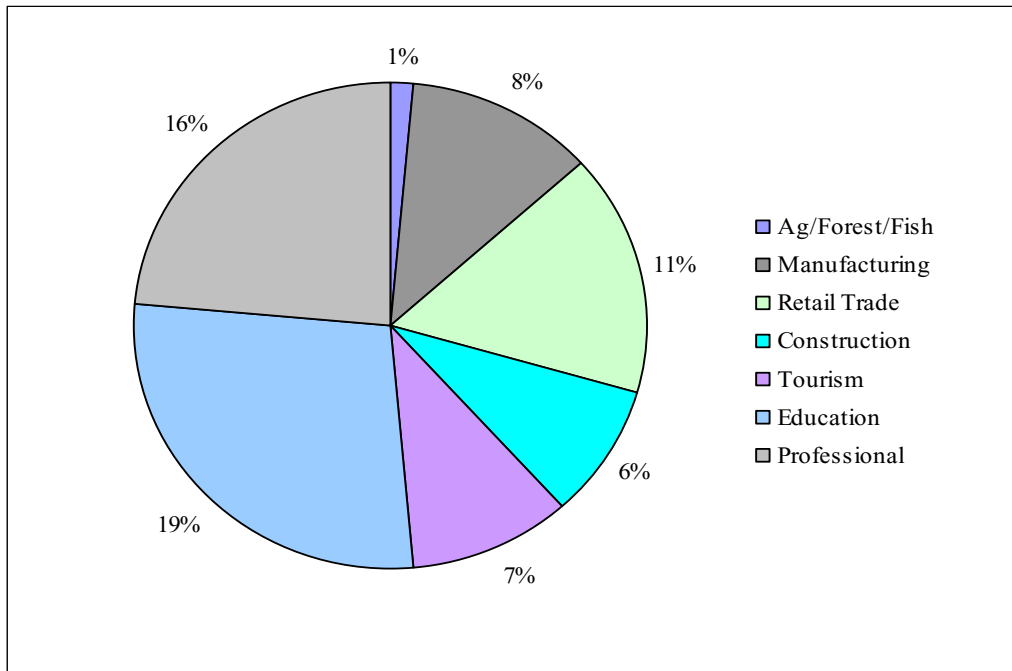


Figure 2-3 Employment by Select Industries, San Mateo County: 2006
(U.S. Census Bureau 2006b)

In 2006, the agriculture industry in San Mateo County employed 0.9 percent of the county’s labor force. That figure is down 50 percent from 1990 figures (1.8 percent). In 2006, employment in the services industry, which includes tourism, was at 15 percent. That is a 20 percent increase from 1990 when tourism-related employment was at 12 percent (U.S. Census Bureau 2006a).

Tourism contributes greatly to the San Mateo County economy, although to a lesser degree than in other counties in the study region. In 2005, tourist-generated state sales tax receipts amounted to 10 percent or \$75 million of the county’s total receipts of \$739 million. In that same year, the county’s tourism industry employed 35,070 persons (Dean Runyan Associates 2007). Popular coastal destinations include: Pigeon Point, Gazos Creek Coastal Area, Franklin Point, and Año Nuevo State Reserve and Park. Many tourists come to see the large population of elephant seals that congregate at Año Nuevo.

Information, bioscience, and medical technology industries are central to the San Mateo economy. Many residents hold jobs in the Silicon Valley area. The most significant occupational sectors in San Mateo County are management (43 percent), sales and office (27 percent), and services (14 percent). The management (32 percent) and services (12 percent) sectors show the most extensive growth from 1990. Employment in the sales and office sector decreased 28 percent from 1990. Employment in the farming, fishing and forestry sector (0.6 percent) is minimal compared to other counties in the study region (Figure 2-4) (U.S. Census Bureau 2006b).

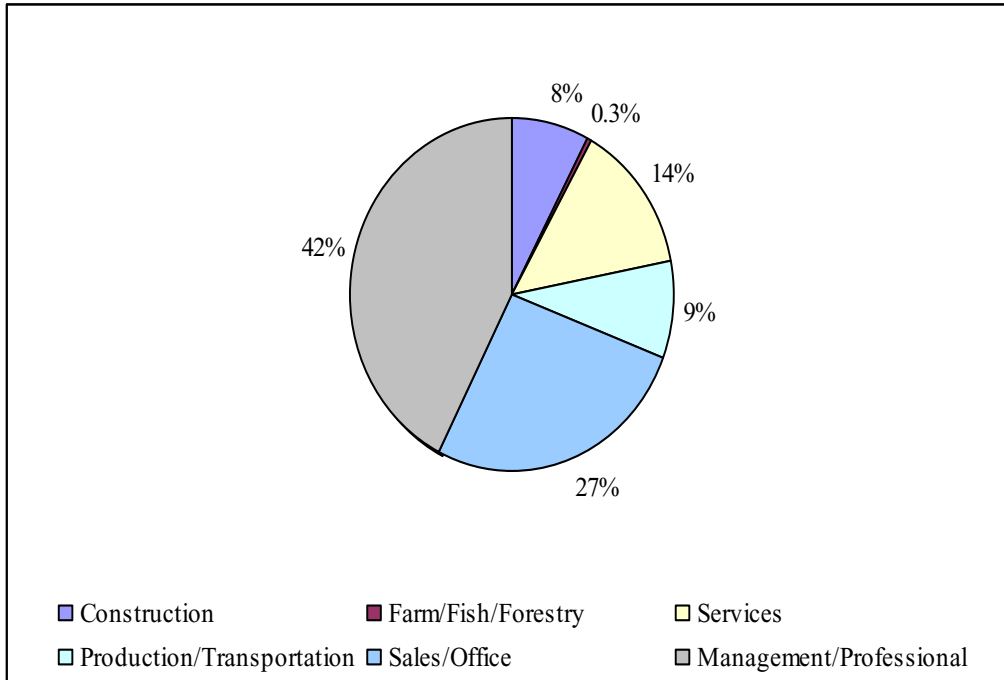


Figure 2-4 Employment by Occupation, San Mateo County: 2006
(U.S. Census Bureau 2006b)

2.2 Santa Cruz County

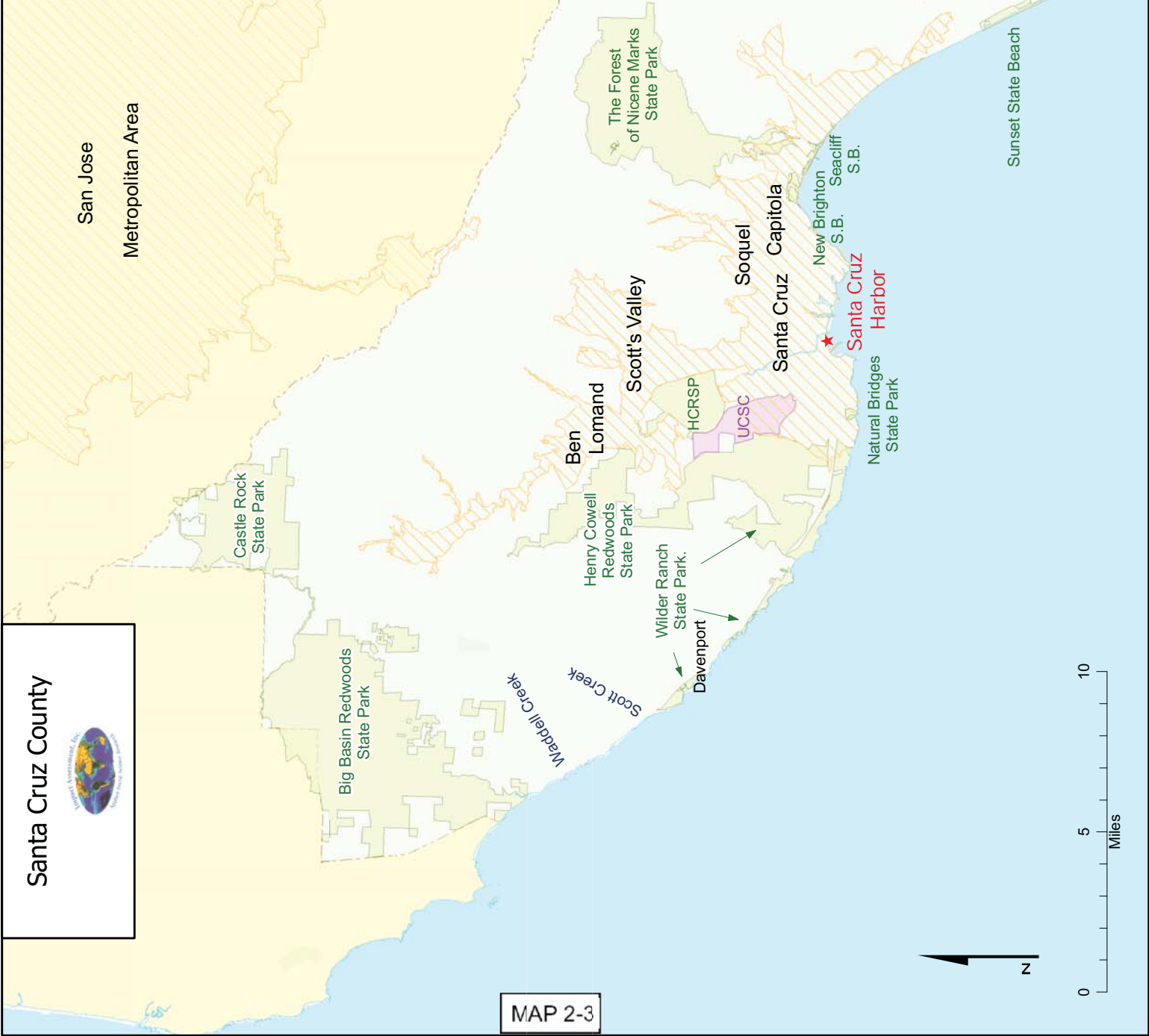
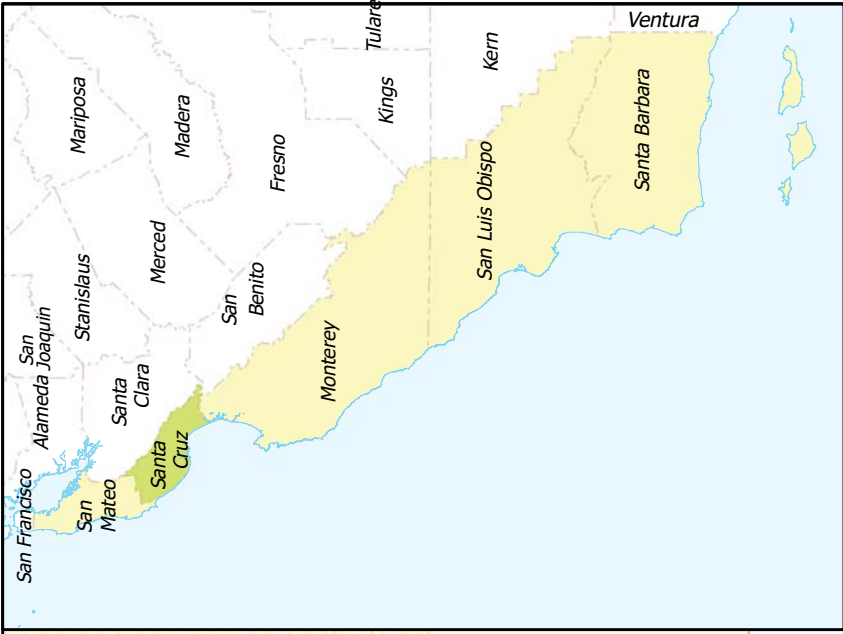
Overview. The coastal county of Santa Cruz is located northwest of Monterey County and southeast of San Mateo County (Map 2-3). The county has a total area of 445 square miles, of which 162 square miles is water. There are 29 miles of coastline. Santa Cruz Harbor is the main commercial harbor in the county, although recreational boating facilities are also available. The 855-foot long Capitola Pier offers private and rental boat facilities (CDFG 2007). Two of the 29 newly established MPAs are located in waters adjacent to the county coastline.³

Population Trends. With 249,705 persons enumerated in 2006, Santa Cruz is the least populous of the five study counties (U.S. Census Bureau 2006). Communities near the coast include: Capitola (10,003 persons), Santa Cruz (54,593), Soquel (5,081) and Watsonville (44,265) (U.S. Census 2000). The total population of Santa Cruz County increased by about eight percent between 1990 and 2006.

The majority of residents of Santa Cruz County are Caucasian (86 percent) (Figure 2-5). Hispanics comprise 28 percent of the population and constitute the fastest growing segment of county population.⁴ The Hispanic population increased by 38 percent between 1990 and 2006. Of the 28 percent of residents who reported speaking a language other than English at home, 82 percent spoke Spanish (Table 2-4) (U.S. Census Bureau 2006a).

³ The Greyhound Rock SMCA and Natural Bridges State Marine Reserve are located along the Santa Cruz coastline (CDFG 2007).

⁴ Persons of Hispanic origin may be of any race; therefore, percentages describing racial composition exceed 100.



MAP 2-3

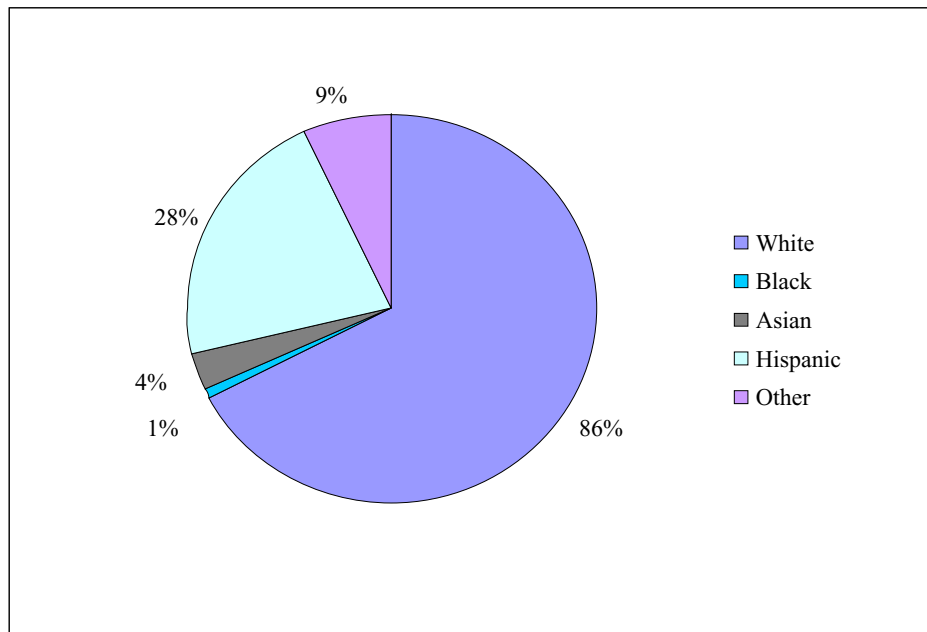


Figure 2-5 Principal Racial Groups in Santa Cruz County: 2006 (U.S. Census Bureau 2006a)
 Note: Persons of Hispanic origin may be of any race; total population percentages therefore exceed 100

Table 2-4 Select Demographic Factors (values expressed as percents): Santa Cruz County, 2006

Santa Cruz County				
Language other than English Spoken at Home	Speaks English less than "Very Well"	BA degree or higher	Persons below poverty level	Civilian Unemployment Rate
28.0	12.8	35.9	11.6	7.5
State of California				
Language other than English Spoken at Home	Speaks English less than "Very Well"	BA degree or higher	Persons below poverty level	Civilian Unemployment Rate
42.5	13.9	29.0	13.1	6.6

Source: U.S. Census Bureau 2006a

Economic Trends. The Santa Cruz population is relatively well-educated, with 36 percent having earned bachelor's degrees or higher (14 percent hold graduate or professional degrees). Individual poverty rates (11.6 percent) are below the state rate of 13.1 percent (U.S. Census Bureau 2006b). Both median household income (\$62,193) and per capita income (\$31,890) surpass the state averages of \$56,646 and \$26,974, respectively (Figure 2-6). Median home values in Santa Cruz are among the highest in the U.S. When ranking all 3,141 counties or county-equivalent administrative units in the U.S. in terms of median home values, Santa Cruz County ranked 5th (U.S. Census Bureau 2004). The median value of an owner-occupied home in 2006 was \$717,100, well above the California median value of \$535,700.

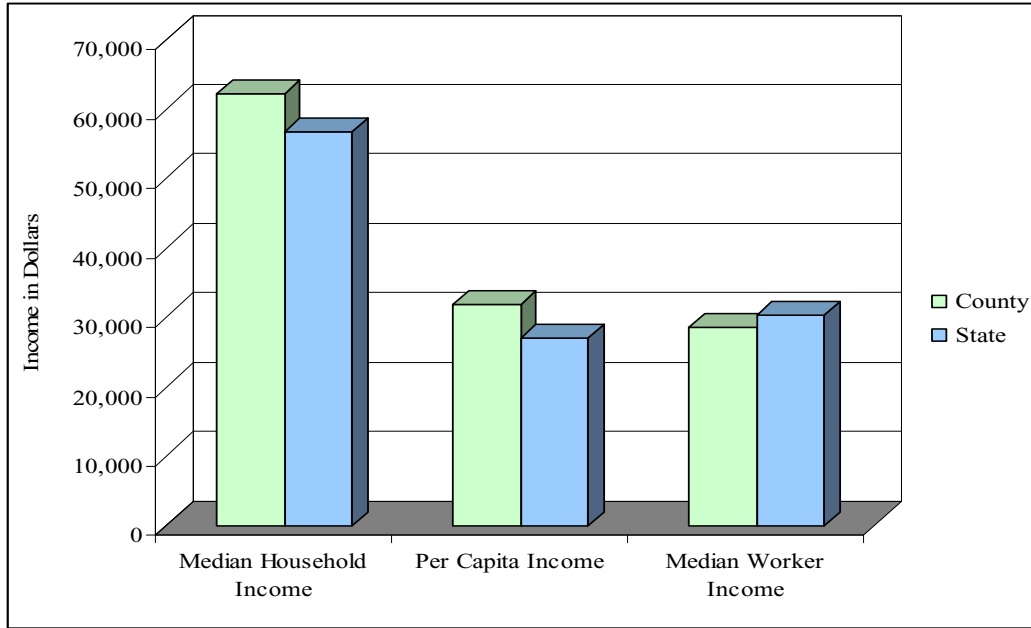


Figure 2-6 Select Economic Characteristics for Santa Cruz County and State of California: 2006
(U.S. Census Bureau 2006b)

Employment Trends. A higher than average unemployment rate can be explained in part by the seasonal nature of agricultural work in Santa Cruz County. In 2006 the agricultural industry employed 6,500 workers, or 5 percent of the county’s labor force; that figure is down 16 percent from 1990 figures. Watsonville is the primary agricultural center in Santa Cruz. Employment in the growing recreation and tourism industries is seasonal in nature. In 2006, employment in the services industry, which includes tourism-related services, was at 18 percent. That is a significant increase from 1990 when tourism employment was at 12 percent (U.S. Census Bureau 2006a).

Employment in educational services, health care services, and social assistance was at 23 percent in 2006. The University of California, the U.S. Health and Human Services Department, Bird’s Eye Foods Inc., the Dominican Hospital, and Platronics are among the major employers in the county (State of California 2007). Other key sectors include “professional, scientific, and management, and administrative and waste management services” (11 percent), retail sales (11 percent), and tourism (9 percent) (Figure 2-7). Government is also a major sector, providing employment to 16 percent of all workers.

Tourism is one of the county’s economic mainstays. Tourists often visit the Santa Cruz County coastline and its 14 state parks and beaches. In 2005, five million visitors contributed nine percent or \$17 million to the county’s total sales tax receipts. In that same year, the tourism industry provided employment for 8,380 persons (Dean Runyan Associates 2007). Nearly three million (or 60 percent) of those who came to the county in 2005 visited the Santa Cruz Boardwalk. Seacliff State Beach, one of the most heavily trafficked beaches in California, attracted 2.9 million visitors during the 2004/2005 fiscal year (California Tourism 2006). Other top recreational destinations in the county include New Brighton State Beach and Natural Bridges State Beach (Department of Parks and Recreation 2004).

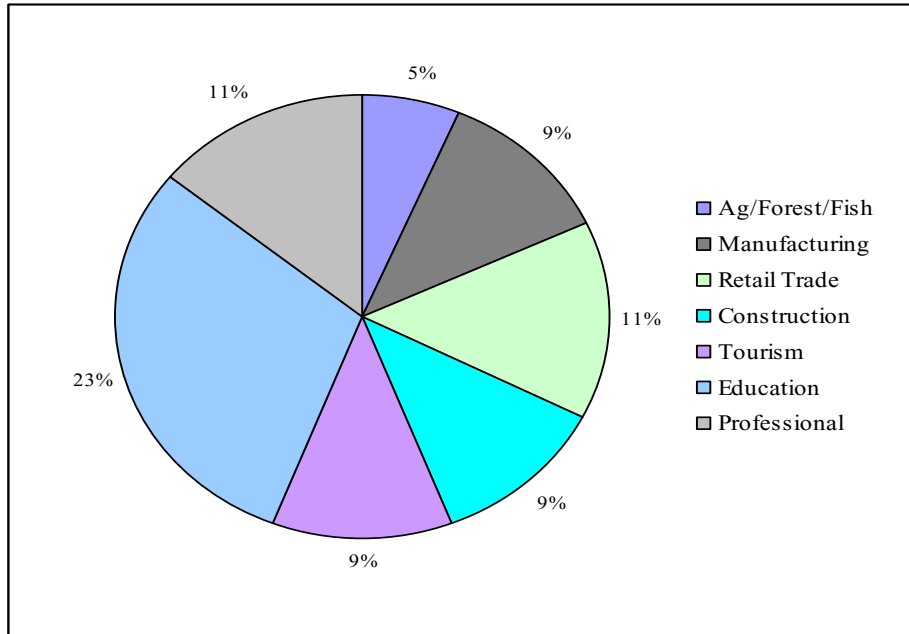


Figure 2-7 Employment by Select Industries, Santa Cruz County: 2006
(U.S. Census Bureau 2006)

The most significant occupational sectors in Santa Cruz County are management (42 percent), sales and office professions (20 percent), and services (18 percent). Employment in the farming, fishing and forestry sector involved 4,384 workers in 2006 (3.4 percent) (U.S. Census Bureau 2006b). Management and services show the most extensive growth since 1990, with employment totaling 33 percent and 12 percent growth in the labor force, respectively. Employment in the sales and office sector decreased 30 percent since 1990 (Figure 2-8).

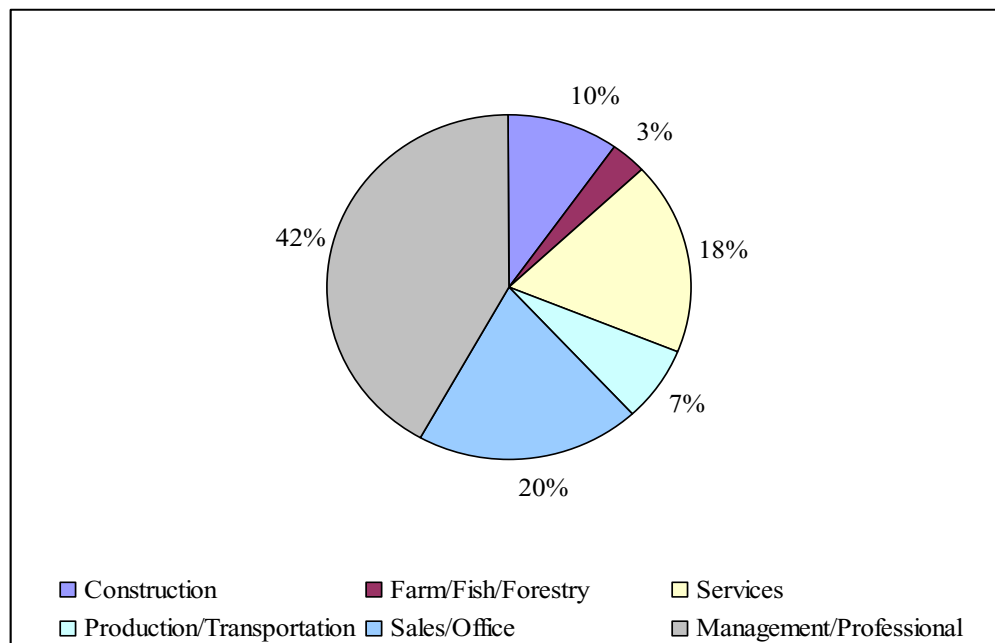


Figure 2-8 Employment by Occupation, Santa Cruz County: 2006
(U.S. Census Bureau 2006b)

2.3 Monterey County

Overview. Monterey County, located north of San Luis Obispo County and south of Santa Cruz County (Map 2-4), encompasses a total area of 3,771 square miles. This includes 449 square miles of water and a highly variegated 100 mile coastline. Seventeen of the 29 newly established MPAs are located in waters adjacent to the Monterey County coastline.⁵ The new MPAs supplement six existing reserves, established in the area between 1960 and 1994.⁶

Population Trends. Monterey County was home to 410,206 persons in 2006 (U.S. Census 2006a). Its largest coastal and near-coastal communities are: Carmel (4,081 persons), Castroville (6,724), Marina (25,101), Monterey (29,674), Pacific Grove (15,522), Salinas (151,060), and Seaside (31,696) (U.S. Census 2000). Monterey and Moss Landing (population 300) are the primary fishing communities in the county. The county population increased by 13 percent between 1990 and 2006,

The resident population of Monterey County is ethnically diverse (Figure 2-9). Sixty-five percent of residents are Caucasian, three percent African-American, and seven percent of Asian ancestry. The county also has a particularly sizeable and growing Hispanic population (52 percent) relative to that of the state (36 percent). The Hispanic population has increased 35 percent since 1990.⁷ Eighty-four percent of residents who reported speaking a language other than English at home spoke Spanish (U.S. Census Bureau 2006a).

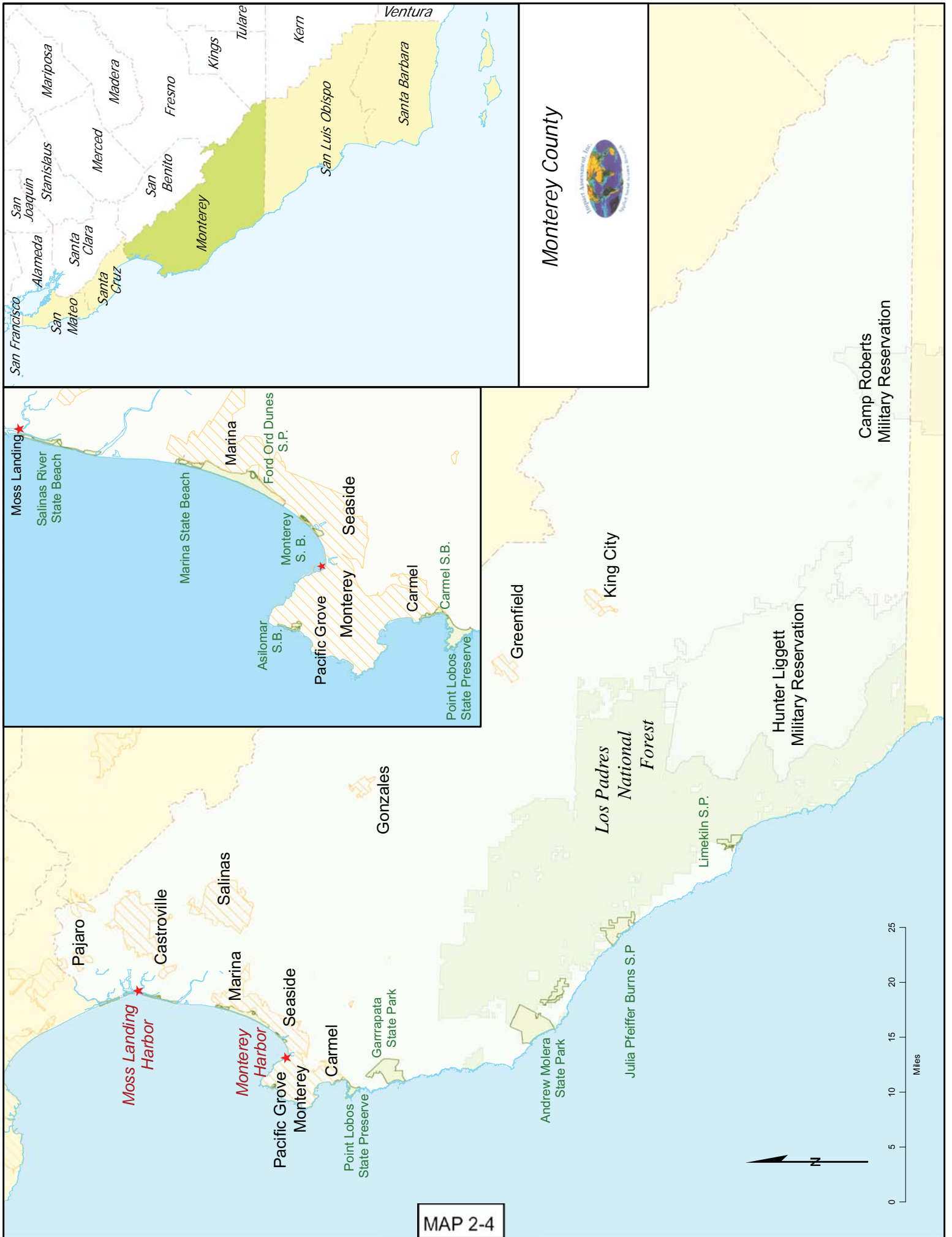


Winter Beach Scene at Asilomar in Monterey County

⁵ The MPAs around Monterey are: Elkhorn Slough SMR and SMCA, Moro Cojo Slough SMR, Soquel Canyon SMCA, Portuguese Ledge SMCA, Edward F. Ricketts SMCA, Lovers Point SMR, Pacific Grove Marine Gardens SMCA, Asilomar SMR, Carmel Pinnacles SMR, Carmel Bay SMCA, Point Lobos SMR and SMCA, Point Sur SMR and SMCA, and Big Creek SMCA.

⁶ Point Lobos State Reserve (1960); Point Lobos Ecological Reserve (1973); Carmel Bay Ecological Reserve (1976); Hopkins Marine Life Refuge (1984); Pacific Grove Marine Gardens Fish Refuge (1984); and Big Creek MRPA Ecological Reserve (1994).

⁷ Persons of Hispanic origin may be of any race; total population percentages therefore exceed 100.



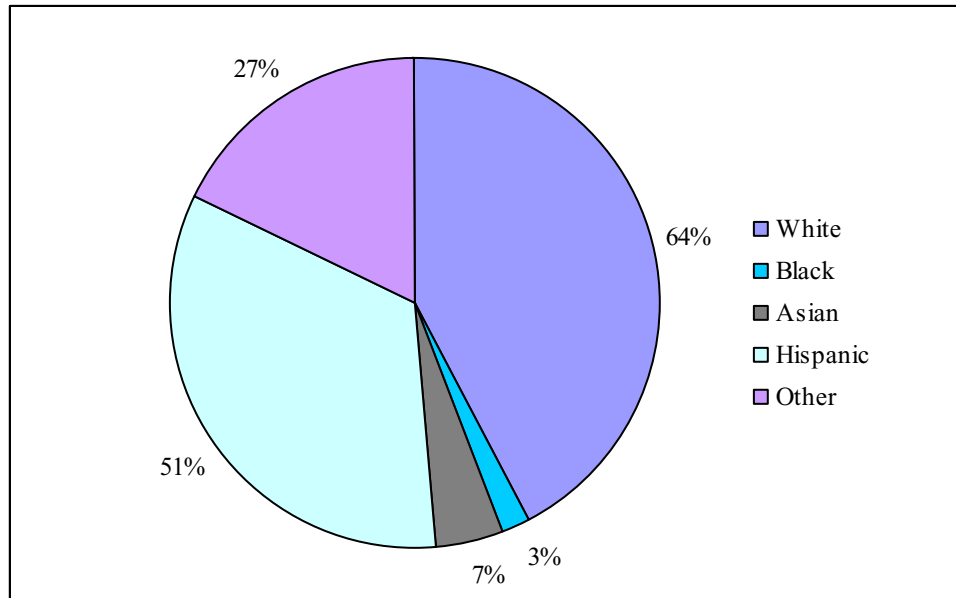


Figure 2-9 Population Demographics for Monterey County: 2006
(U.S. Census Bureau 2006a)

Note: Persons of Hispanic origin may be of any race; total population percentages therefore exceed 100

Economic Trends. Median household income in Monterey County (\$55,045) is comparable to the California median (\$56,645), and the percentage of persons living below the poverty threshold (11 percent) is lower than that for the state as a whole (13 percent) (Figure 2-10). Educational attainment levels in the county are lower than for the state as a whole (24 percent vs. 29 percent), and unemployment levels are higher (10 percent vs. 7 percent) (Table 2-5). The county per capita income also is below that of the state (\$24,012 vs. \$26,974). The county’s relatively high unemployment rate may be explained in part by the seasonal nature of work in the agricultural industries.

Table 2-5 Select Demographic Factors (values expressed as percents): Monterey County, 2006

Monterey County				
Language other than English Spoken at Home	Speaks English less than “Very Well”	BA degree or higher	Persons below poverty level	Civilian Unemployment Rate
51.9	26.1	23.6	10.8	10.4
State of California				
Language other than English Spoken at Home	Speaks English less than “Very Well”	BA degree or higher	Persons below poverty level	Civilian Unemployment Rate
42.5	13.9	29.0	13.1	6.6

Source: U.S. Census Bureau 2006a

The median value of owner-occupied homes in 2006 (\$685,100) was significantly above the California median value of \$535,700. A relatively high percentage of persons rent (44 percent) rather than own their home (56 percent), and 40 percent of residents spend upwards of 35 percent of their gross monthly income on rent (U.S. Census Bureau 2006c).

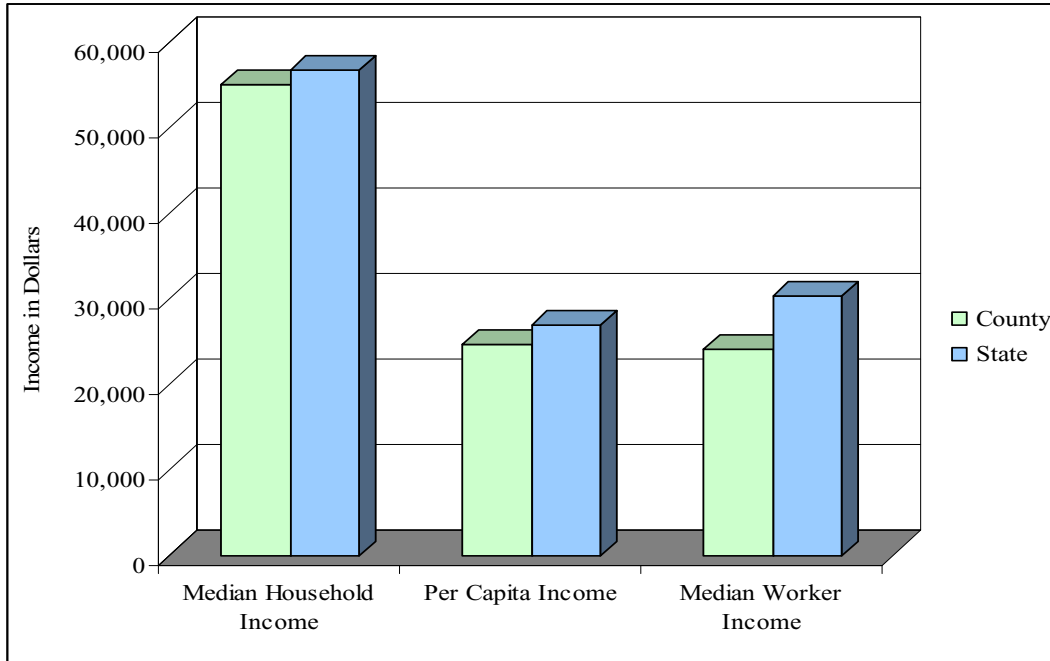


Figure 2-10 Select Economic Characteristics for Monterey County and California: 2006
(U.S. Census Bureau 2006b)

Employment Trends. In terms of employment, the leading sectors in Monterey County are educational services, health care services, and social assistance (totaling 18 percent of the workforce), and agriculture, forestry, fishing and hunting, and mining (15 percent) (Figure 2-11). Monterey is the only county in the study region in which agricultural employment has recently expanded, increasing five percent above the 1990 figure of 14.2 percent. The tourism-related sector (retail sales and recreation) is also strong, employing 20.2 percent of the workforce in 2006 – a 43 percent increase since 1990. Government is also a major sector, providing jobs to 17 percent of the labor force. The Monterey Bay Aquarium is the county’s 10th largest employer.

Monterey County ranks third of all California counties in terms of agricultural production. The top ten agricultural products in 2006 were: lettuce, strawberries, nursery crops, broccoli, grapes, assorted baby lettuces and other salad products, spinach, celery, cauliflower, and mushrooms. Crops grown in Monterey County in 2006 were valued at \$3.4 billion (Monterey County 2006).

Tourism and recreational activities are particularly important in Monterey County. In addition to its nearly 100 miles of coastline, there are six county parks, 15 state parks, two regional parks, a National Forest, a National Monument, a Wilderness Area, a Marine Sanctuary, two harbors, a National Estuarine Research Reserve and Visitor Center, nine museums (history, art, natural history, and children’s), 25 golf courses, the 17-Mile Drive in Pebble Beach, Monterey Bay Aquarium, and the National Steinbeck Center (CDFG 2005). Monterey Bay is also renowned as a diving destination. As the tourism industry continues to grow, its advocates sometimes compete with other user groups for space. For instance, tourism-related businesses increasingly compete with the commercial fishing industry for space at the waterfront (Kildow and Colgan 2005).

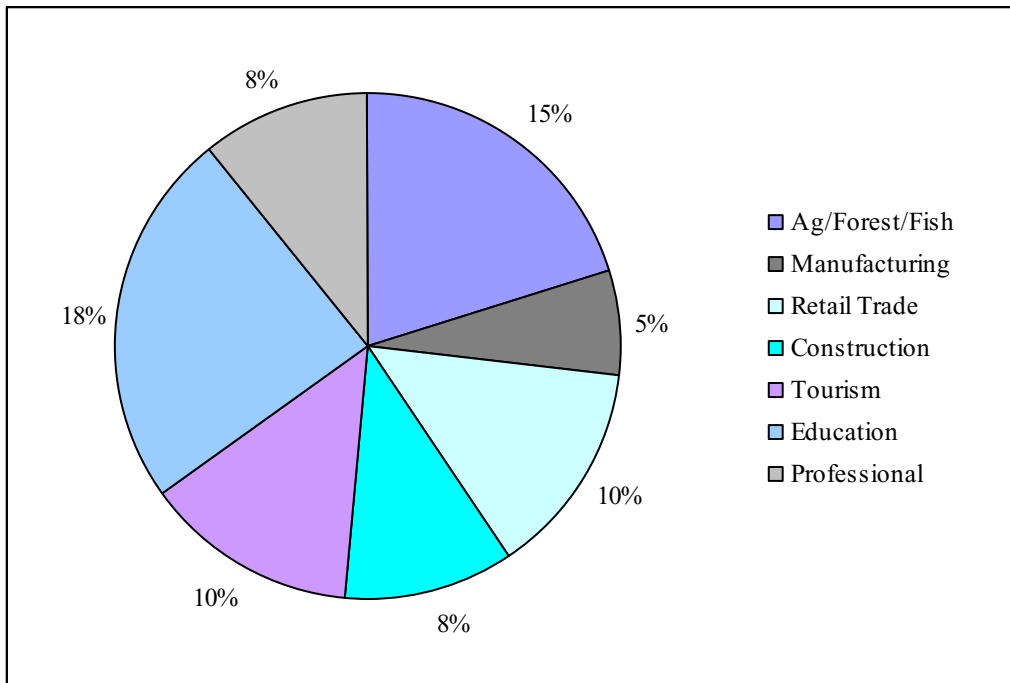


Figure 2-11 Employment by Select Industries, Monterey County: 2006
(U.S. Census Bureau 2006a)

Nearly nine million persons visited Monterey County in 2005. During that year, tourism-related businesses contributed 17 percent or \$54.6 million of the county’s total sales tax receipts, and employed 22,680 persons (Dean Runyan Associates 2007). The Monterey Bay Aquarium is one of the most popular destinations on the Central Coast. In 2005, nearly 1.9 million people visited the Aquarium. Other tourist destinations include: Cannery Row, Fisherman’s Wharf, Marina State Beach, Monterey State Beach, Salinas River State Beach, and Asilomar State Beach and Conference Center (California Tourism 2006; Department of Parks and Recreation 2004).

The largest occupational sectors in the county are management (29 percent), sales and office professions (23 percent), and services (17 percent). The farming, fishing and forestry sector is also sizeable, employing 12 percent (20,491 workers) of the county’s labor force (Figure 2-12) (U.S. Census Bureau 2006a). Of these sectors, growth in management and services has been most significant since 1990, with growth rates of 24 percent and 14 percent of the labor force, respectively. Employment in the sales and office sector decreased 21 percent since 1990.

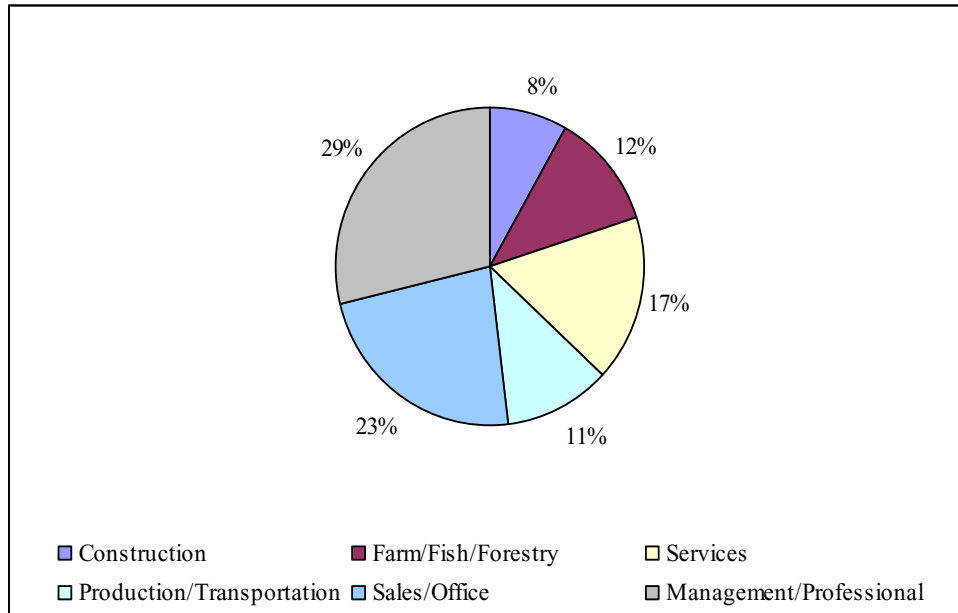


Figure 2-12 Employment by Occupation, Monterey County: 2006
(U.S. Census Bureau 2006a)

2.4 San Luis Obispo County

Overview. San Luis Obispo County is located north of Santa Barbara County and south of Monterey County (Map 2-5). Its variegated shoreline extends for approximately 96 miles. The county has a total area of 3,616 square miles, including 311 square miles of water. Three important ports are located in the county: Morro Bay, Avila/Port San Luis, and San Simeon. Morro Bay is the most active port in terms of fish landings and revenues. Eight of the 29 newly established MPAs are located in waters adjacent to the county.⁸ These supplement four reserves established in the area between 1977 and 1985.⁹

Population Trends. San Luis Obispo County was home to 257,005 persons in 2005 (U.S. Census 2006). Its largest coastally adjacent communities are: Arroyo Grande (15,581 persons), Atascadero (26,411), Cambria (6,232), Cayucos (2,943), Grover Beach (13,067), Los Osos (14,351), Morro Bay (10,350), Nipomo (12,626), Pismo Beach (8,551), and San Luis Obispo (44,174) (U.S. Census 2000). The unincorporated community of Avila Beach had a year 2000 population of 797. Avila is a small but important fishing community located along the north shore of San Luis Obispo Bay, just south of San Luis Obispo. The county population increased by 16 percent between 1990 and 2000.

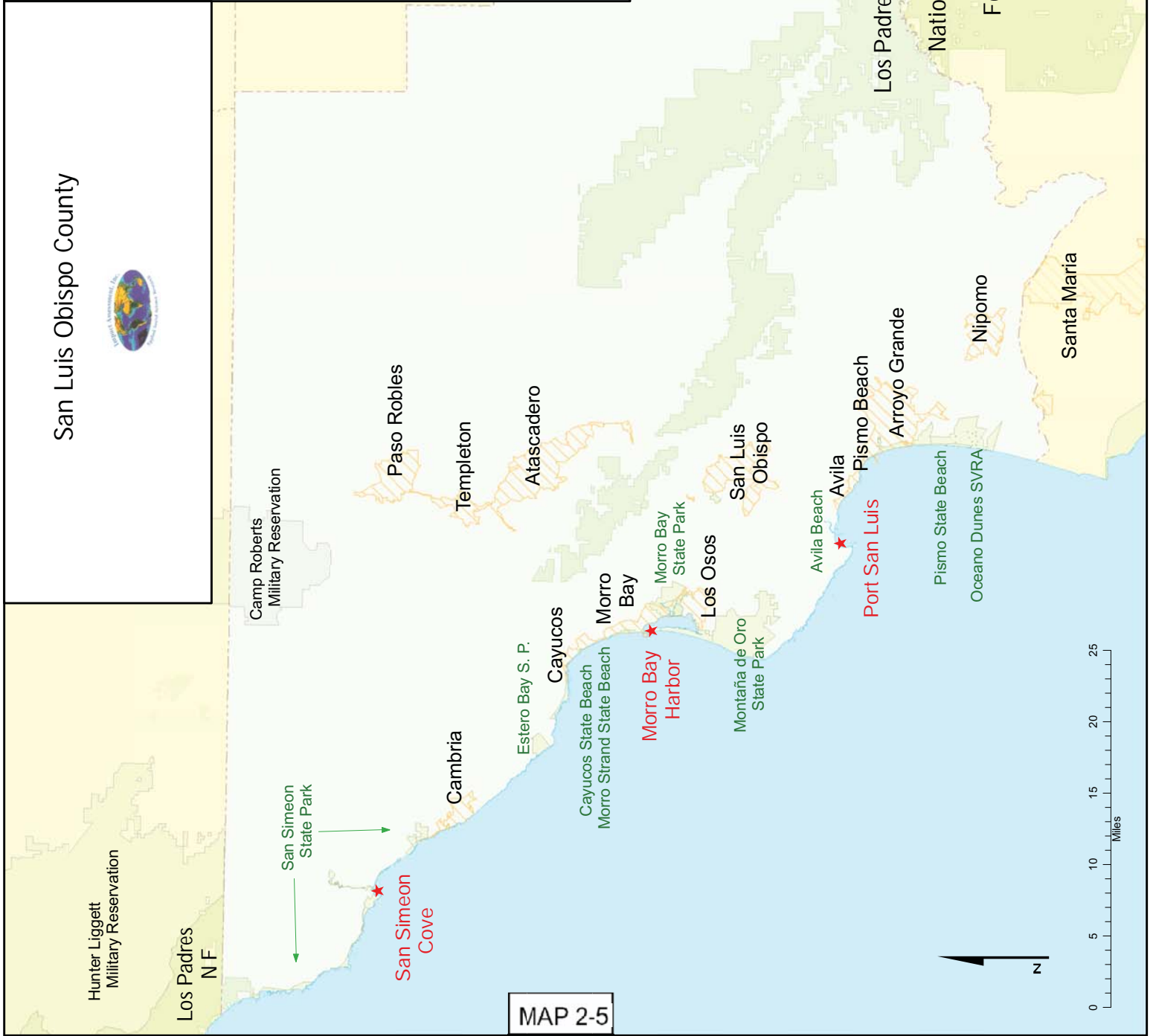
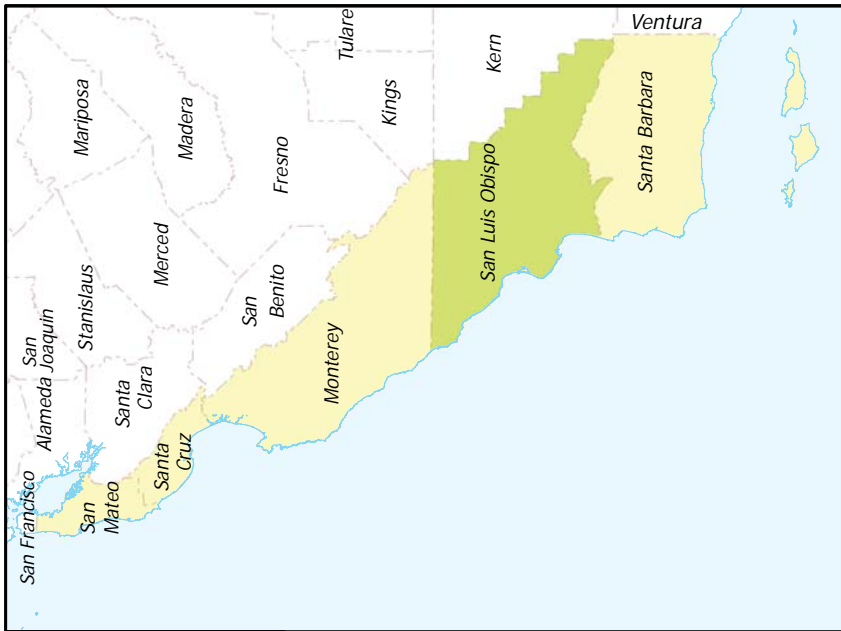
⁸ The MPAs located along the San Luis Obispo coastline are: the Piedras Blancas SMR and SMCA, the Cambria SMCA and White Rock (Cambria) SMCA, the Morro Bay SMRMA and SMR, and the Point Buchon SMCA and SMR (CDFG 2007).

⁹ These are: Pismo Invertebrate Reserve (1977); Atascadero Beach Clam Preserve (1985); Morro Beach Clam Preserve (1985); and Pismo Beach-Oceano Pismo Clam Preserve (1985).

Pismo Beach has become one of the most popular residential areas along the Central Coast. Demands in the real estate market precipitated a gentrification phase in the town's history. Developers bought extensive tracts of craftsman homes in the early 1990s and built, in their stead, large vacation homes and hotels. Properties and homes, that were at one time relatively affordable, have greatly escalated in value, precipitating a variety of demographic changes in the area.

The majority of residents in San Luis Obispo County are Caucasian (85 percent) (Figure 2-13). San Luis Obispo County is the least ethnically diverse of the five study counties. Hispanics comprise 13 percent of the population, well below the state average of 36 percent.¹⁰ Seventy-six percent of residents who reported speaking a language other than English at home spoke Spanish (Table 2-6) (U.S. Census Bureau 2006a).

¹⁰ Persons of Hispanic origin may be of any race; total population percentages therefore exceed 100.



MAP 2-5

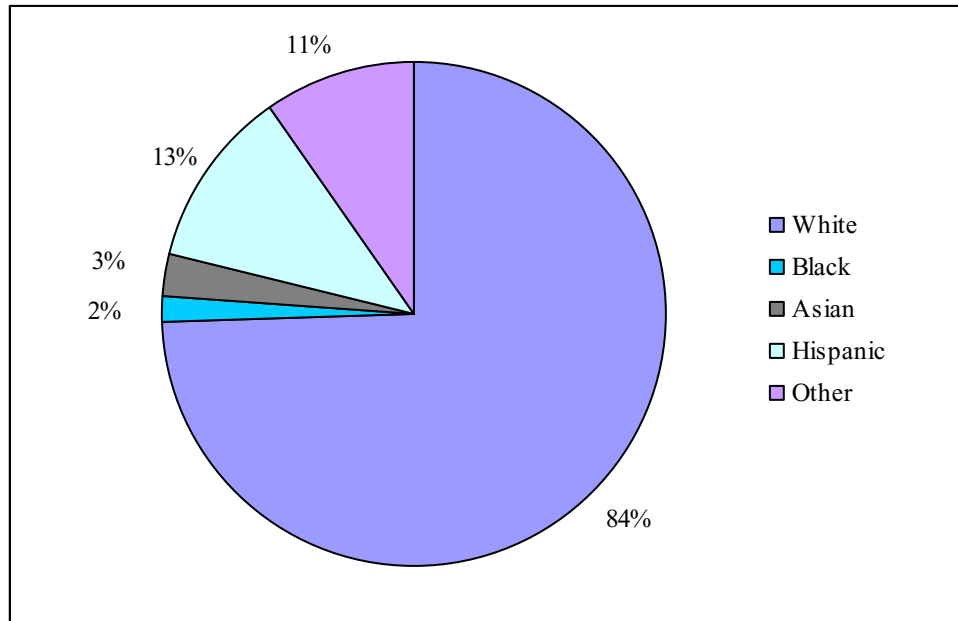


Figure 2-13 Population Demographics for San Luis Obispo County: 2006
(U.S. Census Bureau 2006a)

Note: Persons of Hispanic origin may be of any race; total population percentages therefore exceed 100

Table 2-6 Select Demographic Factors (values expressed as percents): San Luis Obispo County, 2006

San Luis Obispo County				
Language other than English Spoken at Home	Speaks English less than "Very Well"	BA degree or higher	Persons below poverty level	Civilian Unemployment Rate
15.2	6.4	31.1	13.6	5.3
State of California				
Language other than English Spoken at Home	Speaks English less than "Very Well"	BA degree or higher	Persons below poverty level	Civilian Unemployment Rate
42.5	13.9	29.0	13.1	6.6

Source: U.S. Census Bureau 2006a

Economic Trends. Much of San Luis Obispo County is moderately affluent, relative to the rest of the state (Figure 2-14). Signs of economic well-being include a median home value that is well above that of the state (\$581,000 vs. \$535,700), a per capita income that is just above that of the state (\$27,500 vs. \$27,000), a high degree of educational attainment (31 percent vs. 29 percent), and an unemployment rate that is well below that of the state as a whole (5.3 percent vs. 6.6 percent) (Table 2-6). However, the percentage of persons living below the poverty threshold (14 percent) is higher than that of the state (13 percent) and the median household income (\$50,209) is lower than the state (\$56,645) (U.S. Census Bureau 2006c).

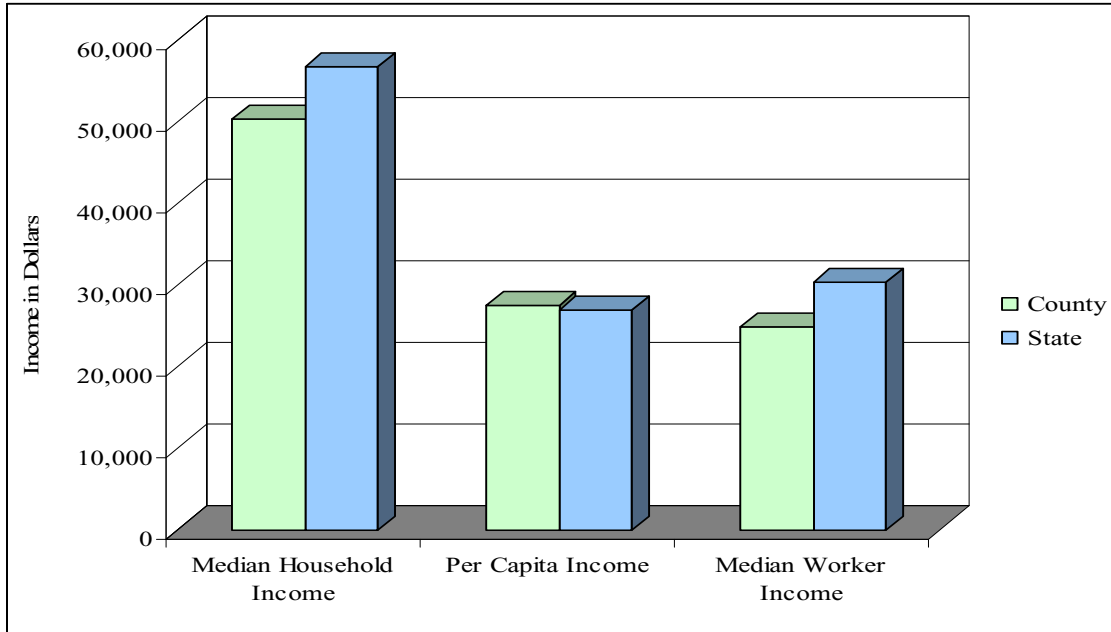


Figure 2-14 Select Economic Characteristics for San Luis Obispo County and State of California: 2006
(U.S. Census Bureau 2006c)

Employment Trends. Some 21 percent of the county workforce is employed in the education sector. Thirteen percent are employed in tourism-related sectors, and 11 percent in construction (Figure 2-15). The retail sales sector is also important, employing 10 percent of the county’s labor force.

In 2006, the agriculture industry in San Luis Obispo County employed only 3.4 percent of the county’s labor force. That figure is down 31 percent from 1990 figures. In 2006, employment in the services industry, which includes tourism, was at 23.2 percent. That reflects an increase of 16 percent since 1990 when tourism employment was at 20 percent (U.S. Census Bureau 2006a).

California Polytechnic State University and government agencies are among the county’s top employers. Three percent of the county’s labor force work in the agricultural industry, which includes fishing, hunting, forestry, and mining. Grapes produced for the wine industry are the primary agricultural product.

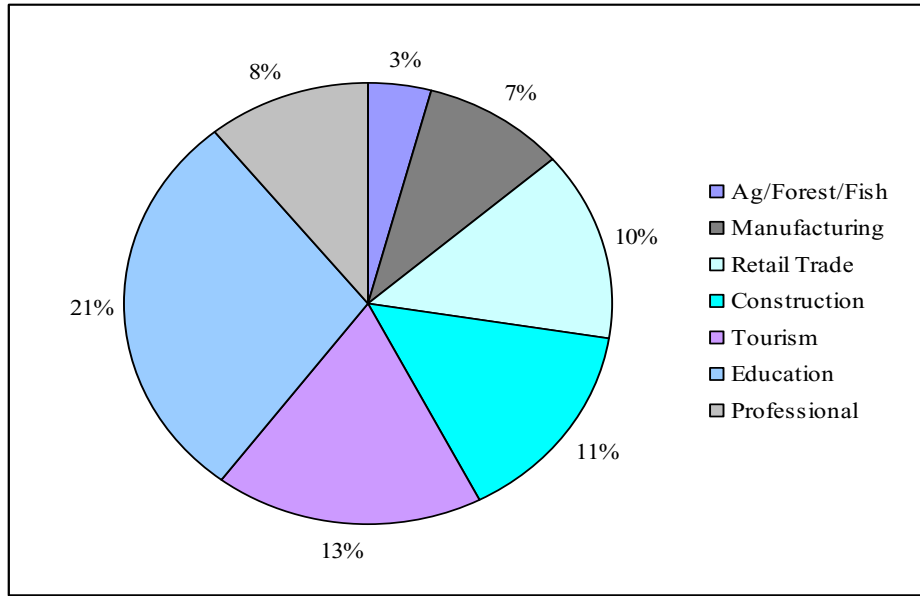


Figure 2-15 Employment by Select Industries, San Luis Obispo County: 2006
(U.S. Census Bureau 2006b)

Management (35 percent), sales and office professions (25 percent), and services (20 percent) are the largest occupational sectors in the county; the farming, fishing and forestry sector employs two percent of the labor force (Figure 2-16) (U.S. Census Bureau 2006b). Of those sectors, management and services has shown the most significant degree of growth since 1990 (26 percent of the workforce were employed in management-related jobs in 1990, and 17 percent were employed in the services sector at that time). Employment in the sales and office sector decreased 17 percent since 1990.

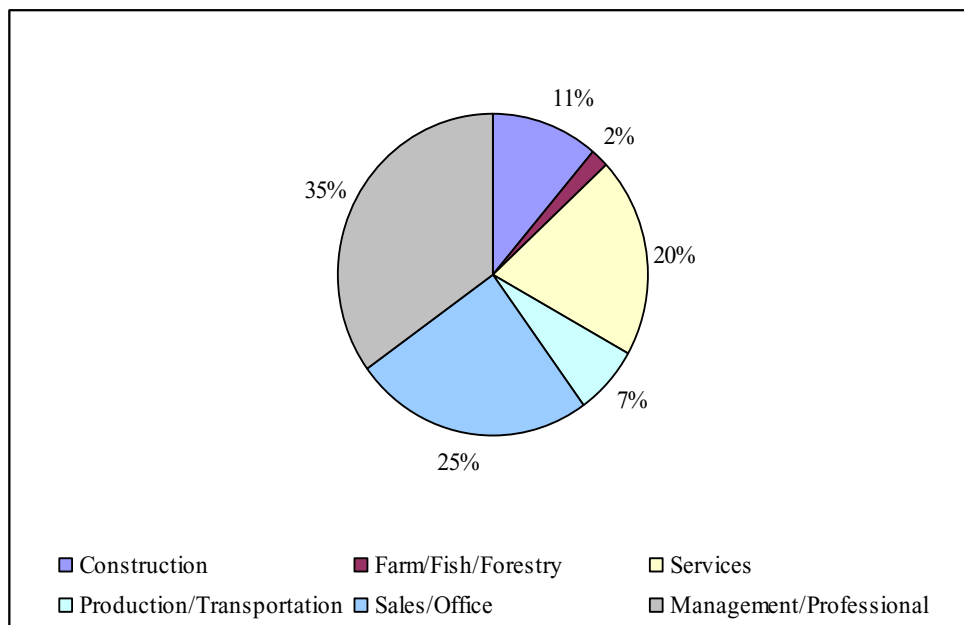


Figure 2-16 Employment by Occupation, San Luis Obispo County: 2006
(U.S. Census Bureau 2006b)

San Luis Obispo is a popular travel destination. Numerous beaches, restaurants, wildlife viewing opportunities, and marine recreational activities are some of the attractions. As many as 8.6 million persons visited San Luis Obispo in 2005. In that year, tourism contributed 12 percent or \$28.7 million to the county's total sales tax receipts of \$234 million. Over 16,000 persons were employed in tourism-related jobs that year (Dean Runyan Associates 2007). Pismo Beach Oceano Dunes State Vehicle Recreation Area is very popular, attracting 1.9 million visitors in 2005. Hearst Castle in San Simeon is another popular destination, attracting 690,860 visitors in 2005 (California Tourism 2006). Other top recreational destinations in the county include: Montaña De Oro State Park, Morro Bay State Park, Pismo State Beach, Avila Beach, Cayucos Beach, Shell Beach, and Morro Strand (Department of Parks and Recreation 2004).



Harbor Seals at Shell Beach in San Luis Obispo County



Morro Rock in San Luis Obispo County

2.5 Santa Barbara County

Overview. Santa Barbara County is located northwest of Ventura County and south of San Luis Obispo County (Map 2-6). Four of the Channel Islands (San Miguel, Anacapa, Santa Cruz, and Santa Rosa) are located in Santa Barbara County. The Vandenberg SMR is located along the southwestern portion of the county.

Population Trends. Santa Barbara County was home to 400,335 persons in 2006 (U.S. Census 2006a). The Vandenberg State Marine Reserve (SMR) is located near the following population centers: Guadalupe (5,659), Lompoc (41,103), and Vandenberg Village (5,802) (U.S. Census 2000). Other population centers adjacent to the county coastline include: Carpinteria (14,194), Goleta (55,201), Isla Vista (18,344) and Santa Barbara (92,325) (U.S. Census 2000). The county population grew by eight percent between 1990 and 2006.

The majority of residents in Santa Barbara County are Caucasian (78 percent) (Figure 2-17). However, the county's Hispanic population (38 percent) is larger than the state average (36 percent) and has increased 30 percent since 1990. Eighty-three percent of residents who reported speaking a language other than English at home spoke Spanish (Table 2-7) (U.S. Census Bureau 2006a).

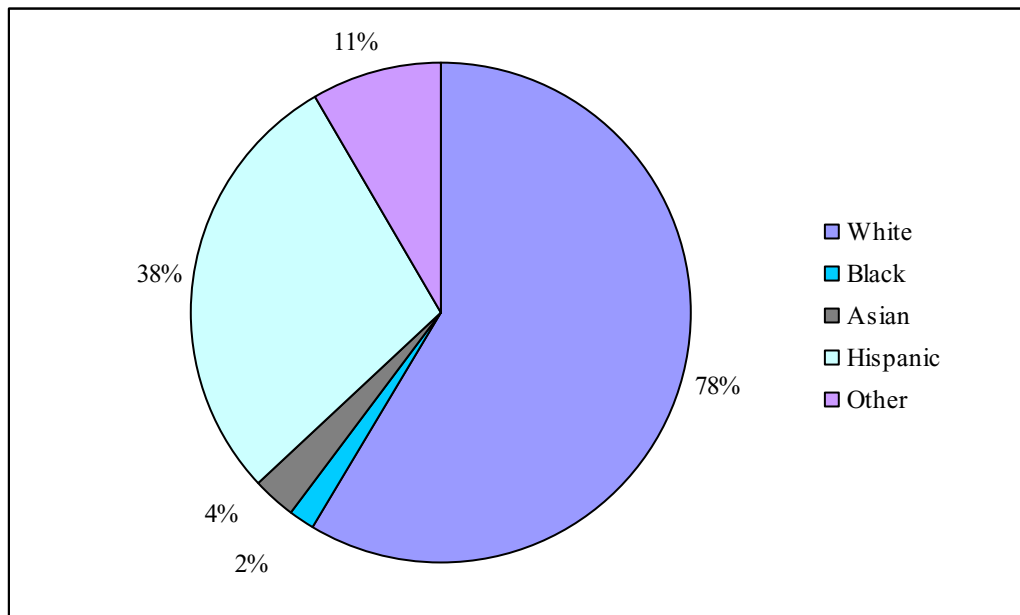


Figure 2-17 Population Demographics, Santa Barbara County: 2006
(U.S. Census Bureau 2006a)

Note: Persons of Hispanic origin may be of any race; total population percentages therefore exceed 100

Santa Barbara County



Guadalupe
Santa Maria
Vandenberg
Air Force Base

Santa Maria

La Purisima Mission
State Park

Lompoc

Buellton Solvang

Los Padres

National

Forest

Gaviota
State Park

Refugio
State Park

El Capitan
State Park

Santa Barbara

Santa Barbara
Harbor

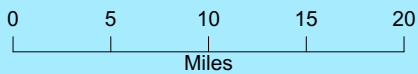


San Miguel Is

Channel Islands National Park

Santa Rosa Is

Santa Cruz Is



MAP 2-6

Table 2-7 Select Demographic Factors (values expressed as percents): Santa Barbara County, 2006

Santa Barbara County				
Language other than English Spoken at Home	Speaks English less than "Very Well"	BA degree or higher	Persons below poverty level	Civilian Unemployment Rate
37.0	18.2	30.4	16.3	5.5
State of California				
Language other than English Spoken at Home	Speaks English less than "Very Well"	BA degree or higher	Persons below poverty level	Civilian Unemployment Rate
42.5	13.9	29.0	13.1	6.6

Source: U.S. Census Bureau 2006a

Economic Trends. The Santa Barbara County economy is characterized by relatively high educational attainment levels, above average per capita income, and low rates of unemployment. The percentage of persons obtaining a Bachelor of Arts degree or higher (30 percent) slightly exceeds the percentage for the state as a whole (29 percent), and unemployment rates (5.5 percent) are lower than for the state as a whole (6.6 percent) (Table 2-7). However, while per capita income (\$27,476) is slightly above that of the state's (\$26,974), the median household income for the county (\$53,477) is below the state median (\$56,645) (Figure 2-18). Moreover, a relatively higher percentage of persons live in poverty (16 percent) than is the case for the state as a whole (13 percent) (U.S. Census Bureau 2006a).

Property values are relatively high in Santa Barbara County. The median value of an owner-occupied home is \$685,700, well above the state average of \$535,700. Santa Barbara County ranks 10th in the nation in terms of median housing values (U.S. Census Bureau 2004). Some 47 percent of all housing units are renter-occupied, compared to 42 percent at the state level. Nearly half of all renters in the county spend 35 percent of their monthly household income on rent, compared to 43 percent throughout California (U.S. Census 2006c).

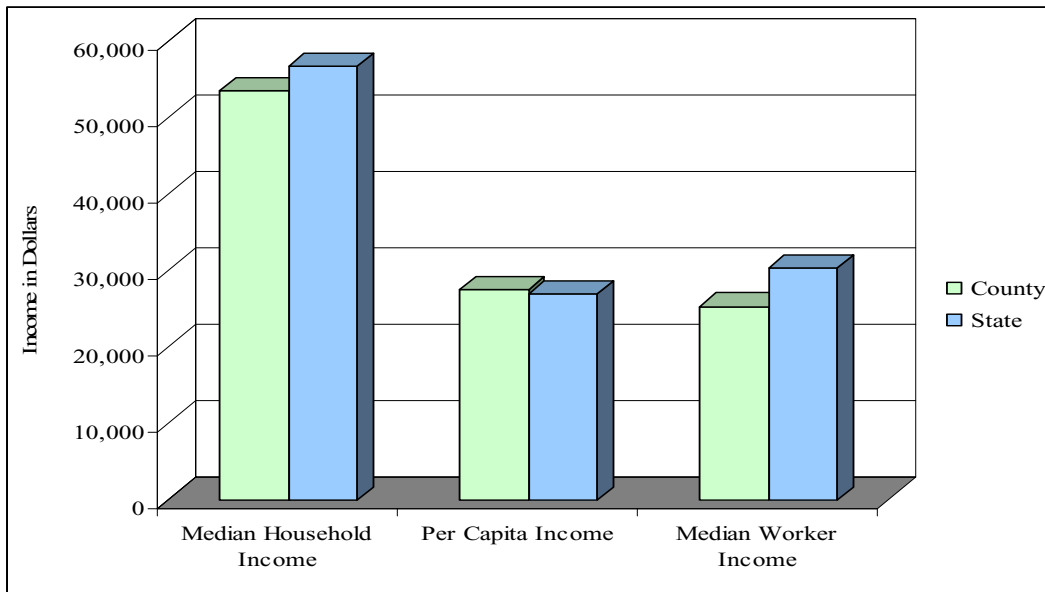


Figure 2-18 Select Economic Characteristics for Santa Barbara County and California: 2006
(U.S. Census Bureau 2006c)

Employment Trends. Twenty-one percent of the Santa Barbara County workforce was employed in the education sector, 13 percent held professional jobs, 12 percent held jobs in the tourism sector, and 10 percent were employed in retail sales (Figure 2-19). In 2006, the agriculture industry employed seven percent of the county’s labor force. That figure is down 13 percent from 1990 figures (when it was eight percent of the workforce). In 2006, employment in the service industry, which includes tourism and recreation, was at 22 percent. That is a 16 percent increase since 1990 (when it was 13.7 percent of the workforce) (U.S. Census Bureau 2006b).

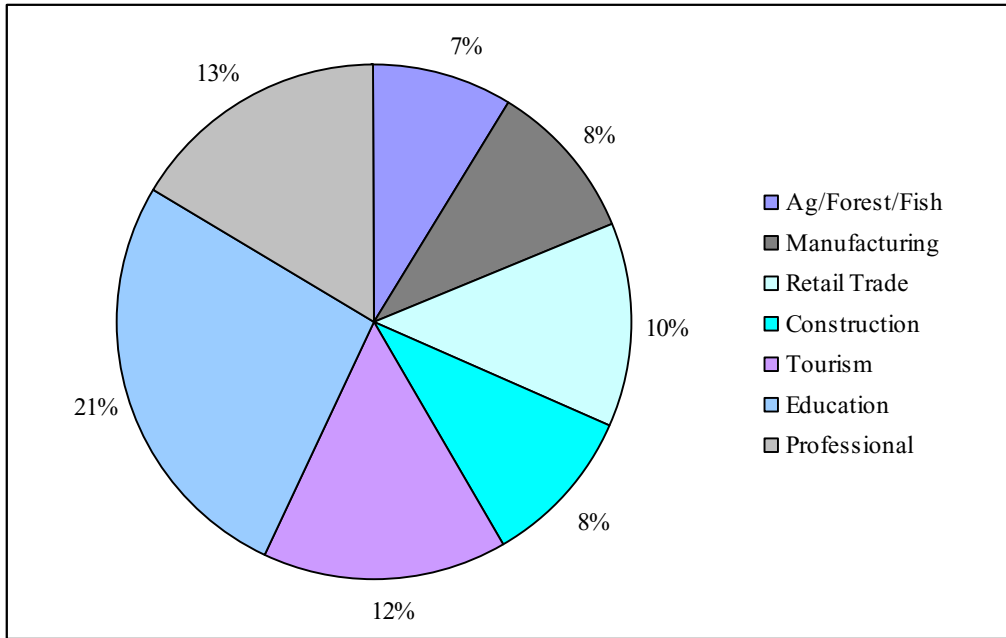


Figure 2-19 Employment by Select Industries, Santa Barbara County: 2006
(U.S. Census Bureau 2006b)

The University of California at Santa Barbara employed nearly 10,000 workers in 2006 (State of California 2007). Government facilities also employ many residents. These include Vandenberg Air Force Base and the Lompoc federal correctional institute, among others.

Tourism—and especially coastal tourism—attracts millions of visitors each year. More than 11 million persons visited Santa Barbara County in 2005 alone. During that year, the tourism industry contributed 11 percent or \$39 million to the county’s total sales tax receipts of \$345 million and it employed 16,170 persons (Dean Runyan Associates 2007). The Channel Islands National Park is a popular destination. Approximately 400,000 people visited the Park in 2005 (California Tourism 2006).

The largest occupational sectors in the county (Figure 2-20) include management (33 percent of the workforce), sales and office professions (25 percent), and services (22 percent). The management and service sectors show the most extensive level of growth since 1990, when they employed 29 percent and 14 percent of the labor force, respectively. Employment in the sales and office sector decreased 18 percent since 1990. The farming, fishing and forestry sector employed five percent of the labor force in 2006 (U.S. Census Bureau 2006b).

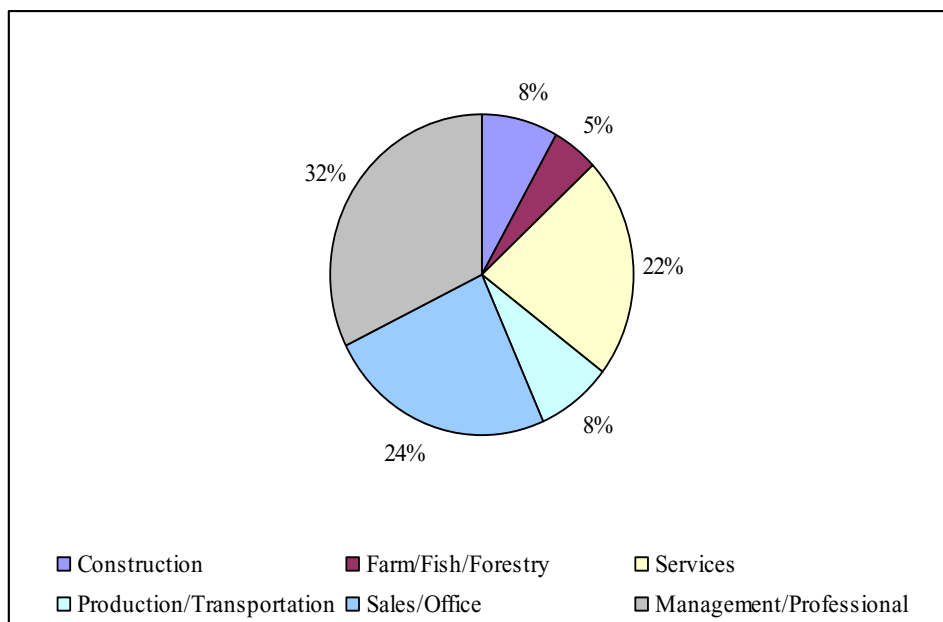


Figure 2-20 Employment by Occupation, Santa Barbara County: 2006
(U.S. Census Bureau 2006b)

Summary of Trends. It is notable that the study area is increasingly characterized by growth in coastal tourism and growth associated with the attractions of coastal living. With the exception of inland Monterey County, involvement in agriculture has declined significantly since the 1990 Census. Tourism and its supporting service sector industries continue to grow, and this is also the case in Monterey proper and in the adjacent towns of Seaside, Marina, Pacific Grove, and Pebble Beach. The entire study area is also becoming more populous, and growth and development are particularly notable in the region’s coastal towns and cities.

3.0 Port-Level Description of the Central California Commercial Fishing Industry

This section describes the commercial fishing fleets of the Central Coast. The description is organized by port, with extensive discussion of Pillar Point, Santa Cruz, Moss Landing, Monterey, Morro Bay, and Avila harbors (Table 3-1). Because only a handful of small-boat captains have ever made the long trip from Santa Barbara to fish on a regular basis in state waters north of Point Conception (with fewer still fishing regularly north of Point Arguello), this section provides only limited description of the port at Santa Barbara.

Table 3-1 Major Central California Harbors by Study County

San Mateo County	Santa Cruz County	Monterey County	San Luis Obispo County	Santa Barbara County
Pillar Point	Santa Cruz	Monterey; Moss Landing	Avila; Morro Bay	Santa Barbara

3.1 Central Coast Fishing Effort and Supporting Infrastructure

Overview. The manner and extent of commercial fishing effort varies significantly across the study region in several respects, including the value and amount of annual landings, the number of vessels both moored in and delivering to a particular port, the number and types of seafood distributors and processors, and the types of fisheries pursued. In this section of the report, we discuss overall trends in commercial fishing effort over the last quarter century (1981-2007). The discussion is primarily organized at the county level of analysis though, when available, individual port level data are also considered. The landings and revenue data presented here reflect effort for all local, in-state, and out-of-state commercial fishing vessels that have delivered to ports in the study region between 1981 and 2007.

We also present an overview of commercial fishing specific to ports in the Monterey Bay National Marine Sanctuary, and continue with in-depth examination of the commercial fishing industry for ports across the region using county-level data provided by the PacFIN database and port-level data available through the CDFG database. Two data streams are necessary given the reporting limitations of each.¹

The Central California Fleet. The Central California commercial fishing fleet varies extensively in terms of vessel characteristics, types of gear used, fishing strategies and locations, and expenditures and revenue. Moreover, most harvest more than one species, use more than one type of gear, and change gear and target species seasonally. Others participate in specific fisheries when conditions are optimal. Captains fishing for high value seafood such as shrimp, crab, lobster, and urchin tend to persist in these fisheries year after year, while others will tend to exit and enter fisheries as opportunity, harvest guidelines, and regulations warrant (Radtke and Davis 2000; Starr et al. 2002).

¹ PacFIN data are available from 1981 through 2007; however the available information is aggregated to the county level only. Port level data are provided by CDFG, however datasets were only available for 2000 through 2006 at the time when IAI engaged in its analysis.

Resident and Non-Resident Commercial Fishing Vessels Combined. The overall number of commercial fishing vessels active in the State of California has declined precipitously since 1981. According to PacFIN, 6,908 vessels were active in the California fleet in 1981. By 2007 the fleet contracted to 2,700 vessels. The Central California component of the statewide fleet reached its peak in 1983 at 2,623 vessels. Approximately 815 vessels now participate (Pacific States Marine Fisheries Commission 2007).

Statewide landings and revenues have declined in conjunction with reduction in the size of the fleet. Landings at California ports had dropped from 792 million pounds in 1981 to 293 million pounds in 2007, a decline of 63 percent. Ex-vessel revenues fell by 89 percent during the same period. The situation was similar along the Central California coast. Landings declined by 56 percent during the period 1981-2007. Ex-vessel revenues diminished by 42 percent – from \$31 million in 1981 to \$18 million in 2007.

Small Commercial Vessels Registered to Residents. PacFIN uses vessel identification numbers (VIDs) to track the number of vessels in a particular regional fleet. The VIDs are obtained from fish ticket data recorded by seafood dealers and processors. As such, the number of vessels attributed to a county or port based on these data includes vessels belonging to resident and non-resident captains or owners. In contrast, the California Department of Motor Vehicles (DMV) vessel registration database includes only those vessels that are registered California residents. Significantly, the DMV database includes commercial vessels under 30 feet in length only.² As such, the DMV database captures trends in the number of locally owned small commercial vessels, while the PacFIN database captures trends in commercial fishing vessels of all sizes as utilized by all commercial fishermen operating in California.

DMV vessel registration data indicate a decline in participation in the Central California commercial fishing fleet between 1985 and 2007 (Figure 3-1). In 1985, commercial fishing vessels totaled 782; that number had dropped by 23 percent to 600 vessels in 2007 (Department of Motor Vehicles 2008). The greatest contraction in the number of registered commercial fishing vessels occurred in Santa Cruz County (46 percent), followed by San Mateo County (45 percent), and Monterey County (44 percent).

² By law, every sail-powered vessel more than eight feet and every motor-driven vessel (regardless of length) that is used or on the waters of California and that is not documented by the U.S. Coast Guard is to be registered with the Department of Motor Vehicles. Commercial vessels of five net tons or more, or 30 feet or more in length, are required to be documented by the U.S. Coast Guard but are not required to be registered with the DMV (California Department of Motor Vehicles 2007).

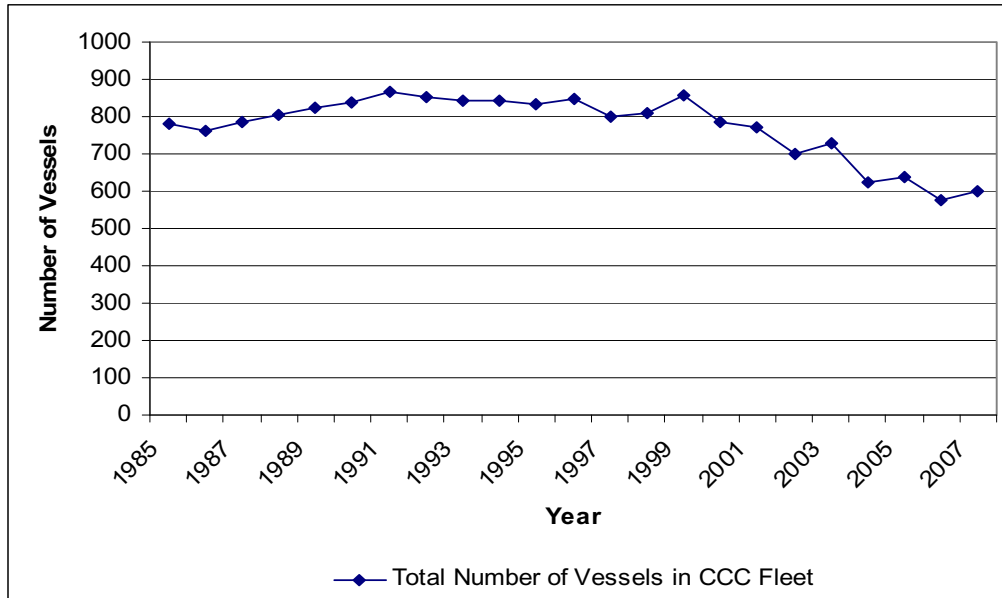


Figure 3-1 Trends in Resident-Owned Small Commercial Vessels, Central California
(California Department of Motor Vehicles 2008)

The number of commercial vessels registered in the Central Coast counties peaked in 1991 at 868; more than 800 vessels were consistently involved in the fleet between 1988 and 1999 (Figure 3-2).

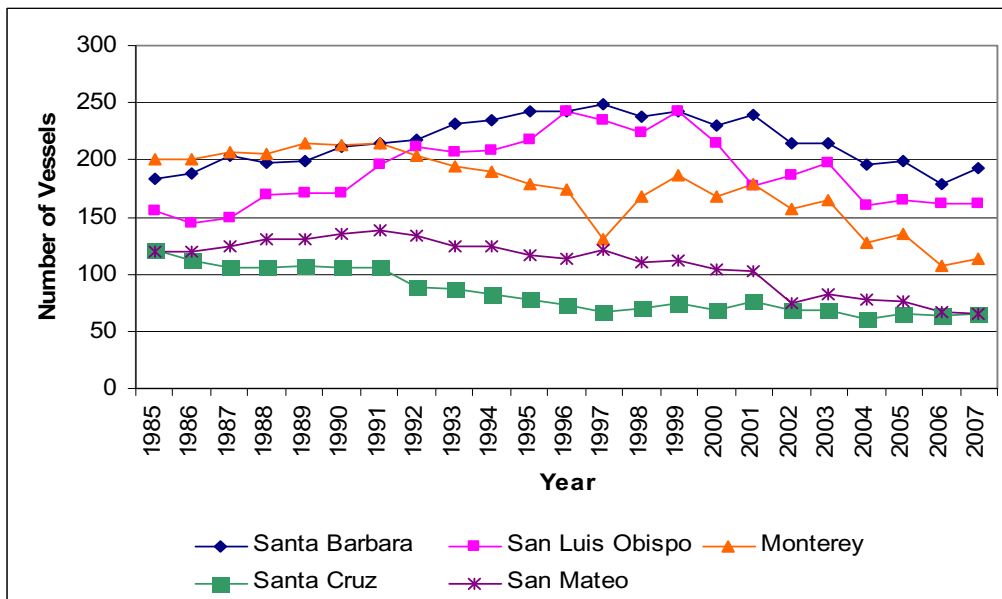


Figure 3-2 Trends in Resident-Owned Small Commercial Vessels by County
(California Department of Motor Vehicles 2008)

While the data sets vary in terms of absolute numbers, both the PacFIN and DMV data reveal a decline in the overall size of the Central Coast commercial fishing fleet. Pomeroy and Dalton (2003) assert that the decline between 1981 and 1985 was in part the result of implementation of a limited entry program for the commercial salmon fishery in 1982, and the effects of the 1982-

1983 El Niño event, which affected abundance and also limited access to the fishing grounds. A subsequent El Niño event in 1998 reduced the abundance of squid and may help explain diminished landings for that year.

Other factors contributing to the overall decline in participation include: an increasing number of regulations; cycles of low abundance; increased availability of farmed and imported products (especially salmon); declining market prices; and ever-mounting overhead costs, such as fuel, insurance, and Workman’s Compensation (Pomeroy and Dalton 2003).

According to Radtke and Davis (2000), commercial fishing operations increasingly involved the use of multiple types of gear. Between 1989 and 1997, crews using only one type of gear while fishing decreased from 71 percent to 64 percent. During the same period, however, crews using three or more types of gear increased from nine to 12 percent.

The introduction of limited entry permit programs naturally reduced the number of vessels reporting landings in California and other Pacific Coast states. The federal groundfish limited entry program has resulted in fewer active commercial operations while increasing profits for those with permits (Radtke and Davis 2000).

Central California Coast Study Region: Landings from 1981 to 2007. Of the seven major ports in the study region, Monterey County landings have been most extensive. Between 1981 and 2007, an average of 45.4 million pounds of seafood was offloaded in Monterey County, with an annual average ex-vessel value of \$8.9 million. The vast majority of landings occurred at Moss Landing Harbor. Landings at the ports of Santa Barbara County (Ventura, Oxnard, and Port Hueneme, combined) ranked a distant second, averaging 9.5 million pounds and \$8.1 million annually. Landings at the ports of San Luis Obispo County (Morro Bay and Avila) averaged 8.5 million pounds and \$6.1 million dollars annually. Landings at San Mateo County averaged 5.1 million pounds and \$4.5 million annually. Landings at Santa Cruz averaged over one million pounds and \$1.1 million dollars annually (Table 3-2).

Table 3-2 Average Total Landings, Value (million USD), and Landings Data by County: 1981-2007

County	Landings (million lbs.)	Revenue (million \$)	Fish Tickets	Vessel IDs	Trips	Trips per Vessel	Dealers & Processors
Santa Barbara	9.5	8.1	9,991	315	7,965	26.25	92
San Luis Obispo	8.5	6.1	7,561	388	6,100	15.80	67
Monterey	45.4	8.9	8,932	537	8,199	15.88	80
Santa Cruz	1.1	1.1	2,356	220	2,214	10.44	37
San Mateo	5.1	4.5	5,498	436	5,018	11.79	97

Source: PacFIN 2007

Dealers/Processors and Commercial Vessels. The number of persons involved in the Central Coast fisheries varies extensively by county.³ The number of captains offloading in Monterey County between 1981 and 2007 has ranged from a high of 979 to a low of 173 (mean = 537). The number of buyers has ranged from 117 to 35 (mean = 80). San Mateo County had, on

³ CDFG defines wholesale fish dealers and processors as those who: (1) buy fish/shellfish from a commercial fisher; (2) process fish/shellfish or any part thereof; or (3) sell fish/shellfish to retailers or wholesalers.

average, 436 captains delivering to 97 buyers during the period. In San Luis Obispo County an average of 388 captains delivered to the ports of Avila and Morro Bay, with an average of 67 buyers distributing the product. Santa Barbara County ports averaged 315 offloading captains and 92 buyers. Santa Cruz County averaged 220 captains and 37 buyers.

Of the seven ports located in the study region, Moss Landing Harbor consistently ranked first in terms of pounds of fish landed (Table 3-3). In fact, in 2006, Moss Landing ranked second in the State of California in terms of pounds landed and ninth in ex-vessel revenues (NMFS 2007). In recent years (2000-2006), fishermen delivered an average of 54.8 million pounds of seafood to Moss Landing Harbor. The average annual landings at Monterey Harbor and Santa Barbara Harbor (each nearly seven million pounds) both ranked distant second to Moss Landing for that same period.

Table 3-3 Landings in Pounds (in millions) at Study Region Ports and 7-Year Average: 2000-2006

Port	2000	2001	2002	2003	2004	2005	2006	Mean
Santa Barbara	7.00	5.26	6.18	6.97	7.80	7.90	6.91	6.86
Avila	1.13	1.41	3.14	2.89	1.63	1.80	0.29	1.76
Morro Bay	2.48	2.63	1.56	2.22	3.16	1.66	0.87	2.10
Monterey	10.8	7.40	14.8	10.0	3.70	1.68	0.36	6.96
Moss Landing	50.4	56.0	80.8	44.1	55.5	37.7	59.3	54.8
Santa Cruz	0.70	0.37	0.44	0.44	0.58	0.65	0.29	0.50
Pillar Point	3.03	2.23	5.06	6.19	4.37	3.54	2.80	3.89

Source: CDFG 2007

Reported landings remained relatively constant at Moss Landing and Pillar Point between 2000 and 2006. In contrast, the landings at the ports of Santa Cruz, Avila, and Morro Bay fluctuated extensively, with particularly low landings reported in 2006. Of the study ports, landings fluctuated most extensively at Monterey Harbor, ranging from a high of 10.8 million pounds in 2000 to a low of 360,000 pounds in 2006.

Table 3-4 depicts ex-vessel values of seafood landed at each of the principal ports in the study area. Of note is the relatively low value of landings at the high volume ports, which relates to extensive landings of low value wetfish.

Table 3-4 Ex-Vessel Revenues (in millions*) at Study Region Ports and 7-Year Average: 2000-2006

Port	2000	2001	2002	2003	2004	2005	2006	Mean
Santa Barbara	6.65	5.21	6.44	6.15	5.93	5.92	5.52	5.97
Avila	1.14	1.32	1.78	1.59	1.15	0.63	0.87	1.21
Morro Bay	4.45	3.35	2.38	1.64	2.00	1.92	1.63	2.48
Monterey	2.44	1.79	2.95	2.88	1.75	1.27	0.74	1.97
Moss Landing	7.30	6.73	9.20	9.01	6.28	4.79	4.17	6.78
Santa Cruz	1.11	0.56	0.59	0.54	0.97	1.28	0.53	0.80
Pillar Point	3.93	2.96	4.21	4.51	5.99	5.26	4.09	4.42

* In constant 2000 United States Dollars. Source: CDFG 2007

Principal target species have varied over time. However, some species are economically important to practically every port in the study region. These include: sablefish (black cod), Chinook salmon, albacore, sole (Dover and petrale) and market squid. There are also niche fisheries of importance to particular ports. For example, red sea urchin, a high-value species, is

principally landed at Santa Barbara Harbor, as are spiny lobster and rock crab. At the Morro Bay area ports, rockfish and cabezon have long been important fisheries for both the commercial and sport fisheries. Sanddabs are primarily landed in Santa Cruz. Dungeness crab, which is important to several Central California ports, is landed in greatest concentration at Santa Cruz and Pillar Point (Table 3-5).

Table 3-5 Top Five Fisheries (total combined value) for each Study Region Port: 2000-2006

Species	Santa Barbara	Avila	Morro Bay	Monterey	Moss Landing	Santa Cruz	Pillar Point
Albacore	–	428,977	2,465,259	–	2,082,950	363,705	–
Anchovy, Northern	–	–	–	220,784	–	–	–
Cabezon	–	–	1,194,008	–	–	–	–
Crab, Dungeness	–	328,129	–	–	–	1,203,417	1,203,417
Crab, rock	4,559,153	–	–	–	–	–	–
Halibut, California	1,527,941	–	–	–	–	386,528	2,672,969
Lobster, spiny	9,514,436	–	–	–	–	–	–
Prawn, spot/ridgeback	2,312,275	–	3,014,652	2,824,441	–	–	–
Rockfish, brown	–	979,052	–	–	–	–	–
Sablefish	–	–	–	–	4,337,486	160,734	–
Salmon, Chinook	–	–	1,561,672	1,853,300	5,795,697	3,014,920	9,880,937
Sanddab	–	–	–	–	–	–	989,146
Sardine, Pacific	–	–	–	–	7,641,073	–	–
Squid, market	–	–	–	5,906,085	16,528,886	–	1,131,473
Sole, Dover	–	835,229	–	555,026	–	–	–
Swordfish	–	–	1,512,935	–	–	–	–
Thornyhead, longspine	–	587,059	–	–	–	–	–
Urchin, red sea	19,514,849	–	–	–	–	–	–

Source: CDFG 2007

3.2 County by County Overview of Marine Fisheries

This section provides additional descriptive detail regarding trends in Central Coast fisheries for the period 1981 to 2007.⁴ The section is organized by county, with extensive discussion of commercial activity at the principal ports in each county. Data are aggregated to describe baseline trends for the region as a whole and to identify important sources of change in each study county.

San Mateo County

Overview. Pillar Point Harbor is part of the San Mateo Harbor District. With 369 berths, Pillar Point is the main commercial harbor in the county. It is located some 30 miles south of San Francisco. Pillar Point was once a minor shipping port known as “Old Landing.”⁵ It began to

⁴ The PacFIN central database relies on fish ticket and vessel registration data provided by the Washington, Oregon, and California (W-O-C) state fishery agencies. Those data are available at the state and county levels. See <http://www.psmfc.org/PacFIN/data.html>.

⁵ This port and its surrounding community are often referred to as simply “Princeton” or “Princeton/Half Moon Bay”; however, the harbor is known as “Pillar Point.”

develop its commercial fisheries during the 1930s. Prior to the collapse of the sardine fishery in the 1950s, two sardine canneries were located here (Scofield 1954). Sportfishing became particularly important during the 1960s and 1970s.

In addition to Pillar Point, the San Mateo Harbor District maintains and operates the Oyster Point Marina and Park in South San Francisco. This primarily recreational facility maintains 600 slips (San Mateo Harbor District 2004). The primary fisheries at Pillar Point Harbor are salmon, crab, and groundfish (California halibut, sanddab, Dover sole, petrale sole, and sablefish). Squid is also targeted. Table 3-6 shows the top five species ranked in terms of value for the period 2000 to 2006.

Table 3-6 Combined Value of the Top Five Species Landed at Pillar Point Harbor: 2000-2006

Species	Total Revenue (\$)	Total Landings in Pounds
Crab, Dungeness	14,961,835	7,428,721
Salmon, Chinook	9,880,937	3,924,531
Halibut, California	2,672,969	984,326
Squid, market	1,131,473	5,945,005
Sanddab	989,146	2,574,434

Source: CDFG 2007

San Mateo County Landings and Revenue. San Mateo County ranks fourth out of the five study area counties in terms of average annual landings and revenues. Between 1981 and 2007, total reported landings in the county averaged five million pounds per year; total revenues averaged \$4.5 million. Landings for that period peaked in 1994 at 10.2 million pounds, with an ex-vessel value of \$6.4 million. In 1995, however, landings began to trend downward, with total landings in 2007 (1.4 million lbs.) nearly matching 1981 figures (1.3 million lbs.) (Figure 3-3) (PacFIN 2007).

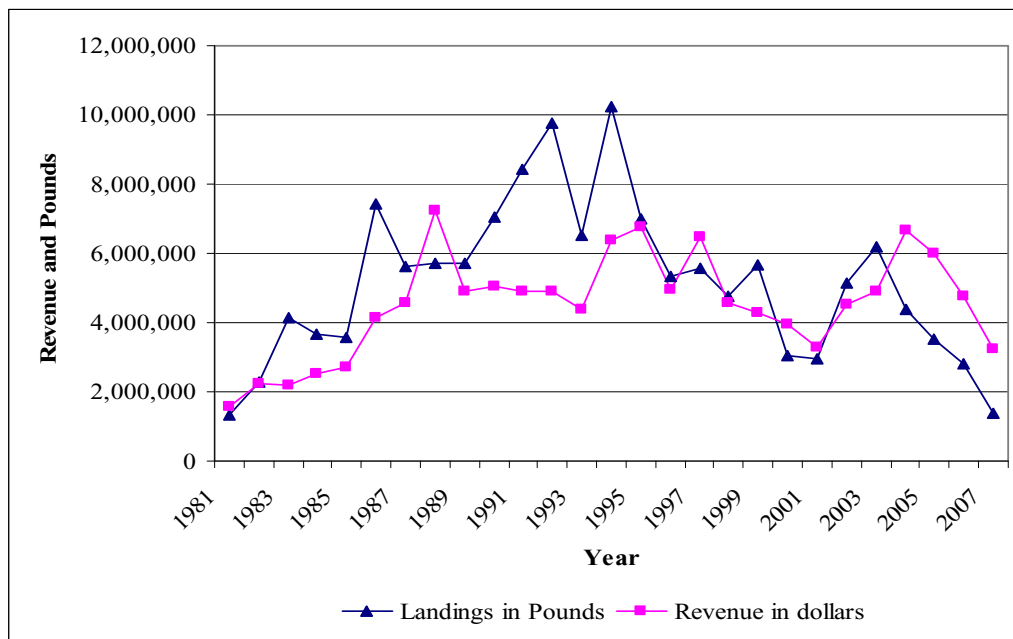


Figure 3-3 Landings vs. Revenue, San Mateo County: 1981-2007 (PacFIN 2007)

Vessels, Trips, and Fish Tickets. The number of boats making commercial landings in San Mateo County rose steadily between 1981 and 1989, peaking at 747 vessels. The size of the fleet began to diminish after 1989 dwindling to 206 vessels in 2007 (Figure 3-4). On average, 436 vessels offloaded in San Mateo County between 1981 and 2007. Each vessel made an average of 12 trips per year. In that same period, the total number of commercial fishing trips dropped from 3,861 to 2,161, a 44 percent decrease. The number of fish tickets⁶ submitted also decreased, dropping from 4,256 in 1981 to 2,273 in 2007, a 47 percent decrease.

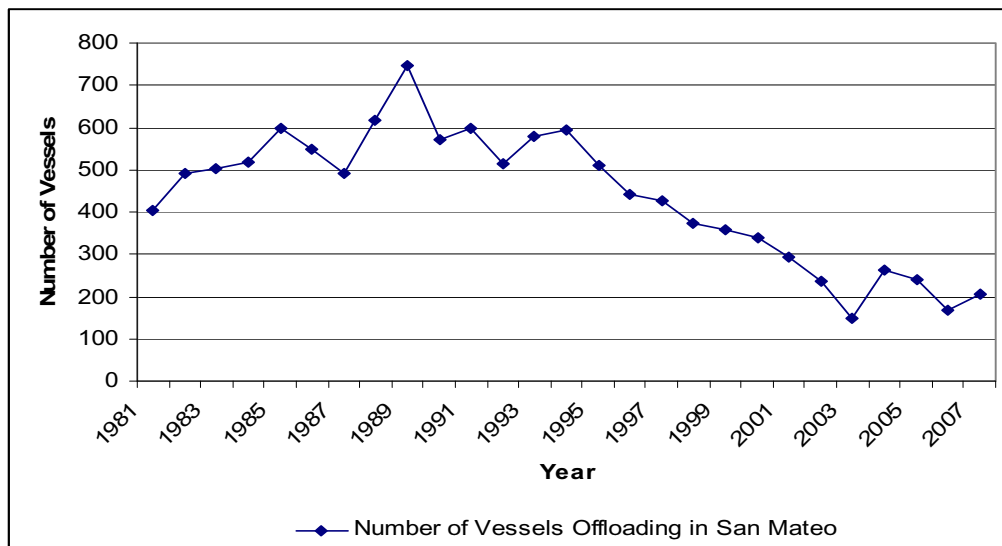


Figure 3-4 Commercial Vessel Participation in San Mateo County: 1981-2007 (PacFIN 2007)

Dealers/Processors. CDFG defines “seafood processor” as including both well-established processing and distribution operations *and* individuals who regularly or occasionally sell to seafood buyers. Seafood processors are assigned a processor identifier number or “PID.” Since 1981, the number of dealers and processors in San Mateo County has ranged from a low of 42 in 1981 to a high of 148 in 1998 (Figure 3-5). On average, there were 97 dealers and processors operating in the San Mateo area between 1981 and 2006.

⁶ Landing receipts, also known as “fish tickets,” are forms documenting the landing of seafood. Seafood dealers must complete and submit the forms to CDFG twice monthly.

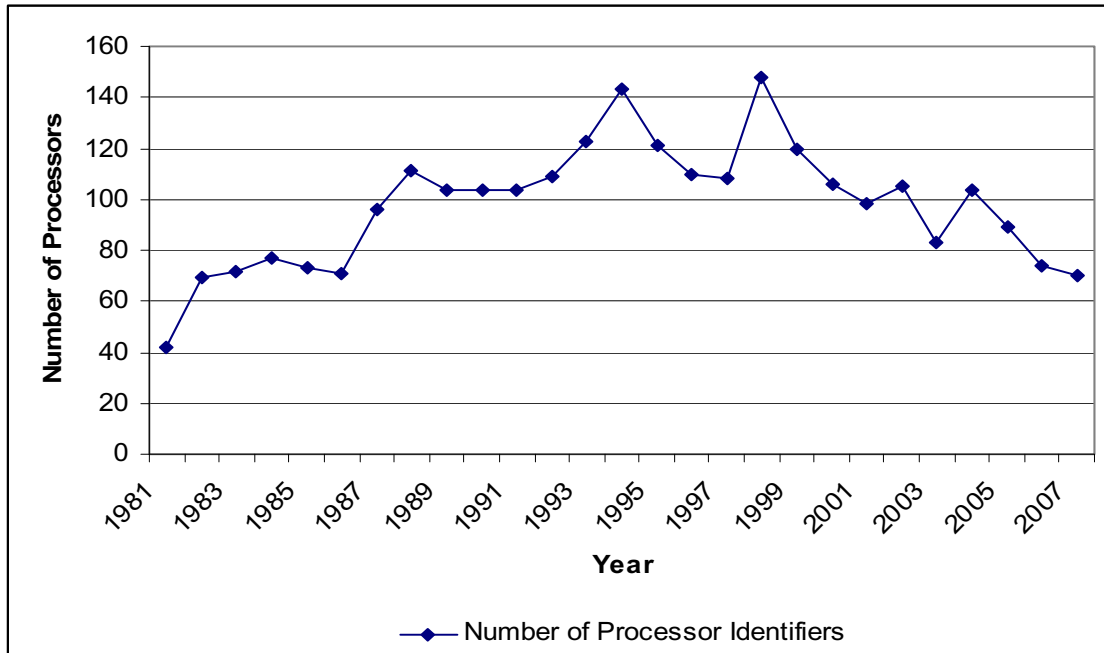


Figure 3-5 Number of Dealers/Processors, San Mateo County: 1981-2007 (PacFIN 2007)

Pillar Point Harbor. From 1985 to 1998, an average of 221 commercial vessels moored at Pillar Point. In March 2008, there were 113 commercial boats moored at the harbor — three months later that number had dropped to 110 (Worth 2008). Of the vessels currently moored here, only about half are described by the harbor master as serious full-timers. Roughly half of this group primarily targets crab. Many captains are also involved in the region’s salmon fishery. Some local fishermen pursue albacore on a commercial basis. California halibut is also a niche fishery.

Harbor Infrastructure. Pillar Point is a mixed use harbor, supporting both commercial and recreational fishing operations and other ocean uses. While tourist traffic is commonplace, the harbor is not geared toward tourism in the manner of Santa Cruz, Monterey Bay, or Santa Barbara.⁷ It rather functions primarily to facilitate fishing activity. The main parking lot surrounds the harbor master’s office, which is located at the head of the pier. A couple of family-owned seafood restaurants and bars are located around the parking lot. They are often frequented by local fishermen and tourists. Some visitors purchase fresh seafood directly from the docks. A small commercial fishing gear store is also in operation here. Public notices, such as new fishing regulations, are posted along the pier. Two recreational tackle and bait shops provide fishing necessities. Kayaks can be rented on the southeast side of the harbor. Until 2003, a boat yard operated in neighboring Princeton, but rising real estate values forced its closing (Stickel 2006). Additional infrastructure includes a few fish buying businesses and retail fish markets, an offloading facility, and a fuel dock.

The capacity of the area’s marine-related services has reportedly been diminishing in recent years. This is indicated by an increasing rate of vessel abandonment. A local official reported that roughly half a dozen boats are abandoned every year, leaving the harbor responsible for

⁷ The San Mateo Harbor District is in the planning stages of adding a boardwalk to the Pillar Point Harbor facility. This is in part intended to introduce visitors to the local commercial fishing fleet.

removal. Many such vessels are dismantled into parts and given away. Local harbor officials attribute the decline to the downsizing of the commercial fishing fleet in general, and to a range of regulatory and economic constraints. One official asserted that rising property taxes and fuel costs have challenged many fishermen in recent years.

A new commercial site is under development on property adjacent to the harbor. An 84-room hotel and various restaurants and shops are planned for the site. Owners of some existing businesses are hoping this will attract new customers to area. Some retailers are upgrading their facilities in anticipation of the new tourist traffic.

Market Infrastructure. For much of the 1990s there were four dockside buyers in Half Moon Bay; now there are only two. At one time, several major truck buyers would come to Pillar Point Harbor to buy from both the large and smaller trawl vessel operations, but that has diminished. The buyer exodus can be attributed to several factors including: rising overhead and fuel costs, low prices resulting from an influx of farmed and imported products in the region's seafood market, and diminished landings. Some informants report that landings diminished most significantly after the implementation of gill net regulations, stricter quotas, and establishment of rockfish conservation areas.



Pillar Point Commercial Pier with New Development in Background

The remaining buyers in Half Moon Bay primarily buy fish from locally based fishermen, but sometimes also buy from outside sources. Crab is the most significant product in terms of volume. At least 15 locally based crab fishermen sell to local buyers. The fleet is active from Crescent City in the north to Morro Bay in the south. Some captains occasionally fish in Oregon, Washington, and Alaska. There is also a local restaurant market for albacore.

Some buyers in the Half Moon Bay area formerly exported locally caught salmon to Japan. In 1989, however, Japanese importers began buying farmed salmon from Canada at a much reduced price. About that time, some local buyers also began to purchase and distribute Canadian farmed

salmon. Free from the vagaries of seasonal availability, farmed salmon provided supermarkets with a stable supply stream. Recently, however, media reports about unhealthy salmon farming practices have improved the market for wild salmon. Given the recent salmon closure along the Pacific Coast, many distributors are using Alaskan salmon to meet the local demand.

Direct Sales. Pillar Point fishermen have recently put much effort into developing a market for sale of fish directly from their vessels. Fishermen participating in direct sales typically advertise their catch of the day on white dry-erase boards strategically located at the end of each dock, and on large banners displayed on their boats. The harbor also maintains a “hot line” that customers can call to determine the catch of the day. These efforts have proven fruitful. Many people now come to Pillar Point Harbor to shop for fresh fish. Currently, about 25 fishermen are involved in direct sales at the harbor. Non-resident fishermen usually sell highly migratory species such as tuna, while resident fishermen primarily sell crab, salmon, and farmed abalone.

In order to participate in direct sales, fishermen are required to possess a fisherman’s retail license (\$80), a certified scale, and a harbor permit (now \$250 per year). A health department permit is not required, as it is when selling at a “farmer’s market.” However, fishermen are not allowed to cut or process the fish in any way.

Pillar Point is an ideal location for direct sales. The harbor is in close geographic proximity to the San Francisco Bay area, and the general population is considered “seafood savvy.” As one fisherman explains, the customers value fresh fish and, for many, buying fish from the harbor is more than a purchase; it is an outing, an experience.

Direct sales have increased demand for high quality seafood products. As the general public becomes aware of the attributes of freshly caught seafood, the overall quality of available fish and shellfish has tended to improve. This is leading to diminished interest in imported seafood and it is tending to increase market prices for locally-landed products. This benefits fishermen and consumers alike. Fishermen are using more ice and undertaking other measures to meet raised expectations. In Pillar Point, the Culinary Institute of America visits the harbor a few times a year to buy fresh fish and create new recipes. This reportedly has fostered an increasingly important and intimate connection between fishermen, chefs, restaurateurs, and consumers.

When direct sales were initiated at the harbor, some were concerned that the fishermen would draw business away from pre-existing establishments. However, some retailers argue that direct sales have enhanced the harbor economy; customers who come to Half Moon Bay to purchase fish often also eat at local restaurants and lodge in the area. Of note, some area restaurants will now cook their customers’ fresh fish purchases.

Santa Cruz County

Overview. Santa Cruz Harbor is located at the northern end of Monterey Bay. It is the main commercial harbor in the county. There is also a small landing facility at Big Creek. Vessels can also be moored at the 855-foot long Capitola Pier (CDFG 2007).

Yachts, sportfishing boats, commercial fishing vessels and smaller recreational vessels (sailboats and kayaks) use facilities at Santa Cruz Harbor. The harbor is divided into four sections. The northern and southern sections are separated by the harbor channel. The western and eastern sections are divided by a bridge that crosses over the harbor. Most commercial vessels are located on the southeast section of the harbor near the offloading station and boat yard.

Principal species offloaded at Santa Cruz Harbor are salmon, Dungeness crab, California halibut, sablefish, albacore, and swordfish. Table 3-7 depicts the combined economic value of the top five species landed at Santa Cruz Harbor between 2000 and 2006.

Table 3-7 Combined Value of the Top Five Species Landed at Santa Cruz Harbor: 2000-2006

Species	Total Revenue (\$)	Total Pounds
Salmon, Chinook	3,014,920	1,176,878
Crab, Dungeness	1,203,417	552,327
Halibut, California	386,528	132,139
Albacore	363,705	342,948
Sablefish	160,734	162,596

Source: CDFG 2007

Santa Cruz County Landings and Revenue. Between 1981 and 2007, total reported landings at Santa Cruz Harbor averaged about one million pounds per year. Ex-vessel values for that same period also averaged about \$1 million. Between 1981 and 1987, landings remained relatively stable, ranging from a low of 264,500 pounds in 1983 to a high of 480,934 in 1987. In 1988, however, landings increased to 1.6 million pounds, increasing by more than one million pounds from the previous year. Landings peaked at over 4.5 million pounds in 1991.

By 2001, landings had dropped to only 370,000 pounds. Landings between 2001 and 2007 averaged only 452,000 pounds (Figure 3-6) (PacFIN 2007).

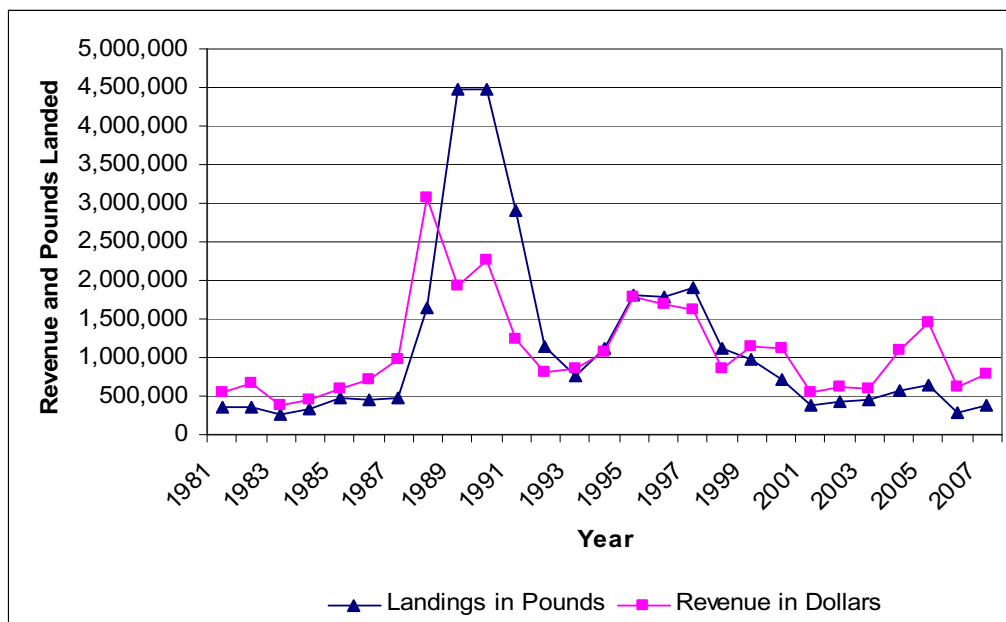


Figure 3-6 Landings vs. Revenue, Santa Cruz County: 1981-2007 (PacFIN 2007)

Vessels, Trips, and Tickets. The number of captains offloading in Santa Cruz County peaked at 495 in 1987. Between 1981 and 2007, an average of 220 captains offloaded in Santa Cruz: local captains made an average of 10.4 trips each year during the period (Figure 3-7). While the number of active vessels has fluctuated since 1981, the general trend suggests a fleet in decline. During the same period, the number of fishing trips dropped from 3,573 in 1981 to 769 in 2007, a 78 percent decrease. The number of fish tickets simultaneously decreased from 3,887 in 1981 to 800 in 2007, a 79 percent decrease (PacFIN 2007).

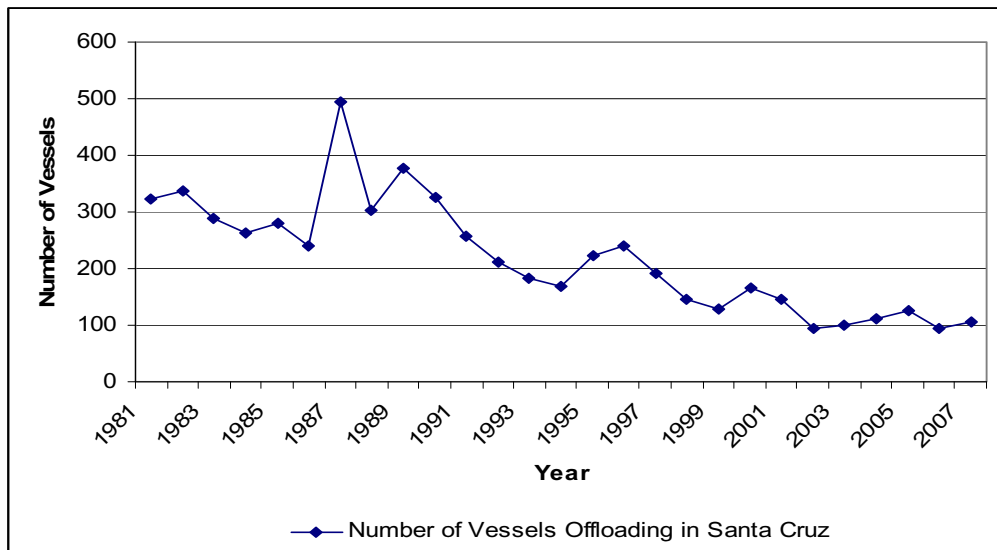


Figure 3-7 Number of Vessels Offloading in Santa Cruz County: 1981-2007 (PacFIN 2007)

Dealers/Processors. Since 1981, the number of dealers and processors active in Santa Cruz County has ranged from a high of 57 in 1994 to a low of 20 during the mid-1980s (Figure 3-8). The average number of active dealers during the period 1981 to 2007 was 37. Three full-time buyers were based in Santa Cruz in 2007.

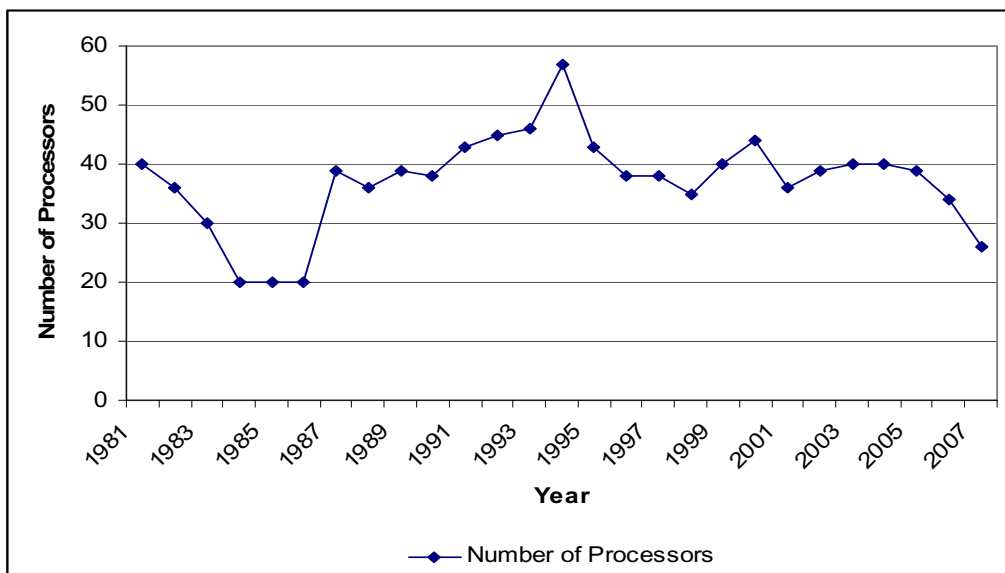


Figure 3-8 Number of Dealers/Processors, Santa Cruz County: 1981-2007 (PacFIN 2007)

Santa Cruz Harbor. Santa Cruz Harbor was an active whaling port until the late 1800s. In 1916, a wharf was constructed to support the areas emerging commercial fisheries. The wharf also became the social center of the harbor. Over the next several decades, Santa Cruz developed as an important commercial port and a summer destination for tourists. By the early 1950s, the primary fisheries were sablefish, sole, rockfish, sardine, salmon, mackerel, albacore, squid, and smelt.

Construction of new harbor facilities was completed in 1964. Numerous fishing vessels used the harbor during this period. By 1975, about 90 commercial fishing vessels were based at the harbor. In 2002, only 45 commercial fishing operations were based here. In 2002, the majority of captains still using the harbor targeted salmon; other important fisheries were crab, albacore, California halibut, and rockfish.

Today, most commercial fishing in the area is conducted on a part-time basis. A knowledgeable fisherman reports that about 12 captains fished on a full-time basis in recent years, and 28 or so fished on a part-time basis.

Although the size of the local fishing fleet has diminished in recent years, public officials feel strongly that the infrastructure supporting the industry must be maintained. Informants assert that commercial fishing activity is very important to the economic status of the harbor.

Harbor Infrastructure. Since 1984, the Santa Cruz Harbor District has secured grant monies to maintain its infrastructure in support of the commercial and recreational fishing industries. Funds were initially used to provide a commercial ice-making machine, cold and frozen storage, and truck loading facilities. Prior to installation of the ice machine, fishermen had to go to Moss Landing or transport ice from Watsonville, which is 15 miles inland from the harbor.

Regular dredging is critical in this dynamic harbor environment. Although three fatalities occurred between 1975 and 1985, none have occurred since a dredging program was initiated in 1986. Bigger berths and a bridge to accommodate transport of gear have been installed in recent years. It is said that these improvements have helped slow attrition of commercial fishing vessels and attract a resident fish buyer.

Marine-related businesses abound in the Santa Cruz Harbor area. At present, there are two kayak outfitters, two bait shops, a commercial dive shop, a sailboat charter operation, a sailboat chandler, a sportfishing charter, a marine engine distributor, a boat broker, a boat sign painter, a canvas worker, a fuel pier, a boat yard, and various marine hydraulic, electrical, and welding businesses.

Market Infrastructure. The buyers in this area purchase what they can from local fishermen, particularly salmon, crab, and albacore. But the quantities of locally caught seafood are not always sufficient to meet demand and most markets now supplement locally caught seafood with imported products.

Several buyers offer various reasons for the decline in the availability of locally caught seafood. First, elimination of the trawl fleet significantly decreased the amount of rockfish and other groundfish in the marketplace. Prior to 2000, two trawl captains offloaded in Santa Cruz: one

has since retired and the other accepted a federal buyout offer. The availability of sablefish diminished once the limited entry program and quotas were established.

The availability of salmon has decreased due to problems with the Klamath and Sacramento runs, and the 2008 closure. Buyers reportedly have increased reliance on imported and farmed salmon.

The availability of albacore has always been seasonal and highly variable. Since 2004, fishermen have tended to land albacore at ports further north, offloading relatively little in Santa Cruz. In 2007, some buyers purchased albacore from Oregon to fill orders.

The swordfish fishery has also had its challenges. Since 2003, the swordfish fishery does not open until November 15 in waters north of Point Sur. This measure was instituted to protect sea turtles. The regulation has led to a shift in effort south, where the season begins three months earlier (August 15). Buyers in northern Monterey Bay area now often purchase swordfish from dealers in Morro Bay or Ventura.

Direct and Indirect Sales Options. Seafood is sometimes sold directly from the harvester to the public in Santa Cruz. More local fishermen are electing to sell directly to consumers, thereby cutting out the middleman.

The direct sales venue typically involves “walk-up” sales. The popularity of direct walk-up sales has varied over time here, largely in association with level of availability and going market prices for salmon, albacore, and crab. Although a number of commercial fishermen have tried their hand at direct sales in the past, few do so today.

Direct sales have been successful in the past partly because of the freshness of the product and partly because the customer is given an opportunity to experience the culture of the harbor. Some sales are conducted through the services of mobile buyers with low overhead. In this scenario, the fisherman sells directly to one of several small-scale mobile buyers who will pay a higher ex-vessel price than can large-scale wholesalers with high overhead costs.

Monterey County

Overview. The commercial fishing industry in the Monterey area dates back to the mid-19th century. Commercially important fisheries have included albacore, groundfish, salmon, sardine, squid, and others. Anglo, Chinese, Italian,⁸ Sicilian, Japanese, Portuguese, and Vietnamese fishermen and buyers have developed and carried out those fisheries over time (Dalton and Pomeroy 2006).

The Monterey Bay Port area includes three major harbors: Monterey (south bay), Moss Landing (east bay), and Santa Cruz (north bay); however, only the first two harbors are within Monterey County boundaries.⁹ Both the Port of Monterey and the Moss Landing Harbor District provide

⁸ Although Chinese fishermen were drying squid and abalone in Monterey in the mid-1800s, Scofield (1956) credits a group of nine Italian fishermen with initiating commercial fishing at the harbor in 1873.

⁹ Monterey Bay area ports are often grouped together for purposes of statistical and socio-economic analyses.

commercial and recreational fishing infrastructure. Two public boat ramps located in Monterey County are at Monterey Municipal Marina and the Coast Guard Pier at Breakwater Cove.

Market squid, spot prawn, salmon, Dover sole, and anchovy constitute the primary fisheries at Monterey Harbor. Squid, sardine, salmon, sablefish, and albacore are the most important fisheries at Moss Landing Harbor, the more active of the two commercial ports in this region. Tables 3-8 and 3-9 show the top five species (in terms of value) landed at Monterey and Moss Landing Harbors between 2000 and 2006.

Table 3-8 Combined Value of the Top Five Species Landed at Monterey Harbor: 2000-2006

Species	Total Revenue (\$)	Total Landings in Pounds
Squid, market	5,906,085	37,688,874
Spot Prawn	2,824,441	271,535
Salmon, Chinook	1,853,300	841,252
Sole, Dover	555,026	1,143,833
Anchovy, Northern	220,784	3,455,582

Source: CDFG 2007

Table 3-9 Combined Value of the Top Five Species Landed at Moss Landing Harbor: 2000-2006

Species	Total Revenue (\$)	Total Landings in Pounds
Squid, market	16,528,886	98,570,770
Sardine, Pacific	7,641,073	176,775,716
Salmon, Chinook	5,795,697	3,008,189
Sablefish	4,337,486	3,602,232
Albacore	2,082,950	3,637,223

Source: CDFG 2007

Monterey County Landings and Revenue. Of the five study counties, Monterey ranks first in terms of pounds landed and revenue; the majority of landings come through Moss Landing. Between 1981 and 2007, reported landings for Monterey County (Monterey Harbor and Moss Landing Harbor combined) averaged 45 million pounds per year. Landings fluctuated only moderately during the period. Between 1981 and 2007, landings ranged from a low of 23 million pounds in 1988 to a high of 96 million pounds in 2002, with peaks in 1997, 2002, and 2007 (Figure 3-9).

Ex-vessel values have diminished 49 percent since 1981. The decline in revenue relates in part to restricted access to groundfish and an increased emphasis on coastal pelagic species (CPS), such as squid, sardines, mackerel, and anchovy. The CPS fisheries tend to be high-volume, with a relatively low price per pound (CDFG 2007).

However, the PacFIN landing data for Monterey County includes statistics from the major ports of Monterey and Moss Landing, and from the lesser port of Mill Creek, but excludes data for the Port of Santa Cruz. Therefore, since we are relying on PacFIN data for county-level analysis, data for the Port of Santa Cruz are considered at the county level in a separate section.

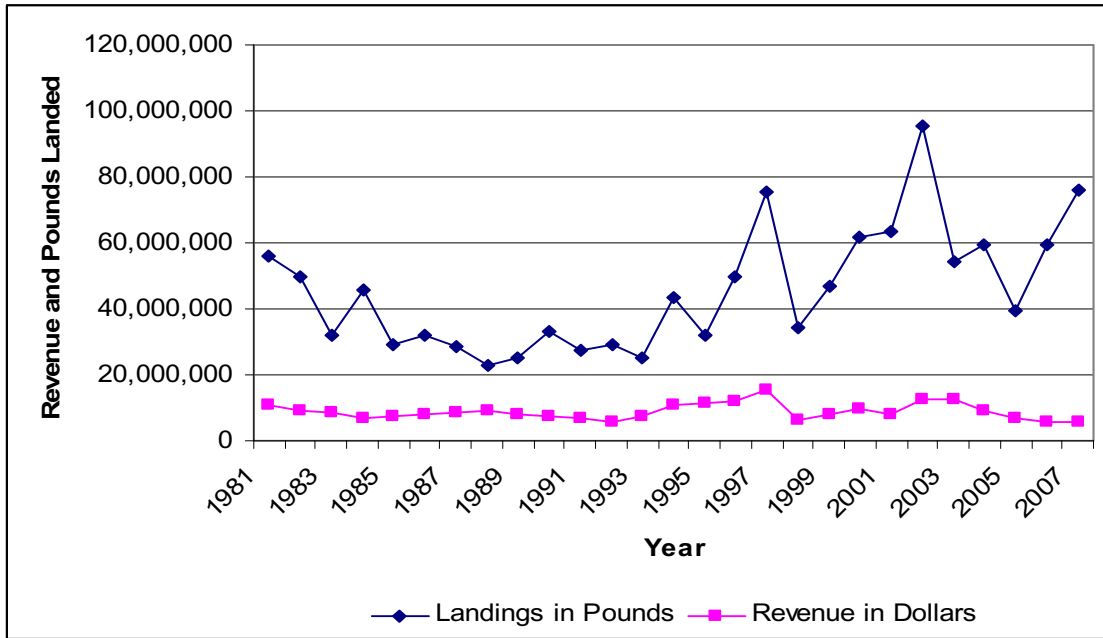


Figure 3-9 Landings vs. Revenue, Monterey County: 1981-2007 (PacFIN 2007)

Vessels, Trips, and Tickets. The number of commercial fishing captains active in Monterey County contracted considerably between 1981 and 2007 (Figure 3-10). The number of active vessels dropped from 918 in 1981 to 173 in 2007, a decrease of 81 percent. During the same period, the number of commercial fishing trips dropped by 76 percent.

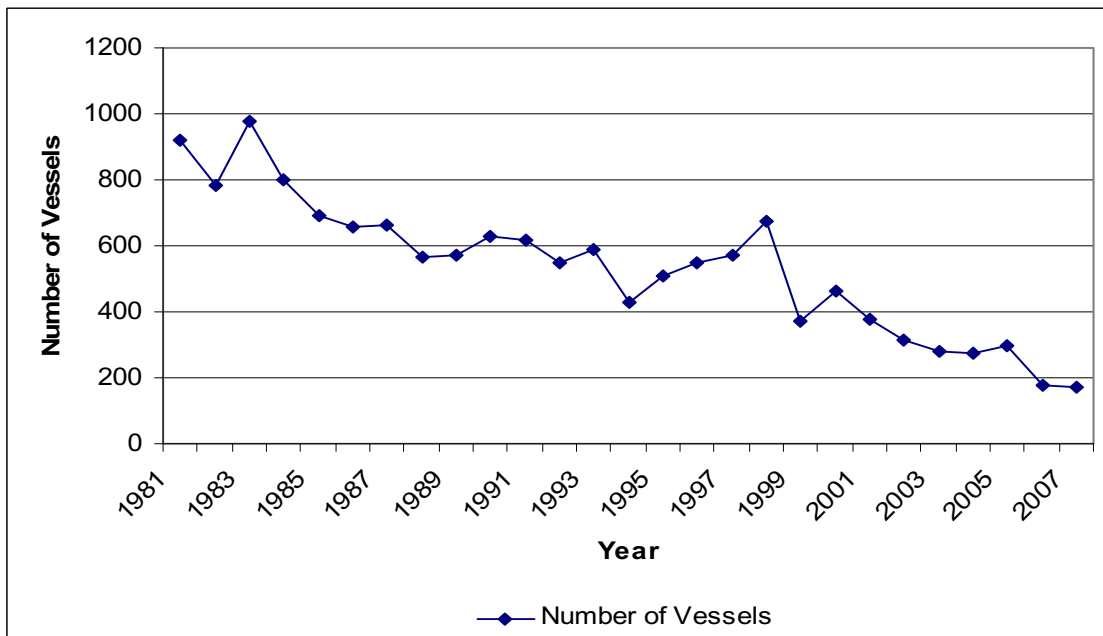


Figure 3-10 Number of Vessels Offloading in Monterey County: 1981-2007 (PacFIN 2007)

Dealers/Processors. The total number of dealers and processors based in Monterey County peaked at 117 in 1991, and began a notable period of decline after the year 2000. Only 35 seafood dealers or processors were active in the county in 2007 (Figure 3-11).

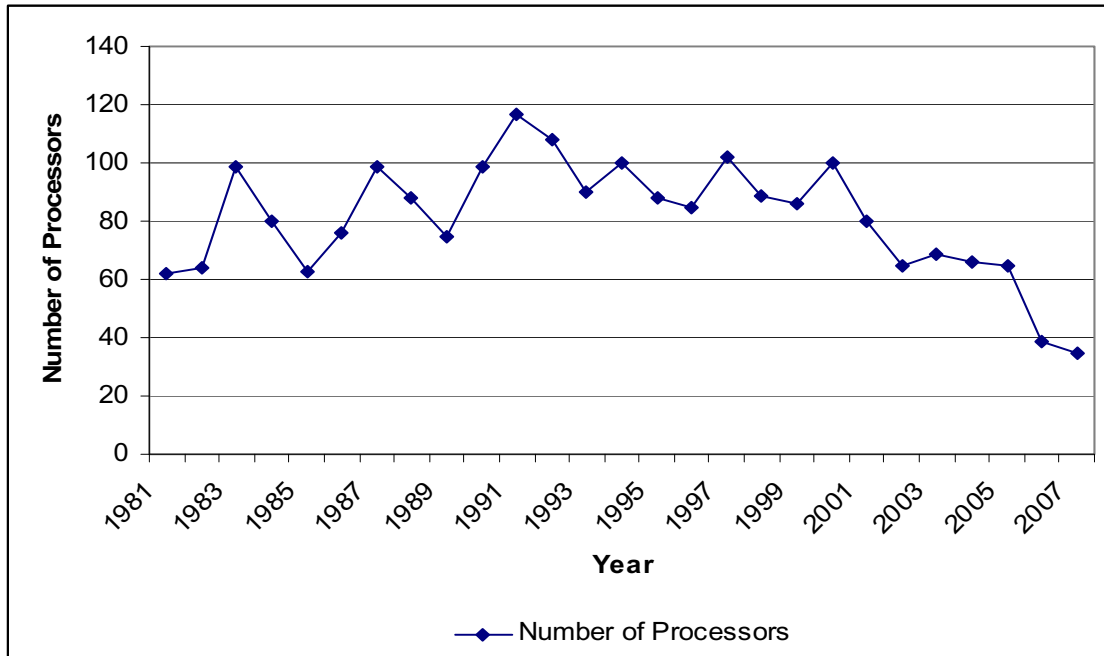


Figure 3-11 Number of Dealers/Processors, Monterey County: 1981-2007 (PacFIN 2007)

Monterey Harbor. Monterey Harbor’s commercial fishing industry began in the mid-1800s. The region’s rich salmon, sardine, squid, albacore, groundfish, and herring resources were pursued by the various ethnic groups beginning to populate the area. Initially, Chinese fishermen focused on squid, Japanese fishermen specialized in abalone, and Sicilians dominated the sardine fishery.

A branch line of the Southern Pacific Railroad reached Monterey in 1880. The rail system provided firms in the burgeoning canned seafood industry with the means to export (Breschini et al. 2000). The Pacific Coast Steamship Company built and operated the only wharf, which came to be known as “Fisherman’s Wharf.” The City of Monterey purchased the wharf in 1916 in order to better provide for the needs of its growing sardine and shipping businesses. The City built a second wharf, Municipal Wharf II, in 1926 (Scofield 1954).

Two sardine canneries were established in 1902.¹⁰ Many more were constructed during and after World War I, a period of high demand for canned protein products. According to an elderly fisherman who grew up around the docks of Monterey, about 200 commercial captains operated in Monterey in 1939 – many were purse seiners.

At the height of the sardine boom, 25 canneries operated along the harbor, distinguishing the area as Cannery Row. By 1945, Monterey was known as the Sardine Capital of the World. Between 1930 and 1950, Monterey Harbor landings averaged 280 million pounds per year, with

¹⁰ “Booth Cannery” and the “Monterey Fishing & Canning Co,” a Japanese canning venture.

a peak of 496 million pounds (chiefly sardines) in 1941. By the early 1950s, however, sardine landings fell to 25 million pounds, and by the mid-1950s, Monterey canneries were processing less than 1,000 tons per year (Hemp 2002).

Monterey processors turned to local squid, anchovy, and jack mackerel (Scofield 1954). After the sardine fishery collapsed, Fisherman's Wharf became a popular tourist attraction and commercial fishing activity occurred mainly at the Municipal Wharf (Monterey Harbor 2003).

The harbor continued to develop through the 1960s and 1970s. A 367-berth marina was completed in 1960. Another 29 berths were added in 1975. Late in 1996, further improvements were completed as part of a \$5 million Marina Reconstruction Project (Monterey Harbor 2008).

Today, the city-owned-and-operated Monterey Harbor provides a range of goods and services to both commercial and recreational fishermen. The commercial dock, Municipal Wharf II, is located on the east end of the Harbor.

In 2002, 145 commercial fishing boats tied up at Municipal Wharf II (Dalton and Pomeroy 2006; Langdon-Pollock 2004). By 2007, the number of commercial vessels had dropped precipitously: approximately 73 commercial vessels were moored in the harbor. The total number of commercial fishing vessels delivering landings to Monterey also declined, from a high of 918 in 1981 to 170 in 2007 (PacFIN 2007).

Currently, Monterey's fleets include wetfish seiners, squid light boats, salmon trollers, groundfish trawlers, and hook-and-line, longline, and trap vessels. Between 1998 and 2005, squid (seine), groundfish (trawl and non-trawl), salmon (troll) and shrimp/prawn (pot) were the most productive fisheries at the port of Monterey (Dalton and Pomeroy 2006). High value species, such as salmon, sea urchin, albacore, and swordfish, were also landed, but in relatively small amounts (Starr et al. 2002). In recent years —2000 and 2006— the top five fisheries in terms of revenue were squid, salmon, spot prawn, Dover sole, and Northern anchovies (CDFG 2007).

Although the wetfish fishery (Northern anchovy, Pacific mackerel, jack mackerel, market squid, and Pacific sardine) has grown in economic importance in the wake of mounting groundfish restrictions, there are fewer active "wetfish" boats, trawlers, and squid seiners in the local fleet each year. About ten wetfish vessels in the Monterey Bay area target wetfish.

Harbor Infrastructure. Marine-related businesses based at Monterey include various seafood distributors, a ships store, a boat yard, a fuel dock, a sushi restaurant, and a kayak outfitter. Additional stores and services are located nearby in Monterey's Central Business District. As recently as 2002, seven seafood distributors were based in Monterey. Only two remained in 2007. The number of commercial fishermen docking at Breakwater Cove Marina along Cannery Row has also declined. Huntington (2006) reports the perspectives of a long-time Monterey processor on the current situation:

These are tough times for Monterey fishermen. There used to be a lot more hustle and bustle around the wharf. Boats were unloading all the time. A large crew of cutters was employed just to clean fish. Now there are only two of us fish cutters. We might get our

bi-monthly quota in a week or less and then have to sit here with our boat tied up to the buoy for the remainder of the two months. ... We would love to keep the fish market going, but we don't know if we're going to make it. We have to create other avenues for the business. Our fixed overhead is more than we can afford with rising fuel, labor, insurance, and repairs to the boat. A lot of times, there isn't anything left.

According to one longtime resident, the marina has changed significantly in recent years. Thirteen years ago, she explains, 85 percent of the boats in the boat yard were commercial; now, yachts and other pleasure craft make up the majority. She also asserts that the customer base has changed: "We have always had little guys [20- to 25-foot boats]; but now our clientele is changing from middle-class to big-money people."

The boat yard reportedly was uncharacteristically empty in June 2008, and local fuel sales were significantly lower than usual. An employee attributes the lack of business to several factors, most notably to the salmon closure and high fuel prices.

Harbor officials are well aware of the decreasing scale of the region's fisheries. The capacity to maintain a multi-million dollar wharf infrastructure in the absence of robust marine fisheries is a growing concern.

At the same time, many of the harbor's tourist-related businesses are often very busy. The old commercial wharf now houses a row of tourist-friendly restaurants, gift shops, and charter tour operations. Visitors can arrange for whale-watching trips, glass bottom boat tours, and sportfishing trips.

In May 2008, a well-known Monterey public official spoke before the California Senate Joint Committee on Fisheries and Aquaculture. He discussed several local projects in need of outside assistance. He noted that the Port of Monterey could benefit from the following upgrades: (1) a project to widen the wharf, thereby facilitating a safe and easy turn around for large trucks; (2) a program to increase the availability of recycled bio-diesel to help fishermen reduce fuel costs; and (3) development of a website profiling local fishermen, restaurants, and fish markets that distribute locally caught seafood. The official asserted that such a program could help educate consumers about sustainable fishing practices and encourage better seafood choices.

Market Infrastructure. At peak production in 1945, 24 canneries lined Monterey Bay. The Hovden Cannery, built in 1916, was one of the most productive canneries on "the row." During the sardine boom of the 1940s, the cannery typically processed some 250,000 tons of fish and employed 4,000 people each year. After the sardine catch fell by more than 90 percent in a matter of a few years in the early 1950s, Hovden Cannery switched from sardine to squid. In the 1960s, only three major canneries remained in operation. Hovden, the last cannery to close, shut down all production in 1973. The Monterey Aquarium opened its doors in 1984 in the building once occupied by Hovden Cannery (Destination Cannery Row Group 2005).

Although the canneries are gone, the seafood processing industry is still active in the Monterey area. In the early 1970s, five seafood processors operated in Monterey. Three of those firms went out of business following implementation of groundfish regulations in the late 1990s and vessel buyback programs in the early 2000s, but others took their place.

Processors are challenged by occasionally poor landings of certain species. There is a notable degree of dependence on imported products for meeting consumer demand. Consequently, a fisherman notes, “Even if the fish show up, [there often is] nowhere to sell.”

Some processors explain that squid has replaced groundfish as their “bread and butter” species. Squid season usually lasts from April to August in the Monterey area; the creatures are found further south between September and February. Squid is a particularly important fishery here due to world-wide demand for a limited, high quality supply. Currently, the majority of squid offloaded in Monterey are processed for export to China, Japan, and Europe.

There is now an important market for squid in China, where a high quality squid product is in growing demand. This higher-priced market translates into roughly \$600 in profit per ton to the fisherman and \$1,300-1,400 to the buyer. There is some added cost due to packing, freezing, and shipping of the product to Asia.

However, processors cannot depend solely on squid landings to stay in business. The availability of squid fluctuates seasonally due to temperature changes and other factors, and periodically due to oceanic regime shifts (Yaremko 2001). Some fishermen report that years with northwesterly winds are associated with upwelling events and the presence of larger squid. Smaller squid are typically processed as bait, which returns less revenue.

In response to diminishing overall availability of local seafood products, most dealers and processors have reorganized their operations. Strategies often involve increasing reliance on imported and farmed seafood products (some estimate imports of up to 80 percent) and/or shifting from processing to distribution. A few informants in the processing industry report concerns about the rising costs of operating on the waterfront and are considering the benefits of reduced property taxes at various inland locations.

Many processors have had to downsize their staff to reduce labor costs. One way processors offset labor costs is by hiring independent contractors. For some Monterey Bay area processors, this strategy reduces Workman’s Compensation rates by 13 percent per employee. But there are long-term disadvantages to this strategy in that high turnover rates among contractors means that the processing crews are often somewhat inexperienced. On the other hand, some processors are having a difficult time retaining employees when all they can offer is part-time work.

Processors sometimes blame the establishment of quota allocation systems for problems associated with periodic flooding and drought in the marketplace. These include volatile pricing and difficulty keeping processing crews busy on a consistent basis. According to one veteran processor who has since left the industry, “It’s impossible to maintain a [processing] crew when 25,000-30,000 pounds of fish is slammed into a few days a month.”



Workers Processing Fillets at Fish House in Monterey

Direct Sales. Because the number of seafood dealers in the Monterey area has decreased over time, fishermen have fewer venues for sale and less overall bargaining power. But, the direct sales option is not a viable alternative since the city council is concerned about liability issues. Several influential and well-established fish buyers also oppose the direct sales option.

Moss Landing Harbor. Moss Landing Harbor is divided into northern and southern sections, with commercial fishing activities concentrated in the South Harbor area. A 70,000-foot dock with 609 berths serves both commercial and recreational vessels (Moss Landing Harbor District 2006). The Monterey Bay Aquarium Research Institute (MBARI) and Moss Landing Marine Laboratories are also located in the South Harbor area.

Commercial operations in the south section of the harbor area include two mid-sized seafood buyer/offloaders, one fuel dock, one boat yard, and a few restaurants. Commercial fishing crews sometimes repair their nets in the south section parking lot.

Moss Landing Harbor first developed as a whaling station in the mid-1800s. It continued in this capacity through the early 1930s, when it began to emerge as a major processing port. The State Legislature established Moss Landing Harbor District in 1947. By the 1950s, eight canneries and reduction plants were based at the harbor, as were nearly 40 commercial fishing vessels. The latter included various purse seiners, salmon and albacore trollers, and a few trawlers. During the heyday of the sardine fishery, landings averaged around 15,000,000 pounds per year. In 1951, landings had diminished to only 4,000,000 pounds (Pomeroy and Dalton 2003; Scofield 1954).

After the collapse of the sardine fishery in the Monterey Bay area, many of the fishermen with large seiners relocated to San Pedro. Monterey Bay area processing plants had to rely on fish trucked in from other locations, such as Tomales Bay and San Francisco. Some Monterey area fishermen eventually shifted into new fisheries, including anchovy, squid, herring, and jack mackerel (Scofield 1954).

Moss Landing is one of the most productive fishing ports in the State of California. In 2001, Moss Landing ranked third in the state in terms of pounds landed and fourth in terms of ex-vessel revenue. In 2006, Moss Landing ranked second in the state in terms of pounds landed, but fell to ninth in ex-vessel revenue (National Marine Fisheries Service 2007).

Moss Landing-based commercial fishing operations typically account for more than 80 percent of revenue generated by the harvest sector in Monterey County. In recent years, the primary fisheries have been coastal pelagic species (CPS), groundfish, salmon, and highly migratory species (HMS). The Dungeness crab, California halibut, and spot prawn fisheries are also economically significant.

In 2007, Moss Landing was homeport for roughly 30 active commercial fishermen.¹¹ Of those, approximately 16 targeted salmon and/or crab, and ten were purse seiners. Many contemporary fishermen once targeted rockfish but transitioned into other fisheries as opportunities diminished due to various regulatory actions. The harbormaster reports that some 200 or more transiting vessels regularly stop at the harbor each year for fuel, supplies, or other services.

Moss Landing Harbor attracts relatively few visitors. Some tourists visit Elkhorn Slough to kayak, view wildlife, or walk along the beach. But there is no urban center or business district to visit as in the case in Monterey or Santa Cruz.



Scene near Elkhorn Slough National Estuarine Research Reserve

¹¹ Nearly 80 percent of the fishermen who offload at Moss Landing also reside in Monterey County (Pomeroy and Dalton 2003).



Moss Landing Harbor with Utility Plant in Background

Harbor Infrastructure. Seven seafood buyers were based in Moss Landing in 2002. Five dealt primarily in wetfish. In 2008, only two buyers were still operating in the area. The majority of wetfish offloaded at this harbor are transported by truck to processing plants in nearby Watsonville and Salinas (Pomeroy and Dalton 2003).

Moss Landing's commercial fishing industry and support businesses face considerable short- and long-term economic challenges. Clearly, the downturn in the commercial fishing industry is affecting the viability of local businesses. These challenges are described below.

Moss Landing Fuel Dock. A single fuel supplier has been operating at Moss Landing since 1989. A mobile fuel truck service went out of business in 1984, and a second supplier went out of business after the Loma Prieta earthquake in 1989. Currently, commercial fishermen purchase 80 percent of all fuel sold at the Moss Landing fuel dock. Many recreational anglers and boaters trailer in and purchase fuel elsewhere.

Several events have led to diminished sales at the Moss Landing fuel dock. These include: 1) removal of the large trawl vessels from the fleet;¹² 2) movement of the northern swordfish fleet to south of Point Sur, which drew large commercial swordfish vessels away from the Moss Landing area; and 3) recently weak seasonal runs of albacore and salmon. The 2008 salmon closure, along with a weak albacore season, is reportedly exacerbating challenges already being experienced by fishermen in the current economic climate.

Weak sales at the fuel dock have also affected the type of customer service provided to local fishermen. In the past, fuel suppliers could afford to defer payment from valued customers.

¹² Prior to 2003, seven trawlers would regularly purchase fuel from the Moss Landing fuel dock.

Now, because of fuel costs ¹³ and an overall decline in sales, the suppliers are no longer able to offer credit. Some fishery participants speculate whether or not the fuel dock can remain open under current economic conditions.

Boat Yard. The Moss Landing boat yard has been in business since the early 1950s. In 1995, the yard's services and staff were cut back considerably as a result of rising Workman's Compensation costs. This continues to be a problem today. Diminishing business from the commercial fishing industry is also a problem. Until 2002, 90 percent of boat yard business came from commercial fisherman, primarily trawlers. Today, commercial fishermen comprise only about 50 percent of the client base.

Customers preparing for salmon season formerly would come from Morro Bay, Santa Cruz and, even from Oregon and Washington States for service and, until recently, many booked appointments a year in advance. This year, with no prospects at all, many salmon fishermen are canceling reservations and deferring annual maintenance.

Overall Loss of Infrastructure. The service capacity at most of the ports around the study region reportedly has diminished in recent years. Local officials attribute the decline to several factors, but especially to the downsizing of the region's commercial fishing industry. The departure of the trawl fleet has been particularly significant since participants formerly purchased large amounts of fuel, ice, and various services. Following the departure of the trawlers, support service businesses have also departed or are struggling to remain in business. As such, there is less tax revenue available to fund repairs and projects that formerly supported the fishing industry.

The general decline of the commercial fishing industry at Moss Landing has meant that increasing operating costs are exceeding harbor revenues. Pomeroy and Dalton (2003: v) observe that:

Decreases in allowable catches for some species coupled with stagnant or declining prices have made it difficult for some fishermen to pay their slip fees and do basic vessel maintenance. The resulting reduced revenues limit the ability of support businesses and the Harbor to support themselves, and to provide goods and services to the larger community, as well as the industry. Reduced landings limit fish buyers' ability to provide a dependable supply of fish to their markets, and can result in loss of those markets to other sources. Moss Landing lacks the industrial infrastructure, available land, and zoning needed for new fish processing and fishery-support businesses.

At present, an estimated 25 to 30 commercial fishing vessels are moored at Moss Landing; the rest are yachts, sailboats, and other recreational vessels. The increasing number of empty slips at Moss Landing is a concern for harbor administrators since harbor districts must meet a commercial vessel quota set by the Army Corps of Engineers in order to be eligible for dredging.

¹³ On July 1, 1999, diesel fuel at Moss Landing sold for \$1.05 per gallon; as of July 1, 2008, it sold for \$4.77 per gallon (EFIN 2008).

Market Infrastructure. Over the last ten years, three processors have gone out of business in the Monterey area, including a formerly highly productive cannery. Two buyers/processors currently operate in Moss Landing. Five retail seafood markets formerly operated at Moss Landing. Today, only two remain.

Direct Sales. Direct sales are not as common in Moss Landing or Monterey as they are in other Central California ports. Some local buyers reportedly do not want the extra competition posed by direct sales, and many fishermen report that they do not want to jeopardize rapport with a steady buyer.

Seafood Processing. In the 1980s, Moss Landing processors dealt primarily in locally caught rockfish, salmon, albacore, flatfish, swordfish, California halibut, squid, and shark. Today, squid is the principal local product. Processors now often rely on scallops, clams and mussels from the East Coast and tuna from overseas.

Some processing firms operated five days per week in the early 2000s. Today, the remaining firms often operate only during part of each week. Some fishermen relate that the price of non-resident landing permits in California has contributed to the loss of local processors by reducing the supply of seafood. For example, non-residents in Oregon pay only \$20 a year to land tuna, and those in Washington pay \$170 a year. A California non-resident permit costs \$1,400 annually.

In 2006, the research entity known as Moss Landing Marine Laboratories (MLML) purchased a fish offloading facility formerly owned by a major seafood processor. This purchase provided MLML with a place to moor its research vessel and thereby further its research interest in the region. One of those interests includes an effort to create a locally sustainable market for seafood by converting the currently high volume-low value wetfish market into a low volume-high value fishery. It is hoped that higher ex-vessel values will provide fishermen with an economic incentive to reduce the amount of fish being harvested (Abraham 2008).

Not all fishery participants are pleased with MLML's latest acquisition. Some feel pushed out by the increasing presence of research institutions in the region. The Monterey Bay Aquarium Research Institute (MBARI) was the first to locate in Moss Landing. Founded in 1987, MBARI berths three research vessels and two remotely operated vehicles at Moss Landing.

Because the MBARI and MLML research vessels are too large to fuel up at the Moss Landing fuel dock, and because there are basic ideological differences between some fishermen and researchers, certain fishermen assert that the institutions are not supporting the fishing community. A counter argument can also be made: that marine research can benefit those who depend on the ocean for a living, even if local benefits are not readily apparent. Local restaurants reportedly derive lunchtime patronage from employees who work at these research institutions.

Seafood Buyers/Distributors. Generally speaking, there are three types of seafood buyers: 1) those who sell primarily to restaurants; 2) buyers who sell to other buyers (a.k.a. "distributors"); and 3) buyers who specialize in exports, such as tuna and squid, for the foreign market. Some of

the larger operations provide all three services. Other mid-sized buyers both offload and distribute to maximize their profits. Still other buyers deal in volume. The one constant between buyers is the ongoing struggle to secure enough product to satisfy demand; as is noted throughout this chapter, most cannot rely on local seafood and therefore must import fish (fresh, frozen, and farmed). Mid-sized buyers who need large quantities of fish to meet demand and make a profit may import as much as 80 percent of their products. Much of the imported seafood, including rockfish and salmon, reportedly comes from Canada. However, the demand for local fish, especially salmon, crab, and live fish, remains strong. Sablefish (black cod), thornyheads, hardheads, and spot prawn currently drive the live fish market. Albacore, squid, and hagfish (slime eel) are largely destined for foreign markets at this time.

Buyers who have worked extensively in Moss Landing explain how both natural and regulatory events have affected the seafood processing business. Historically, some of the biggest fisheries were swordfish, rockfish, salmon, and sablefish. One buyer describes swordfish as his “winter bread and butter.” Boats would come down to Moss Landing from the north and up from the South when the warm weather currents brought swordfish. On average, processors could buy swordfish from about 35 boats per year. Now, because the season opens three months earlier south of Point Sur than it does in the north, the majority of swordfish landings are offloaded in Morro Bay. By the time the season opens in Monterey, the weather tends to be rough and there are very few swordfish, if any, remaining in the waters.

Chilipepper rockfish (*Sebastes goodei*) was also a historically important local seafood product. Now, local buyers often rely on chilipeppers imported from Canada to meet customer demand.

Salmon was another high volume fishery in years past. In recent years, an average of 20 local captains would deliver salmon to Moss Landing buyers, with another 100 or so non-local captains offloading throughout the season. The 2008 salmon closure has precluded the distribution of regionally caught salmon throughout the Central Coast.

Locally caught spot prawns have not been readily available since the Soquel Canyon MPA was established in 2007. In order to satisfy local demand, some retailers are now importing trawl-caught prawns from Mexico. One seller asserts that MPA restrictions have disrupted the local supply and increased demand for unsustainable “third world” shrimp which are caught with gear that endanger dolphins. Prices for local spot prawn reportedly are quite high. One fisherman reports that he was getting \$15 per pound (ex-vessel price) for spot prawn during the course of this study, which he asserted was the highest priced seafood in California.

Regulatory changes reportedly have had a significant impact on sablefish production. In particular, sablefish deliveries dropped notably following a change in the open access quota. When the quota was lowered from 200,000 pounds to 24,000 pounds, at least ten sablefish fishermen left the industry as they were no longer able to make ends meet. Currently, open access quotas for sablefish are just 2,200 pounds for a two-month period. The ex-vessel compensation for that quota is roughly between \$2,500 and \$4,000, depending on how much of the catch is sold on the live fish market. Those with limited entry permits have a quota of 5,000 pounds per two-month period. Some buyers predict that open access sablefish fishermen in Monterey will not survive the double economic threat of low quotas and high fuel prices. Those

with either non-endorsed longline permits or tiered permits (limited entry) reportedly will be able to sustain operations longer.

The federal buyback program led to the retirement of the four trawl vessels that formerly offloaded at Moss Landing, thus reducing the quantity of available fish to local buyers. Three of those vessels were from the Monterey Bay area. More recently, one of the remaining trawl fishermen targeted California halibut in Monterey Bay, but lost those grounds in 2006 when trawling was prohibited within all state waters inside Monterey Bay. Only hook-and-line is now permitted to catch California halibut in the grounds that remain, and this will only be possible a few months of the year when California halibut reside in shallower water. That fisherman has now shifted into another less lucrative fishery.

Regulatory changes and the cyclical nature of production in some fisheries have resulted in the loss of several major seafood distributors along the Central California coast. This has allowed small and mid-sized local buyers to fill the gap. But small firms can also experience problems obtaining a sufficient amount of seafood to meet demand.

Some of the smaller buyers have formed exchange networks to help solve the supply problem. Others buy directly from the fisherman, rather than from an offloader or other distributor.

Despite the variety of challenges now confronting participants in the harvest and distribution sectors, Moss Landing continues to be one of the leading fishing ports in California. In recent years, it has also been a leading producer among U.S. ports, ranking 13th and 17th in total landings in 2007 and 2008, respectively.

San Luis Obispo County

Overview. Agriculture, fishing, fish processing, and manufacturing have long been important industries in San Luis Obispo. Educational services, health care, social assistance, tourism, and construction have become increasingly important in recent decades. Retail sales are also significant. Today, the agriculture industry employs just three percent of the county's labor force (U.S. Census Bureau 2006), down significantly from decades past.

The three ports in San Luis Obispo County are: Avila (commercial); Morro Bay Harbor (commercial/recreational); and San Simeon (small scale commercial/recreational). Avila and Morro Bay Harbors provide docking, mooring, and processing facilities. San Simeon is often used by small-boat captains during adverse weather conditions (California Coastal Management Program 2001). Morro Bay Harbor is currently the county's most active commercial fishing port, followed by Avila. Commercial landings at San Simeon are minimal.

In recent years, the most lucrative fisheries at Morro Bay have been spot prawn, albacore, salmon, swordfish, and cabezon. At Avila, rockfish (brown and thornyhead), Dover sole, albacore, and Dungeness crab have been most lucrative. Tables 3-10 and 3-11 show the five most valuable species landed at Morro Bay Harbor and Avila between 2000 and 2006.

Table 3-10 Combined Value of the Top Five Species Landed at Morro Bay Harbor: 2000-2006

Species	Total Revenue (\$)	Total Landings in Pounds
Spot prawn	3,014,652	361,041
Albacore	2,465,259	3,109,116
Salmon, Chinook	1,561,672	717,141
Swordfish	1,512,935	657,793
Cabezon	1,194,008	282,613

Source: CDFG 2007

Table 3-11 Combined Value of the Top Five Species Landed at Avila Harbor: 2000-2006

Species	Total Revenue (\$)	Total Landings in Pounds
Rockfish, brown	979,052	199,074
Sole, Dover	835,229	2,394,397
Thornyhead (longspine)	587,059	1,239,390
Albacore	428,977	347,929
Crab, Dungeness	328,129	170,742

Source: CDFG 2007

San Luis Obispo County Landings and Revenue. Between 1981 and 2007, reported landings at San Luis Obispo ports averaged eight million pounds per year, with a combined average ex-vessel value of \$6 million. Combined landings peaked in 1985 at 15.3 million pounds. Total combined landings reached a 27-year low in 2007, amounting to only 653,281 pounds (Figure 3-12) (PacFIN 2007).

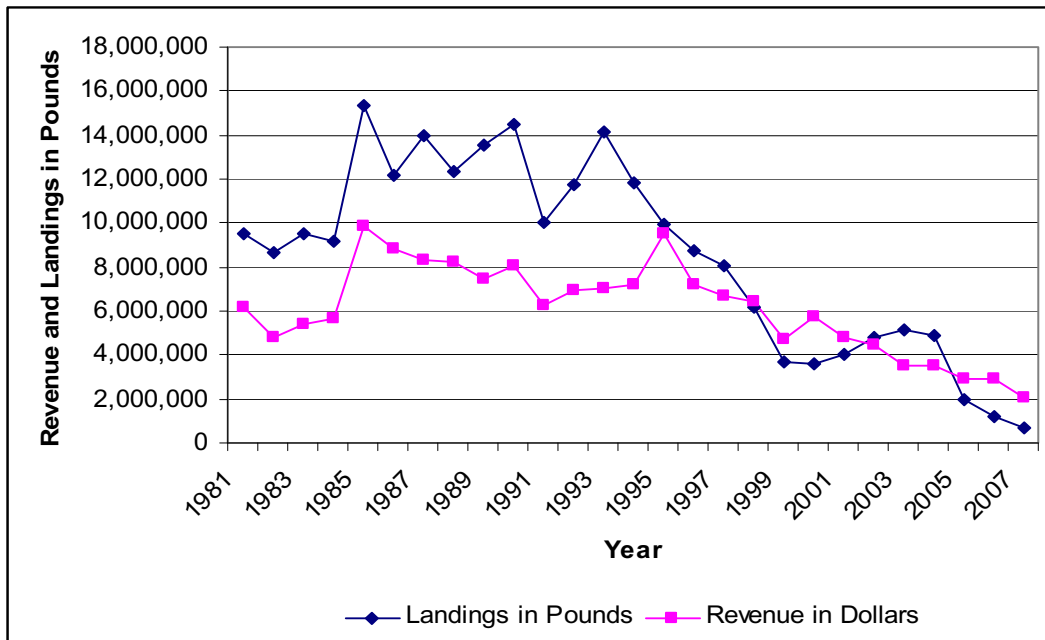


Figure 3-12 Landings vs. Revenue, San Luis Obispo County: 1981-2007 (PacFIN 2007)

Vessels, Trips, and Tickets. A trend of diminishing participation in the region’s commercial fisheries is evident in the declining number of fishing trips, fish tickets, and active captains. The number of commercial captains offloading in San Luis Obispo County has decreased 72 percent since 1981, with the most precipitous decline occurring after 1994 (Figure 3-13). The number of fishing trips dropped 60 percent during the same period. The average number of annual trips

made by each captain increased from 12 to 17 during the period. Thus, it appears that fewer captains were fishing harder to catch less fish. In that same period, the total number of fish tickets at the three ports also decreased by 63 percent, dropping from 8,161 to 3,032 (PacFIN 2007).

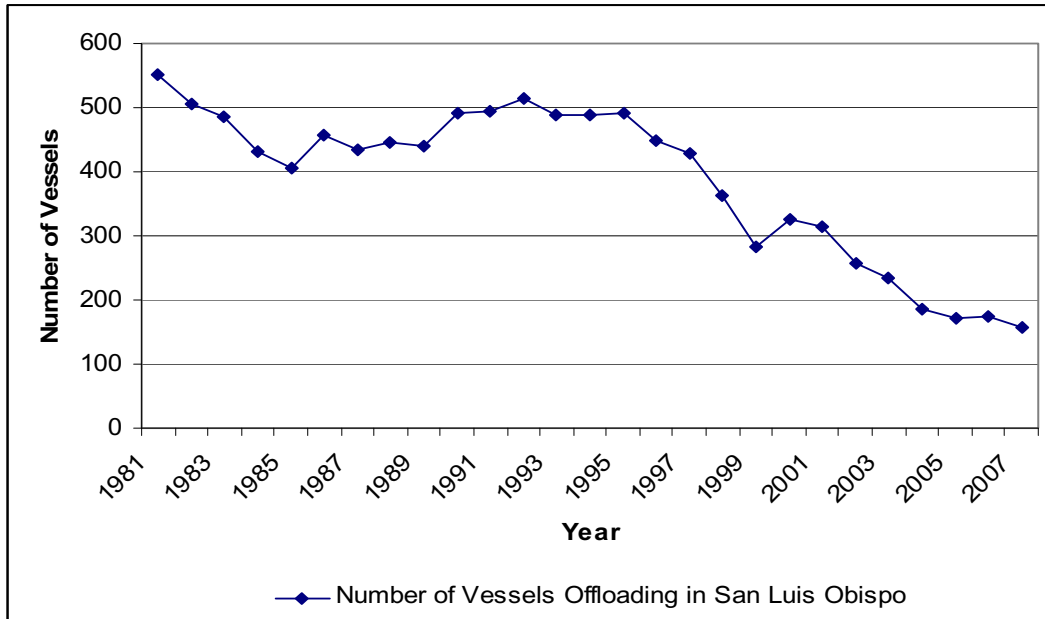


Figure 3-13 Vessels Offloading in San Luis Obispo County: 1981-2007 (PacFIN 2007)

Dealers/Processors. The number of processors or wholesale fish dealers in San Luis Obispo County has fluctuated throughout the years, ranging from a high of 101 in 1993 to a low of 43 in 2007. An average of 67 dealers or processors was based in the county during any given year during the period (Figure 3-14).

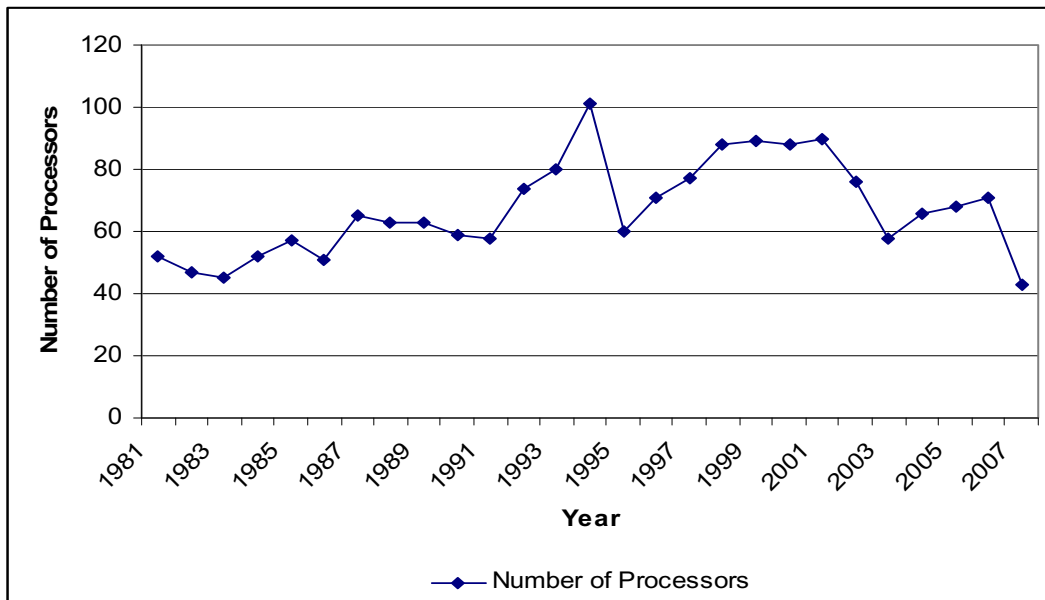


Figure 3-14 Number of Dealers/Processors, San Luis Obispo County: 1981-2006 (PacFIN 2007)

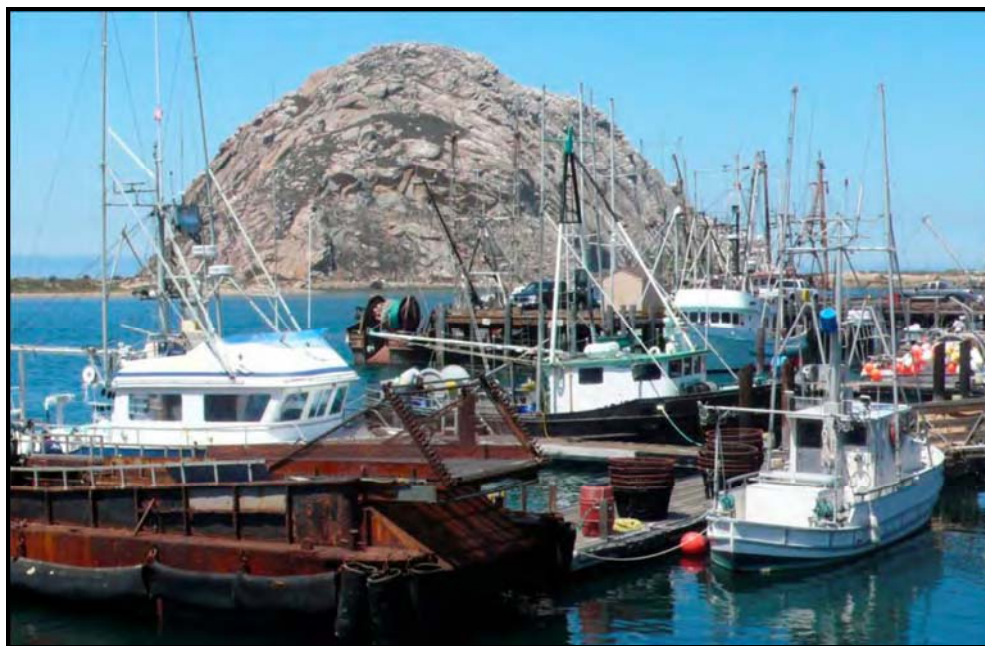
The low amount of fish now offloaded in Morro Bay does not support multiple processing facilities in this region. Regional landings have trended downward since the mid-1990s following federal and state restrictions on groundfish fishing, and bans on gill nets, and set, vertical, and troll lines.

Morro Bay Harbor. Morro Bay has supported commercial and recreational fishing activities since at least the 1930s. Sullivan (1997) reports that, in 1935, at least 150 fishing vessels operated out of Morro Bay Harbor.

Between 1930 and 1950, the commercial fleet in Morro Bay offloaded an average of 1.6 million tons of sardines each year. The sardine fishery peaked in 1951 at 11 million pounds. The sardines were trucked north to processors in Monterey and San Francisco, or south to San Pedro. The harbor became an active processing center in the 1960s.

Other historically important species included abalone, crab, and rockfish. Deep-water trawl grounds were discovered in the region in the early 1950s (Scofield 1954).

Today, Morro Bay Harbor has 400 berths and 150 mooring spots. In 1990, 355 commercial fishing vessels were moored here. By 1998, that number had dropped to 111 (Marshall and Associates 1998). In 2007, commercial fishing vessels numbered only 48. Salmon vessels comprised roughly half of that fleet.



Morro Bay Harbor

Harbor Infrastructure. The capacity of the infrastructure at Morro Bay Harbor to serve the commercial fishing industry is increasingly limited. While there were two active boat yards in the area for nearly half a century, none are currently operating. One business was sold in 1997 and the other ceased functioning in 2007 (Marshall and Associates 1998).



Commercial Vessels at Morro Bay Harbor in 2007

Business at the Embarcadero fuel dock reportedly has been in decline since the late 1980s, and increasingly so in the last few years. The Nature Conservancy's buy-out program is frequently described by fishery participants as having had a major effect on business. This is because a single trawler holds between 5,000 and 10,000 gallons of fuel and hundreds of pounds of ice, while the smaller hook-and-line boats used for salmon and albacore trolling carry only 125 to 200 gallons of fuel and much less ice. Given reductions in demand for fuel and ice, the owner of the fuel dock is thinking about closing the operation.

The City of Morro Bay has helped commercial fishermen by subsidizing slip rents and, with funding assistance from the California State Coastal Conservancy,¹⁴ making improvements at the harbor. "Measure D" was a City-driven effort to prevent tourist-related businesses from pushing the commercial fishing industry out of the waterfront. In 1984, this resulted in the rezoning of the north end of the Embarcadero for waterfront-dependent uses only. Existing restaurants and other businesses were allowed to stay. In recent years, the City Council has been pressed to consider modifying Measure D zoning as some argue that there is now insufficient commercial fishing activity to restrict other kinds of businesses, especially along the largely unused northern portion of the harbor (Gustaitis 2005).

Avila Harbor. Like many other California ports, Avila developed as a small whaling station in the mid-1800s. Commercial fishing grew in importance, and, between 1930 and 1950, average annual landings were around 2.7 million pounds, most of which were sardines. In the early 1950s, jack mackerel, abalone, rockfish, crab, and albacore superseded sardines in economic importance (Scofield 1954). Today, groundfish such as Dover sole, thornyhead, and brown rockfish are among the most valuable fisheries in the area.

¹⁴ The California State Coastal Conservancy is a state agency established in 1976 to purchase, protect, restore, and enhance California's coastal resources.



Sun Setting on Morro Bay Commercial Dock

Avila Harbor is under the jurisdiction of the Port San Luis (PSL) Harbor District. There are three piers here, two of which are open to the public. The Harbor District operates and maintains the boat launch, ice facility, fuel dock, and offloading dock. Boat repair and supply and storage for commercial gear and trailer boats are also available (Langdon-Pollock 2004). There are no facilities for permanent moorage.

Harbor Infrastructure. As is the case at Morro Bay, the infrastructure at Avila Harbor is aging and increasingly limited in its capacity to serve the commercial fishing industry. This is in large part the result of the circular process noted elsewhere along the Central Coast, wherein a declining commercial fishing industry diminishes the tax base available for maintenance of infrastructure, which in turn has a negative impact on the fleets. The loss of revenue formerly generated by the trawl fleet has had a particularly detrimental effect in this regard, and local officials describe funding-related challenges with Avila's fuel dock and ice machine.

In recent years, the Harbor District has endeavored to improve the economic viability of the Avila waterfront. Tourism-related retail businesses are becoming more numerous. A local official explains the situation by noting that the commercial fishing industry is no longer the biggest source of revenue in the area and that demand for tourist-related facilities and services is on the rise. Indeed, in 1994, commercial fishing vessels occupied 170 moorings while today only 128 moorings are designated for use by commercial fishing vessels, and a variety of new services are available in the area to meet the demands of recreation-oriented residents (California Coastal Management Program 2001).

San Simeon. A whaling center was established in San Simeon Cove during the latter half of the nineteenth century. Although it functioned as a small shipping port, further growth was limited

by its remote location. According to Scofield (1954), a small fishing fleet moored in the cove during the 1930s and 1940s, with average annual landings around 200,000 pounds. The author also notes that albacore, shark, and lingcod were commonly landed here during the 1950s. Although the cove offers good shelter from wind and ocean swells, it was not widely used by the commercial fishermen during the second half of the twentieth century.

Market Infrastructure. In the early 1970s, six major processors ran operations in the Morro Bay area. Today, only two remain in business. Challenges include rising rents, increasing potable water prices on the Embarcadero, reduced landings of rockfish, and falling salmon prices. One company's primary focus shifted from processing to distribution due to the overall drop in landings by locally operated vessels. Imported seafood products are increasingly important to local buyers. One local processing firm regularly purchases seafood from suppliers in Tahiti, Fiji, Japan, Canada, Mexico, Costa Rica, Ecuador, Chile, Greece, France, South Africa, New Zealand, and Australia.

In 2008, Morro Bay-area processors began reaping the benefits of the Morro Bay sea trials. During those trials, The Nature Conservancy (TNC) leased to a single trawl fisherman one of the seven trawl permits purchased during the 2006 buyout. The fisherman is permitted to use low impact trawl gear in specific areas and has been selling Dover sole, sanddabs, and other flatfish to Morro Bay processors, restaurants, and retailers. At least one processor has recently hired more fish cutters and expanded into local markets as a result of the increase in locally caught seafood (Johnston 2008).

Buyers/Distributors. A few buyers in the region act as intermediaries, purchasing from local fishermen and selling to local processors. Restaurant owners in Big Sur typically purchase fresh fish from Morro Bay or Monterey Bay wholesalers. Much of the fresh fish currently offered in Morro Bay-area restaurants is imported. According to one city official, 90 percent of fish served at Morro Bay restaurants in the 1970s was locally caught, but today very little local seafood is sold at area restaurants. Albacore is often exported to American Samoa for canning. Gustaitis (2005) reports that the Pismo clam and abalone fisheries diminished in association with recovery of the region's sea otter population.

Santa Barbara County

Overview. The commercial fishing industry in Santa Barbara first developed around the spiny lobster fishery in the mid-19th century. The first wharf, built in 1868, provided the infrastructure needed to support a growing export market for lobster. Rail service expanded into the area in 1887 and facilitated further growth of the industry. By the early 1950s, the port had developed as a well-equipped California harbor. Landings averaged around four million pounds per year during the 1930s and 1940s. Sardines, mackerel, white sea bass, sole, abalone, shark, and lobster were the most important species landed in the area (Scofield 1954).

Today, the city-owned-and-operated harbor has 1,100 slips available for commercial and recreational use. Lobster and red sea urchin are the region's high-value fisheries. Rock crab, California halibut, and ridgeback prawns are also economically important to the local fleet. Harbor amenities include a fuel dock and an ice house.

Santa Barbara County Landings and Revenue. Between 1981 and 2007, total reported landings for Santa Barbara Harbor averaged 9.4 million pounds, with an average ex-vessel value of \$8.1 million. Until 1996, landings averaged 11 million pounds per year. Since 1996, landings have averaged 7.6 million pounds per year. During that period, landings fell precipitously at several points: 1983, 1988, 1995, and 1998 (Figure 3-15) (PacFIN 2007).

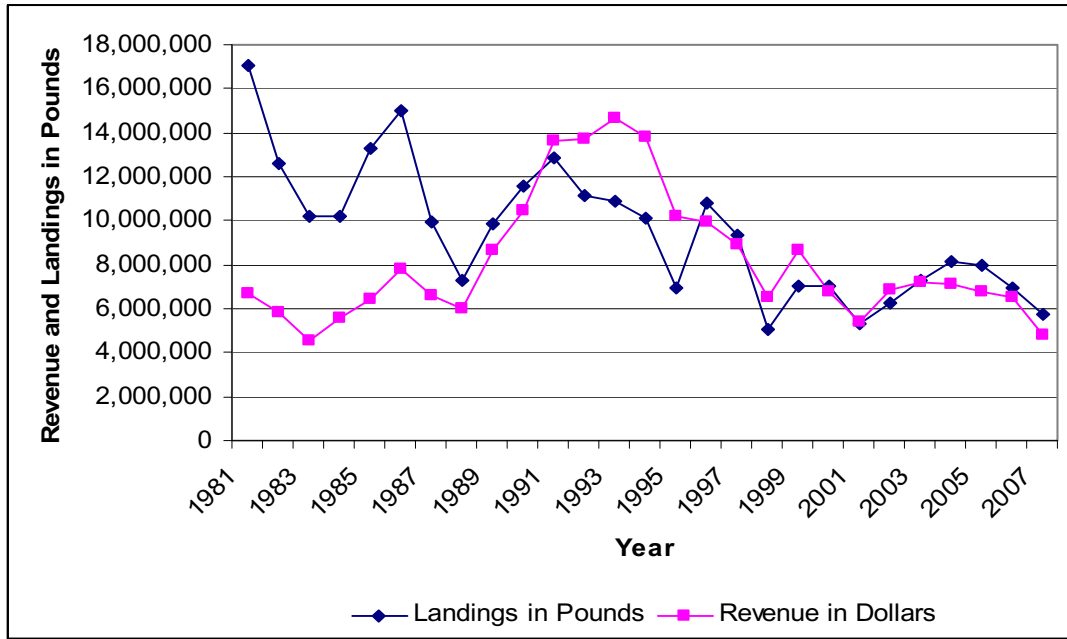


Figure 3-15 Landings vs. Revenue, Santa Barbara County: 1981-2007 (PacFIN 2007)

In terms of value, Table 3-12 depicts the top five species landed at Santa Barbara between 2000 and 2006. Although not indicated in the table below, market squid landings are also locally important.

Table 3-12 Combined Value of the Top Five Species Landed at Santa Barbara Harbor: 2000-2006

Species	Total Revenue (\$)	Total Pounds Landed
Urchin, red sea	19,514,849	29,199,289
Lobster, spiny	9,514,436	1,262,026
Crab, rock	4,559,153	3,596,528
Prawn, ridgeback	2,312,275	1,971,156
Halibut, California	1,527,941	509,844

Source: CDFG 2007

Vessels, Trips, and Tickets. The highly productive fishing grounds around the Channel Islands have long sustained Santa Barbara County’s commercial fishing fleet. In 1981, crews on 365 vessels landed 17 million pounds of fish valued at \$6.6 million. The fleet continued to expand, reaching a peak of 473 boats in 1994 (Figure 3-16). The number of fishing trips and fish tickets also decreased between 1981 and 2007, declining by 53 percent and 41 percent, respectively.

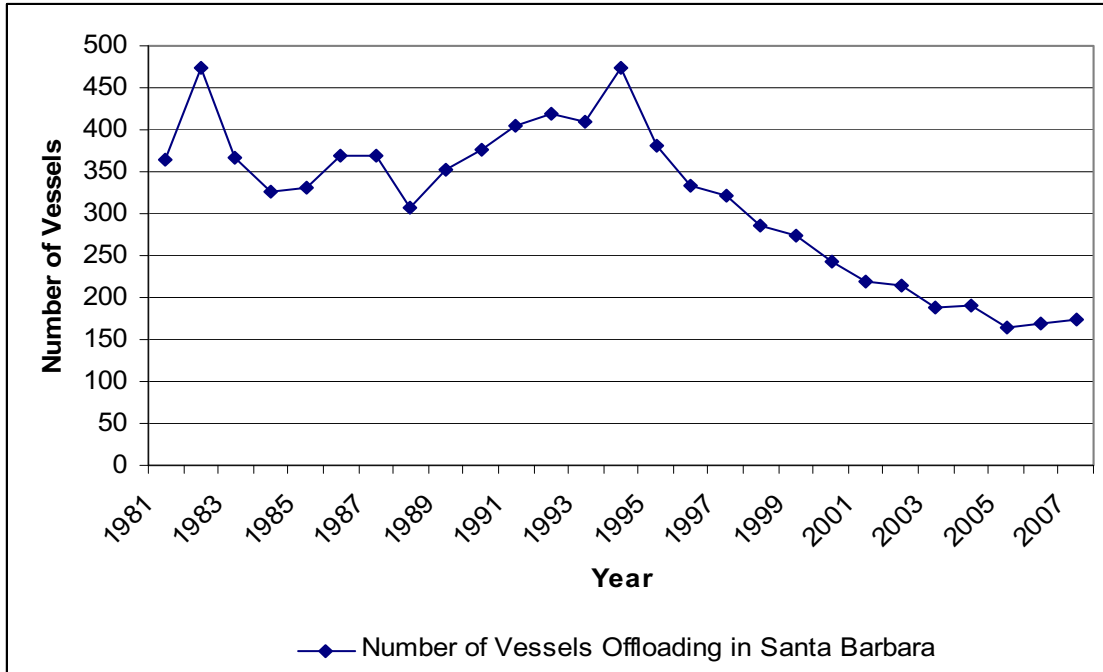


Figure 3-16 Number of Vessels Offloading in Santa Barbara County: 1981-2007 (PacFIN 2007)

Dealers/Processors. Since 1981, the number of dealers/processors in Santa Barbara County has ranged from a high of 114 in 1999 to a low of 62 in 2007 (Figure 3-17). On average, 92 dealers were licensed to sell or process fish in Santa Barbara County between 1981 and 2007.

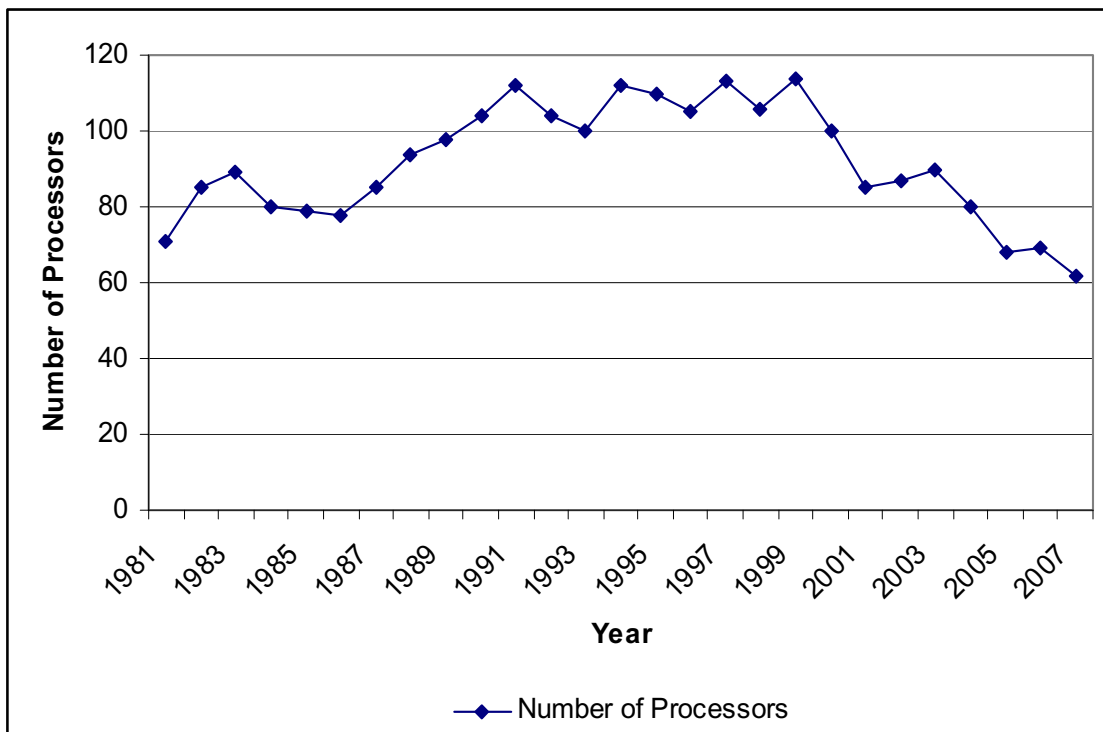


Figure 3-17 Number of Dealers/Processors, Santa Barbara County: 1981-2007 (PacFIN 2007)

4.0 Principal Marine Fisheries of Central California

This chapter presents a historical and contemporary overview of the principal fisheries in the study region. The overview focuses on fisheries shared by two or more Central California ports; therefore, niche fisheries, such as red sea urchin, spiny lobster, and rock crab, which are landed only at Santa Barbara Harbor, are not included here. When applicable, the species-level discussion is continued at the regional level, divided here into the Monterey Bay area (i.e., Monterey, Moss Landing, Santa Cruz, and Pillar Point harbors) and Morro Bay area (Morro Bay, Avila, and Santa Barbara harbors).

The Central Coast fisheries have changed significantly over the past decades. Through the early 1970s, the principal factors determining a viable fishery were largely biological, environmental, and economic. Beginning with the passage of the Magnuson Fishery Conservation and Management Act in 1976, however, federal and state fishing regulations have also had a major influence in the region's fisheries. We use two time periods to illustrate the apparent effects of fishing regulations on landings and ex-vessel value across the study region. These are 1995-1999 and 2000-2006.

Between 1995 and 1999,¹ coastal pelagic species, groundfish, herring, market squid, and salmon accounted for 91 percent of all fish landed at Central California ports. In terms of value, groundfish was the most lucrative fishery, accounting for 32 percent of total value. Following groundfish, the most valuable fisheries were: herring, salmon, and crab. Together with groundfish, those fisheries accounted for 77 percent of all Central Coast fisheries (Table 4-1).

Table 4-1 Average Annual Landings and Ex-Vessel Values* by Major Species Group: 1995-1999

Species Group	Landings in Pounds	Percent (%)	Ex-Vessel Value (\$) **	Percent (%)
Coastal Pelagics	32,000,000	38	1,499	3
Groundfish	22,772,000	27	14,986	32
Herring	10,431,000	12	8,800	19
Market Squid	7,709,000	9	1,198	2
Salmon	4,132,000	5	6,940	15
Crab	2,428,000	3	5,135	11
Shrimp	1,913,000	2	1,314	3
Albacore/Other Tuna	1,619,000	2	1,449	3
Prawn	336,000	0	2,279	5
Shark/Swordfish	759,000	1	2,093	5
All Else	1,192,000	1	1,181	2
Total	85,290,000	100	46,874	100

*In the Central California study region. **In 1999 constant U.S. dollars, in millions. Source: Leet et al. (2001)

Data for the period 2000-2006 appear to reflect the effects of major regulatory changes introduced on groundfish landings. These involved quotas, RCA closures, vessel and permit buyouts, and the region's Nearshore Fishery Management Plan. Groundfish landings at Central California ports in 2006 were 98 percent below 1996 totals (Parrish 2007).

¹ Comparable landings data are not publicly available for years prior to 1995.

However, wetfish landings increased in volume during the period. Sardines, market squid, salmon, Dungeness crab, and albacore tuna were the top species landed at Central California ports between 2000 and 2006.

In terms of value, the five most valuable fisheries across the Central California region during the period were: market squid, Chinook salmon, red sea urchin, Dungeness crab, and spiny lobster. Two of those species—red sea urchin and spiny lobster—are landed only at Santa Barbara Harbor (Table 4-2).

Table 4-2 Central Coast Total Combined Landings and Ex-Vessel Values by Species: 2000-2006

Species	Total Revenue (\$)	Total Landings in Pounds
Squid, Market	23,566,444	142,204,649
Salmon, Chinook	22,106,526	9,664,991
Urchin, Red Sea	19,514,849	29,199,289
Crab, Dungeness	16,493,381	8,156,000
Lobster, Spiny	9,514,436	1,262,026
Sardine, Pacific	7,641,073	176,775,716
Prawn, Spot	5,839,093	632,576
Albacore	5,340,891	7,437,216
Halibut, California	4,587,438	1,626,309
Crab, Rock	4,559,153	3,596,528
Sablefish	4,498,220	3,764,828
Prawn, Ridgeback	2,312,275	1,971,156
Swordfish	1,512,935	657,793
Dover Sole	1,390,255	3,538,230
Cabazon	1,194,008	282,613
Sanddab	989,146	2,574,434
Anchovy, Northern	220,784	3,455,582

Source: CDFG 2007

4.1 Coastal Pelagic Species (CPS)

Overview. Coastal pelagic species (CPS) are small- to medium-sized fish that travel in large schools near the top of the water column in coastal waters (Hill and Klingbeil 2001). The Central California CPS fishery includes: northern anchovy, Spanish (jack) mackerel, Pacific mackerel, Pacific sardine, Pacific bonito, Pacific saury, Pacific herring, and market squid. The Pacific Fishery Management Council manages northern anchovy, Pacific sardine, market squid, Pacific mackerel, and Spanish (jack) mackerel. The fishery is characterized by cycles of abundance and scarcity.

CPS species are commonly referred to as “wetfish” in the processing industry, because they are typically canned “wet from the sea” with minimal pre-processing. The CPS fishery is one of the largest in California in terms of both landings and revenue. During the first part of the 20th century, wetfish—especially anchovies and sardines—were canned primarily for human consumption. Today, squid is often frozen for export to China or used for bait (Hill and Klingbeil 2001).

Currently, wetfish producers are concerned about a new bill (California Legislature Assembly Bill 2712 – Forage Species Management Plan; pending) that is designed to sustain large predator species by protecting the foraging species upon which they feed (i.e., sardines and anchovies). The bill would restrict most wetfish fisheries to within three miles of shore and establish new quota restrictions based on a 2002-2007 control date.

In the Central California region, the most economically important CPS fisheries in recent years have been market squid, Pacific sardines, and northern anchovy. Moss Landing is the center of the CPS fishery in Central California, and is the primary port of production for both sardine and anchovy. Market squid is harvested in significant quantities at all ports except Santa Cruz.

Purse seiners are responsible for 99 percent of CPS total landings and revenues in any given year (Pacific Fisheries Management Council 1998). Purse seine nets are approximately 250 fathoms by 35 fathoms, and can hold up to 50 tons of fish. Some fishermen emphasize that, in contrast to drag nets, purse seines enable more sustainable fishing since most fish are alive when brought to the surface, thereby allowing the return of non-target species to the ocean.



Purse Seine Vessel at Moss Landing Harbor

Wetfish fishing often occurs at night, preferably moonless nights, when fishermen can locate sardines and mackerel by phosphorescence. Squid are also targeted at night, lured to the surface by participants using “light boats.” Some fishermen hire specialists to locate schools of sardine, mackerel, or anchovies; payment being ten percent of the catch. Fishermen usually go out in small groups of three or four vessels, traveling from 0.8 miles to 20 miles offshore.



Sardines in Purse Seine



Light Boat Fishing in Monterey Bay

The following sections discuss the CPS fisheries most important to the ports of the study region: Pacific sardine, market squid, and anchovy. The discussion includes a brief historical overview of the fishery and review of contemporary management measures, operational challenges, and other important issues.

Pacific Sardine (*Sardinops sagax*)

Overview. The Pacific sardine is found along most of the coastline of California, Oregon, and Washington. Between 1920 and 1940, captains offloaded their catch primarily at Central California ports and the Pacific sardine was one of the most commercially important species in the state.

Historically, sardines were used primarily for human consumption, and also as a key ingredient in fishmeal, fish oil, soap oil, paint mixer, vitamins, glycerin, and shortening (Starr et al. 2002). Today, nearly 70 percent of sardines are reduced to fishmeal and used as feed on chicken and fish farms. This shift has resulted in lower ex-vessel value for sardines. However, because reduction canneries are illegal in California, sardine fishermen sell their catch to processors, which typically can a portion and export the majority for reduction outside the state. Some fishermen argue that sardines would fetch a higher price if they could be sold directly to a reduction cannery.

Management Measures. The Pacific sardine has been extensively managed since the 1970s, first under the jurisdiction of the CDFG. State recommended catch quotas were among the earliest management measures (Wolf and Smith 2001). Regulations limiting the take of incidental catch to no more than 110,000 pounds per year were introduced in 1974 and remained in place through 1981. This management measure, along with favorable environmental conditions, is thought to have helped the species to rebound. Sardine landings in the Monterey Bay area gradually increased from less than 5,000 pounds in 1985 to more than 37 million pounds in 1999. In 1999, the Pacific sardine was added to the federally managed Coastal Pelagic Species federal management plan (FMP). Management measures for this “actively managed species” include coast-wide harvest limits and a limited entry fishery (Starr et al. 2002).

Monterey Bay Area Sardine Fishery.² Monterey Canning Company, the first sardine cannery in Monterey, was established in 1902. The cannery initially packed large sardines and marketed them as “Monterey mackerel.” Participants used gill nets and early purse seines; the first Monterey purse seine was 1,200 feet by 72 feet, with a one-inch mesh (Fry 1931).

The lampara net was introduced in 1905. This net was more effective at catching large deep water sardines than was the purse seine. A second Monterey sardine cannery started operating in 1906 (Scofield 1951).

² For purposes of this report, the Monterey Bay area fisheries are defined as Monterey, Moss Landing, Santa Cruz, and Pillar Point.

The lampara net enabled rapid expansion of wetfish fisheries along the Central Coast. By 1922, seven sardine canneries were operating in Monterey. These had a combined production capacity of 335 tons per day (Scofield 1951). In the late 1930s, 19 canneries, 20 reduction factories, and over 100 captains were involved in the Monterey sardine fishery (Starr et al. 2002). Most captains were of Sicilian ancestry. The fishery reached its peak in 1936, with the total catch exceeding 700,000 tons (Scofield 1951). This industry had a significant economic impact on the Monterey Bay area, supporting many hundreds of families for much of the first half of the 20th century. Participation in the region's sardine fishery diminished significantly during the 1950s.



Monterey Canning Company on Cannery Row

The last sardine cannery in Monterey closed in 1960. Most sardine fishermen either left the commercial fishing industry or began to fish for squid and anchovies (Starr et al. 2002). Some fished for rockfish, salmon, or albacore.

In the late 1970s and through the 1980s, many persons of Vietnamese ancestry settled in the Monterey Bay area. Many who immigrated to the U.S. were fishermen in their homeland. The influx of Vietnamese fishermen into the Monterey area came at just the time when a generation of Sicilian fishermen was aging and their children were opting for other opportunities. Many Vietnamese refugees were hired on as crew for existing operations.

The sardine fishery began to rebound in the late 1970s, and, between 1981 and 2000, Pacific sardines were one of the most economically important species landed at the ports of Moss Landing and Monterey. In 2001, 87 percent of all Pacific sardines were landed in California. That figure dropped somewhat to 77 percent in 2002, primarily because of continuing expansion of the Oregon and Washington fisheries (Pacific Fisheries Management Council 2003). Sardines are the second most popular canned fish product in the U.S., after tuna (Johnson 2001).

Sardine season in Monterey Bay typically runs from October through August (California Seafood Council 1997). The best months for harvesting sardines are April and May.

On average, 51 sardine fishermen were active in the Monterey Bay area between 1981 and 2000. Sardines accounted for 14 percent of Central Coast landings during this period (Starr et al. 2002).

Local sardine fishermen tend to target fish in Monterey Bay, but will fish as far north as San Francisco and as far south as Morro Bay. Sardines are typically caught at night and must be offloaded in the morning for immediate processing.

In 2007, three captains from Monterey Bay and four from Moss Landing fished for sardines. Thus, the size of the Monterey Bay sardine fleet is a small fraction of years past. Fishermen attribute this to a variety of problems, including diminished market demand for canned sardines, depressed ex-vessel prices, years of abundance followed by years of scarcity, and increasingly higher fuel prices.



Sardine Fishing: Monterey, 2007

Morro Bay Area Sardine Fishery.³ Between 2000 and 2006, a total of 224,815 pounds of sardines were landed in the Morro Bay area. Ex-vessel value was less than \$7,000.

Overall Recent Landings. Table 4-3 below depicts recent figures for sardine landings along the Central Coast. Of note in the table is the pattern of overall cyclical production and the relatively extensive landings at Monterey and especially at Moss Landing (see also Figure 4-1).

³ For purposes of this report, the Morro Bay area fishery is defined as the ports of Morro Bay, Avila/Port San Luis and, to a lesser extent, Santa Barbara.

Table 4-3 Pacific Sardine Landings (in pounds) at Major Central California Ports: 2000-2006

Year	Santa Barbara	Avila	Morro Bay	Monterey	Moss Landing	Santa Cruz	Pillar Point
2000	0	0	0	879,684	24,172,947	0	NA
2001	NA	0	0	257,596	15,388,153	0	NA
2002	0	224,700	0	0	29,977,158	21,675	0
2003	NA	0	0	1,018,151	16,367,784	46,559	0
2004	0	0	0	43,089	33,968,853	35,460	815,854
2005	0	0	0	0	17,880,743	0	681,196
2006	NA	0	NA	0	39,020,078	25,640	288,552
Avg. Lbs.	13.6	32,100	NA	314,074	25,253,673	18,476	255,242
Avg. Value	\$3	\$963	NA	\$12,670	\$1,091,581	\$3,654	\$10,061

Source: CDFG 2007; NA = Below reporting threshold

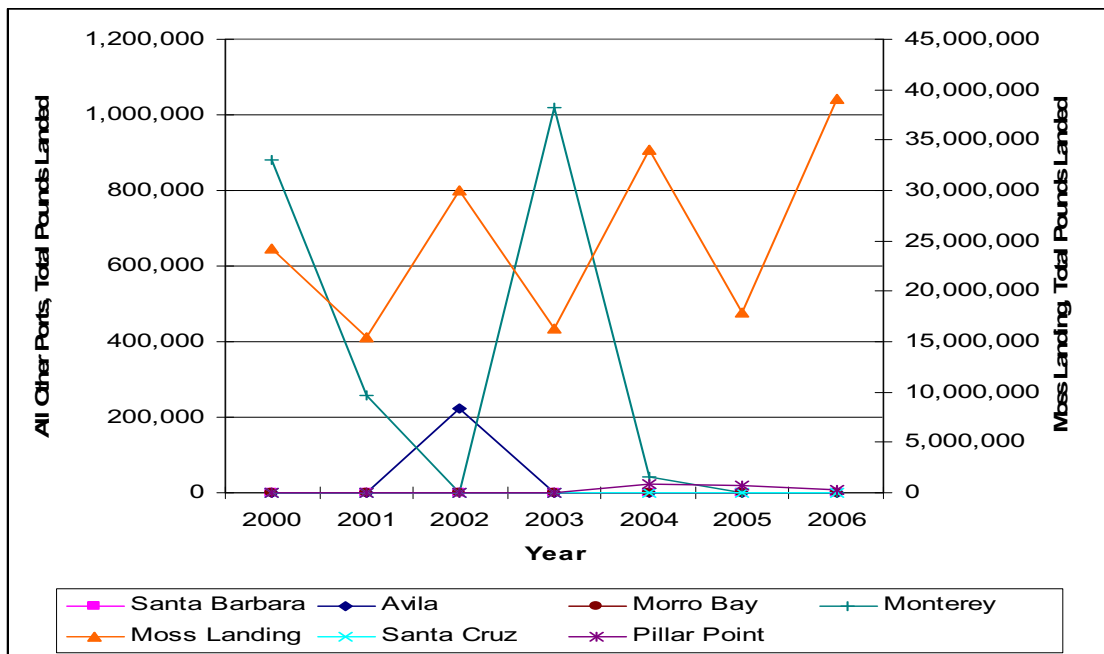


Figure 4-1 Pacific Sardine Landings at Central California Ports: 2000-2006 (CDFG 2007)

Market Squid (*Loligo opalescens*)

Overview. California market squid have a wide-ranging geographic distribution: from the southeastern coast of Alaska to Baja California in Mexico. Squid are found in greatest concentration in semi-protected inlets with sandy bottoms and rocky outcroppings, like Monterey and Morro Bays, and the Channel Islands. In the Monterey Bay area, spawning usually begins in late April and lasts through October. Further south, spawning starts in October and ends in April.

Chinese immigrants were the first participants in the region's commercial market squid fishery (Lydon 1985). This began in 1863 with use of hand-held seines along the Monterey Peninsula. By the early 1900s, use of lampara nets greatly increased landings. The demand for squid in both domestic and international markets continued to grow throughout the 20th century. Between

1981 and 2000, market squid was one of the most economically important species landed at the ports of Pillar Point, Santa Cruz, Moss Landing, and Monterey (Starr et al. 2002).

California's squid fishery is currently the largest in the U.S., and market squid is the top commercial product in terms of both landings and ex-vessel revenue. In 2000, the California fleet landed a record 262 million pounds of market squid, with an ex-vessel value of \$27 million (National Marine Fisheries Service 2007). The vast majority of squid caught in West Coast waters is frozen for consumption in Asia and Europe. Some squid is frozen for use as bait.

As is the case in most CPS fisheries, squid fishing usually takes place at night. The California fleet typically utilizes two vessels in its fishing operations. One vessel functions as the "light boat," locating and attracting the squid to the surface, while the other deploys round haul seine nets to make the catch (California Seafood Council 1997). Some light boat captains freelance and contract in situ with the highest bidding purse seiner for the squid they find, whereas others work with one partner.

Management Measures. The squid fishery has been managed by the Pacific Fisheries Management Council since 1999 as part of the Coastal Pelagic Species Fishery Management Plan. Market squid has a statewide total allocation quota.

Due to a reported link between lights and overfishing, the use of lights on squid boats was prohibited in Central California from 1959 to 1987. In 1999, the California Fish and Game Commission placed a wattage restriction (30,000 watt maximum) on commercial vessels. The Commission determined that the lights disrupted the nesting patterns of the Channel Island shorebirds. Vessels were also required to avoid shining their lights directly onto shore (Yaremko 2001).

In 2000, market squid became a limited entry fishery under State Legislation SB 364. New participants were prohibited from entering the fishery for three years, while captains who had purchased a permit in 1999 were eligible to remain in the fishery.

The market squid fishery is significantly affected by El Niño conditions, which involve warmer surface temperatures (Yaremko 2001). In the Monterey Bay area, landings dropped off dramatically during the ENSO events of the 1980s and 1990s (Starr et al. 2002).

Monterey Bay Area Squid Fishery. Squid have long been pursued throughout the nearshore waters of Monterey Bay, with extensive activity occurring around Año Nuevo, Moss Landing, and especially the Monterey Peninsula. Certain areas around Monterey, such as Lovers Point, the bell buoy, and near the canneries have been particularly productive over the years. Squid fishing also occurs in the nearshore waters of Santa Barbara County and around the Channel Islands. Yaremko (2001) and Starr et al. (2002) report that, in the 1990s, some 90 percent of the state's squid landings were the result of fishing effort south of Point Conception. Many participants in the Central Coast wetfish fishery will shift from sardines to squid when the latter species appear in the region.

Key informants report that around 50 captains were pursuing squid from Monterey Harbor during the 1980s. About ten of those captains reportedly were focused on the grounds around the Channel Islands. There appears to have been some degree of capitalization during this period, as many operators built or purchased fiberglass boats to replace their wooden-hulled vessels. This is said to have increased the overall efficiency of the fleet.

In the early 1990s, fishermen from Washington, Oregon, and Alaska came to fish for squid around Monterey and the Channel Islands. Many were seeking an alternative to the Alaska salmon fishery in a context of falling market prices for salmon. Some continue to fish in the Monterey area.

As of 2008, less than a dozen or so captains were squid fishing on a regular basis in Monterey Bay. One former squid fisherman who sold his permit and boat in 2004 explains that his decision to get out of the business was influenced by recent management measures that made it clear to him that the fishery was in trouble.

Morro Bay Area Squid Fishery. Squid fishing in the Morro Bay area is best between October and January. Much of the 1980s and late 1990s were particularly productive for the Morro Bay fleet. The past eight years have not been so productive. Local fishermen assert that the limited entry program and establishment of the Channel Islands MPAs⁴ have led to a significant reduction in landings.

Overall Recent Landings. In recent years, Moss Landing and Monterey have been the primary squid-producing ports in the study region. Landings at Moss Landing averaged 14 million pounds per year during the period 2000-2006, peaking at 41 million pounds in 2002 (Table 4-4, Figure 4-2).

Table 4-4 Market Squid Landings (in pounds) at Major Central California Ports: 2000-2006

Year	Santa Barbara	Avila	Morro Bay	Monterey	Moss Landing	Santa Cruz	Pillar Point
2000	2,483,758	0	0	5,467,538	10,241,160	0	0
2001	1,572,467	136,880	0	5,968,373	11,109,875	0	NA
2002	1,092,773	785,117	0	13,949,132	41,312,039	NA	1,906,089
2003	1,163,832	497,086	936,417	8,203,076	22,486,597	NA	3,655,302
2004	874,260	368,668	1,565,231	2,904,711	9,271,635	NA	362,568
2005	784,960	0	0	1,164,171	3,060,520	0	NA
2006	0	0	0	31,873	1,088,944	0	NA
Avg. Lbs.	1,138,876	255,394	362,823	5,384,124	14,081,538	6,500	849,286
Avg. Value	\$153,918	\$42,681	\$82,947	\$843,726	\$2,631,269	\$1,582	\$161,639

Source: CDFG 2007; NA = Below reporting threshold

⁴ In 2003, a network of ten marine reserves and two marine conservation areas were implemented in the Channel Islands. A second network of MPAs was implemented in 2007.

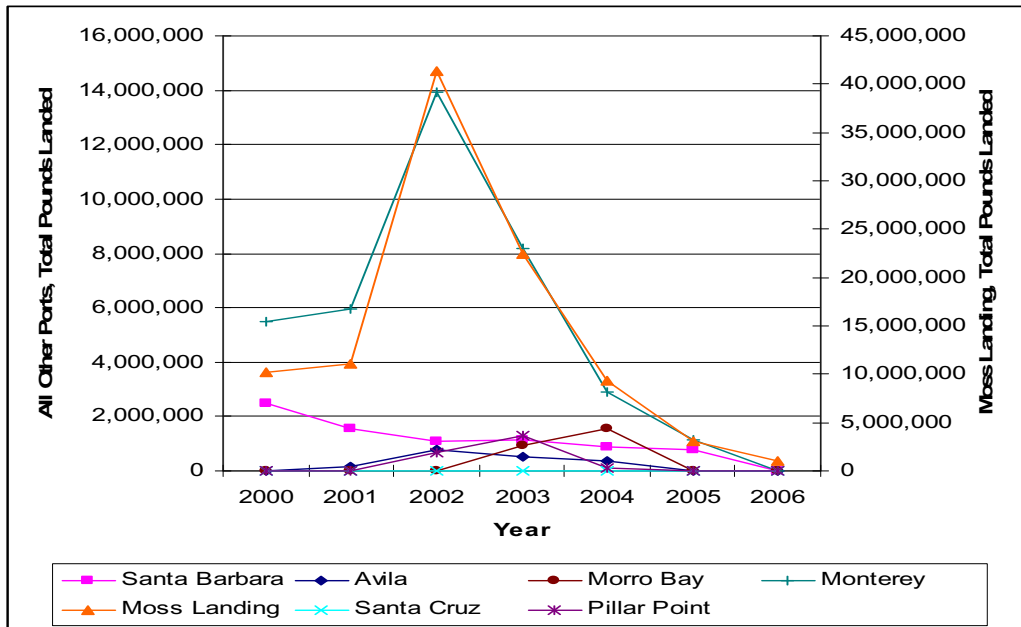


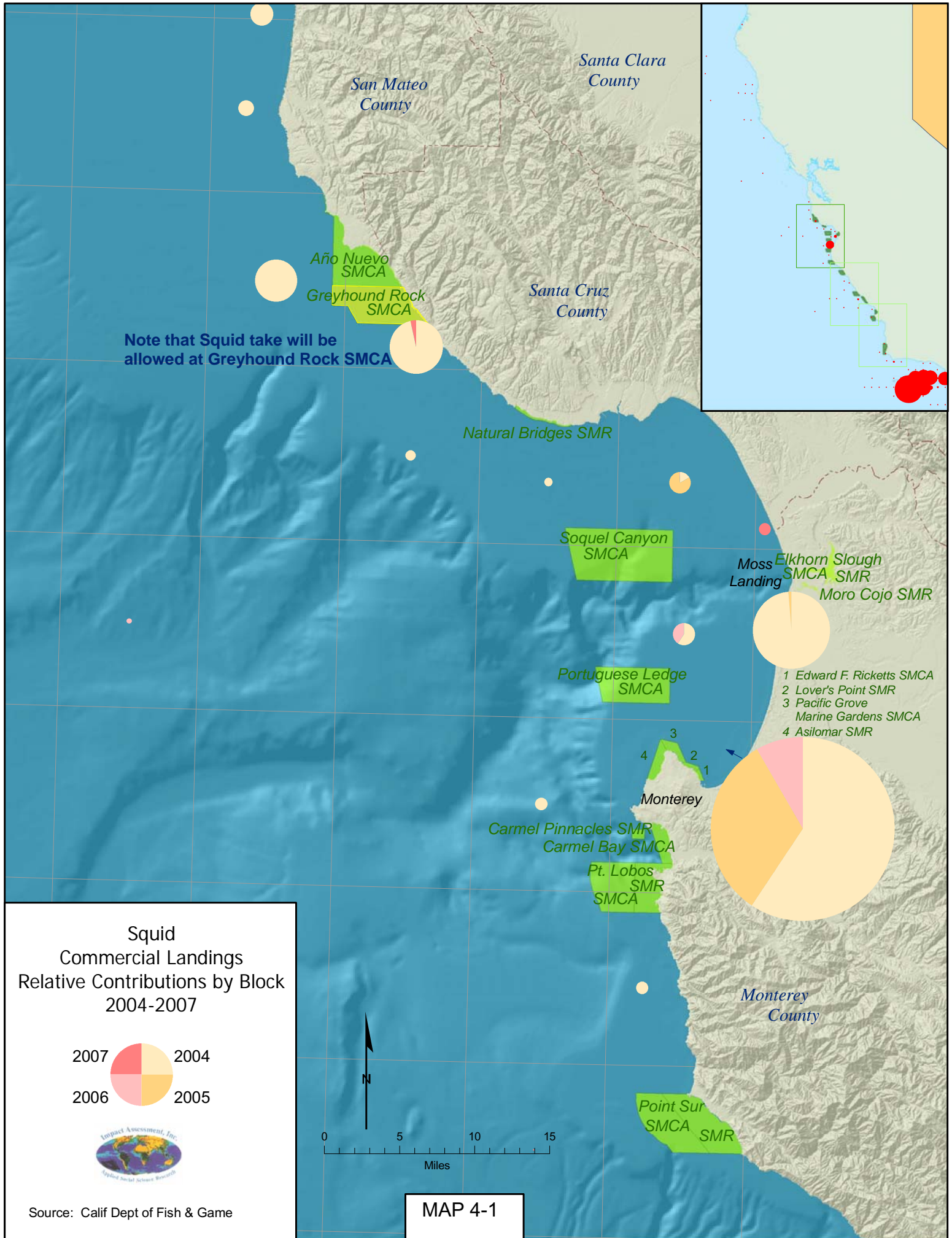
Figure 4-2 Market Squid Landings at Major Central California Ports: 2000-2006 (CDFG 2007)

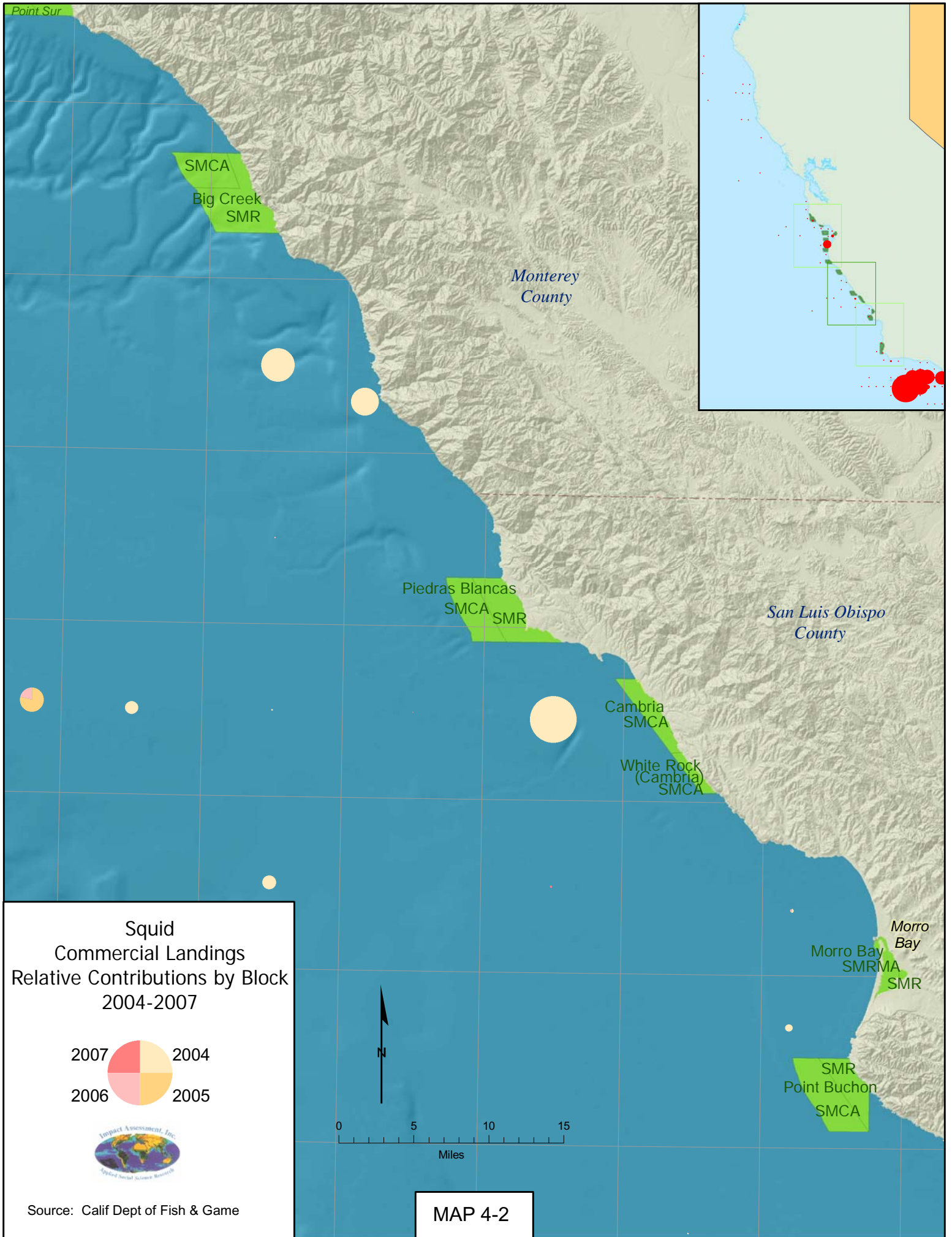
Of particular note in the figure above is the volatility of production at the region's most active squid fishing ports. This characterizes the nature of productivity in the fishery over the long term. Maps 4-1 through 4-3 depict squid landings by region of capture for the period 2004 through 2007. The maps are intended to provide the reader with a basic sense of the spatial distribution of effort during the most recent years of this important fishery.

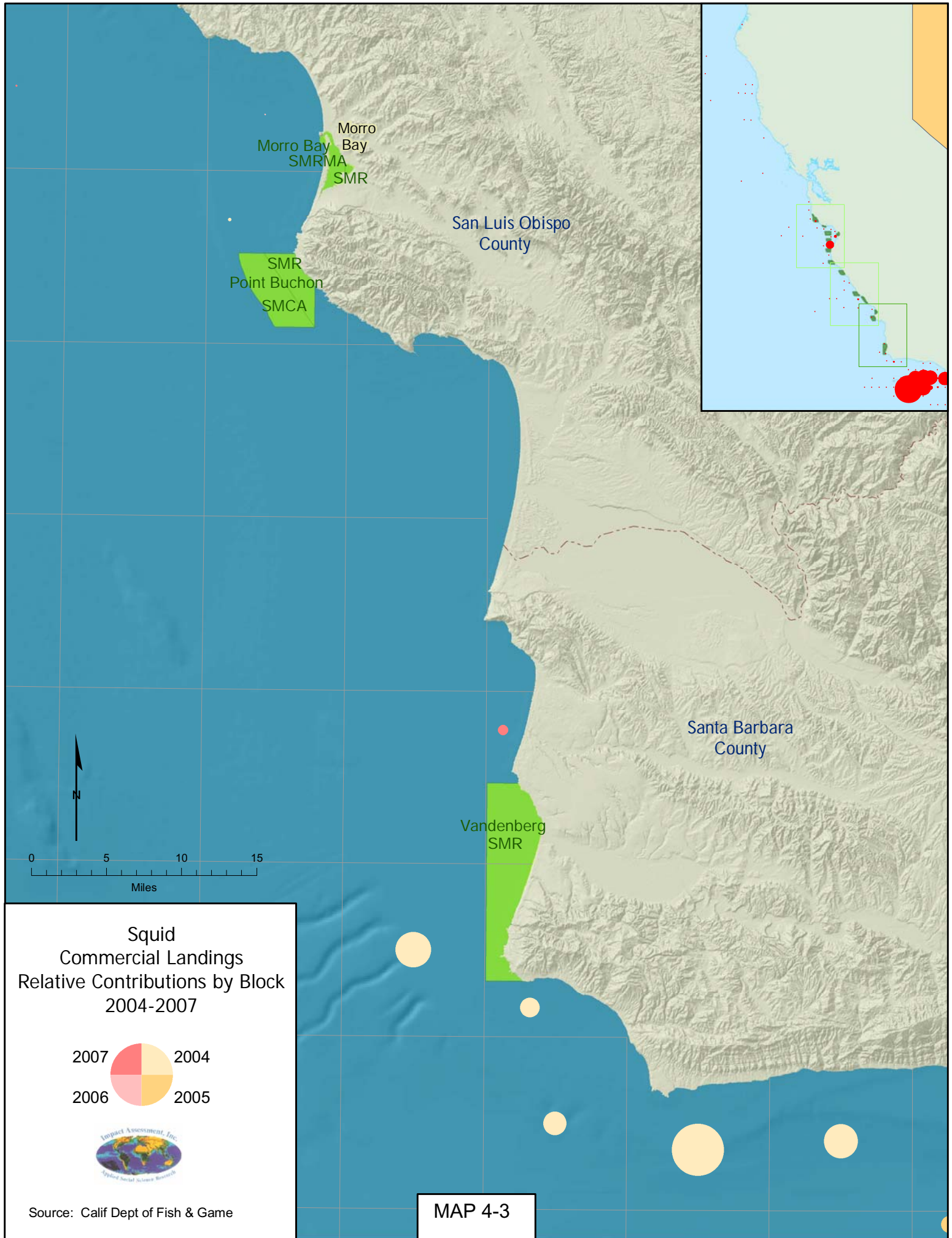
Northern Anchovy (*Engraulis mordax*)

Overview. Northern anchovy are found along the entire California coast, but are most abundant from Point Conception south. Like the Pacific sardine and the market squid fisheries, the northern anchovy fishery is characterized by cycles of extensive and minimal productivity. Anchovy are most abundant during the cold water months of February, March, and April. Anchovies landed on the West Coast tend to be too small to market for human consumption; most are used for bait.

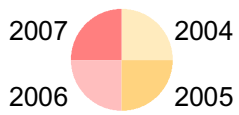
Through the first half of the 20th century, most of the anchovy harvest was reduced for oil and fishmeal. Landings increased during World War II when the Central Coast sardine fishery was undergoing a period of decline. By 1953, the harvest had increased to 42,918 tons. This strained the capacity of West Coast processing plants and excess deliveries were diverted to reduction plants. In 1965, two anchovy reduction plants were opened in the Monterey Bay area (Messersmith 1969). Landings peaked in 1975 at 158,511 tons (NOAA 2009).







Squid
Commercial Landings
Relative Contributions by Block
2004-2007



Source: Calif Dept of Fish & Game

MAP 4-3

Management Measures. The Pacific Fishery Management Council manages the northern anchovy fishery as part of the Coastal Pelagic Species FMP. In 1998, the California Fish and Game Commission petitioned the Council to add the northern anchovy to the same federally managed group as the Pacific sardine, Pacific mackerel, jack mackerel, and market squid. The petition, known as Amendment 8, was implemented in 2000. This measure requires a limited entry permit to commercially harvest Coastal Pelagic Species south of Point Arena, California (Hill and Klingbeil 2001). There are no harvest guidelines or quotas for northern anchovy, but landings are monitored for any significant changes.

Overall Recent Landings. Between 1981 and 2000, the northern anchovy was among the top five most valuable species landed at both Santa Cruz and Monterey Harbors (Starr et al. 2002). In recent years, however, the majority of northern anchovies have been landed at Moss Landing. Between 2000 and 2006, reported landings at the harbor averaged nearly 12 million pounds per year (Table 4-5), peaking at 26 million pounds in 2001 (Figure 4-3).

Table 4-5 Northern Anchovy Landings (in pounds) at Major Central California Ports: 2000-2006

Year	Santa Barbara	Avila	Morro Bay	Monterey	Moss Landing	Santa Cruz	Pillar Point
2000	NA	0	NA	3,354,858	11,637,149	8,784	NA
2001	0	NA	0	100,724	25,592,273	13,126	NA
2002	0	0	0	0	5,911,457	17,806	NA
2003	NA	NA	NA	0	1,503,282	52,552	0
2004	0	0	0	0	8,518,084	59,500	NA
2005	0	0	0	0	13,614,907	36,480	NA
2006	0	0	0	0	16,808,634	22,430	155,400
Avg. Lbs.	956	1,091	1,001	493,654	11,940,826	30,096	22,362
Avg. Value	\$191	\$218	\$200	\$31,540	\$375,086	\$5,996	\$729

Source: CDFG 2007; NA= Below reporting threshold

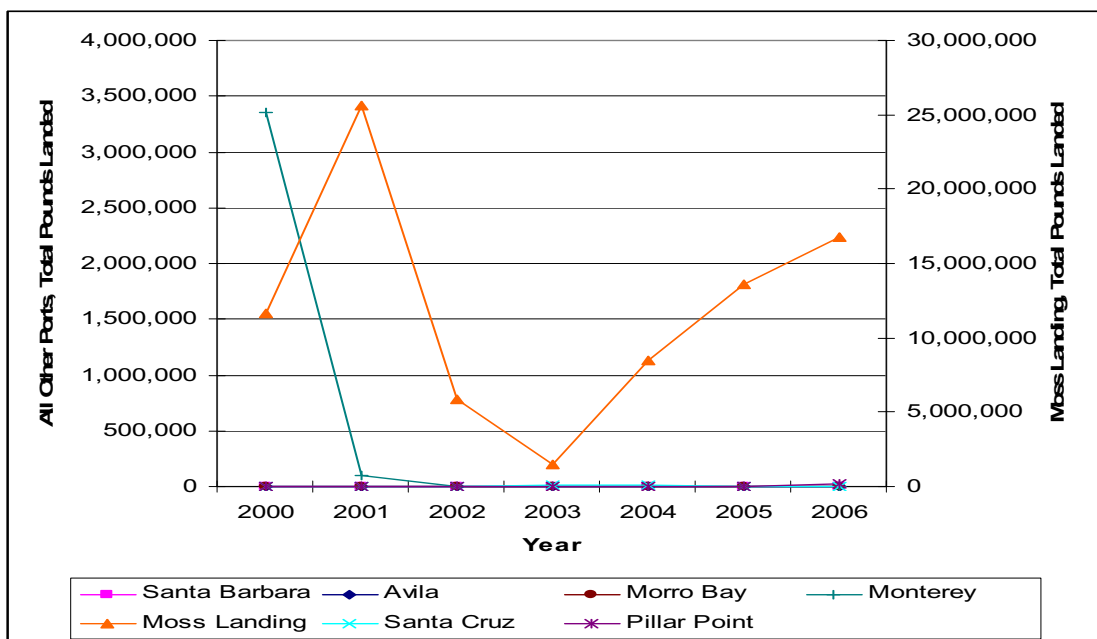


Figure 4-3 Northern Anchovy Landings at Major Central California Ports: 2000-2006 (CDFG 2007)

4.2 Crustaceans

Dungeness Crab (*Cancer magister*)

Overview. Dungeness crab is a commercially important species in all the Pacific Coast states. The species ranges from Amchitka Island in the Aleutians to Point Conception, California. In California, Dungeness is particularly important in the northern ports and less so along the Central Coast.

Dungeness crab is a highly cyclical fishery. Periods of abundance tend to occur every eight to eleven years along the West Coast. Dungeness season begins in December and typically runs through March. The fishery is characterized by particularly extensive effort during the first part of the season, as needed to meet demand for crab over the holidays. During some years, 75 to 80 percent of the annual catch is landed in the first month—or even first two weeks—of the season (Radtke and Davis 2000; Starr et al. 2002).

Italian fishermen residing in the San Francisco Bay area initiated the commercial Dungeness fishery around 1860. They first fished for crab from sailboats using ring or hoop nets (Radtke and Davis 2000). The industry expanded during the late 1880s, and a number of commercial operations were established in the Monterey Bay area. The introduction of crab traps in the late 1940s furthered the expansion of the fishery (Wild and Tasto 1983).

During the 1950s, the Central California crab fleet consisted of approximately 215 vessels (Hankin and Warner 2001). Central California landings declined substantially between 1960 and the mid-1980s. This appears to have followed an oceanic regime shift in the late 1950s. Other contributing factors may have involved predation and pollution (Wild and Tasto 1983). Landings remained below one million pounds until the 1984-1985 season (Hankin and Warner 2001). In 2006, statewide landings reached 26 million pounds (National Marine Fisheries Service 2007).

Management Measures. The first legislative protection for crabs was established in 1897. This law prohibited the possession and sale of female Dungeness crabs (Danner 2007). State-legislated seasonal closures were introduced in 1903. Although the specific months of the closures have changed over time, the purpose is to protect crabs during molting season, thereby allowing their shells to harden and their meat to fill out before harvesting (Wild and Tasto 1983). In Central California, crabs molt during summer and fall and can be taken from November 15 through June 30. Only males may be harvested and minimum size is 6 ¼ inches (Reilly 1983; Starr et al. 2002).

California approved a statewide Limited Entry Program for Dungeness in 1992 (implemented in 1995). The program capped the statewide number of resident commercial crab permits at 600. As of March 2000, 600 resident and 70 non-resident limited entry permits had been granted (Hankin and Warner 2001). Casey (2007c) suggests a vessel upgrade clause in the limited entry program has led to use of more traps and an overall increase in effort.

Market Challenges. Extensive landings of crab during the first weeks of the season have tended to saturate the market. This is of consequence to small-boat crabbers who often have difficulty

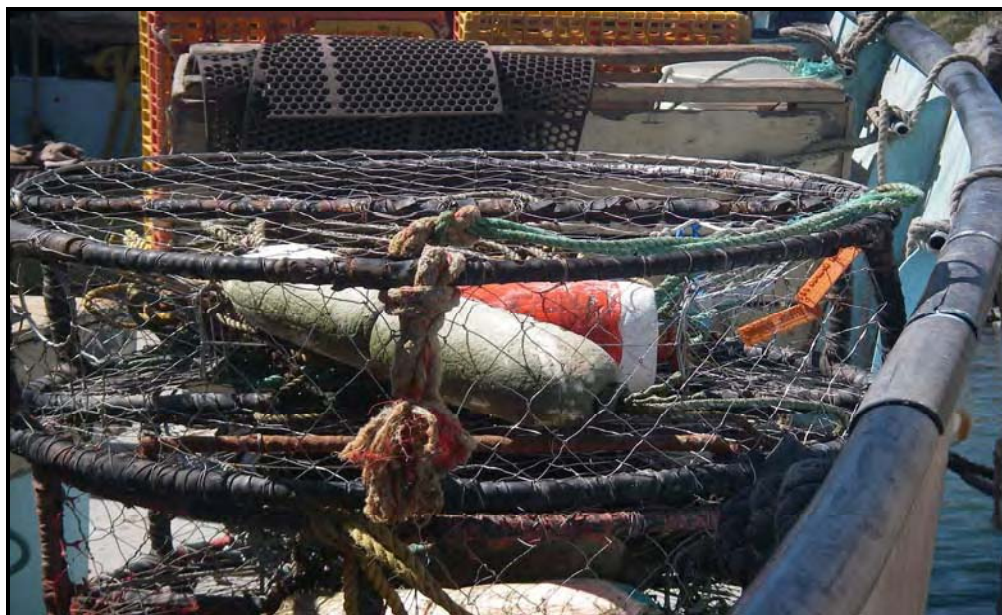
offloading crab at a good price in a competitive market. Overloading the market also means that much of the crab is frozen.

The lucrative nature of the crab fishery lends to extensive competition. The competition results in part from seasonal demand and the nature of current regulations. In the Half Moon Bay area, the crab season begins November 15; further north, opening day is December 1. Therefore, fishermen from northern port towns, such as Eureka and Crescent City, sometimes travel to fish grounds in the south until their own season opens in December. Some crabbers argue that it would be better for all parties if the crab season was strategically lengthened.

There are some notable differences between Northern and Central California Dungeness operations, which give the Northern fleet an advantage when crabbing along the Central Coast. The Northern California vessels then tend to be larger and can carry more pots. Large vessels also carry large crews; with a crew of five or more, crabbers can work 24-hour days by alternating shifts. Central Coast crab boats tend to be smaller, hold less crab, and must return to port more frequently to offload.

Competition during the early part of the season can force crabbers into ever more dangerous conditions. Some crab fishermen will negotiate particularly high seas and winds in order to pull up traps and re-bait them (Casey 2007a). Four crabbers were lost at sea at the start of crab season in 2007, most likely because they were competing for crab in rough seas.

In 2003, an association representing crabbers from Avila, Morro Bay, and Monterey requested a state-legislated cap of 250 traps per vessel. This request, known as AB 2146, was vetoed in 2004. Some fishermen with large vessels reportedly interpreted the veto as a green light to buy more traps (Fish Sniffer 2004). Another attempt at capping traps (AB 749) was similarly vetoed in 2005 (Casey 2007c). Currently, some crabbers are working with the Environmental Defense Fund to reintroduce the idea of trap limits.



Crab Pots: Half Moon Bay

Monterey Bay Area Dungeness Crab Fishery. In the Monterey Bay area, the number of crab fishery participants increased from an average of 65 in the early 1980s to an average of 180 in the mid-1990s. Starr et al. (2002) assert that crab populations have been increasing in abundance in recent years, in part, a result of increasingly stringent regulations.

Many crabbers in Monterey Bay also fish for salmon and are now speculating on ways in which they will be affected by the 2008 salmon closure. Many anticipate extending their crab operations through the end of June. A fisherman from Half Moon Bay explains that “we used to fish salmon to make the money and crab to pay the taxes, but now crab will have to cover our bases” (Casey 2007a).

Overall Recent Landings. Pillar Point is at the heart of the Central California Dungeness crab fishery (Table 4-6). Historically, the crab grounds located south of the harbor have been highly productive and are in close proximity to the 60 or so active crabbers who operate around Half Moon Bay. Dungeness landings are also significant at Santa Cruz and Moss Landing Harbors (Figure 4-4).

Table 4-6 Dungeness Crab Landings (in pounds) at Major Central California Ports: 2000-2006

Year	Santa Barbara	Avila	Morro Bay	Monterey	Moss Landing	Santa Cruz	Pillar Point
2000	0	5,375	0	NA	9,898	18,234	355,537
2001	0	5,777	2,882	NA	10,421	12,559	450,993
2002	0	22,208	4,798	5,851	60,008	40,782	1,018,726
2003	0	16,633	13,724	8,695	88,761	65,564	1,422,668
2004	NA	11,792	17,200	31,842	55,989	81,210	1,263,486
2005	NA	24,731	21,469	10,317	54,060	238,279	1,439,312
2006	NA	83,956	178,652	3,331	66,641	95,699	1,477,999
Avg. Lbs.	296	24,353	34,104	8,768	49,397	78,904	1,061,245
Avg. Value	\$1,113	\$46,876	\$77,077	\$15,746	\$109,049	\$171,916	\$2,137,405

Source: CDFG 2007; NA = Below reporting threshold

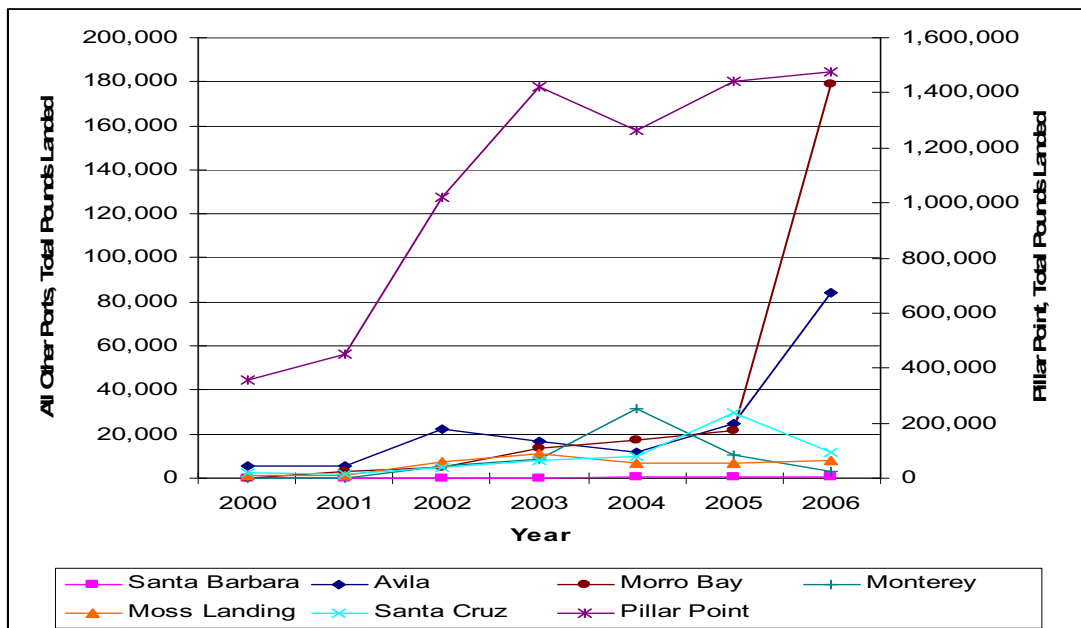


Figure 4-4 Dungeness Crab Landings at Major Central California Ports: 2000-2006 (CDFG 2007)

Pink Shrimp (*Pandalus jordani*)

Overview. Shrimp is the top selling seafood product in the nation. Along the West Coast, pink shrimp account for the vast majority of coldwater shrimp landings. Pink shrimp are found from Unalaska in the Aleutian Islands to Baja California, Mexico at depths of 400 to 800 feet. Also called “ocean shrimp” or “cocktail shrimp,” the species is harvested primarily by trawl vessels in the 50- to 75-foot range (Radtke and Davis 2000).

The pink shrimp season runs from May to September. As is the case for all coldwater shrimp species, abundance of pink shrimp varies considerably with environmental conditions. Abundance is associated with strong upwelling, while poor upwelling— characteristic of El Niño events— is believed to negatively affect juvenile survival rates. In years of low abundance, many shrimp fishermen have fished for groundfish (Radtke and Davis 2000).

Fishermen began targeting shrimp in the Monterey area around 1930. Caught incidentally at first, pink shrimp were soon intentionally harvested using modified bamboo octopus traps. Favored grounds were four miles southwest of Point Cypress in Monterey County in 150 fathoms of water. The dangers of setting traps in deep water initially discouraged large-scale participation in the fishery (Bonnot 1932). Favorable conditions in Morro Bay ultimately led to development of the region’s principal shrimp fishery in that area.

Introduction of the automatic peeling machine in 1949 reduced labor involved in the processing sector and stimulated significant the growth in the industry (Collier and Hannah 2001). As processing capacity increased, so, too, did fishing effort. Commercial quantities of shrimp were found in the Morro Bay area in the 1950s, and, between 1960 and 1976, approximately 25 captains pursued shrimp on a commercial basis each season. Entry into the Morro Bay shrimp fishery escalated rapidly in 1977, peaking at 104 active captains in 1980. However, the fleet downsized as rapidly as it expanded: only 33 captains participated in the fishery during and after the 1983 El Niño event. The fishery quickly recovered in the years that followed and, by 1994, 55 vessels were participating (Starr et al. 2002). The Morro Bay area continues to be the focus of the Central Coast shrimp fishery. More than 250 participants targeted shrimp in the Morro Bay area in the mid-1990s (Roberts 2005).

Pink shrimp landings in California ranged from a low of 206,000 pounds in 1952 to a high of 18,683,000 pounds in 1992. While landings initially increased during each decade between 1950 and 1990, a sharp drop occurred in the late 1990s (Collier and Hannah 2001), in part the result of new regulations. Only 50 captains were involved in the Morro Bay fishery in 2005 (Roberts 2005).

Management Measures. Catch quotas, first implemented in 1952, were the earliest regulatory measure for managing the pink shrimp fishery. Quotas were amended in 1976 and again in the late 1980s. Pink shrimp became a limited entry fishery in 1994. In 2001, its status was amended to bring California into accord with an agreement with Oregon Department of Fish and Wildlife and Washington Department of Fisheries to institute uniform regulations, coast-wide. The new regulations included a seven-month season limit (April 1 to October 31), a maximum count per

pound of 160, and a minimum mesh size. Both transferable and non-transferable vessel and individual permits are available (Starr et al. 2002).

Overall Recent Landings. At the port of Morro Bay, reported pink shrimp landings ranged from a high of 669,000 in 2002 to a low of 65,000 in 2006 (Table 4-7; Figure 4-5). Landings averaged 346,171 pounds per year during the period. It should be noted, however, that the last pink shrimp processor in the Morro Bay area closed in 2005 due to water quality problems. Therefore, the sharp drop off in landings in 2006 is largely attributable to the lack of a buyer rather than lack of abundance (Roberts 2005).

Table 4-7 Pink Shrimp Landings (in pounds) at Major Central California Ports: 2000-2006

Year	Santa Barbara	Avila	Morro Bay	Monterey	Moss Landing	Santa Cruz	Pillar Point
2000	2,972	29,220	274,053	0	NA	0	0
2001	1,674	0	247,412	0	0	0	0
2002	1,137	75,153	668,846	0	NA	0	0
2003	0	630,420	282,696	0	NA	0	0
2004	0	79,504	502,142	0	0	0	0
2005	0	0	383,096	0	0	0	0
2006	0	0	64,954	0	0	0	0
Avg. Lbs.	833	116,328	343,171	0	33	0	0
Avg. Value	\$1,048	\$42,204	\$159,834	\$0	\$29	\$0	\$0

Source: CDFG 2007; NA = Below reporting threshold

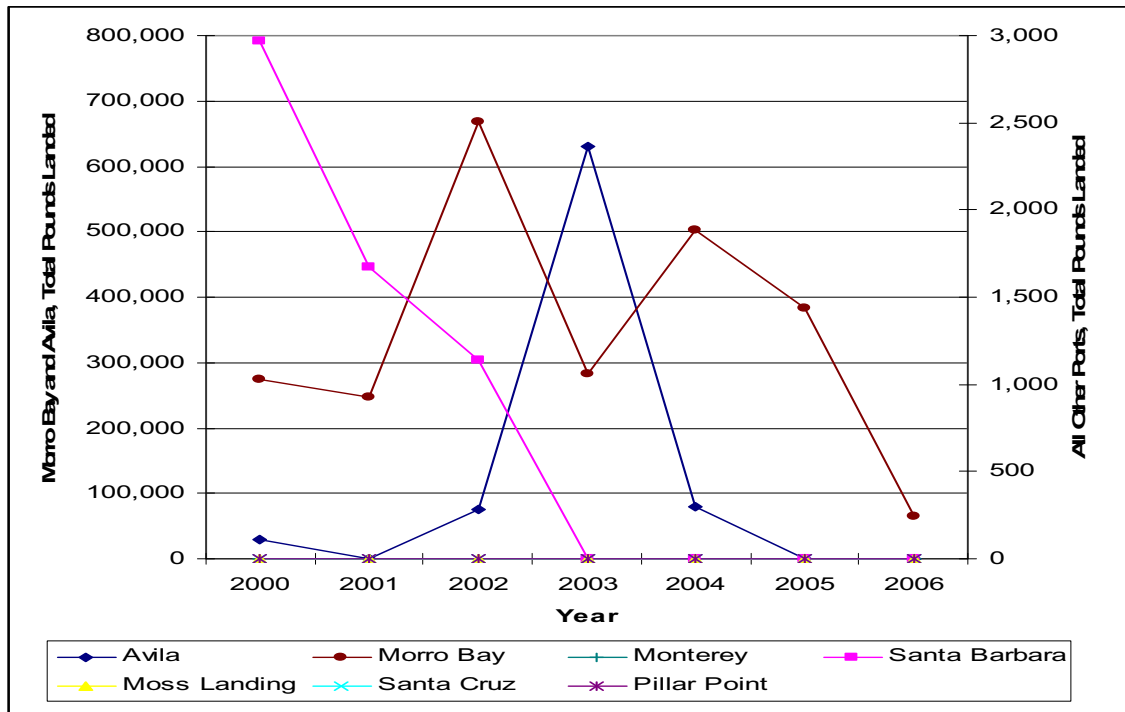


Figure 4-5 Pink Shrimp Landings at the Major Central California Coastal Ports: 2000-2006
(CDFG 2007)

Spot Prawn (*Pandalus platyceros*)

Overview. Spot prawns, the largest of the coldwater shrimp, constitute the focus of one of the most lucrative fisheries in California. The species is distributed between the Gulf of Alaska and Baja California, Mexico at depths of 600-1,000 feet along submarine canyons and hard, soft, and mixed bottom shelf breaks (Leet et al. 2001). Most spot prawns are trapped in pots and harvested live. Spot prawn traps vary in design.

The spot prawn fishery began in Monterey in the early 1930s. Between 1930 and 1973, landings averaged about 2,000 pounds per year. The industry expanded significantly during the mid-1980s. In 1991, 247,000 pounds of spot prawns were landed in California.



Spot Prawn Traps: Monterey Bay Harbor

More participants entered the fishery after the introduction of rock hopper gear in the 1990s. This “all terrain” gear expanded spot prawn grounds to include rocky bottoms (Larsen 2001). In 2000, about six vessels ranging from 30 to 60 feet targeted spot prawn in the Monterey Bay area (Starr et al. 2002).

Management Measures. Spot prawn became a limited permit entry fishery in 2003. Regulations also prohibited the use of trawl nets.

Monterey Bay Area Spot Prawn Fishery. Participants in this fishery offload in Monterey Harbor and Moss Landing. Monterey receives the bulk of spot prawns offloaded in the region.



Spot Prawn Vessel with Prawn Traps: Monterey Bay Harbor

Morro Bay Area Spot Prawn Fishery. Morro Bay Harbor is the center of spot prawn production in the Morro Bay area. Very little spot prawn is landed at Avila.

Overall Recent Landings. In recent years, the primary spot prawn ports in the region were Morro Bay, Monterey, Moss Landing and Santa Barbara. Very little prawn was harvested in ports north of Moss Landing (Table 4-8, Figure 4-6).

Table 4-8 Spot Prawn Landings (in pounds) at Major Central California Ports: 2000-2006

Year	Santa Barbara	Avila	Morro Bay	Monterey	Moss Landing	Santa Cruz	Pillar Point
2000	30,133	3,177	126,871	29,906	7,607	NA	NA
2001	15,973	NA	77,356	33,488	14,901	0	5,674
2002	25,847	7,099	91,123	73,133	8,159	NA	8,159
2003	5,630	0	NA	36,312	21,924	0	0
2004	3,617	NA	NA	27,779	20,025	0	0
2005	5,130	NA	18,801	30,288	14,687	0	0
2006	11,072	0	30,163	40,629	21,204	NA	NA
Avg. Lbs.	13,914	1,548	51,577	38,970	15,501	84	1,978
Avg. Value	\$143,103	\$14,251	\$430,665	\$403,492	\$14,251	\$824	\$16,558

Source: CDFG 2007; NA = Below reporting threshold

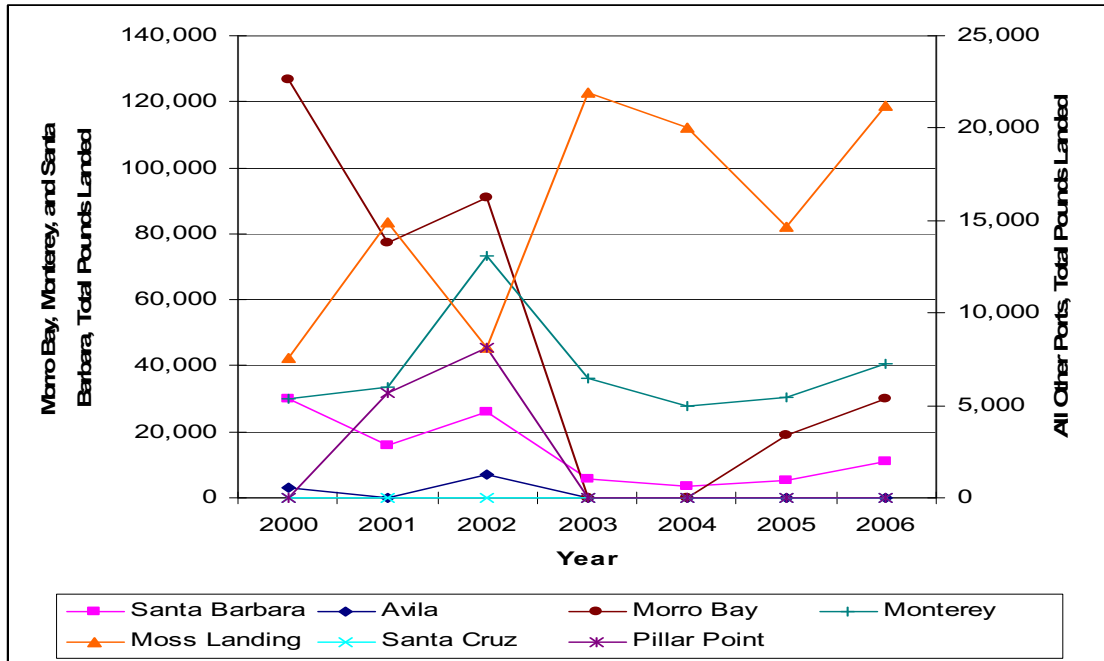


Figure 4-6 Spot Prawn Landings at the Major Central California Coastal Ports: 2000-2006 (CDFG 2007)

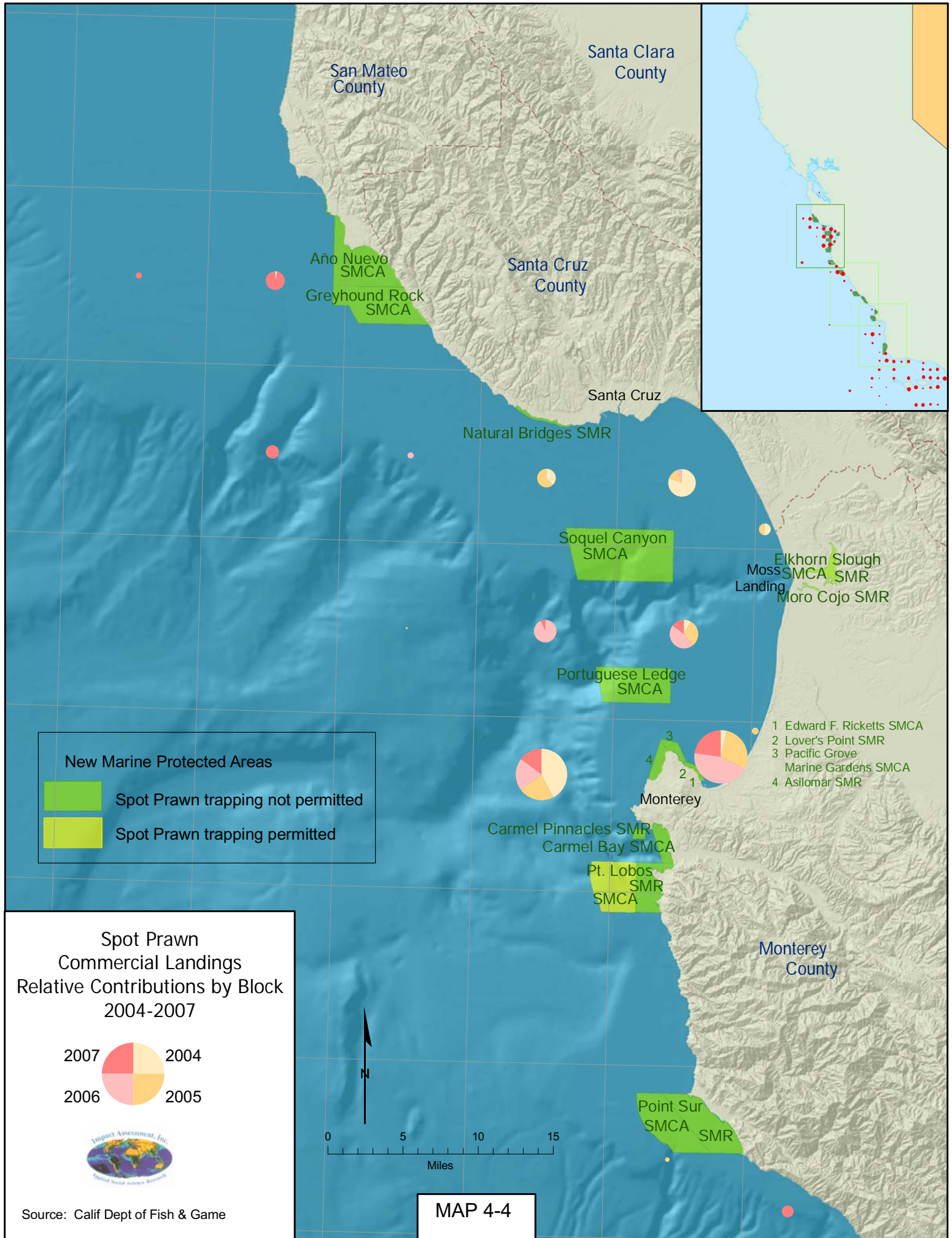
Maps 4-4, 4-5, and 4-6 below depict the reported areas of capture for the Central Coast spot prawn fishery for the years 2004-2007.

Pacific Ridgeback Prawn (*Sicyonia ingentis*)

Overview. Pacific ridgeback prawn are found in the waters between Monterey and Baja California, Mexico. Landings of ridgeback prawn occur primarily at Santa Barbara Harbor.

Management Measures. Statewide landings of ridgeback prawn have fluctuated widely from year to year, and decade to decade. For much of the 1970s, landings remained below 5,000 pounds, increasing to 356,000 pounds in 1979, but dropping to 129,000 pounds three years later. The California Fish and Game Commission initiated a summer closure in 1981 to protect spawning females. Landings subsequently increased to almost 900,000 pounds in 1985. Landings ranged from a low of 64,000 pounds in 1992 to a new high of 1,391,000 pounds in 1999 (Starr et al. 2002).

Overall Recent Landings. Ridgeback prawn landings at Santa Barbara Harbor have trended downward in recent years (Figure 4-7). Landings ranged from a high of 1.1 million in 2000 to a low of 17,288 in 2005 (Table 4-9). In 2004, about 35 single-rigged trawlers participated in the fishery (Roberts 2005). Traditionally, participants in this area fish year-round for both ridgeback and spot prawn.

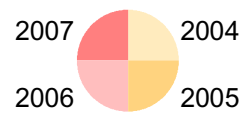


New Marine Protected Areas

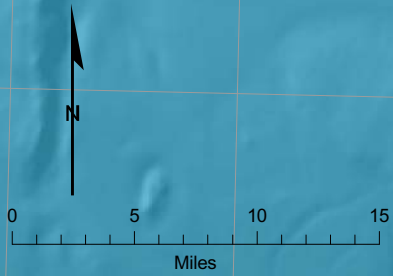
- Spot Prawn trapping not permitted
- Spot Prawn trapping permitted

- 1 Edward F. Ricketts SMCA
- 2 Lover's Point SMR
- 3 Pacific Grove Marine Gardens SMCA
- 4 Asilomar SMR

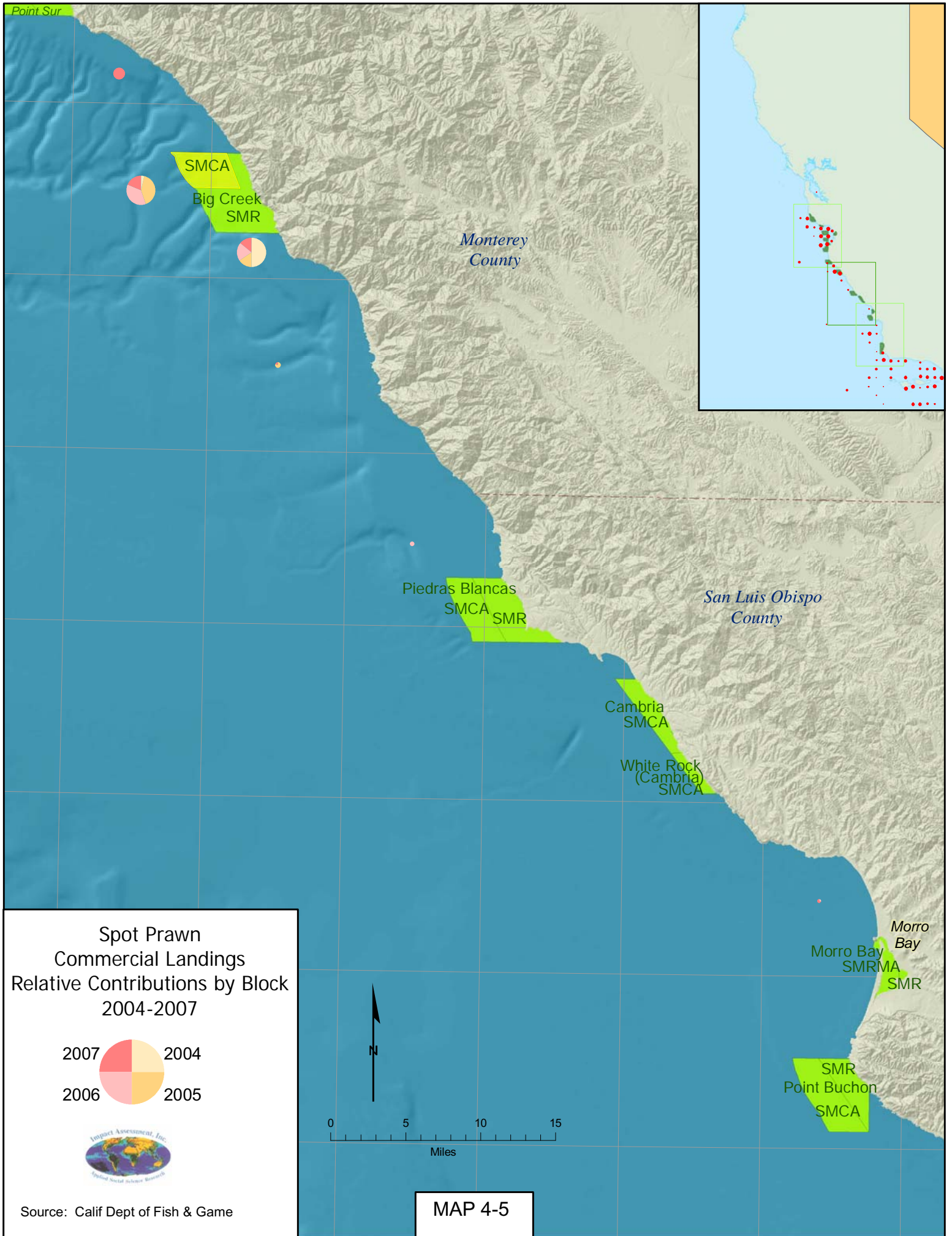
Spot Prawn Commercial Landings Relative Contributions by Block 2004-2007

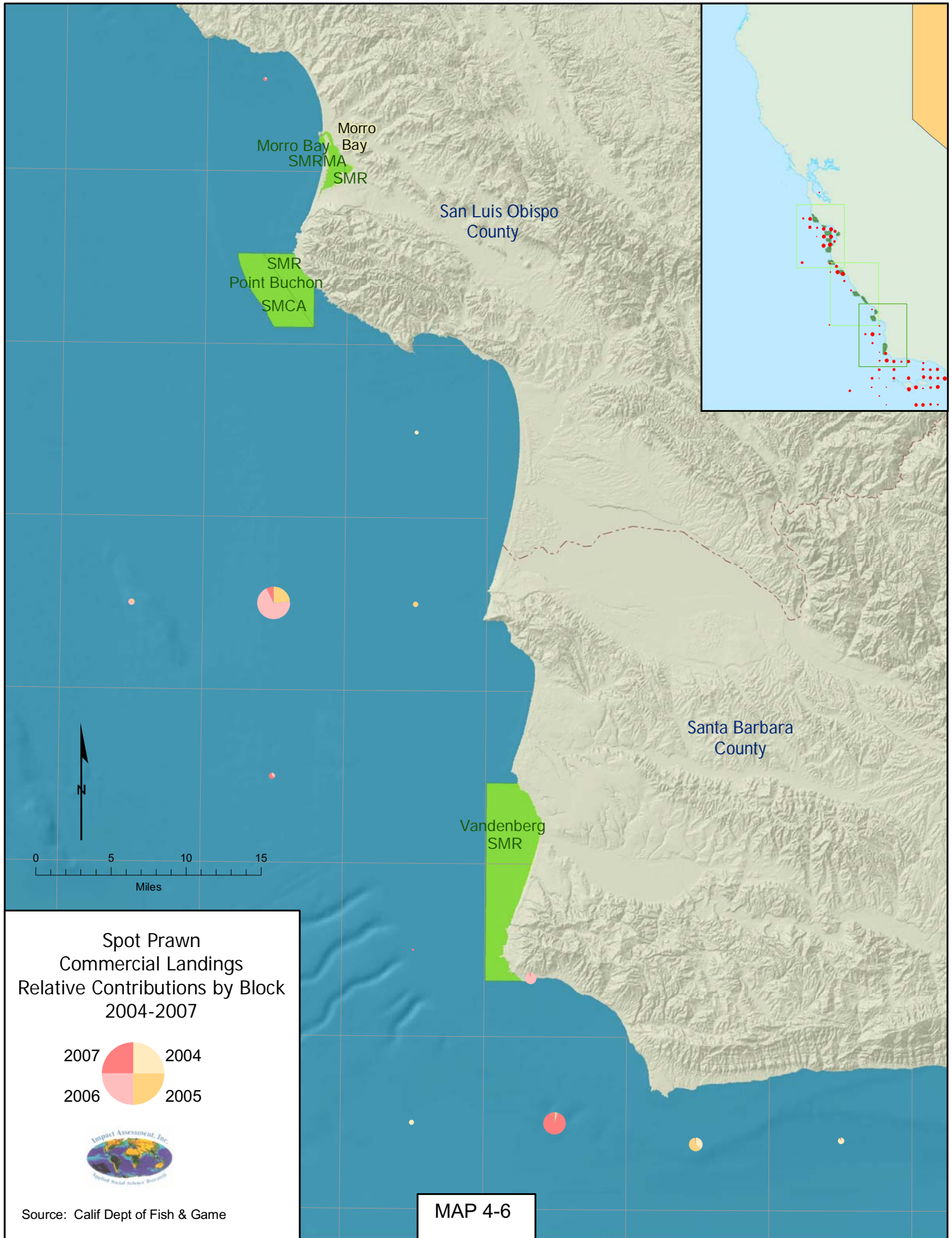


Source: Calif Dept of Fish & Game

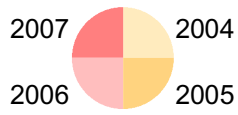


MAP 4-4





Spot Prawn
Commercial Landings
Relative Contributions by Block
2004-2007



Source: Calif Dept of Fish & Game

MAP 4-6

Table 4-9 Ridgeback Prawn Landings (in pounds) at Major Central California Ports: 2000-2006

Year	Santa Barbara	Avila	Morro Bay	Monterey	Moss Landing	Santa Cruz	Pillar Point
2000	1,132,439	0	2,150	0	0	0	NA
2001	180,708	NA	0	0	0	0	0
2002	272,262	0	1,226	0	0	0	0
2003	301,196	NA	2,049	0	0	0	NA
2004	43,232	0	0	0	0	0	0
2005	17,288	0	0	0	0	0	0
2006	24,031	0	0	0	0	0	0
Avg. Lbs.	281,593	884	784	0	0	0	57
Avg. Value	\$330,325	\$401	\$1,108	\$0	\$0	\$0	\$86

Source: CDFG 2007; NA = Below reporting threshold

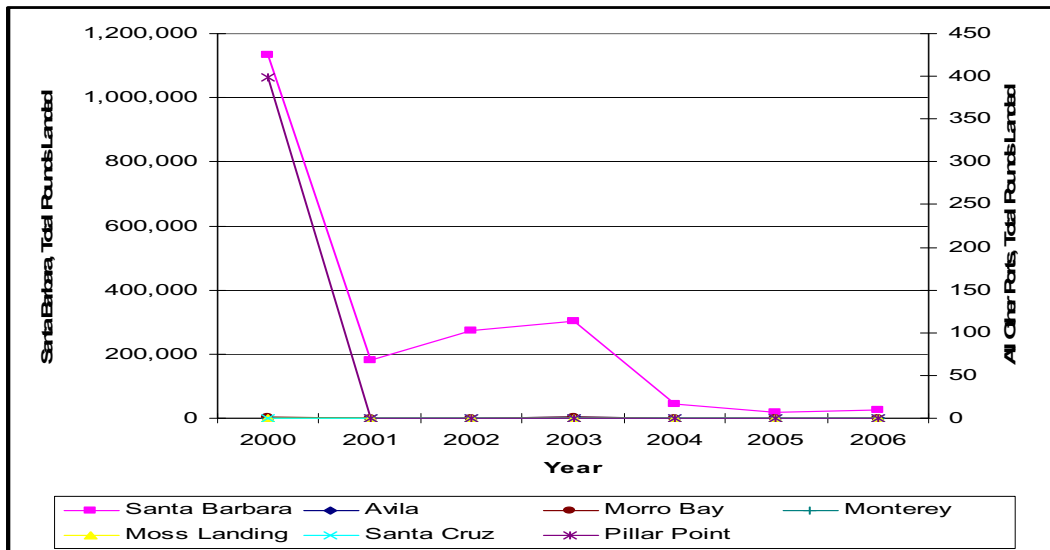


Figure 4-7 Ridgeback Prawn Landings at the Major Central California Coastal Ports: 2000-2006
(CDFG 2007)

4.3 Groundfish

Overview. Groundfish tend to live and feed along the bottom of the seafloor. All 60 species of rockfish are considered groundfish, as are sablefish, thornyheads, lingcod, sanddabs, California halibut, red snapper, and Dover sole. Rockfish species may be categorized based on preferred habitats, which include shallow nearshore and nearshore habitats, shelf habitats, and slope habitats. The commercial and recreational groundfish fisheries of California are particularly important in economic and dietary terms, and much of the fishing activity along the Central Coast is related to the pursuit of these species.

The type of gear used to catch groundfish varies by species. The deepwater trawl fishery traditionally targeted sole, but began targeting thornyheads, sablefish, and rockfishes during the 1990s, when domestic demand for sole had declined. Groundfish trawlers tend to be in the 50- to 75-foot range. Harvest of California halibut and sablefish (black cod) involve trawl gear, longlines, traps, and hook-and-line gear (Radtke and Davis 2000). Sanddabs are harvested using trawl and longline gear. Rockfish are harvested with a variety of gear, including trawl gear, longlines, stick gear, traps, and hook-and-line (Pacific Fisheries Management Council 2007).

Groundfish management is complicated for many reasons, not the least of which is the wide range of species and habitats involved. Some groundfish fall completely under federal jurisdiction, others are state-managed, and yet others are managed at *both* the federal and state level. Both the federal Groundfish Fishery Management Plan (GFMP) and the state Nearshore Fishery Management Plan (NFMP)⁵ provide regulations regarding the harvest of groundfish.



Trawl Gear: Monterey Bay

The GFMP is administered through the Pacific Fisheries Management Council. The GFMP includes both limited entry and open access strategies. The limited entry program permits both trawl and fixed gear; however, trawl gear is prohibited in the directed open access fishery. Other management tools include area closures, cumulative limits, seasonal closures, and gear restrictions. Some of the state-level management measures include permit and license requirements, minimum size limits, seasonal closures, depth restrictions, landing and trip limits, and gear restrictions.

Regulatory and Other Changes. Groundfish landings were highest during the apex of the trawl fishery in the 1970s and 1980s. Several events and technological innovations contributed to the expansion of the groundfish fleet, but also to its decline in the 1990s and 2000s.

1970s. The nation's fleets expanded during the 1970s and 1980s in part a result of the Magnuson Fishery Conservation and Management Act of 1976. Owners and captains used easily acquired loans and tax deferments to upgrade or expand fishing operations which, in turn, increased

⁵ The NFMP covers the following species: Black rockfish (*Sebastes melanops*), black-and-yellow rockfish (*S. chrysomelas*), blue rockfish (*S. mystinus*), brown rockfish (*S. auriculatus*), calico rockfish (*S. dallii*), china rockfish (*S. nebulosus*), copper rockfish (*S. caurinus*), gopher rockfish (*S. carnatus*), grass rockfish (*S. rastrelliger*), kelp rockfish (*S. atrovirens*), olive rockfish (*S. serranoides*), quillback rockfish (*S. maliger*), treefish rockfish (*S. serriceps*), cabezon (*Scorpaenichthys marmoratus*), kelp greenling (*Hexagrammos decagrammus*), rock greenling (*H. lagocephalus*), California scorpionfish (*Scorpaena guttata*), California sheephead (*Semicossyphus pulcher*), and monkeyface prickleback (*Cebidichthys violaceus*).

efficiency. Increased capacity significantly increased deepwater groundfish landings—especially of rockfish and roundfish (Starr et al. 2002).

One fisherman offers his perspective on federal subsidies and growth of the local trawl fleet:

The federal government had a large role in the development of the fisheries, particularly in the 1970s. They helped to build the fleet; they evolved it into the 1980s, using roller gear. The fleet grew in size, as did the size of the boats, growing from 75' to 100' to 150'. The government did this to help the fisherman compete with foreign fishermen, who were fishing in U.S. waters (within the 100-mile limit). These were almost always trawlers who had come from Taiwan, Japan, and other Asian countries. They had a huge presence. They were targeting flatfish and rockfish, mainly black cod. This was the beginning of the decimation of the rockfish. It was the local fisherman who screamed to have regulations. In the 1980s, the enforcement got better. American boats also got better.

A shift away from nylon mesh toward stronger and less costly monofilament in the late 1970s also increased efficiency. Monofilament nets are also more resistant to rot, thereby allowing fishermen to catch more fish with less gear replacement costs (Love 2006).

Perhaps the most significant technological innovation was the introduction of roller gear in the 1960 and 1970s, which allowed some fisherman to move away from chain and rope gear (Love 2006). Unlike chain and rope drag gear, which requires a relatively smooth bottom surface to avoid snags and tears, roller gear allows fishermen to drag on both rocky and non-rocky bottoms. The tires simply roll and bounce over rock piles and allow the net to ride over obstacles without tearing. Prior to the advent of roller gear, participants targeted fish only in non-rocky areas.

1980s. Development of a management plan for groundfish began in the late 1970s. The GFMP was adopted by the Pacific Fishery Management Council in 1982 and implemented in 1983. The GFMP “provides for management of bottom dwelling finfish species (including all rockfish and whiting) that are found in U.S. Exclusive Economic Zone (EEZ) waters of Washington, Oregon and California” (Barnes 2001: 359). This management plan also imposed limits on rockfish take.

The trawl fishery began to decline over the course of this decade and the commercial hook-and-line and gill net fisheries expanded. The live finfish fishery, which would become economically significant in the early 1990s, began to spread from the Monterey area to other regions of the state.

1990s. The Marine Resources Protection Act of 1990 prohibited the use of gill nets within three miles of the mainland coast in southern California and within one mile of the Channel Islands. The Act also initiated a three year phase-out of gill and trammel nets within the same areas, with a total prohibition in 1994.

In 1994, the federal Groundfish Restricted Access Program split the *Sebastes* complex into limited entry and open access fisheries. Limited entry trip limits were set at 80,000 pounds per month; open access trips were limited to 40,000 pounds per month. The Program also expanded the ban on gill net use within three miles of shore to the entire West Coast.

In the first round of limited entry, only 185 commercial fishermen qualified for permits. The open access phase was established to allow fishermen who did not have sufficient landings to qualify for a permit.

The Program also affected recreational fishing. Prior to this legislation, charter fishermen were allowed to land 15 rockfish and 5 lingcod per day; afterwards, the take was limited to 10 rockfish. This limit reportedly was a disincentive for some anglers to book charters.

The Marine Resources Protection Act of 1990 (California Proposition 132) and the federal Groundfish Restricted Access Program (established in 1994) contributed significantly to the 60 percent reduction in groundfish landings at California ports noted during the 1990s. Groundfish landings would have diminished even further if numerous commercial participants had not adapted by seeking out new grounds and fisheries. But as can be determined through spatial analysis of landings data, the level of production in the region's nearshore fisheries— especially the live fish fishery— significantly increased following implementation of the new regulations. Some displaced offshore fishermen explored previously unused areas in the nearshore zone. Such areas were particularly attractive to displaced trawl and gill net captains since close proximity to port enabled a reduction in fuel costs and rapid transfer of fish to the marketplace.

Thus, the new regulations inadvertently shifted commercial fishing pressure to new areas and species. This subsequently led to increased competition for limited resources in certain areas both within the commercial fleet and between commercial and recreational participants (LMR Fisheries Research Inc. 2001).

The lucrative live fish fishery remained largely unregulated until the late 1990s, when the sustainability of nearshore species came under review.⁶ Subsequently, concern over the rapid depletion of nearshore finfish resulted in the enactment of the Marine Life Management Act (MLMA) and the Nearshore Fisheries Management Act (NFMA), both in 1998. The MLMA mandated the CDFG to develop fisheries management plans (FMPs) for the state's living marine resources. The NFMA gave the California Fish and Game Commission and the CDFG the authority to develop and adopt management plans for current recreational and commercial fisheries in state waters, and to identify and manage emerging fisheries. It also established minimum sizes for several species of rockfish, cabezon, and lingcod, and established a nearshore fishery permit.

One of the first FMPs developed was for the finfish fisheries (implemented in 2002). The Nearshore FMP manages 19 species of nearshore finfish, including 16 groundfish species that are also federally managed. These are: black rockfish (*Sebastes melanops*), black-and-yellow rockfish (*S. chrysomelas*), blue rockfish (*S. mystinus*), brown rockfish (*S. auriculatus*), calico rockfish (*S. dallii*), china rockfish (*S. nebulosus*), copper rockfish (*S. caurinus*), gopher rockfish (*S. carnatus*), grass rockfish (*S. rastrelliger*), kelp rockfish (*S. atrovirens*), olive rockfish (*S.*

⁶ Some fishermen attribute the decline of the nearshore rockfish population to extraction methods employed by immigrants during the 1980s and early 1990s and, later, by bottom trawlers. In the former case, fishermen then recently arriving from Vietnam typically used gill nets, which were often two or three times as long as those typically set in the region (Orbach 1983).

serranoides), quillback rockfish (*S. maliger*), treefish rockfish (*S. serriceps*), cabezon (*Scorpaenichthys marmoratus*), kelp greenling (*Hexagrammos decagrammus*), rock greenling (*H. lagocephalus*), California scorpionfish (*Scorpaena guttata*), California sheephead (*Semicossyphus pulcher*), and monkeyface prickleback (*Cebidichthys violaceus*).⁷ The Nearshore FMP requires commercial fishermen to buy permits to target those 19 species and provides for maintenance of nearshore fisheries at a sustainable level (Marx 2000).

In 1998 the state established a limited entry program for the nearshore fishery.⁸ Control dates were set between 1994 and 1999. Qualifying nearshore fishermen were eligible to purchase a limited entry permit. Size limits for ten nearshore species, including some rockfish, and catch limits for nearshore rockfishes (< 1,000 pounds per month), were also instituted. Commercial fishermen who now wish to fish in nearshore areas must buy either a transferable Nearshore Fishing Permit or a non-transferable Deeper Nearshore Fishing Permit (Myers et al. 2007). In the South-Central Coast Region (Point Año Nuevo to Point Conception), the Nearshore FMP now allows for 60 permits and 13 trap endorsements. Without a trap endorsement, the fishery participant is limited to hook-and-line gear (CDFG 2003).

2000s. As of the year 2000, 288 limited entry permit holders and 325 licensed buyers were active in California's groundfish fishery (Barnes 2001). In that same year, however, the Secretary of Commerce declared the groundfish fishery a disaster.

Stock assessment capability improved in the early 2000s with the development of new GPS technologies. Improved stock assessment capabilities resulted in more species of rockfish being declared overfished.

In an effort to reduce overfishing and rejuvenate imperiled stocks, Rockfish Conservation Areas (RCAs) were adopted in 2001 and implemented in 2002. RCAs are designed to minimize the incidental catch of those rockfish species that the National Marine Fisheries Service has declared as overfished⁹ (NOAA 2007). The closures may constrain a particular type of fishing gear, or they may entail closure of a particular area. As a result, Dover sole, thornyheads, sablefish, and Pacific whiting dominated California's 2002 groundfish harvest, while landings of sablefish, lingcod, and other rockfish declined sharply (CDFG 2003). The RCA network includes Yelloweye Rockfish Conservation Areas, Cowcod Conservation Areas, Cordell Banks Closed Area, Farallon Islands Closed Areas, and Essential Fish Habitat Conservation Areas (NOAA 2007).

The location and boundaries of a given RCA are not static but changes as necessary, based on updated information regarding the status of the species being protected. According to Bacher

⁷ California sheephead, California scorpionfish, and the monkeyface prickleback are not important contributors to the nearshore fishery in the Central Coast study region and, therefore, are not discussed further in this document.

⁸ The California Nearshore Fishery Management Plan defines "nearshore" as the area from the high-tide line off shore to a depth of 120 feet (20 fathoms).

⁹ West Coast groundfish species that have been declared overfished are: widow rockfish, canary rockfish, yelloweye rockfish, dark-blotched rockfish, bocaccio, Pacific Ocean perch, and cowcod.

(2002), the array of rules and exceptions used to govern the areas are subject to frequent changes and are therefore often confusing to fishermen. Efforts have been made by various governing bodies, such as the California Fish and Game Commission, to simplify rules and regulations. Although some fishermen supported the RCA regulations as a way to rebuild depressed stocks, some also report economic difficulties following their implementation. Some contend that the RCAs protect depleted stocks but prohibit fishermen from catching several species they consider to be abundant, such as chilipeppers, widow rockfish, and bocaccio.

From a management perspective, the RCAs were an alternative to closing down a given fishery entirely and a way to allow some fishing to continue while depleted stocks rejuvenated. However, the RCAs effectively moved numerous commercial fishermen into unregulated nearshore areas. The resulting concentration of effort in shallow waters eventually led to new controls via the Nearshore FMP, including the adoption of a restricted access program intended to reduce pressure on nearshore rockfish. This exemplifies situations in which new regulations can lead to new pressures on the resources which, in turn, can create the need for new regulations. This unintended circular effect is an important aspect of fisheries management in this and other regions, with implications for policy makers seeking long-term solutions to recurrent resource management challenges.

Although the status of the groundfish fishery has generally improved, and 400 limited entry permits were granted in 2008, the entire fishery remains carefully managed at both the federal and state level.¹⁰ Currently four types of groundfish are under federal management: rockfish, flatfish, roundfish, and sharks and skates. Within those four groups, the GFMP provides guidelines for more than 82 different species (Pacific Fisheries Management Council 2007).

Monterey Bay Area Groundfish Fishery. In recent years, the principal species of groundfish landed in the Monterey Bay area, in descending order of value, were sablefish, California halibut, Dover sole, sanddab, and petrale sole. Thus, there has been a shift in effort away from rockfish toward the flatfish species. This obviously relates largely to increasingly stringent rockfish regulations. Of the many fishermen who participated in the groundfish fishery around Monterey Bay prior to the advent of the RCAs, relatively few remain today.

Morro Bay Area Groundfish Fishery. For decades, groundfish landings dominated Morro Bay area fisheries. In the 1950s and 1960s, the Morro Bay groundfish fleet involved some 50 trawlers. This regional change occurred in conjunction with diminished groundfish trawl landings and revenue statewide. Statewide revenue fell from \$110 million in 1987 to \$35 million in 2003 (The Nature Conservancy 2006). In recent years, the most valuable groundfish species in the Morro Bay area were, in descending order: cabezon, rockfish, California halibut, Dover sole, thornyhead, and sablefish.

Two recent events have affected current commercial groundfish landings in the Morro Bay area. First, in May 2006, the Pacific Fishery Management Council established a 3.8-million acre no-trawl zone between Point Conception and Point Sur (Gustaitis 2005).

¹⁰ Sixteen of the nineteen finfish species occurring in the State's Nearshore Fishery Management Plan (NFMP) also occur in the federal Groundfish Fishery Management Plan (GFMP). The State has active management jurisdiction over 4 of the 19 species: California sheephead, cabezon, rock greenling, and kelp greenling (CDFG 2008a).

Second, in June 2006, The Nature Conservancy (TNC) and the Environmental Defense Fund purchased six federal trawling permits and four trawl vessels from commercial fishermen in the Morro Bay area. Two of the vessels were scrapped and the other two remained moored at Morro Bay Harbor. With that purchase, TNC became the first private organization to buy out Pacific fishing permits and boats for conservation purposes (The Nature Conservancy 2006).

In October 2007, TNC, in conjunction with federal regulators and a grant from the Ocean Conservancy, began its experimental fishing program. This trial, known as the Conservation Fishing Agreement, was in effect for one year. It included monitoring of landings of one permit holder in the Morro Bay area; the participant used one of the six federal trawl permits previously retired. According to the terms of the agreement, the participant employed selective flatfish trawl gear designed to reduce bycatch of other groundfish species. Fishing grounds were confined to areas currently open to trawl fishing; any fishing in existing federal and state trawl closure areas, previously untrawled areas, or sensitive habitats in remaining open areas are prohibited (The Nature Conservancy 2007).

Both of those recent conservation measures may improve prospects for fishermen in the future, but are a deterrent to fishing today. According to a Morro Bay harbor official interviewed by Gustaitis (2005: 1), “Depleted fish stocks are no longer our problem here in Morro Bay. Most days we never even have a boat leave the harbor, since the regulatory regime doesn’t let them fish.”

Another pilot program was recently approved. In this new experiment, the remaining five shelved trawl permits will be leased to Morro Bay fishermen so that they, too, may use non-trawl methods to target groundfish. Participants will share catch limits. Fishermen will be permitted to use gear that targets individual species, such as hook-and-line and traps (Johnston 2008). According to TNC, “this pilot project will help test the social, economic, and biological benefits of converting traditional trawling practices to alternative, more selective gear that has less impact on the fish and the habitat” (2007:1). The project will be a collaborative effort between the Morro Bay Harbor, the Morro Bay Commercial Fishermen’s Organization, The Nature Conservancy, and the Environmental Defense Fund, and will be known as the Central Coast Community-Based Fishing Association (Sneed 2008).

As of March 2008, one captain in the program was bringing in fish, much of which was being sold to local restaurants and retailers. The five other fishermen who have leased back trawl permits were expected to begin fishing during the summer months of July 2008. According to some local fishermen, the pilot program is lifting spirits and may, to some extent, revitalize the commercial fishing industry in this area.

Rockfish

Overview. Over the years, rockfish have provided commercial fishermen with a consistent, accessible resource. In the 1980s and 1990s, the hook-and-line fishery and the nearshore live fish fishery provided many displaced trawl fishermen and gill netters with alternative fisheries.

Between 1980 and 2000, bocaccio, chilipepper, widow rockfish, and yellowtail rockfish comprised 98 percent of the total commercial catch from rocky deep shelf and slope habitats in the Monterey Bay area. Rockfish is also commonly pursued by recreational fishermen. Rockfish can be fished year-round and comprise over 50 percent of the recreational catch in Central California (Starr et al. 2002).

Monterey Bay Area Rockfish Fishery. Local fishermen estimate that there were between 16 and 25 commercial rockfish fishermen active in the Monterey area nearshore live fish fishery throughout the 1990s. Informants also assert that no more than six local fishermen remain active in the fishery today, with another three or four periodically traveling up from Morro Bay to engage in the fishery.

Morro Bay Area Rockfish Fishery. Although the rockfish fishery is an important component of the Morro Bay area fishery, landings have significantly decreased over the last two decades (Figure 4-8). Local fishermen contend that seasonal closures, trip limits, limited entry permits, vessel buyback programs, and the establishment of RCAs resulted in reduced capacity and diminished landings.

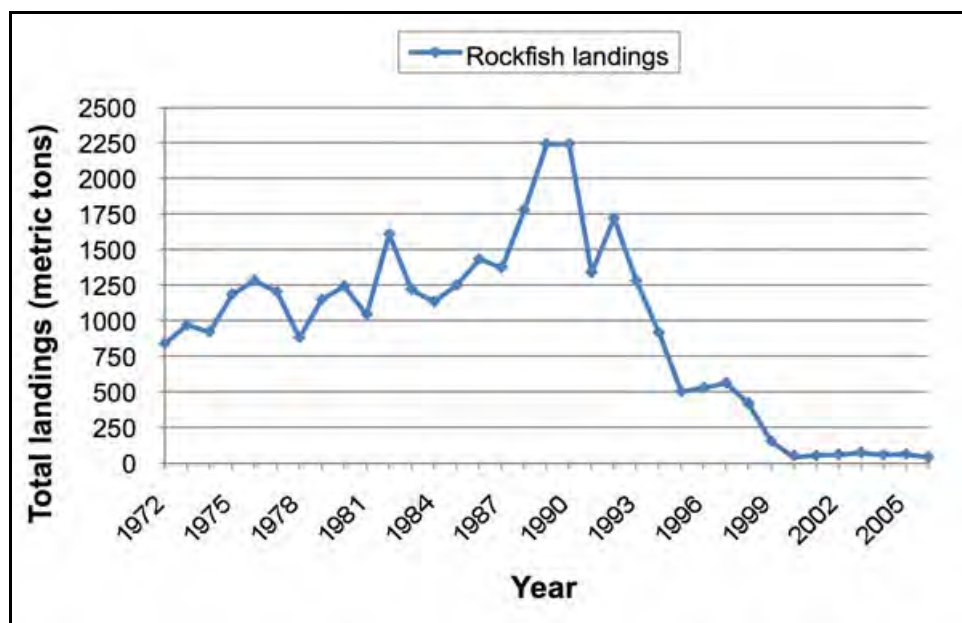


Figure 4-8 Total Rockfish Landings (in metric tons) in the Morro Bay Area: 1972-2006 (San Luis Obispo Science and Ecosystem Alliance 2007)

Overall Recent Landings. Although the rockfish fishery is highly regulated at present and despite steeply declining landings since 1990, it remains an economically important fishery in some areas, especially in the southern portion of the Central Coast (Table 4-10, Figure 4-9). For example, rockfish accounted for two of the top five most economically important species landed at Avila where, between 2000 and 2006, 1.9 million pounds of brown rockfish were landed with an ex-vessel value of \$979,052. Significant amounts of rockfish are also landed at Moss Landing (CDFG 2007). With the exception of Morro Bay and Moss Landing, rockfish landings have generally trended downward across the region.

Table 4-10 Rockfish Landings (in pounds) at Major Central California Ports: 2000-2006¹¹

Year	Santa Barbara	Avila	Morro Bay	Monterey	Moss Landing	Santa Cruz	Pillar Point
2000	40,219	218,574	114,332	256,126	207,980	32,367	179,912
2001	36,642	212,525	115,485	169,443	233,403	13,428	160,804
2002	27,809	544,673	131,180	83,186	154,941	5,129	116,654
2003	12,623	290,690	159,820	66,384	286,350	6,219	28,711
2004	16,412	195,057	130,693	80,609	154,250	3,274	11,954
2005	12,490	70,514	139,261	69,961	138,795	4,071	9,618
2006	18,602	71,245	94,148	85,569	267,132	8,404	18,262
Avg. Lbs.	23,542	229,040	126,417	115,897	206,122	10,413	75,131
Avg. Value	\$142,848	\$395,305	\$341,024	\$127,614	\$163,787	\$14,391	\$75,849

Source: CDFG 2007

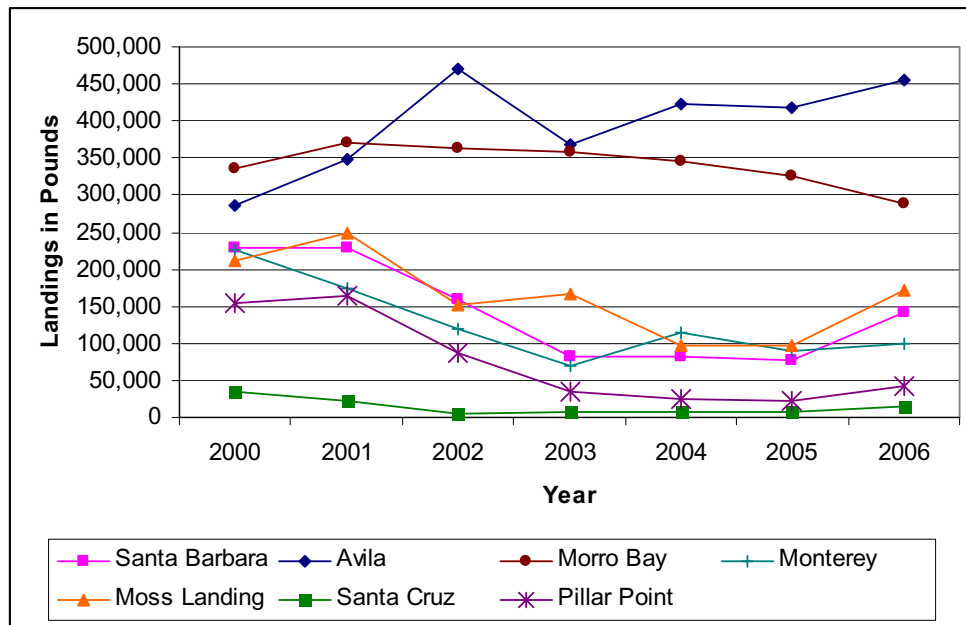


Figure 4-9 Rockfish Landings at Major Central California Ports: 2000-2006

Maps 4-7, 4-8, and 4-9 below depict the reported areas of capture for all commercial rockfish fisheries conducted along the Central Coast for the period 2004-2007. Maps 4-10, 4-11, and 4-12 depict the reported areas of capture for all commercial *nearshore* rockfish fisheries across the region.

¹¹ Rockfish species included in annual totals are: aurora, bank, black, black-and-yellow, blackgill, blue, bocaccio, bronzed-spotted, brown, canary, canary/vermillion, chilipepper, China, copper, cowcod, darkblotched, flag, gopher, grass, greenspotted, group black/blue, group bolina, group deepwater reds, group gopher, greenstriped, group nearshore, group red, group rosefish, group shelf, group slope, group small, kelp, Mexican, olive, Pacific ocean perch, pink, quillback, redbanded, rosethorn, rosy, shortbelly, speckled, splitnose, starry, stripetail, swordspine, treefish, unspecified, vermillion, widow, yelloweye, and yellowtail.

Nearshore Live Fish Fishery. Fishermen of Vietnamese ancestry living in the Monterey Bay area are credited with first recognizing the economic potential of the live fish fishery.¹² Initiated in the mid-1980s, the fishery expanded in conjunction with increasing demand for specialty foods in Central California's Asian markets and restaurants. The nearshore live fish fishery also provided opportunity for commercial fishermen who were struggling in other fisheries (Starr et al. 2002).

The live fish fishery is highly profitable. In March 2008, live rockfish sold for \$9 a pound in the Monterey Bay area, well above the market price for standard rockfish. Captured fish are held in aerated containers and transported live to both seafood markets and restaurants. This fishery is well-suited to use of small skiffs and kayaks, which involve relatively low operating costs.

Management Measures. The live finfish fishery is managed under the GFMP and NFMP. Management measures include: seasonal and area closures; trip, landing, and size limits; and permit and licensing requirements.

Monterey Bay Area Live Fish Fishery. Initially, the Monterey Bay live fish fishery involved rockfishes, cabezon, kelp greenling, thornyheads, crab, abalone, octopus, prawn, and albacore. Today, the fishery has largely shifted from nearshore species to shelf and slope species such as shortspine thornyhead, rosy rockfish, and sablefish. Much of the seafood produced in this fishery is distributed to clientele in San Francisco.

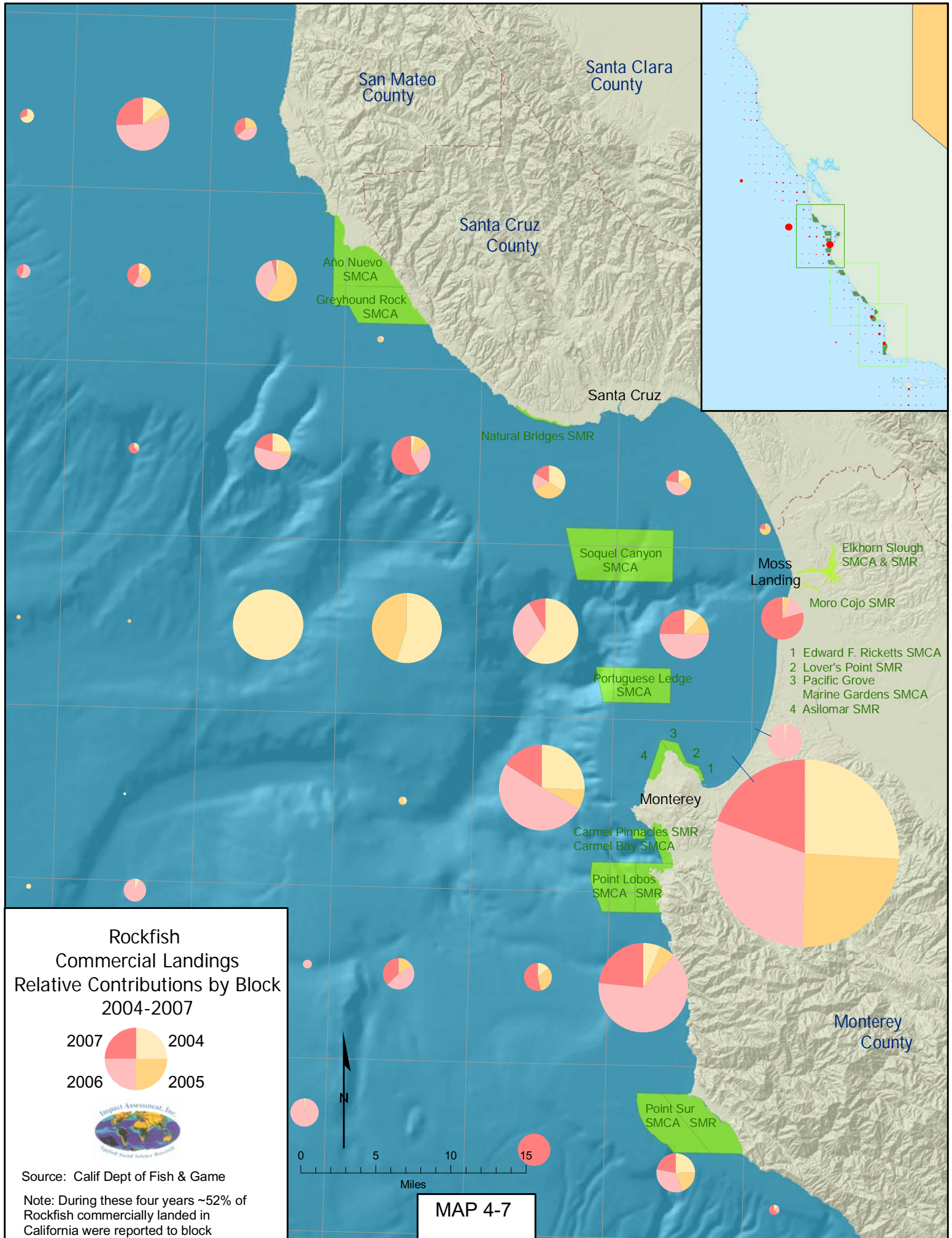
Nearly two dozen fishermen were involved in the Monterey Bay nearshore live fish fishery during the 1990s. Less than ten are consistently involved in the fishery today. Some participants claim the high price of permits has constrained participation; others assert that multiple regulations made it difficult to succeed. Some fishermen have retired and fewer young fishermen are now participating.

Morro Bay Area Live Fish Fishery. Morro Bay was the leading port for live fish landings in California during the 1990s. At Avila, at least 100 fishermen participated in this fishery during the period. One buyer recalls purchasing between 2,000 and 4,000 pounds of live rockfish each week during that time.

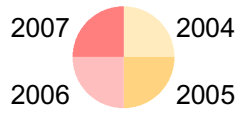
The Point Arguello area, located at the southern end of the Vandenberg SMR, is a prime location for inshore fishing. Some 30 nearshore commercial fishermen traveled from Morro Bay to fish here during the 1990s. Although high fuel prices limited the frequency of such trips, the high prices paid for live fish allowed some Morro Bay area fishermen to profit despite the costs.

Between 1994 and 2006, three local seafood retailers - two in Morro Bay and one in Santa Barbara - consistently bought live fish from Morro Bay area fishermen. Numerous buyers from Los Angeles and San Francisco also purchase live fish from the local fleet.

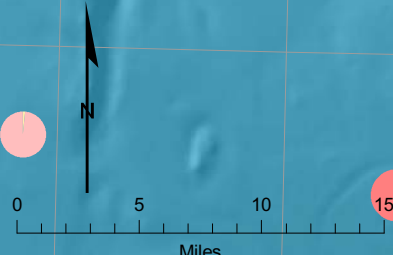
¹² Fishermen of Vietnamese ancestry are also credited with bringing gill netting into popular use and under public scrutiny. Anti-gill net sentiments resulted in the passage of Proposition 132 (the Marine Resources Protection Act of 1990).



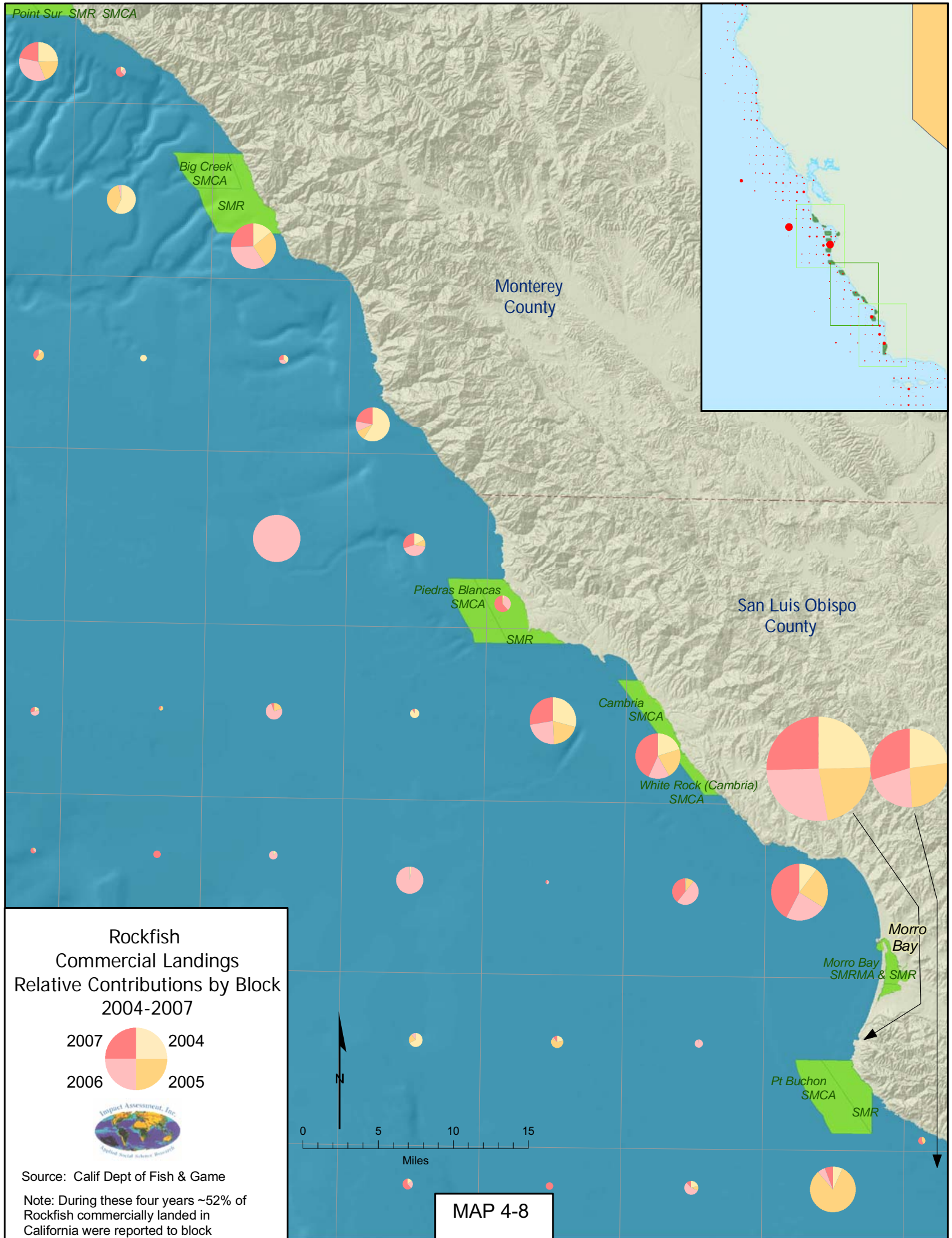
Rockfish Commercial Landings Relative Contributions by Block 2004-2007



Source: Calif Dept of Fish & Game
 Note: During these four years ~52% of Rockfish commercially landed in California were reported to block



MAP 4-7



Point Sur SMR SMCA

Big Creek SMCA

SMR

Monterey County

Piedras Blancas SMCA

SMR

San Luis Obispo County

Cambria SMCA

White Rock (Cambria) SMCA

Morro Bay

Morro Bay SMRMA & SMR

Pt Buchon SMCA

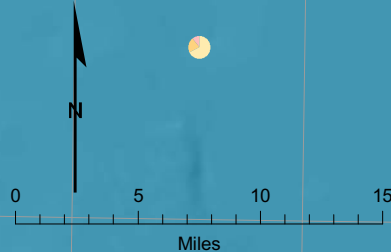
SMR

Rockfish Commercial Landings Relative Contributions by Block 2004-2007

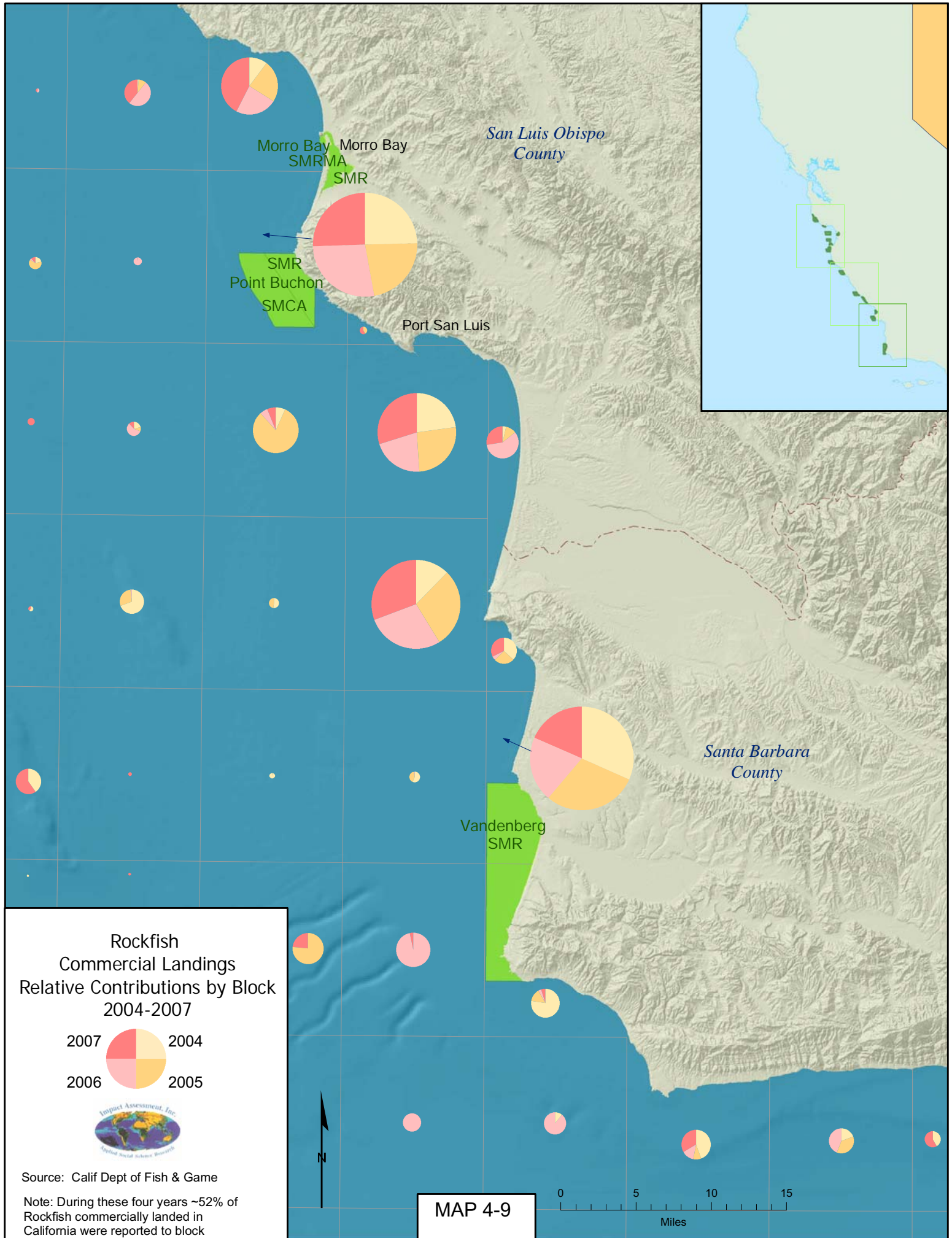


Source: Calif Dept of Fish & Game

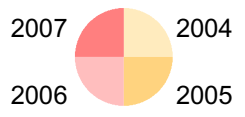
Note: During these four years ~52% of Rockfish commercially landed in California were reported to block



MAP 4-8



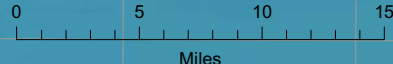
Rockfish Commercial Landings Relative Contributions by Block 2004-2007

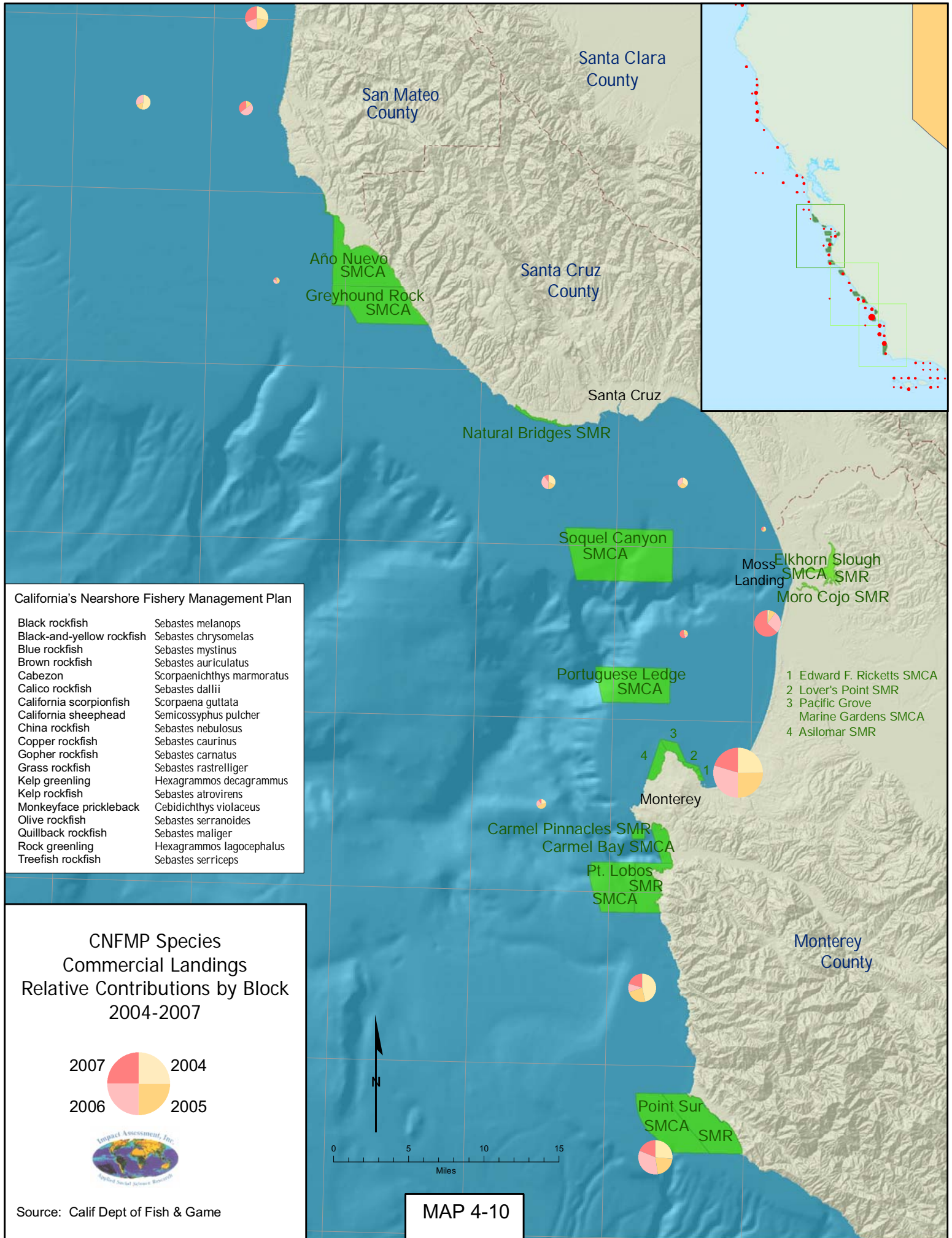


Source: Calif Dept of Fish & Game

Note: During these four years ~52% of Rockfish commercially landed in California were reported to block

MAP 4-9



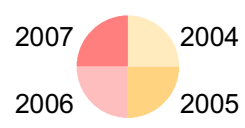


California's Nearshore Fishery Management Plan

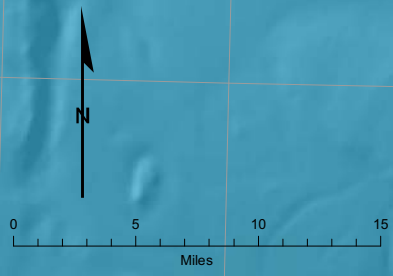
Black rockfish	<i>Sebastes melanops</i>
Black-and-yellow rockfish	<i>Sebastes chrysomelas</i>
Blue rockfish	<i>Sebastes mystinus</i>
Brown rockfish	<i>Sebastes auriculatus</i>
Cabezon	<i>Scorpaenichthys marmoratus</i>
Calico rockfish	<i>Sebastes dallii</i>
California scorpionfish	<i>Scorpaena guttata</i>
California sheephead	<i>Semicossyphus pulcher</i>
China rockfish	<i>Sebastes nebulosus</i>
Copper rockfish	<i>Sebastes caurinus</i>
Gopher rockfish	<i>Sebastes carnatus</i>
Grass rockfish	<i>Sebastes rastrelliger</i>
Kelp greenling	<i>Hexagrammos decagrammus</i>
Kelp rockfish	<i>Sebastes atrovirens</i>
Monkeyface prickleback	<i>Cebidichthys violaceus</i>
Olive rockfish	<i>Sebastes serranoides</i>
Quillback rockfish	<i>Sebastes maliger</i>
Rock greenling	<i>Hexagrammos lagocephalus</i>
Treefish rockfish	<i>Sebastes serripes</i>

- 1 Edward F. Ricketts SMCA
- 2 Lover's Point SMR
- 3 Pacific Grove Marine Gardens SMCA
- 4 Asilomar SMR

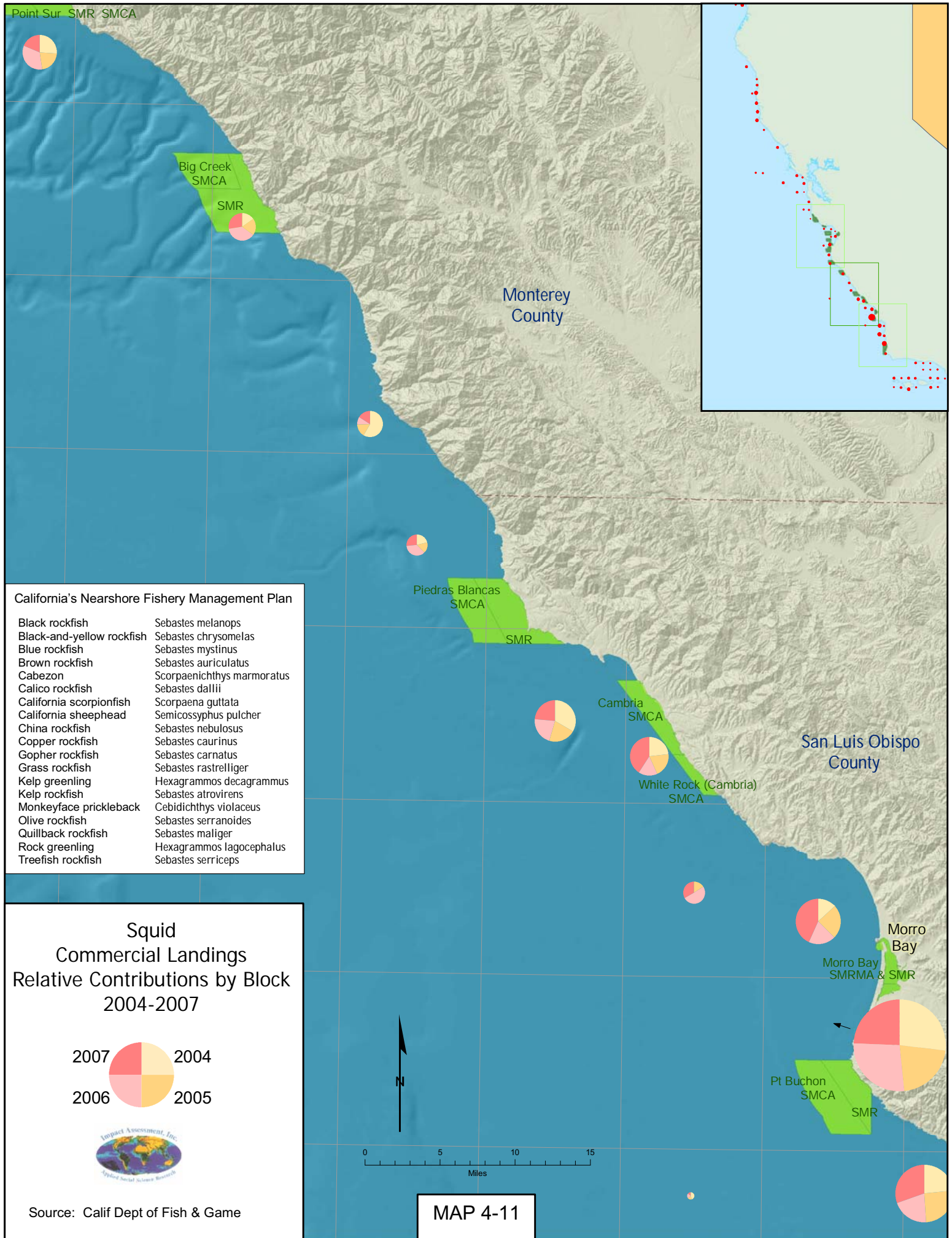
CNFMP Species Commercial Landings Relative Contributions by Block 2004-2007



Source: Calif Dept of Fish & Game



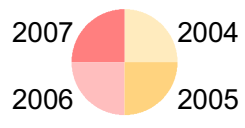
MAP 4-10



California's Nearshore Fishery Management Plan

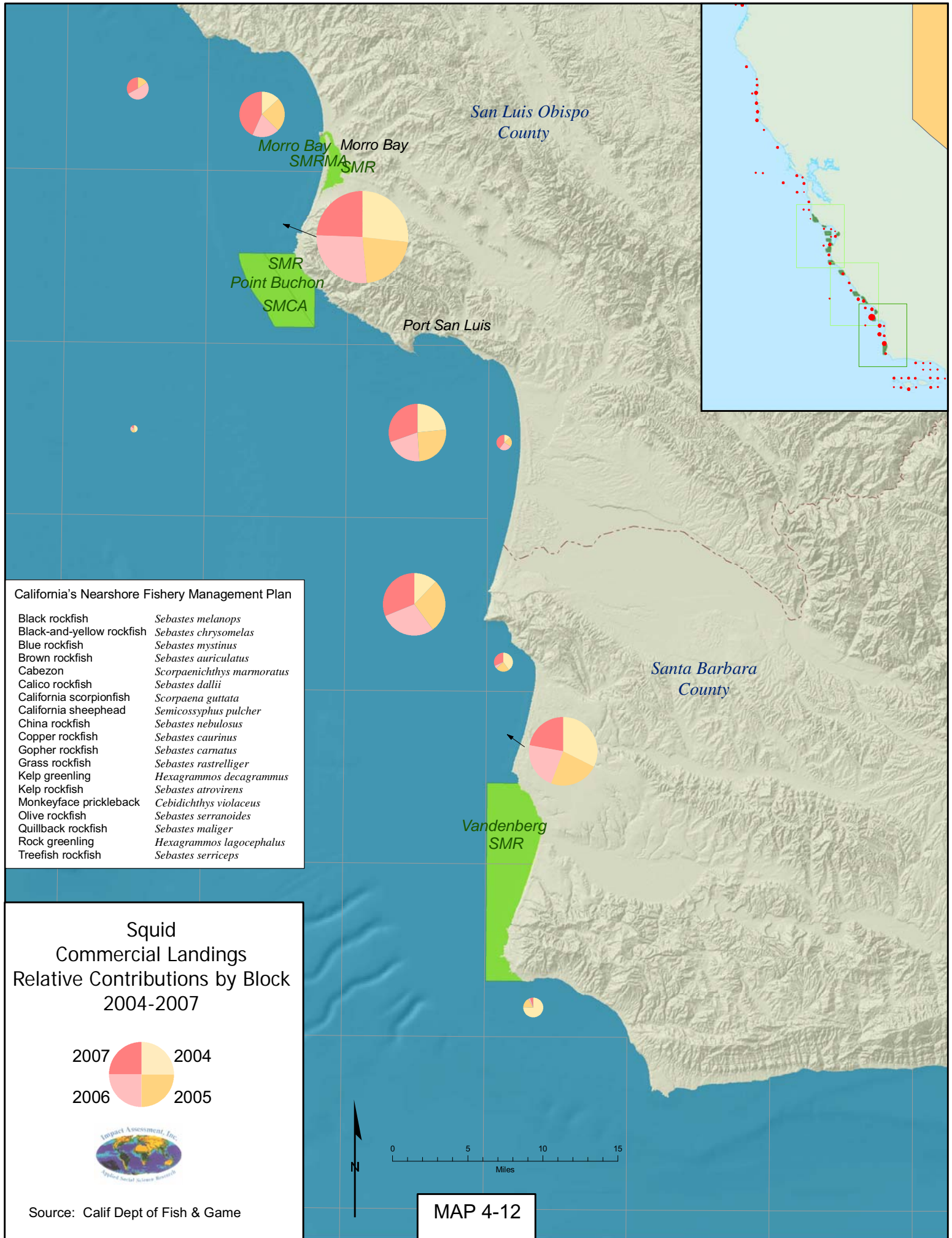
Black rockfish	<i>Sebastes melanops</i>
Black-and-yellow rockfish	<i>Sebastes chrysomelas</i>
Blue rockfish	<i>Sebastes mystinus</i>
Brown rockfish	<i>Sebastes auriculatus</i>
Cabezon	<i>Scorpaenichthys marmoratus</i>
Calico rockfish	<i>Sebastes dallii</i>
California scorpionfish	<i>Scorpaena guttata</i>
California sheephead	<i>Semicossyphus pulcher</i>
China rockfish	<i>Sebastes nebulosus</i>
Copper rockfish	<i>Sebastes caurinus</i>
Gopher rockfish	<i>Sebastes carnatus</i>
Grass rockfish	<i>Sebastes rastrelliger</i>
Kelp greenling	<i>Hexagrammos decagrammus</i>
Kelp rockfish	<i>Sebastes atrovirens</i>
Monkeyface prickleback	<i>Cebidichthys violaceus</i>
Olive rockfish	<i>Sebastes serranoides</i>
Quillback rockfish	<i>Sebastes maliger</i>
Rock greenling	<i>Hexagrammos lagocephalus</i>
Treefish rockfish	<i>Sebastes serriceps</i>

Squid Commercial Landings Relative Contributions by Block 2004-2007



Source: Calif Dept of Fish & Game

MAP 4-11



California's Nearshore Fishery Management Plan

Black rockfish	<i>Sebastes melanops</i>
Black-and-yellow rockfish	<i>Sebastes chrysomelas</i>
Blue rockfish	<i>Sebastes mystinus</i>
Brown rockfish	<i>Sebastes auriculatus</i>
Cabezon	<i>Scorpaenichthys marmoratus</i>
Calico rockfish	<i>Sebastes dallii</i>
California scorpionfish	<i>Scorpaena guttata</i>
California sheephead	<i>Semicossyphus pulcher</i>
China rockfish	<i>Sebastes nebulosus</i>
Copper rockfish	<i>Sebastes caurinus</i>
Gopher rockfish	<i>Sebastes carnatus</i>
Grass rockfish	<i>Sebastes rastrelliger</i>
Kelp greenling	<i>Hexagrammos decagrammus</i>
Kelp rockfish	<i>Sebastes atrovirens</i>
Monkeyface prickleback	<i>Cebidichthys violaceus</i>
Olive rockfish	<i>Sebastes serranoides</i>
Quillback rockfish	<i>Sebastes maliger</i>
Rock greenling	<i>Hexagrammos lagocephalus</i>
Treefish rockfish	<i>Sebastes serriiceps</i>

Squid Commercial Landings Relative Contributions by Block 2004-2007

2007 (red) 2004 (yellow)
 2006 (pink) 2005 (orange)

Source: Calif Dept of Fish & Game

MAP 4-12

Thornyheads (*Sebastolobus altivelis* and *S. alascanus*)

Overview. Two species of thornyheads are pursued in the Central Coast region: longspine and shortspine. Longspines are found as far north as the Aleutian Islands and as far south as Baja California, Mexico. Shortspines inhabit waters from the Sea of Okhotsk in the Western North Pacific to Baja (Love 1991). Both species are bottom-dwellers and are found in abundance along the Central California coast, especially in the Morro Bay area. Few are captured south of Point Conception (Barnes et al. 2001). Longspines are most commonly found between depths of 2,000 and 4,000 feet. Shortspines prefer depths between 450 to 1,900 feet (Love 1991). The majority of thornyheads are taken with bottom trawl and longline gear and exported to Japan (Barnes et al. 2001; Love 1991). Thornyheads are of limited interest to recreational fishermen.



Shortspine Thornyhead

The West Coast thornyhead fishery first developed during the 1960s in Northern California. Participation and production were minimal until a Japanese market developed in the 1970s. Landings increased during the 1980s and 1990s, peaking at 7,800 tons in 1992. Thornyhead stocks apparently diminished thereafter, and by 1999 landings hit a low of 1,628 tons (Barnes et al. 2001).

Management Measures. The thornyhead fishery is managed through the GFMP. Since 1981, management measures have included annual quotas, individual quotas, and trip limits (Barnes et al. 2001).

Overall Recent Landings. As noted in Table 4-11, thornyhead landings occur primarily at Avila, Morro Bay, Monterey, and Moss Landing. In recent years, landings have been most extensive at Moss Landing. At all Central California ports, thornyhead landings fell steeply in 2001 and then increased in 2002. With the exception of Moss Landing, thornyhead landings dropped significantly in 2006 (Figure 4-10).

Table 4-11 Thornyhead Landings (in pounds) at Major Central California Ports: 2000-2006

Year	Santa Barbara	Avila	Morro Bay	Monterey	Moss Landing	Santa Cruz	Pillar Point
2000	0	129,898	93,775	102,403	334,746	12,604	27,159
2001	0	79,632	12,640	87,070	213,893	NA	NA
2002	0	335,516	55,544	139,855	306,039	0	38,605
2003	0	342,129	62,564	128,191	278,323	NA	NA
2004	0	197,176	124,603	15,131	182,571	0	NA
2005	0	NA	170,622	NA	183,320	0	NA
2006	0	NA	20,038	NA	248,600	NA	NA
Avg. Lbs.	0	154,924	77,112	67,865	249,642	1,972	10,316
Avg. Value	\$0	\$120,727	\$54,524	\$57,428	\$354,240	\$2,487	\$9,561

Source: CDFG 2007; NA = Below reporting threshold

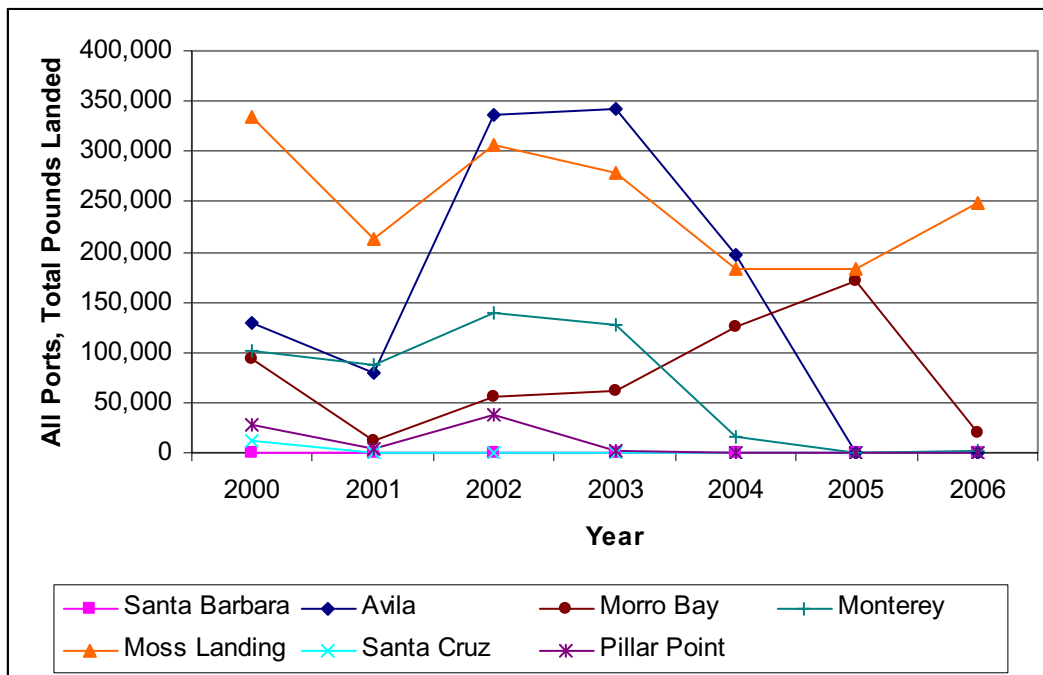


Figure 4-10 Thornyhead Landings at Major Central California Ports: 2000-2006
(CDFG 2007)

Roundfish

Sablefish (*Anoplopoma fimbria*)

Overview. Sablefish, more commonly marketed as black cod and sometimes butterfish, are found only in the North Pacific. They are most abundant in the Gulf of Alaska. Sablefish are primarily deepwater fish, inhabiting shelf and slope water to depths of over 4,000 feet. They are also semi-migratory and juveniles sometimes move into nearshore waters during the summer (Love 1991). The larger deepwater fish are typically frozen for export to Japan, while the smaller nearshore fish are typically sold on the live fish market (Henry 2001).

There has been a commercial market for sablefish in California since the early 1900s. Annual landings reached 3,000 tons in 1945. Landings ranged from 770 to 2,220 tons per year during

the post-war years. Foreign fleets, especially Korea, dominated the sablefish fishery until the passage of the Magnuson Act in 1976. Overseas demand created an export market and California landings were over 14,000 tons in 1979. Although the fishery eventually recovered, Henry (2001) asserts that the surge in landings is associated with the collapse of the fishery in 1980.

Today, most sablefish are caught with deep water longlines and gill nets, although traps and bottom trawls are also used. Along with sablefish, trawl and gill net fishermen also catch thornyheads and Dover sole in waters between 1,200 and 4,200 feet. Collectively, these species are known as the “DTS complex” because they are often caught together using trawl gear (Cascorbi 2004).

Management Measures. Sablefish are one of 83 species of groundfish regulated under the GFMP. West coast sablefish are managed as a single population.

Statewide landing trip limits and quotas were first implemented in 1983. Between 1982 and 1984, statewide annual quotas were around 19,000 tons, but by 1990 were dropped to 9,800 tons. As the health of the fishery improved, sablefish quotas were gradually, if only slightly, relaxed. Between 1990 and 2000, the statewide annual quota was capped at just over 10,500 tons (Henry 2001).

The Pacific Fishery Management Council introduced a tiered quota system in 2000. Eligibility for a particular tiered permit is based on past landings. Tier 1 permits afford the largest quota, and are the most expensive to purchase. Currently, about 91 percent of the total allowable sablefish catch along the West Coast is allocated to the limited entry fishery, the remainder is designated as open access (Cascorbi 2004).

In 2007, sablefish quotas were 300 pounds per day for the limited entry fixed gear fishery in Monterey Bay, or one landing per week up to 1,000 pounds, not to exceed 5,000 pounds every two months. For the open access fishery, the quotas were 300 pounds per day, or one landing per week up to 700 pounds, not to exceed 2,100 pounds over a two-month period.

The sablefish fishery is monitored with the vessel monitoring system (VMS). Participants are prohibited from stopping, slowing down, or zigzagging through RCA boundaries between 30-150 fathoms (180-900 feet). Captains can fish for other species within RCA boundaries but must first notify NOAA Fisheries.

Sablefish is one of the most important groundfish harvested along the Central California Coast. It was among the top five most valuable species landed at all ports in the study region, with the exception of Santa Barbara.

Monterey Bay Area Sablefish Fishery. The sablefish fishery is labor intensive, particularly in terms of preparation. It can take three days to prepare a vessel for a trip and only one day of fishing to meet the single quota. Many sablefish fishermen in the Monterey Bay area are of Vietnamese ancestry.



Longline Fisherman Baiting Hooks

In 2001, NOAA Fisheries approved a Pacific Fisheries Management Council proposal that allows sablefish fishermen to stack up to three permits per boat.¹³ The intent is to reduce the total number of vessels fishing for this species (Cascorbi 2004). This allowance has helped local fishermen adapt to the reduced quotas associated with limited access. For example, a fisherman who owns three Tier 3 permits can land an annual total of 37,500 pounds of black cod. On top of that quota, he is also permitted the regular allotment associated with the open access fishery (300 pounds a day; 1,000 pounds a week). Unlike the limited access fishery, open access allows for sablefish year round.

Many fishermen who fish only under open access rules assert that it is difficult to earn a living. One longline fisherman estimates that about 13 percent of earnings go to fuel. It takes approximately 50 gallons of fuel (about \$200 at the time of this writing) to catch 1,000 pounds of black cod (now worth about \$1,600). Also contributing to financial concerns is a recent change in the open access limit from 3,000 pounds to 2,100 pounds per two-month period.

Some sablefish fishermen are adapting to low quotas by participating in the live fish fishery. Because of the significant price difference between live (\$4.50 per pound) and standard (\$1.25-\$1.60 per pound) sablefish, some fishermen try to fill as much of their quota with live catch as possible.

Morro Bay Area Sablefish Fishery. Recent sablefish landings at Morro Bay are second only to those at Moss Landing Harbor. On average, nearly 80,000 pounds were landed between 2000 and 2006, with an average ex-vessel value of \$84,723. Of the seven study region ports, participants in the Avila fleet experienced the most precipitous decline in sablefish landings during that period. Conversely, participants in the Morro Bay fishery experienced the highest relative increase (Figure 4-11).

¹³ This strategy is particular to limited access sablefish fishermen. Open access fishermen are entitled to one open access quota per vessel. They can, however, own a number of boats. Once they have met their daily or weekly sablefish quota on one vessel, they must change vessels to continue fishing.

Overall Recent Landings. Sablefish is one of the most valuable species landed at all ports north of Santa Barbara Harbor (Table 4-12). In 1999, sablefish ranked fourth in ex-vessel value among the groundfish species commonly landed in California (Henry 2001). In 2005, sablefish ranked sixth in ex-vessel value of *all* species landed in the State of California.¹⁴

Of the study region ports, sablefish landings at Moss Landing are most extensive. Between 2000 and 2006, an average of 515,000 pounds of sablefish was offloaded annually at Moss Landing, with an average ex-vessel value of \$619,640.

Table 4-12 Sablefish (black cod) Landings (in pounds) at Major Central California Ports: 2000-2006

Year	Santa Barbara	Avila	Morro Bay	Monterey	Moss Landing	Santa Cruz	Pillar Point
2000	NA	59,895	28,757	61,968	589,054	58,941	91,437
2001	NA	57,244	6,369	66,394	494,084	10,288	66,818
2002	NA	99,419	24,782	50,061	457,249	18,702	75,093
2003	NA	151,469	36,794	95,770	552,822	25,408	64,384
2004	NA	107,848	73,034	22,076	470,161	16,280	42,874
2005	0	NA	125,261	27,335	535,726	18,148	44,962
2006	NA	NA	263,484	25,588	505,136	14,829	52,885
Avg. Lbs.	294	68,548	79,783	49,884	514,890	23,228	62,636
Avg. Value	\$396	\$68,715	\$84,723	\$50,121	\$619,640	\$26,732	\$81,886

Source: CDFG 2007; NA= Below reporting threshold

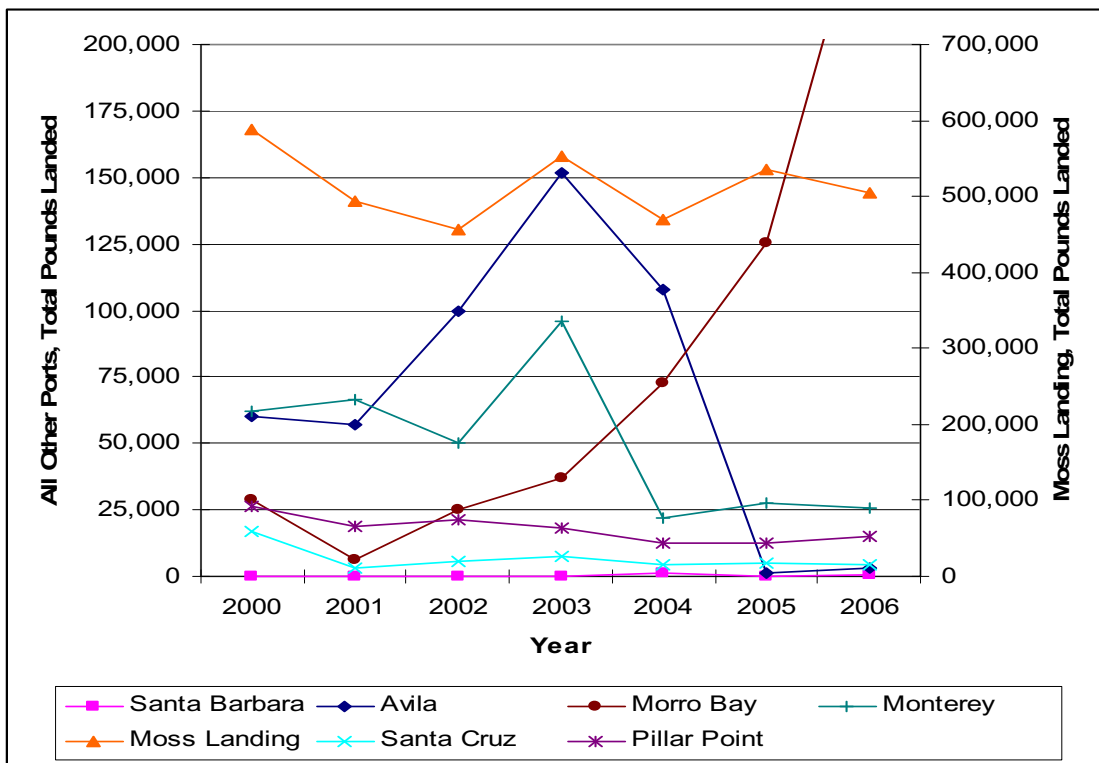


Figure 4-11 Sablefish Landings at Major Central California Ports: 2000-2006 (CDFG 2007)

¹⁴ The top five ranking species, from high to low, for that year were: market squid, Dungeness crab, Chinook salmon, red sea urchin, and spiny lobster (CDFG 2007).

Cabazon (*Scorpaenichthys marmoratus*)

Overview. Cabazon is part of the state-managed nearshore CGS fisheries complex, which also includes greenlings and California sheephead. Cabazon is a significant component of the live fish fishery. The species ranges from Alaska to Southern California. It is relatively sedentary and prefers reefs, hard bottoms, and crevices at depths of around 90 feet. Cabazon is captured by recreational anglers using hook-and-line gear, and by commercial fishermen using hook-and-line, trap, and gill net gear. Landings increased between 1981 and 1998 due in large part to development of the region’s live fish fishery (Love 1991).

Management Measures. Currently, a Nearshore Fishery Permit is required to take cabazon on a commercial basis. Other management measures for the commercial fishery include extended weekend closures (Thursday-Sunday), size limits (15-inch minimum), and area closures. Cabazon may not be taken commercially north of Point Conception to 40 degrees, 10 minutes north latitude (near Cape Mendocino) in March and April. The species also may not be taken commercially south of Point Conception to the Mexican border during January and February. The size limit also applies to the recreational fishery, which also has a take limit of ten fish.

As of January 1, 2008 the statewide commercial allocation of cabazon was 59,300 pounds or 39 percent of the Total Allowable Catch (TAC). The remainder of the allocation (61 percent) was for recreational use. There are also cumulative two-month trip limits in effect for the CGS complex. For cabazon, the trip limits range from a high of 900 in September/October to a low of 100 in November/December. The season is closed in April and May (CDFG 2008a).

Overall Recent Landings. Cabazon is particularly abundant in the Morro Bay area. However, landings declined precipitously between 2000 and 2006, from 67,000 pounds to 16,900 pounds. On average, 40,000 pounds of cabazon were offloaded annually during the period, with an average ex-vessel value of \$200,000. Landings at Santa Barbara harbor also declined during that seven-year period, dropping by 87 percent between 2000 and 2006. Cabazon harvest at Avila has been relatively steady (Table 4-13, Figure 4-12).

Table 4-13 Cabazon Landings (in pounds) at Major Central California Ports: 2000-2006

Year	Santa Barbara	Avila	Morro Bay	Monterey	Moss Landing	Santa Cruz	Pillar Point
2000	34,930	19,361	67,264	9,678	4,409	NA	3,035
2001	17,962	18,451	54,518	4,134	7,599	NA	2,642
2002	10,189	8,415	42,362	12,075	6,142	NA	1,295
2003	8,900	8,306	41,663	3,658	NA	0	NA
2004	4,941	15,187	37,065	8,262	1,735	NA	0
2005	3,444	10,098	22,862	3,041	NA	NA	NA
2006	4,442	13,644	16,879	2,616	2,237	0	NA
Avg. Lbs.	12,115	13,351	40,373	6,209	3,473	338	1,121
Avg. Value	\$64,800	\$62,358	\$205,088	\$26,149	\$15,960	\$1,335	\$2,867

Source: CDFG 2007; NA = Below reporting threshold

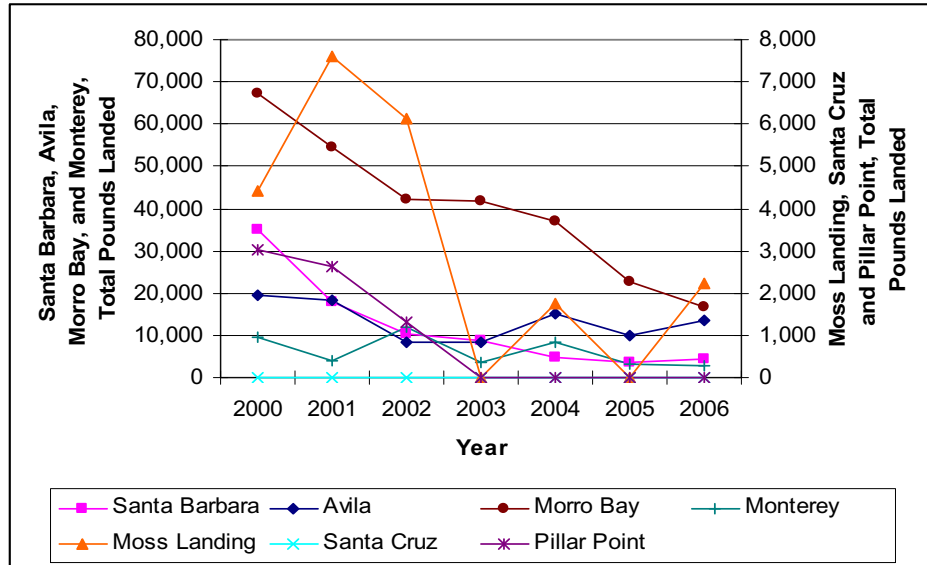


Figure 4-12 Cabezón Landings at Major Central California Ports: 2000-2006 (CDFG 2007)

Flatfish

Overview. The primary species of flatfish pursued in Central California waters are Pacific Dover sole, petrale sole, sanddab, and California halibut. California halibut is a state-managed species. Other types of sole, such as rex sole (*Glyptocephalus zachirus*) and English sole (*Parophrys vetulus*) are harvested, but in relatively small quantities.

Pacific Dover Sole (*Microstomus pacificus*)

Overview. Dover sole populations are distributed from Southern Oregon to around Santa Barbara (Hagerman 1952). Dover sole is one of the principal continental shelf and slope species targeted by the California commercial groundfish fishery, and is especially targeted by the deepwater trawl fishery. In 2004, Dover sole was the top marketed species in California in terms of pounds landed (PacFIN 2005).

From the late 1800s through about 1945, Dover sole was primarily caught as by-catch by bottom trawlers. The transition from by-catch to target species began during World War II when there was an increased market demand for new sources of protein. Improvements in processing operations gradually enhanced the fishery. Starr et al. (2002) assert that the increased popularity by consumers of Dover and petrale (*Eopsetta jordani*) sole contributed to the expansion of the trawl fleet.

Landings of Dover sole tallied 28 tons in 1943, but rose to nearly 5,900 tons by 1952. Landings hit a sustained high point between 1969 and 1989 when they averaged 10,200 tons per year; but dropped to about 6,000 tons per year between 1990 and 1999.

Management Measures. The drop in landings is likely due in part to a federally imposed coast-wide quota initiated in the late 1980s. Diminishing demand for Dover sole in the early 1990s is

said to have caused trawl captains to redirect their efforts towards more valuable species, such as thornyheads, sablefish, and other groundfish (Henry 2001; Starr et al. 2002).

Monterey Bay Area Dover Sole Fishery. Dover sole is a particularly important species in the Monterey Bay area. Regional landings of Dover sole peaked in 2003 at 203,760 pounds.

Morro Bay Area Dover Sole Fishery. In the mid-1980s, Morro Bay was homeport for the majority of Dover sole fishermen on the Pacific coast. At that time, more than 24 trawl vessels moored at the port. However, increased regulation, reduced consumer demand for sole, and other factors led to decline (Francis and Lo 2001). Morro Bay fishermen lost a significant buyer when Vandenberg Air Force Base began using frozen Pollock instead of Dover sole. There is a limited interest in Dover sole on the part of the region’s recreational fishing fleets.

Overall Recent Landings. In recent years, Moss Landing, Monterey, Morro Bay, Avila, and Pillar Point received the highest amount of Dover sole in the Central Coast region. In both Avila and Monterey, Dover sole was one of the top five most lucrative fisheries between 2000 and 2006 (Table 4-14).

Table 4-14 Dover Sole Landings (in pounds) at Major Central California Ports: 2000-2006

Year	Santa Barbara	Avila	Morro Bay	Monterey	Moss Landing	Santa Cruz	Pillar Point
2000	0	419,448	87,551	333,803	729,156	32,265	236,060
2001	0	248,940	0	294,167	630,028	NA	164,770
2002	0	568,528	59,695	222,349	655,188	NA	229,755
2003	0	672,184	103,288	240,470	760,270	NA	70,710
2004	0	485,273	215,882	49,839	529,972	0	NA
2005	0	0	261,930	NA	383,557	NA	NA
2006	0	0	24,919	NA	411,360	NA	12,373
Avg. Lbs.	0	342,057	107,609	165,884	585,647	4,730	102,186
Avg. Value	\$0	\$119,318	\$33,432	\$79,289	\$169,730	\$1,538	\$33,169

Source: CDFG 2007; NA = Below reporting threshold

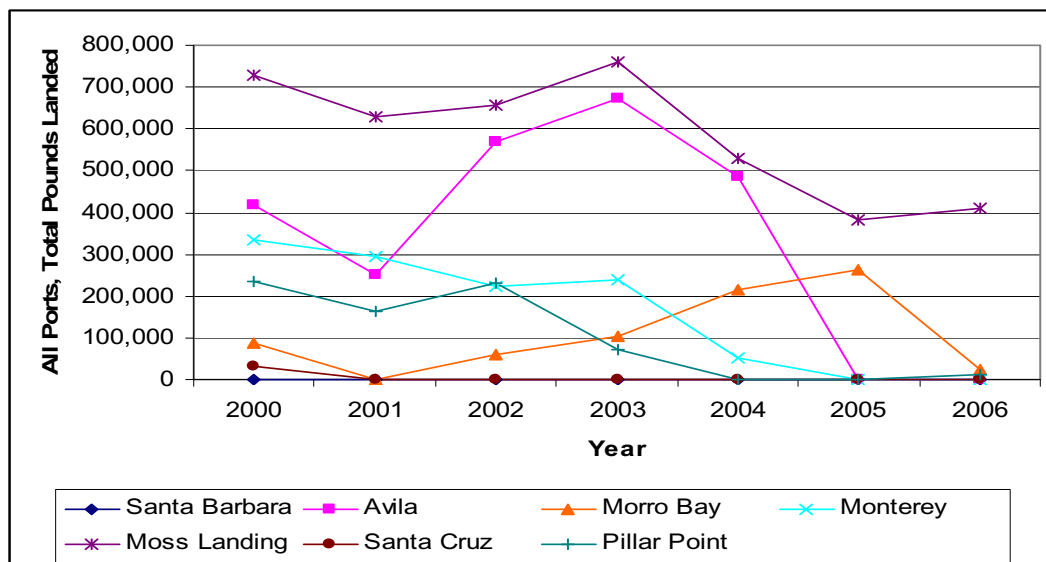


Figure 4-13 Dover Sole Landings at the Major Central California Coastal Ports: 2000-2006
(CDFG 2007)

Sanddabs (*Limanda limanda*)

Overview. Sanddabs are an important species in the Central Coast commercial trawl and longline fisheries. The species is offloaded in the greatest concentration at Pillar Point (Starr et al. 2002).

There has been an active commercial sanddab fishery in California since the early 1900s. Between 1917 and 1929, landings fluctuated between 2.6 million pounds to less than 0.8 million pounds. Landings remained under a million pounds from 1930 through 1974. Between 1975 and 1999, landings ranged from 0.6 million pounds to two million pounds, with sizeable drops during the El Niño events of the early 1980s and 1990s (Allen and Leos 2001).

Management Measures. The Pacific sanddab is managed under the GFMP. At present, there are no quotas or size limits for the commercial or recreational take of sanddabs.

Overall Recent Landings. Sanddabs were the fifth most lucrative fishery at Pillar Point between 2000 and 2006 (Table 4-15). During that time, an average of 368,000 pounds was offloaded at Princeton/Half Moon Bay, with an average ex-vessel value of \$140,000. However, the trend is one of decline, with landings dropping by 85 percent between 2000 and 2006 (Figure 4-14).

Table 4-15 Pacific Sanddab Landings (in pounds) at Major Central California Ports: 2000-2006

Year	Santa Barbara	Avila	Morro Bay	Monterey	Moss Landing	Santa Cruz	Pillar Point
2000	NA	0	5,681	17,105	55,880	20,904	784,796
2001	NA	NA	4,799	NA	62,051	22,208	622,499
2002	NA	0	0	89,476	105,326	10,736	296,397
2003	NA	0	0	33,129	604,787	2,696	335,153
2004	NA	0	0	95,356	63,177	0	330,192
2005	NA	0	2,175	78,811	48,024	6,130	91,172
2006	0	NA	0	NA	3,826	1,294	114,225
Avg. Lbs.	174	70	1,837	46,194	134,724	9,225	367,776
Avg. Value	\$93	\$19	\$489	\$19,110	\$44,107	\$5,116	\$141,307

Source: CDFG 2007; NA = Below reporting threshold

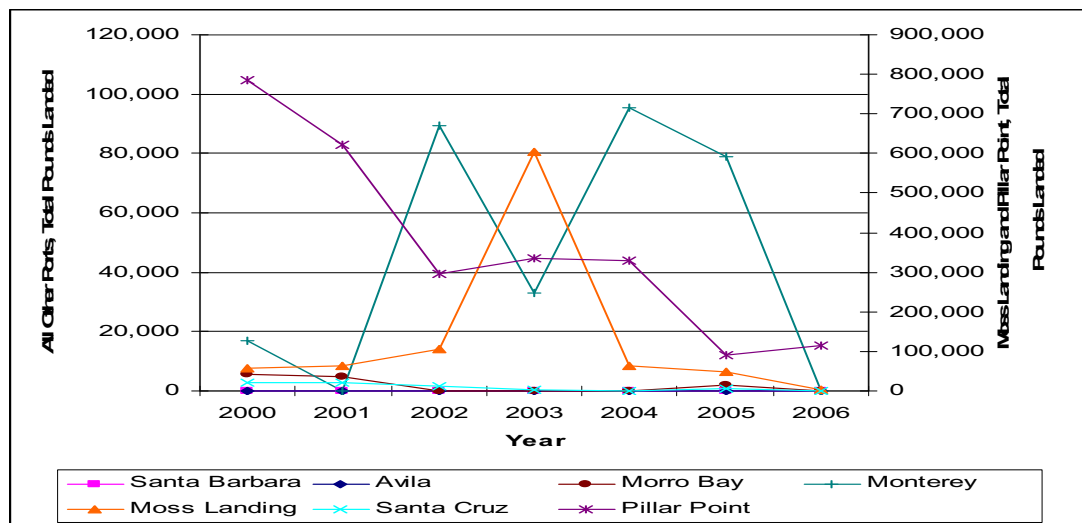


Figure 4-14 Pacific Sanddab Landings at Major Central California Ports: 2000-2006 (CDFG 2007)

California Halibut (*Paralichthys californicus*)

Overview. The commercial California halibut fishery dates to the late 1800s. Set nets were used in the early years of the fishery (Starr et al. 2002). Today, California halibut are harvested with trawl, longline, hook-and-line, and pot gear (Radtke and Davis 2000). Trawlers targeting groundfish tend to be 50 to 75 feet in length. Unlike the other groundfish species discussed in this report, the California halibut is under state jurisdiction.

California halibut is one of the most important flatfish species in the state. Between 1919 and 1999, commercial halibut landings ranged from a high of 4.7 million pounds in 1919 to a low of 257,000 pounds in 1970, with peaks years in 1936 (1.58 million pounds), 1946 (2.46 million pounds), 1964 (1.28 million pounds), 1981 (1.26 million pounds), and 1997 (1.25 million pounds). On average, annual landings between 1932 and 1999 were around 910,000 pounds (Leet et al. 2001).

Management Measures. The California halibut fishery is state-managed. Management measures include area and seasonal closures, minimum gill net mesh size (8.5 inches) and minimum catch size (22 inches). With the exception of the area between Point Arguello and Point Mugu in waters more than 1.15 statute miles from shore, trawling is not allowed in state waters (effective 1971, amended 1989; Fish and Game Code, sec. 8495). Bottom trawls used in the allowable area must have a minimum mesh size of 7.5 inches, and trawling is closed from March 15 to June 15 to protect spawning adults (Allen and Leos 2001). In 1990, the California Marine Resources Protection Act restricted gill netting to depths of 30 fathoms or greater. In 1995, federal regulators implemented a quota-based management strategy. Individual quotas were allocated based on each captain's documented historical catch.

Overall Recent Landings. The halibut fishery is economically significant across the study region. The ports of Pillar Point, Santa Barbara, and Moss Landing receive the highest landings of California halibut (Table 4-16). Between 2000 and 2006, fishermen offloaded an average of 141,000 pounds of halibut at Pillar Point, with an average ex-vessel value of \$382,000 (Figure 4-15). In Central California in 2008, wild-caught California halibut from local waters sold on the retail market for about \$11.00 per pound. Farmed halibut imported from Korea sold for \$5.50 per pound.

Maps 4-13, 4-14, and 4-15 depict the reported areas of capture of commercially landed California halibut for the years 2004-2007.

Table 4-16 California Halibut Landings (in pounds) at Major Central California Ports: 2000-2006

Year	Santa Barbara	Avila	Morro Bay	Monterey	Moss Landing	Santa Cruz	Pillar Point
2000	66,467	26,656	13,075	15,230	9,089	17,105	100,428
2001	102,132	40,531	22,591	13,728	11,943	20,159	101,395
2002	104,779	13,282	4,060	12,075	40,321	31,740	124,247
2003	69,386	6,366	4,148	14,129	22,343	15,841	125,803
2004	58,947	4,507	NA	32,959	48,073	19,587	151,613
2005	46,724	4,569	3,925	6,946	46,726	14,320	199,437
2006	61,409	15,525	NA	5,410	52,071	13,387	181,403
Avg. Lbs.	72,834	15,919	7,048	14,354	32,938	18,877	140,618
Avg. Value	\$218,277	\$47,401	\$18,014	\$31,417	\$98,747	\$55,218	\$381,583

Source: CDFG 2007; NA = Below reporting threshold

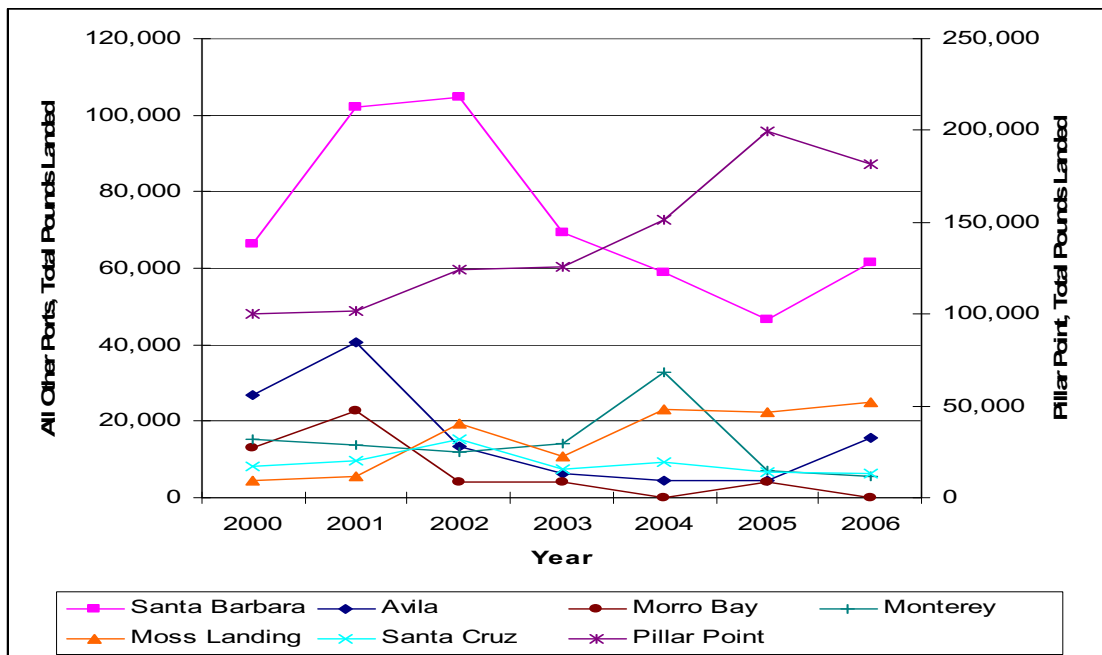


Figure 4-15 California Halibut Landings at Major Central California Ports: 2000-2006 (CDFG 2007)

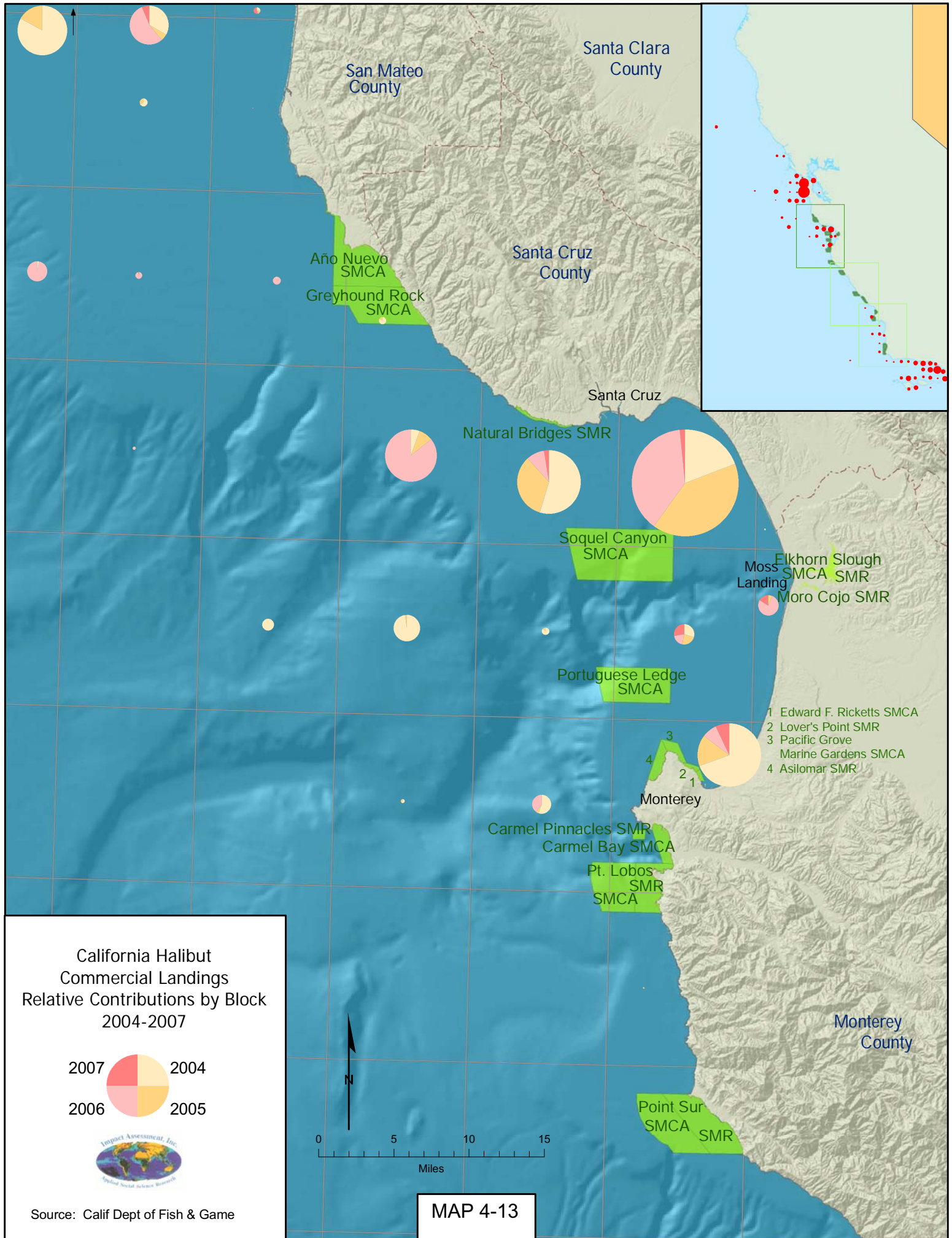
4.4 Highly Migratory Species

Overview. Highly migratory species (HMS) are pelagic species that “move great distances in the ocean to feed or reproduce” (Pacific Fisheries Management Council 2003a). This grouping includes tunas, sharks, swordfish, wahoo, and mahimahi (or dolphin fish). HMS live primarily in the open ocean, although they may spend part of their life in nearshore waters. Albacore and swordfish are the two most economically important of the HMS species landed at Central California ports. Both are federally managed.

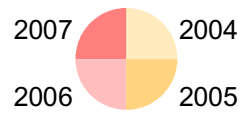
Albacore Tuna (*Thunnus alalunga*)

Overview. Pacific albacore are found from the Gulf of Alaska to the coast of central Mexico. The species is abundant in surface waters between 60° and 67° F, though large, deep-swimming albacore may be found in waters between 55° and 77° F. The species is known to concentrate around thermoclines.

California’s first tuna cannery opened in 1903. By 1918, over 35 canneries were operating in the state (United States Tuna Foundation 2008). The supply of local tuna diminished in the mid-1920s but increased again during the 1950s. An average of 30 million pounds of albacore was landed in California during the 1960s. Competition from foreign fleets and processors began to slow expansion of the industry during the 1970s and, by the 1990s, many California tuna canneries were going out of business (American Fishermen’s Research Foundation 2005).

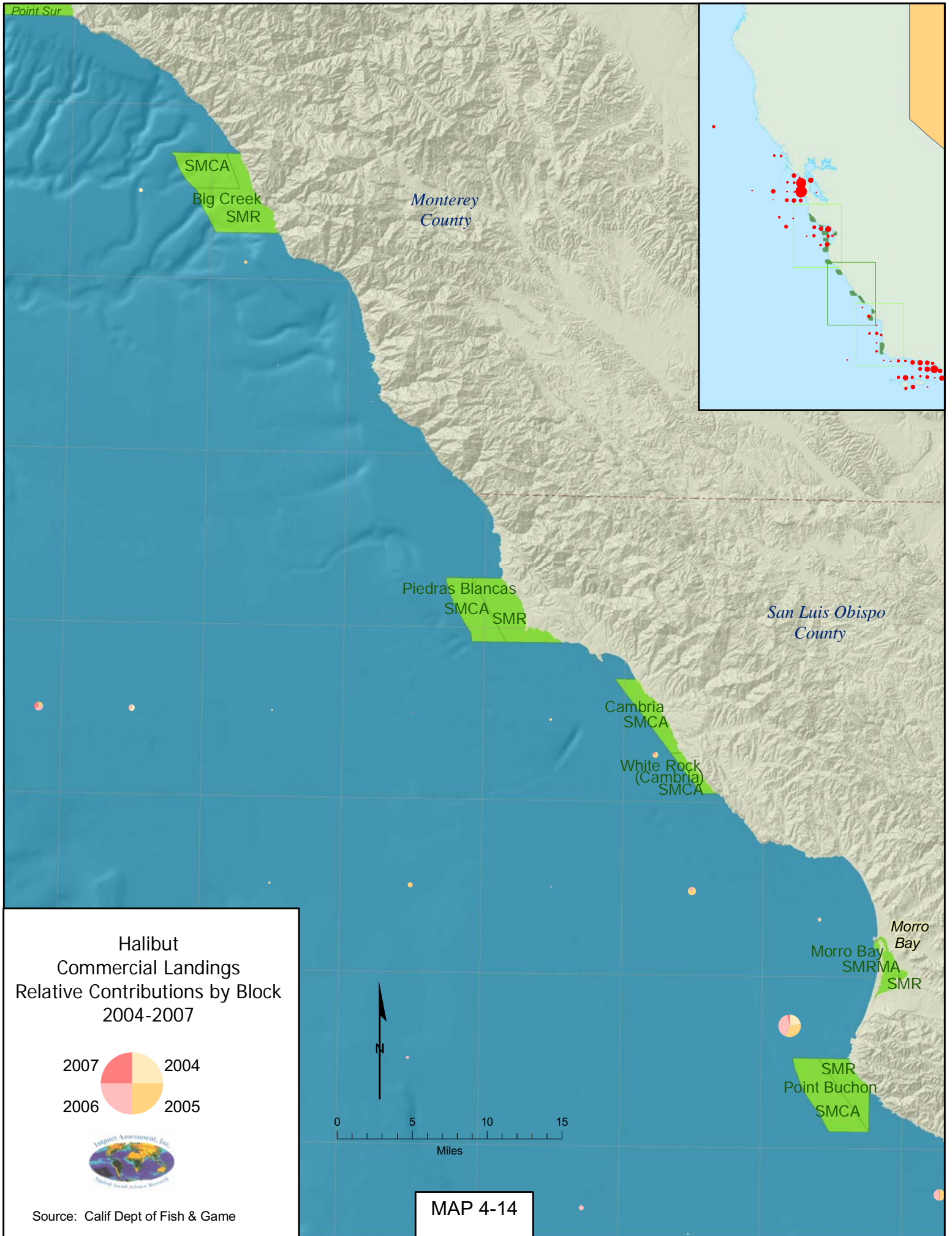


California Halibut
Commercial Landings
Relative Contributions by Block
2004-2007

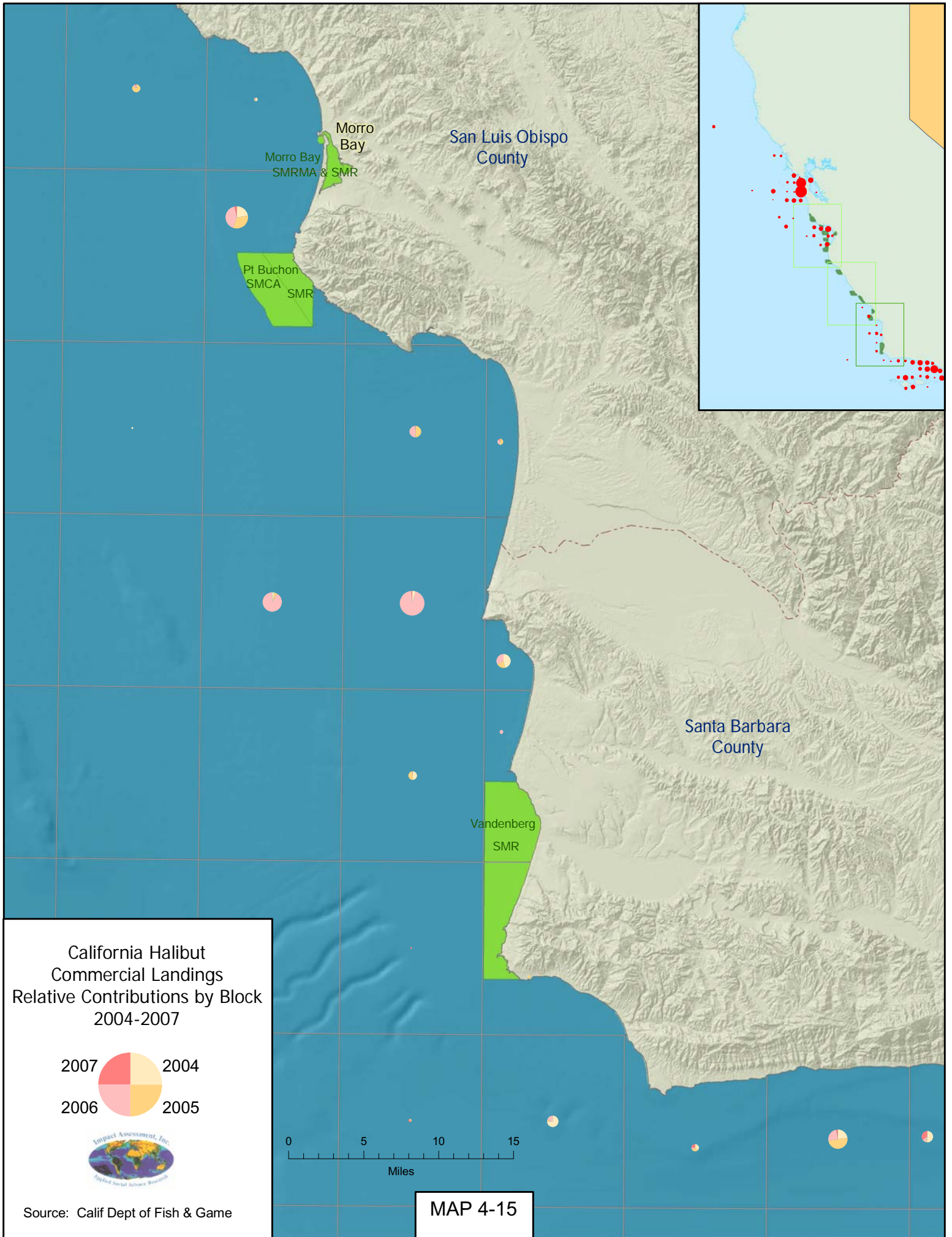


Source: Calif Dept of Fish & Game

MAP 4-13



Source: Calif Dept of Fish & Game



Monterey Bay Area Albacore Fishery. In the 1950s and 1960s, Monterey was one of the leading albacore-producing ports in the United States. In the early 1950s, around 30 tuna fishermen participated in the Monterey area fishery. Vessels fishing 40-70 miles offshore with one- or two-man crews could catch up to five tons of albacore per trip. The local buyer would purchase and ship the albacore to San Pedro for packing and canning.

Albacore landings at Monterey Bay area ports have been generally declining since the mid-1980s. The fleets have also diminished. Numerous members of what was once a fleet of 50 vessels at Moss Landing have reportedly moved to Oregon to take advantage of a lower cost of living. The remaining fleet of six captains often fish in deep water in search of albacore.

Deepwater fishing costs are high. Trolling is particularly fuel intensive because the captain typically maintains a speed of six knots. Albacore fishermen often fish with nine lines that run (in increasing distance) between 7 and 25 fathoms (42 to 150 feet) behind the boat. One fisherman calculates that the average daily fuel consumption for a 45-foot boat is up to 60 gallons, which recently translates to nearly \$300 a day. Monterey Bay area albacore fishermen typically do so seasonally and switch to other fisheries during off or slow albacore seasons (Starr et al. 2002).

In recent years, high-grade albacore or tombo is often used for sushi. This requires special treatment on-board and refrigeration. Sushi-grade tuna will receive a higher price (~ \$1,900 per ton) than tuna destined for the overseas canning market (\$1,200 to \$1,400 per ton). Albacore that is not prepared for the sushi market is typically “brined” and sold to large distributing companies. When tuna is “brined” it is put in a tank and sprayed with zero-degree brine water. The brining method is less labor intensive than blast freezing and enables the fisherman to bring more fish onto the boat. A good refrigeration system that can maintain a constant temperature of 10 degrees or less is required for this method. Brined fish is often destined for overseas canneries in Samoa, Puerto Rica, or Spain, as there are no major canneries in operation in the United States. There are a few small, localized canning operations; however, these are unable to handle large amounts of albacore.

Overall Recent Landings. Albacore landings at Central California ports have fluctuated widely over the last several years. Between 2000 and 2006, albacore was the second most valuable species landed at Morro Bay, fourth at Santa Cruz and Avila, and fifth at Moss Landing (Table 4-17). An average of 520,000 pounds of albacore was offloaded at Moss Landing during the period. Landings at Moss Landing and Morro Bay peaked in 2001 at more than 1.2 million pounds, and then dropped sharply the following season (Figure 4-16).

Table 4-17 Albacore Tuna Landings (in pounds) at Major Central California Ports: 2000-2006

Year	Santa Barbara	Avila	Morro Bay	Monterey	Moss Landing	Santa Cruz	Pillar Point
2000	4,288	12,391	859,106	33,921	670,048	53,952	20,029
2001	12,983	379,141	1,505,220	29,056	1,267,829	69,797	36,547
2002	5,686	236,547	300,021	11,165	834,055	78,164	40,541
2003	2,612	14,261	379,408	34,797	373,194	64,723	23,306
2004	8,436	NA	34,124	31,907	316,545	46,336	13,069
2005	4,412	0	14,825	0	140,992	5,976	10,878
2006	0	NA	16,412	0	34,560	24,000	22,163
Avg. Lbs.	5,488	49,704	444,159	20,120	519,603	48,992	23,790
Avg. Value	\$5,247	\$61,282	\$352,180	\$18,570	\$297,564	\$51,958	\$40,718

Source: CDFG 2007; NA = Below reporting threshold

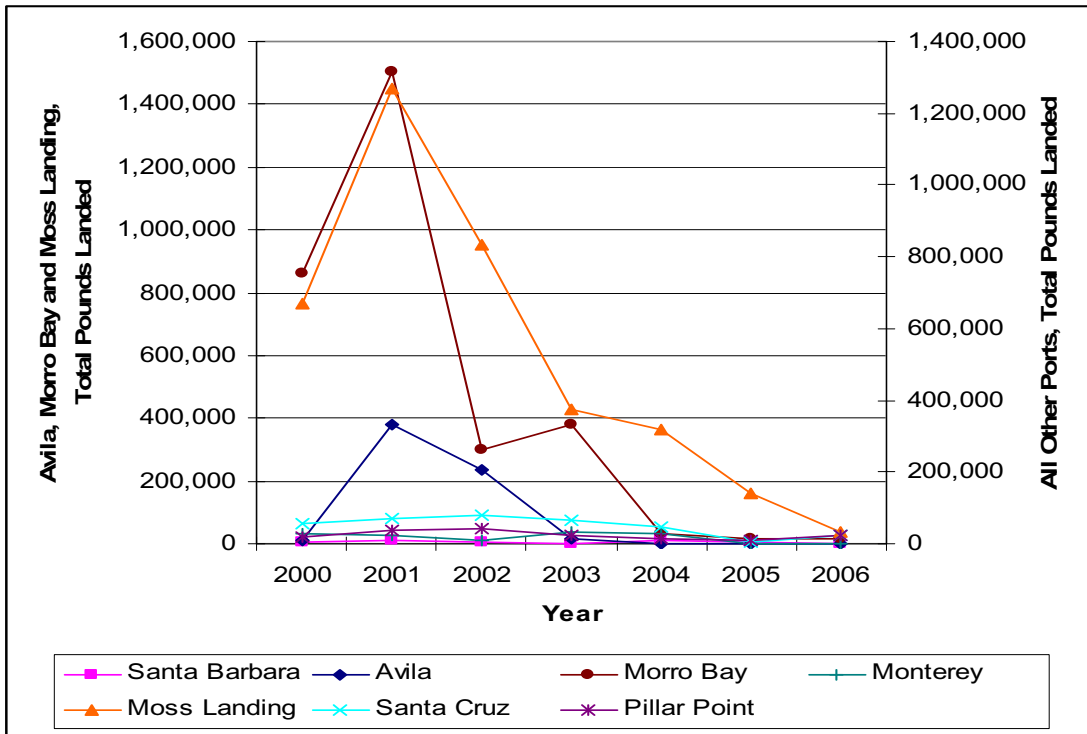


Figure 4-16 Albacore Tuna Landings at Major Central California Ports: 2000-2006
(CDFG 2007)

Market Challenges. Competition with the Canadian albacore fleet reportedly is one of the biggest challenges facing the Central California tuna fleet. It is said that the number of Canadian tuna vessels operating in the U.S. EEZ has increased as Canadian captains seek to establish a history of landings in anticipation of an international quota system for albacore.

Tuna fishermen are also challenged by the demands of the international albacore market. In the past, fisherman caught tuna, stored it on ice, and delivered it to the canneries. Today, much of the tuna is exported for sale overseas. Overseas processors do not accept frozen tuna because the process of separating the tuna from the block of ice in which it is encased is too labor intensive.

Swordfish (*Xiphias gladius*)

Overview. Swordfish are found in warm and temperate oceans around the world. In the California region, they are found in greatest concentration south of Point Conception (Love 1991). The majority of fishing effort takes place from September through May. Driftnets are used but cannot be more than one mile in length. There is also a small harpoon fishery.

Swordfish were first caught in California waters in the early 1900s by recreational fishermen using harpoons. Although use of harpoons by recreational fishermen was eventually banned, provisions were made for commercial use of the gear in 1931. Participation in the harpoon fishery peaked in 1978, with 309 captains landing 2.6 million pounds (Holts 2001).

The drift net swordfish fishery began in the 1970s. The fishery peaked in 1984 with 220 captains bringing in 5.2 million pounds (Holts 2001).

Management Measures. In 1980, a statewide limited entry program was established for swordfish and shark. Logbooks and observers were required. Legislation curtailed the use of drift net gear in 1985 by limiting the number of permits to 150, and initiating seasonal closures. The California drift gill net swordfish fishery now occurs primarily outside of state waters to about 150 miles offshore (Pacific Fisheries Management Council 2003). In 2000, approximately 120 captains were participating in the state's swordfish fishery, primarily offshore southern California (Holts 2001). Recent regulations aimed at reducing by-catch in the Monterey Bay National Marine Sanctuary have shifted the swordfish fishery effort out of the Monterey Bay area (Starr et al. 2002).

The swordfish fishery is open May 1 to August 14, beyond 75 miles of the mainland coast. From August 15 to December 15, both swordfish and shark fisheries are open with sub-area closures and restrictions. The drift net fisheries are closed within 25 miles of the mainland from December 15 to January 31 to protect gray whales (California Seafood Council 1997). No swordfish quotas are currently in place in the Pacific.

Overall Recent Landings. The vast majority of swordfish landed in the study area is landed at Morro Bay, where it has been the fourth most valuable fishery in recent years. Morro Bay landings peaked at nearly 300,000 pounds in 2000. Between 1981 and 2000, swordfish landings at Monterey Bay area ports averaged 741,000 pounds per year, with a peak of 1.6 million pounds in 1984. Much of this high-value product is shipped to the East Coast. Between 2000 and 2006, combined landings at all seven Central California ports averaged 17,000 pounds per year (Table 4-18; Figure 4-17).

Table 4-18 Swordfish Landings (in pounds) at Major Central California Ports: 2000-2006

Year	Santa Barbara	Avila	Morro Bay	Monterey	Moss Landing	Santa Cruz	Pillar Point
2000	1,724	NA	291,472	16,084	7,462	5,701	NA
2001	6,136	NA	118,975	NA	5,953	0	NA
2002	5,074	0	56,160	NA	0	0	0
2003	6,219	0	27,773	5,683	9,559	0	0
2004	4,694	0	21,284	2,482	5,223	0	0
2005	7,659	0	45,575	0	41,666	4,594	0
2006	4,024	0	96,554	0	37,044	0	0
Avg. Lbs.	5,076	97	93,970	3,564	15,272	1,471	128
Avg. Value	\$16,934	\$315	\$216,134	\$11,799	\$47,935	\$5,305	\$394

Source: CDFG 2007; NA = Below reporting threshold

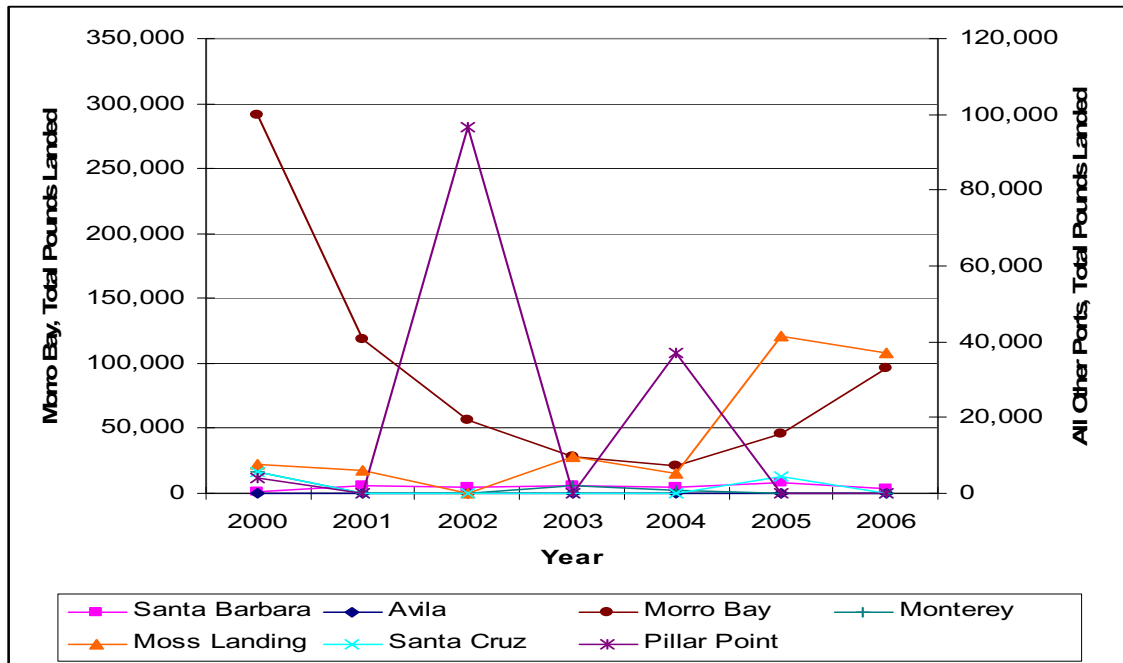


Figure 4-17 Swordfish Landings at Major Central California Ports: 2000-2006 (CDFG 2007)

4.5 Mollusks

Red Abalone (*Haliotis rufescens*)

Overview. Red abalone is the largest abalone in the world and the most abundant abalone species in California. It can be found along the entire coast of California, with particular concentrations in intertidal and shallow subtidal waters (Haaker et al. 2001; Price and Tom 1997). Currently, all five major species of abalone in Central and Southern California are considered depleted.¹⁵ Haaker et al. (2001) assert that depletion is associated with increased sea otter predation, fishing effort (both commercial and sport), market demand, pollution, withering foot disease, diminishing kelp populations, and management challenges.

¹⁵ In descending order of harvest abundance, these are red, pink, green, black, and white.

Abalone has long been important to residents of the California Coast.¹⁶ Commercial pursuit of abalone dates back to the 1850s when Chinese Americans began harvesting green (*Haliotis fulgens*) and black (*Haliotis cracherodii*) abalone with skiffs and gaffs in intertidal waters around San Diego (Cox 1962; Price and Tom 1997). By 1879, California commercial landings of abalone were over 4.1 million pounds per year (Cox 1962). A law banning shallow water harvest of abalone was passed in 1900.

Monterey Bay Area Abalone Fishery. The commercial abalone harvest in Monterey and San Luis Obispo Counties was stimulated by the establishment of an abalone cannery at Point Lobos in 1903. The owner, a wealthy Japanese businessman (Kodani),¹⁷ enticed many young Japanese fishermen in search of a better living to come to America and work for his company. By 1920, ten Japanese-owned-and-operated abalone companies were based in the Monterey area. Adept free divers could extract abalone from the deeper intertidal waters (Cox 1962; Haaker et al. 2001; Price and Tom 1997).

Crews operated as far south as Point Conception, but the fishery was centered around Point Lobos and the south end of Monterey Bay. The abalones were kept in live-boxes and returned to Monterey for processing (Cox 1962). Between 1916 (the first year in which CDFG collected catch statistics for abalone) and 1929, nearly all abalone landings—which averaged two million pounds per year—were landed at Monterey (Starr et al. 2002).

Japanese Americans dominated the abalone fishery until the start of World War II, when the U.S. government relocated many such fishermen to inland locations. Many did not return to Monterey after the war. In 1947, 130 permits were issued, all to Caucasians. By that time, the center of the fishery had shifted to Morro Bay (Cox 1962; Haaker et al. 2001).

During World War II, abalone poaching along the coast went largely unchecked. According to an ex-abalone diver of Japanese descent who worked out of Monterey until he was sent to an internment camp, there was only one Fish and Game warden patrolling the entire central California coast during the war years.¹⁸ Therefore, he explained, poachers indiscriminately took whatever abalone they found, including those below the minimum allowable take size.

Refinements to hard hat and dive gear technology in the late 1940s and early 1950s significantly improved the efficiency of abalone harvesting.

¹⁶ Archaeological evidence indicates that the Rumsien people, a culture indigenous to the Monterey area, were the first non-commercial abalone divers in California.

¹⁷ Due to the anti-Asian sentiment prevalent at the time, Kodani had to find a Caucasian co-signer to pose as the primary owner of the cannery. The cannery was so successful it eventually accounted for 75 percent of the abalone sold in California. It stayed in operation until 1928, and was dismantled in 1933 (California State Parks, no date).

¹⁸ The California Fish and Game Commission assumed regulatory powers for the abalone fishery in 1945 (Cox 1962).

Morro Bay Area Abalone Fishery. The second abalone cannery was established in 1905 in Cayucos, San Luis Obispo County. Although five abalone canneries were operating between Point Lobos and San Diego by 1917, domestic demand for canned abalone was never significant. There was an Asian market for dried abalone, but export of canned abalone was banned in 1915 (Cox 1962).

Divers operating out of Morro Bay joined the abalone industry in 1929 when the area south of Cape San Martin was opened. Morro Bay became the center of the state's abalone fishery between 1930 and 1945 (Haaker et al. 2002). During that 15-year period, the coastline between Monterey and Point Conception produced commercial landings of about 720,000 pounds of red abalone on an annual basis (Starr et al. 2002).

Following World War II, declining stocks of red abalone shifted landings southward to Santa Barbara and Los Angeles (Cox 1962). Again, that decline is attributed to the combined effects of pollution,¹⁹ a growing population of sea otters (that also shifted southward), and technological advances (i.e., the aqua lung and faster boats, which led to increased fishing pressures) (Cox 1962; Haaker et al. 2001). Shell collectors, aquarium enthusiasts, and the general public also contributed to a significantly diminished littoral abalone population (Cox 1962). Four abalone processing plants were still operating in the Morro Bay area in the 1950s and early 1960s. The last processor went out of business in the 1970s.

A recreational fishery for abalone developed in the 1950s. Between 1965 and 1985, the number of recreational divers, shore pickers, and free divers targeting abalone increased four-fold (Starr et al. 2002). During the 1960s and 1970s, abalone diving and harvesting was popular in the Morro Bay area, mainly around Point Buchon and Point Estero north to Cambria. Piedras Blancas, in particular, was known for its abalone population.

Management Measures. The California Fish and Game Commission closed the commercial abalone fishery in 1997 (effective 1998). The recreational fishery is restricted to the coastline north of the center of the mouth of San Francisco Bay. Only recreational skin diving and shore picking are allowed in those northern waters; use of SCUBA gear is prohibited (Haaker et al. 2002).

Abalone Aquaculture. The first aquaculture production facility in California to commercially farm red abalone was established in 1968 in Monterey's Estero Bay. Today, all abalone on the wholesale and retail markets is commercially farmed; there are between 13 and 15 abalone farms in California. Two are located in Monterey and one is located in Santa Cruz. Current wholesale prices hover around \$20 per pound for unprocessed abalone, and up to \$80 per pound for processed meat. The customer base is supported primarily by private Asian buyers and high-end restaurants (Wu 2007).

¹⁹ In particular, several respondents blamed the Diablo Canyon Power Plant in Avila for wiping out nearly 10,000 abalones in the mid-1980s. A marine biologist (San Luis Obispo County) explains that waste material in condesen tubes was responsible. Additionally, he claims, warm water releases into the Bay detrimentally affected the water column and interrupted breeding patterns.

4.6 Salmonids

Overview. Chinook or “king” salmon currently is the principal salmon species harvested in California; the coho or silver salmon fisheries were closed in 1994. Salmon is harvested in the ocean using troll gear.

Chinook Salmon (*Oncorhynchus tshawytscha*)

Overview. The earliest commercial salmon fishery in California dates back to the 1850s. Subsequent growth of the fishery was closely tied to the cannery industry in the Central Valley. By 1880, 20 canneries were operating along the banks of the Sacramento River. Pollution and the degradation of rivers by mining, agriculture, and timber operations combined with overfishing resulted in the collapse of the fishery in the early 1900s. The last salmon cannery in the Central Valley closed in 1919 (Boydston et al. 2001).

The ocean troll salmon fishery first developed in the Monterey Bay area. By 1904, some 175 sail-powered fishing boats were trolling for salmon in the Monterey Bay (Lufkin 1990). In 1909 there were 180 boats; 145 were owned by Japanese American fishermen. Nearly all of the harvest was dried or smoked and exported to Europe.

Several technological advances contributed to the increasing commercial importance and capacity of the California salmon industry. First, the advent of the gasoline-powered boat in the early 1900s intensified the offshore commercial salmon trolling effort. The next major advance occurred when strong yet lightweight monofilament line came into mainstream use during the 1950s. Echolocation electronics and more recently, global positioning systems (GPS) have had a major impact on the fishery. GPS enables one to identify and record the position of schools, habitats, thermoclines and other important features. Some participants state that GPS and fish finders make it possible for “anyone to become a [good] fisherman,” regardless of knowledge or experience.

Statewide landings of Chinook were consistently high during the 1960s and 1970s, as an increasing number of fishermen joined the summer salmon fishery. During that period, landings averaged about seven million pounds per year (Boydston et al. 2001). In the Monterey Bay area, however, the 1970s were not a particularly productive decade for salmon fishermen. Loss of salmon habitat reportedly led to a period of decline that did not reverse until the 1980s, when regulations aimed at curbing water diversion and riverine habitat destruction ostensibly began to improve the status of the stocks.

One program designed to improve salmon stocks is the Salmon Stamp Program. This is a self-taxation program that requires salmon fishermen to purchase a “commercial salmon stamp” in addition to the basic commercial fishing license. The State provides matching funds which are applied to habitat restoration and improvement of hatchery potential (Commercial Salmon Stamp, no date). The Program began in 1979 with a \$30 stamp; current stamp prices are about \$285 per stamp. A “Consensus Committee,” comprised of one CDFG representative and five salmon fishermen, decides how funds should be spent.

Variability in California salmon landings during the 1980s and 1990s can be attributed to several factors, including environmental factors, population trends, fishing pressure, seasonal closures, sea lion predation, and increasingly stringent regulations (Boydston et al. 2001; Starr et al. 2002).

Salmon fishermen from Moss Landing recall the 1980s as a “time of plenty,” when the fleet could “fish most of the coast most of the time” and trip costs were minimal. They describe how there would be hundreds of salmon boats between Moss Landing and Half Moon Bay.

Fishermen often discuss the increasing overhead costs of salmon fishing. For example, in the 1970s, one needed only two licenses to participate in the salmon fishery – a \$50 commercial license that allowed one to fish for all species, and a \$100 boat license. Today, one needs a permit to fish in the limited entry program, a vessel license for salmon, and a salmon stamp. Crew members must also be licensed. With no deckhand, the outlay for all necessary permits is approximately \$600. If one sells dockside, additional costs accrue, such as the \$90 retail license and the cost of a required certified scale. For the seller to fillet his catch, a processor license is required (\$400); however, it is legally permissible to clean the fish before selling.

In 2007, approximately 1,200 commercial salmon fishermen were active in California. Fewer than 200 participants were active in Monterey Bay (Starr et al. 2002).

The salmon fishery in Alaska is an important distant water fishery for some Central California fishermen, but most limit their participation to California waters. Captains of vessels smaller than 45 feet tend to stay in California, going back to their home ports at the end of salmon season. Captains of larger vessels sometimes steam up to Oregon, fishing from July to November for albacore, and salmon.

Management Measures. Entry into the commercial salmon fishery was first limited in 1987. Prior to limited entry, there were about 7,000 permitted salmon vessels, with nearly 1,500 in the Monterey area; now there are less than 2,000 statewide (Commercial Salmon Trollers Advisory Committee no date; Starr et al. 2002). The salmon vessel permit system was instituted in 1983 (Boydston et al. 2001).

The ultimate cause of the recent salmon fishery collapse is often debated, but many fishermen and environmentalists blame diversion of water from the Sacramento-San Joaquin River Delta to inland farmlands.²⁰ Fishery participants anticipate increasing state regulations and restrictions governing the salmon fishery.

On April 10, 2008, the Council voted to close the salmon season to commercial as well as recreational fishing. The Council’s recommendation was approved by the NMFS on May 1, 2008. The closure affected nearly 1,000 fishermen between Santa Barbara and Southeast Alaska (Fimrite 2008); including nearly 400 commercial salmon fishermen in California alone (Koopman 2008). Also, on May 1, 2008, federal authorities declared the West Coast salmon fishery a disaster, thereby opening the door for Congress to appropriate emergency disaster assistance for affected communities in California, Oregon, and Washington (Barnard 2008).

²⁰ There were 277,000 salmon counted in 2006. That count reflects a decrease of nearly 90 percent in the number of salmon returning to spawn from 2002 when 804,000 were counted in the Central Valley (Chea 2008).

Monterey Bay Area Salmon Fishery. The salmon cannery industry preceded the sardine cannery industry in Monterey. Salmon was also one of the first major sport fisheries in the area. In the 1880s, salmon was targeted by wealthy sport fishermen who brought the newest troll fishing methods and gear to Monterey. The switch from gill nets to trolling gear resulted in a 400 percent increase in total landings between 1895 and 1899 (Thomas 2000).

Salmon fisheries at Pillar Point, Santa Cruz, Moss Landing, and Monterey have been active for most of the 20th century. Until recently, salmon has been one of the primary fisheries sustaining fleets in Half Moon Bay, Santa Cruz, and Moss Landing. The 2008 closure had an obviously significant effect on the fleets, and Monterey Bay area buyers reportedly have increased reliance on imported and farmed salmon.

Morro Bay Area Salmon Fishery. Morro Bay is located at the southern end of the California salmon run. Most of the salmon caught in Morro Bay have been released from hatcheries. The Central Coast Salmon Enhancement program has been rearing and releasing up to 140,000 juvenile Chinook into Avila Bay since 1986. To date, Central Coast Salmon Enhancement has released nearly 1.5 million juvenile fish (Central Coast Salmon Enhancement no date). Funding for the program comes from the Commercial Salmon Stamp Program.

Overall Recent Landings. Of the seven major study ports, Chinook salmon landings have been highest at Pillar Point, followed by Moss Landing, Santa Cruz, Monterey, Morro Bay, and Avila. There is also a small salmon fishery in Santa Barbara (Table 4-19). Salmon is the top fishery in Santa Cruz and Pillar Point in terms of value. Cycles of abundance and relative scarcity vary by port (Figure 4-18). Relatively low landings between 2000 and 2006 relate in part to strict federal regulations limiting ocean-based salmon fishing and occasional local closures to protect the dwindling Klamath stock.

Table 4-19 Chinook Salmon Landings (in pounds) at Major Central California Ports: 2000-2006

Year	Santa Barbara	Avila	Morro Bay	Monterey	Moss Landing	Santa Cruz	Pillar Point
2000	NA	63,738	364,291	241,346	1,133,524	348,725	858,275
2001	0	NA	31,162	62,114	201,261	107,350	263,280
2002	61,547	39,753	91,246	142,277	449,309	103,617	580,645
2003	NA	NA	20,098	84,171	281,805	109,634	235,221
2004	8,801	11,114	53,166	152,583	389,248	218,342	1,117,992
2005	3,847	15,155	148,820	150,977	524,097	251,972	762,290
2006	NA	NA	8,358	7,784	28,945	37,238	106,828
Avg. Lbs.	10,784	19,610	102,448	120,178	429,721	168,125	560,647
Avg. Value	\$24,488	\$43,319	\$223,096	\$264,797	\$827,957	\$430,703	\$1,411,562

Source: CDFG 2007; NA = Below reporting threshold

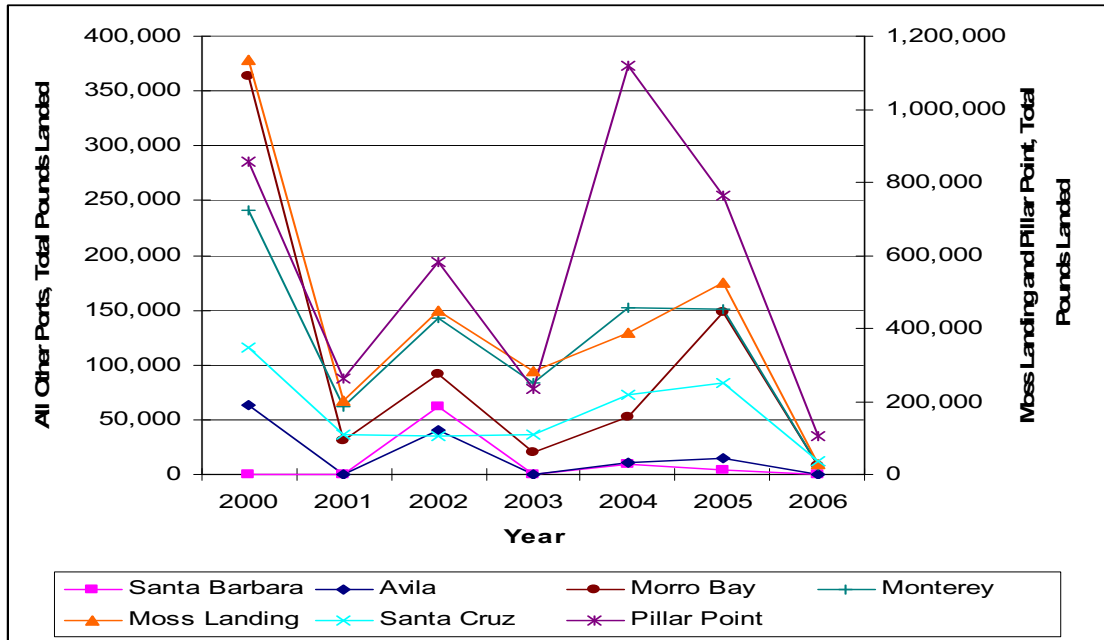


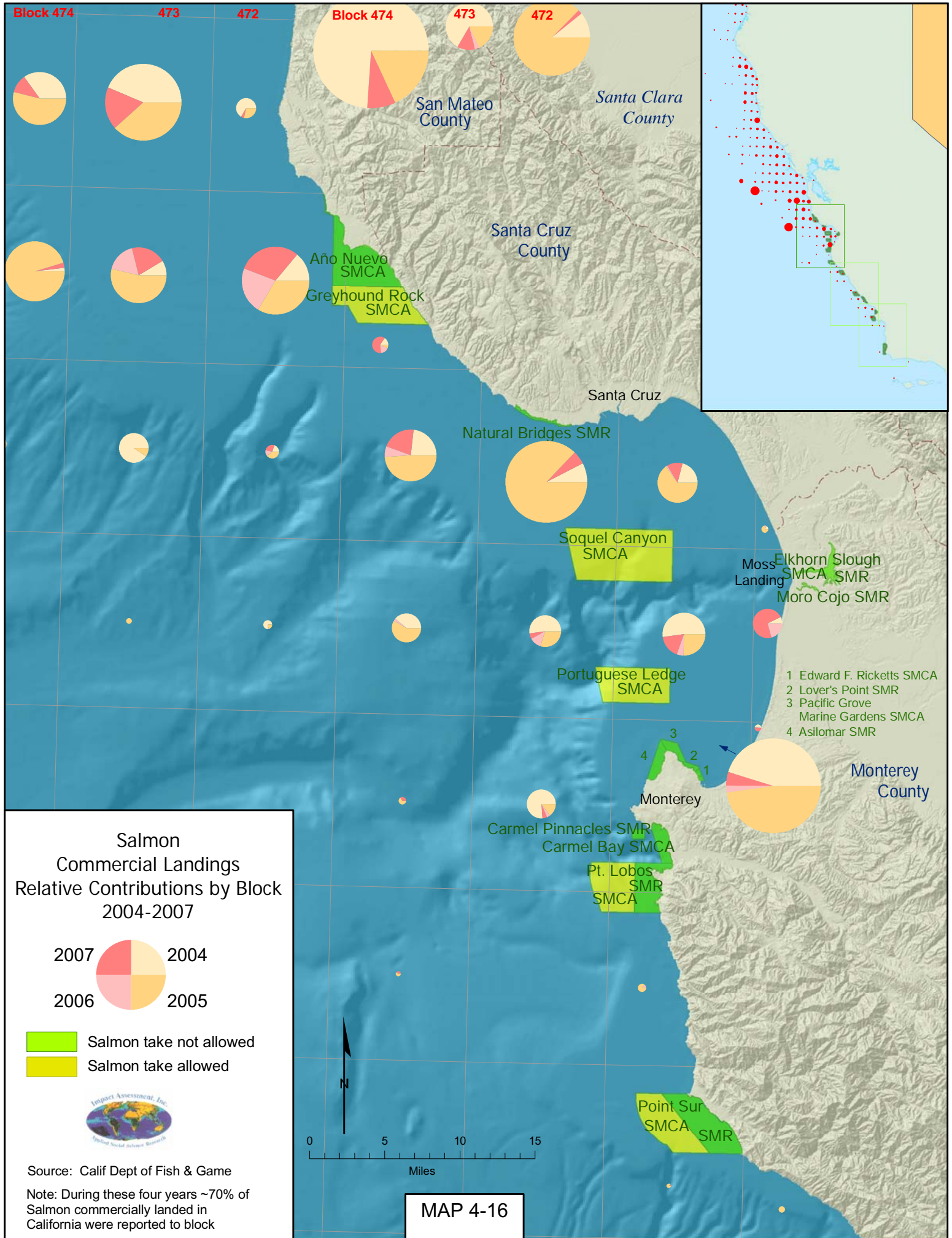
Figure 4-18 Chinook Salmon Landings at Major Central California Ports: 2000-2006 (CDFG 2007)

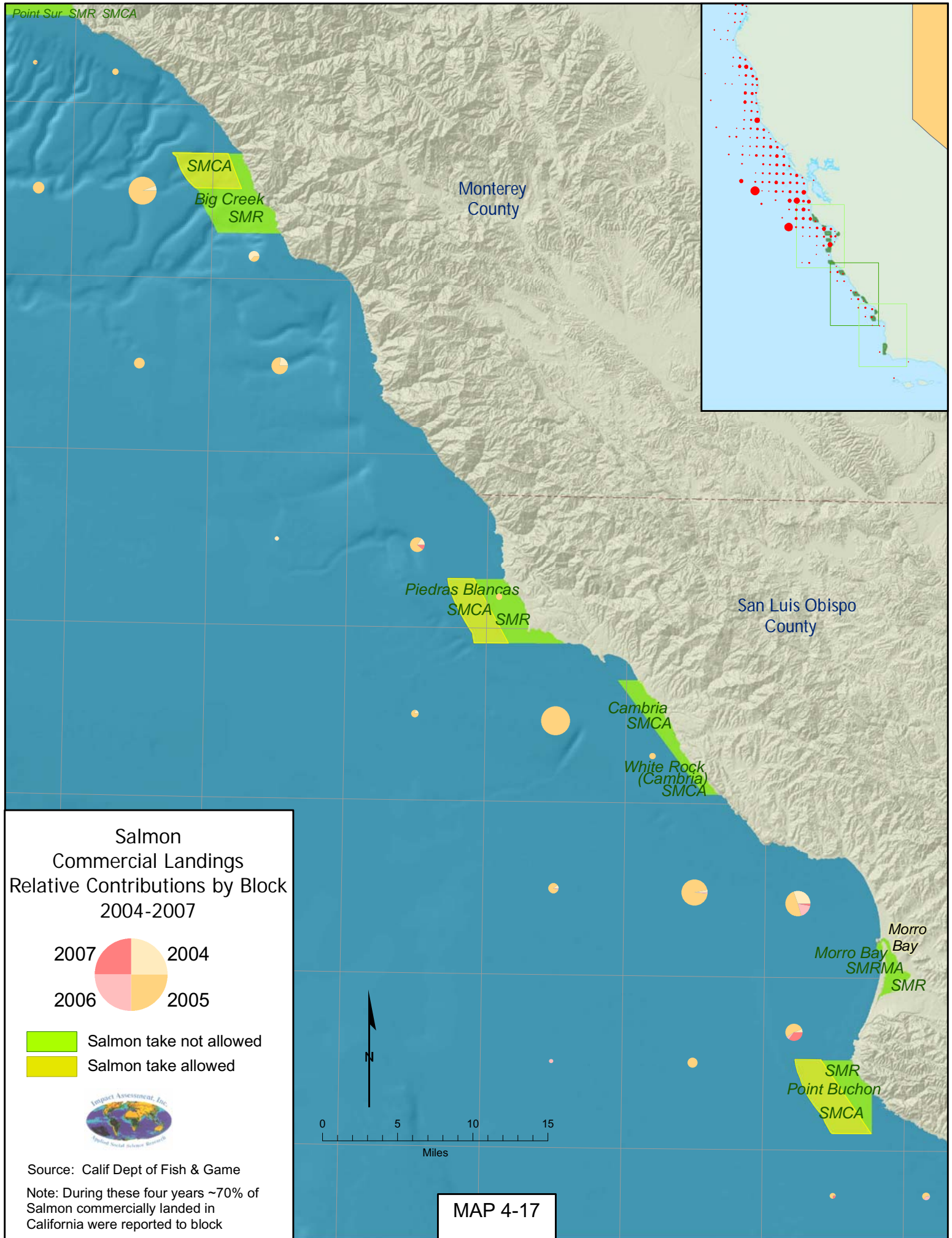
Maps 4-16, 4-17, and 4-18 below are provided to depict the reported areas of capture for commercial salmon fisheries conducted along the Central Coast for the years 2004 through 2007.

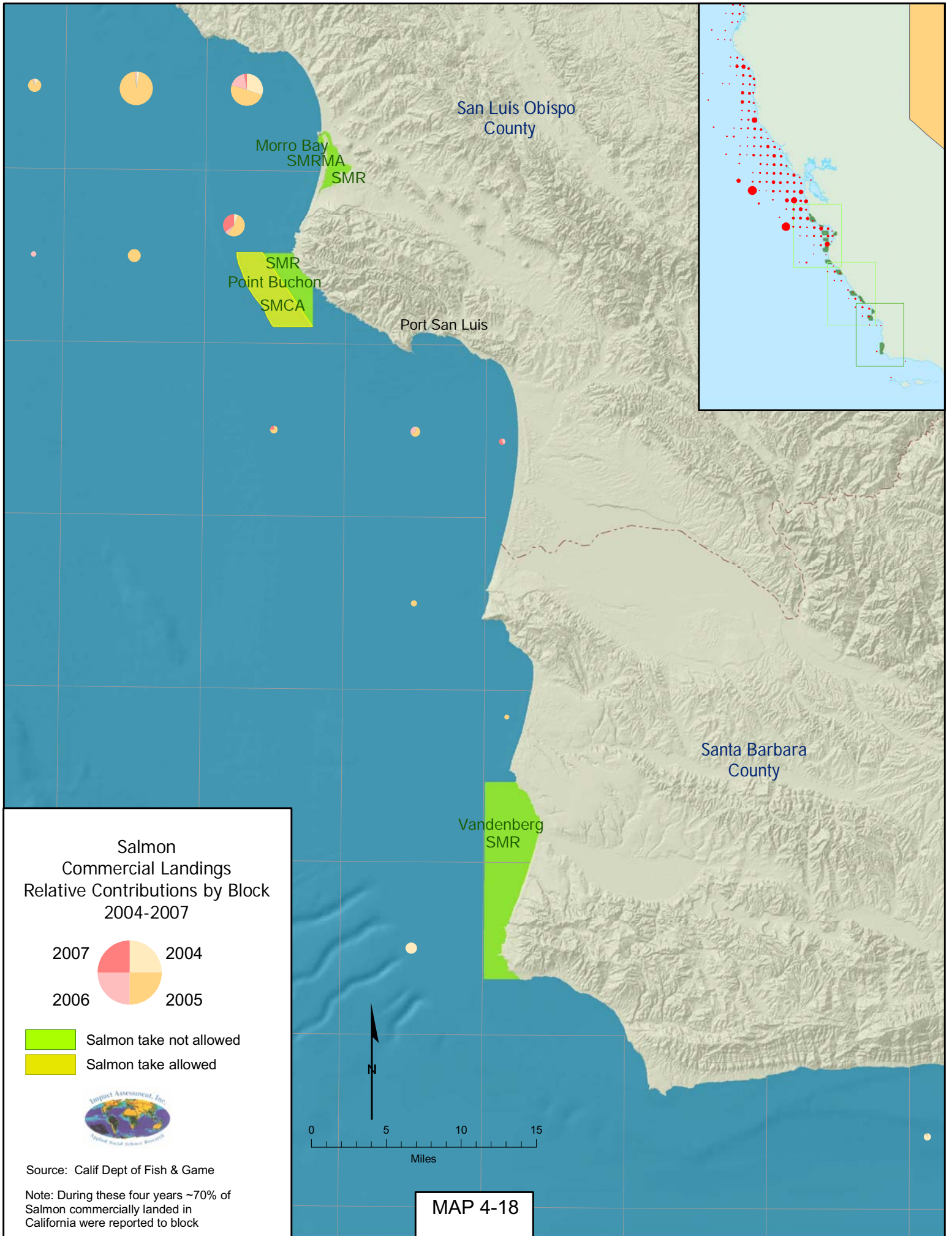
Challenges to the West Coast Salmon Fishery. Several factors have affected the salmon fishery over the last decade or so—and particularly in the last few years. Importantly, the Sacramento River system supplies 90 percent of salmon caught in California, and nearly 60 percent of salmon is currently caught in waters north of San Francisco. The Klamath stock reportedly has been affected by disease, the diversion of water to inland farms, and hydroelectric dams (Guillen 2003). The wild salmon fishery has also suffered due to the importation of Chilean and Norwegian farmed salmon (Knapp et al. 2007: xii-xiii).

At one point, the ex-vessel price offered to commercial fishermen for wild-caught salmon was so low (about \$1 per pound) that some fishermen preferred to give away their Chinook rather than accept such a low price. Low prices, in tandem with the rising cost of the commercial salmon stamp, served as economic disincentives for salmon fishermen.

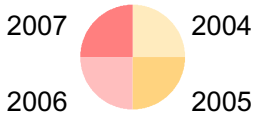
Sea lion predation is an important consideration in the management of the region’s salmon fishery. According to one salmon fisherman, “If a sea lion follows, and you are the only guy out there, you might as well just pull up your gear and leave, because they can easily eat as much as you pull in.” Other fishermen estimate sea lion-related losses of \$10,000 to \$12,000 each year. Given problems with sea lions, the best month for salmon fishing in the Monterey Bay area is June, when sea lions head to rookeries south of Point Conception. When they return at the end of July, however, the creatures are said to be ravenous. For this reason, some fishermen assert that July is the best time for a seasonal closure of the fishery.







Salmon Commercial Landings Relative Contributions by Block 2004-2007



- Salmon take not allowed
- Salmon take allowed



Source: Calif Dept of Fish & Game

Note: During these four years ~70% of Salmon commercially landed in California were reported to block



MAP 4-18

The market influx of wild Alaskan salmon and farmed Atlantic salmon also challenges California-based salmon fleets. But there is some potential for Central California fishermen to acquire a niche in the marketplace. In the last few years, for example, ex-vessel prices for salmon have been increasing as consumers increasingly perceive the benefits of wild-caught salmon. Select markets in Central California were paying between \$6 and \$7 per pound for wild-caught salmon in 2007. Some fishermen, who were selling their catch directly from the boat in Monterey, were getting \$4.50 per pound. In 2006, ten good size fish could potentially be sold for between \$800 and \$1,000. This is in contrast to the early 1990s, when the same amount of fish would have been valued at around \$150.

The 2008 closure of the commercial and recreational salmon fishery was of great and immediate concern for Central Coast salmon fishermen, often dwarfing concerns about the MPAs. Estimated losses associated with the closure vary between state and federal agencies and the impact categories that are considered. A CDFG report prepared for the California Office of the Governor estimated the loss of 2,263 California jobs and overall economic losses of \$255 million. California fishermen reportedly may have lost up to 80 percent of their annual income in 2008. The Governor of California proclaimed a state of emergency in association with the closure of the salmon fishery (Office of the Governor of California 2008) and requested \$208 million in federal disaster assistance funds (Barnard 2008).

Some local salmon fishermen may opt out of the fishery as a result of the 2008 closure. Other fishermen are planning to head to Alaska to participate in the salmon fisheries there. Many crab fishermen who typically also participate in the salmon fishery, are extending their crab season as a way to generate income. Others are investing in new crab pots for use in 2009. Several salmon/sablefish fishermen, who were already challenged by limited sablefish quotas, are trying to obtain crab permits for next year. Many of them have never participated in the crab fishery. Permits can cost upwards of \$30,000. Although one of the local buyers in the Monterey Bay area says he does not like to deal with crab because of processing costs, he will support local fishermen who have shifted into this fishery.

Officials from the Central Coast harbor districts predict that losses from the closure will range from \$60,000 to \$100,000. In Monterey, the harbor master estimates a loss of about \$60,000 in berthing fees that would otherwise accrue from transient salmon fishermen. At Pillar Point, officials estimated losses close to \$100,000 (Smydra 2008). Salmon is often the most profitable fishery in the Santa Cruz area, and the closure has challenged many participants in both the harvest and support sectors. Typically, bait and tackle store owners sell large amounts of gear during the salmon opener, and recreational salmon anglers frequent harbor restaurants and bars. Loss of parking fees is another economic impact. The Santa Cruz Harbor District reduced its FY 09 budget by approximately \$25,000 in response to anticipated losses from the closure (Santa Cruz Port Commission 2008).

In May 2008, the Bush administration passed a \$170 million addition to the U.S. Farm Bill to aid West Coast families and businesses affected by the closure. Some \$100 million was released in September of that year; \$63 million to fishermen in California, \$25 million to fishermen Oregon and \$12 million to fishermen in Washington State. The remaining \$70 million was released in November 2008 (Daly 2008; U.S. Water News Online 2008).

5.0 An Overview of Recreational Fishing along the Central Coast

The recreational fisheries of California generate billions of dollars in direct and indirect revenue each year (CDFG 2008b). The Central Coast region attracts thousands of recreational anglers to its rugged shorelines and productive nearshore waters. Motivations include sport, camaraderie, relaxation, subsistence, and a combination of these and other factors. As might be expected, most recreational fishing activity occurs during the summer months.

According to the *California Recreational Fisheries Survey Annual Review 2007* (CDFG 2008b), anglers in the Central District, which includes Santa Cruz, Monterey, and San Luis Obispo Counties, made an estimated total of over 363,000 fishing trips that year. The region ranked third among the state's six regions for total fishing trips. The South and Channel Districts ranked first and second, respectively. Fishing from piers and jetties was the most common recreational fishing strategy among Central Coast anglers, and more than 157,000 such trips are estimated to have taken place in 2007. Fishing from beach and bank was the second most popular strategy, with over 137,000 such trips made during the survey year. Commercial Passenger Recreational Fishing Vessel (CPFV, or charter vessel) trips were also popular, and an estimated 43,166 such trips were taken along the Central Coast in 2007. Finally, survey analysts estimate that over 25,000 Central Coast fishing trips were made in privately owned vessels during 2007. Central and North Coast anglers most typically landed rockfish species, with upwards of one million rockfish estimated to have been landed in those regions during the survey year (Table 5-1). By way of contrast, Southern California anglers most typically landed tunas and mackerels during 2007.

Table 5-1 Total Recreation Landings by Trip Type in Central and Northern California: 2007

Species	Estimated Landings in Pounds	Trip Type	Estimated Trips By Trip Type
Surfperches	218,257	Inshore	132,000
Silversides (Family Atherinidae: topsmelt, jacksmelt)	74,957		
Croakers	13,228		
Smelts (Family Osmeridae: surfsmelt)	<2,205		
Flatfishes (sanddab, sole, halibut, turbot, and flounder)	167,551		
Rockfishes	1,565,280	Bottomfish	120,000
Greenlings and Lingcod	352,739		
Flatfishes (sanddab, sole, halibut, turbot, and flounder)	167,551		
Striped bass, sturgeon, and shad	NA	Anadromous	77,000
Salmon	401,241	Salmonid	48,000
Tunas and Mackerels	454,152	Coastal Migratory	34,000
Anchovies	6,614		

Source: CDFG 2008b

Historic Overview. Saltwater angling has been a popular form of ocean recreation in Central California since at least the 1940s. Boat-based angling increased in popularity in the 1960s following improvements in hull materials and design, and mass production of outboard engines. Mason (1995) describes important changes that have occurred in association with recreational

fishing across the Central Coast region over decades past. These include: (1) a four-fold increase in the number of fishermen and the volume of fish landed between 1959 and 1986; (2) a reduction in allowable take of rockfish in 1971 (from 20 to 15 fish); (3) a significant increase in fuel prices in the 1980s; and (4) a decrease in landings of the highly sought after blue rockfish.

In the 1950s, blue rockfish was targeted by many anglers in the Monterey Bay area. The species was easily caught using the light tackle and multi-hook gear that was popular at the time. Mason asserts that recreational landings began to diminish in the 1960s (*ibid.*). Monterey-based party boat skippers responded by fishing new blue rockfish grounds at Yankee Point and later at Point Sur. By the 1980s, blue rockfish landings had further declined, reportedly due to diminished abundance and an increase in fuel prices that made distant fishing trips less cost-effective. One long-time captain recalls that his clientele gradually gained interest in fishing for lingcod and red rockfish in increasingly deeper waters. Improvements in navigational and fish-finding technology facilitated the shift and have had a dramatic effect on the level of efficiency achieved by operators of privately owned fishing vessels and charter and party boats.

A variety of new regulatory changes have affected recreational fishing in the region since Mason's study in 1995. For instance, bag limits are now lower and seasonal and spatial closures have been implemented. For many boat-based recreational fishers, the establishment of the RCAs has significantly constrained their activities. Meanwhile, escalating fuel prices continue to make distant fishing trips cost prohibitive. Some charter and party boat captains report that they are traveling at lower speeds in order to reduce fuel consumption.

By the late-1990s, hook-and-line kayak fisherman began targeting nearshore rockfish. A new era of small vessel nearshore recreational angling had begun. Today, boat-based anglers target about 30 species of rockfish and a range of other species. In shallow areas along the immediate coast, blue, olive, kelp, black, brown, and gopher rockfish are most frequently pursued. Species such as yellowtail rockfish, bocaccio, chilipepper, widow rockfish, green-spotted rockfish, rosy rockfish, starry rockfish, and lingcod are taken in deeper waters, as are various pelagic species.

5.1 Primary Modes of Fishing

Introduction. Resident and visiting fishermen engage in a variety of recreational fishing activities along the Central Coast, depending on their interests and inclinations, and various economic factors. Some fish along the shoreline; some use their own vessels. Others pay for a fishing experience on charter or party boats. The majority of recreational fishing effort occurs along the beach and bank, and most privately owned fishing vessels frequent waters within ten miles of the marinas and launch ramps (CDFG 2005). In nearshore areas, rockfish, California halibut, lingcod, kelp greenling, and sanddabs are perennial favorites. Offshore anglers often enjoy the pursuit of salmon and albacore tuna.

Shore-Based Fishing. In 2005, beach and bank and shore-based modes of fishing accounted for 50 percent of all fishing effort in the Central California region. In that year, an estimated 110,400 persons engaged in shore-based fishing in the region: 68,000 fished from beaches and banks and 42,400 fished from man-made structures such as piers and jetties (CDFG 2006a).

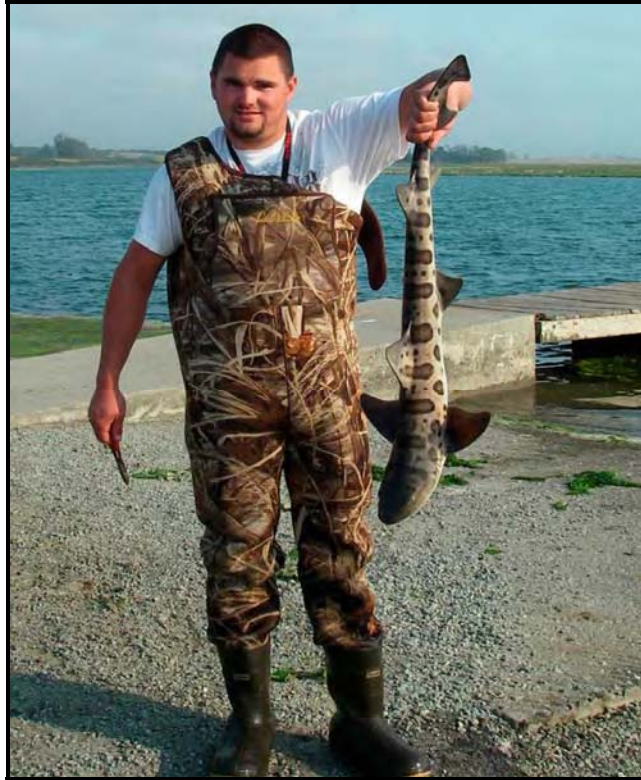


Angling from the North Shore of Carmel Bay



Fishing from Avila Pier in 2007

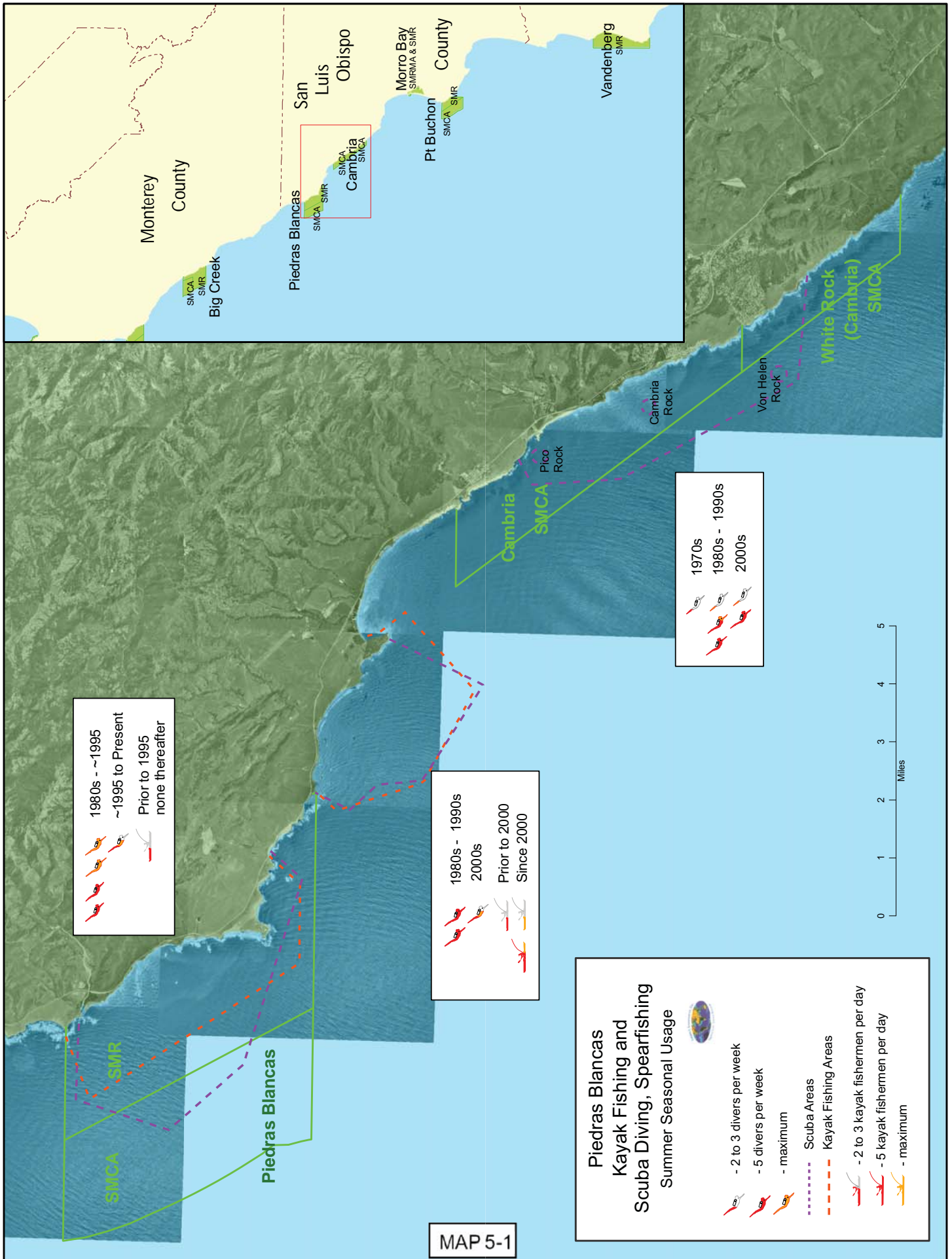
Roughly 40 well-known shoreline fishing spots are notable between Año Nuevo in San Mateo County and the Big Sur area in Monterey County. There are also at least 15 readily accessible fishing locations in San Luis Obispo County. Some of the most popular areas include Santa Cruz Pier, the Monterey Coast Guard breakwater, and the beach area south of Guadalupe Nipomo Dunes in San Luis Obispo County (CDFG 2005). Popular beach and bank species include: surfperches, white croaker, and nearshore rockfishes. Elkhorn Slough has been a popular angling area for shark for over 60 years.



Angler and Leopard Shark: Elkhorn Slough

Kayak Fishing. Kayak fishing is gaining popularity in the region. Some consider it the fastest growing segment of the recreational fishing industry. The kayak holds great appeal for fishermen because it does not require fuel, is quick and easy to launch, and is highly maneuverable. Kayak fishers typically fish in relatively shallow waters for various rockfish species, California halibut, surf perches, and other nearshore species.

Kayak fishing is particularly common in the Morro Bay area (Map 5-1). When launching from Morro Bay or Leffingwell Landing, favored fishing areas include: the sea caves at San Simeon Cove for California halibut, Cambria for rockfish, and the Piedras Blancas lighthouse and Point Buchon for rockfish, California halibut, and other species. Those who launch from Avila/Port San Luis typically fish inside the bay for California halibut or at Pecho Rock for rockfish. South of Avila, there are no developed launch areas until Santa Barbara Harbor; however, kayakers sometimes launch from the sandy beaches at Guadalupe Beach and Jalama State Park just north of Point Conception. Jalama offers the only publicly accessible beach area along this part of the Central Coast.



Private Boat Fishing. According to the California Department of Motor Vehicles, the number of recreational vessels registered in the Central Coast region increased 25 percent between 1985 and 2006. Registration increased most dramatically during that period in San Luis Obispo County (46 percent), followed by Monterey County (28 percent), Santa Cruz County (27 percent), and Santa Barbara County (21 percent). Registration declined by 15 percent in San Mateo County (Figure 5-1). In 2006, 57,145 sport fishing licenses were issued to ocean-based fishermen in the region: 13,752 in San Luis Obispo County, 12,628 in Santa Barbara County, 11,330 in Santa Cruz County, 9,945 in Monterey County, and 9,487 in and San Mateo County.

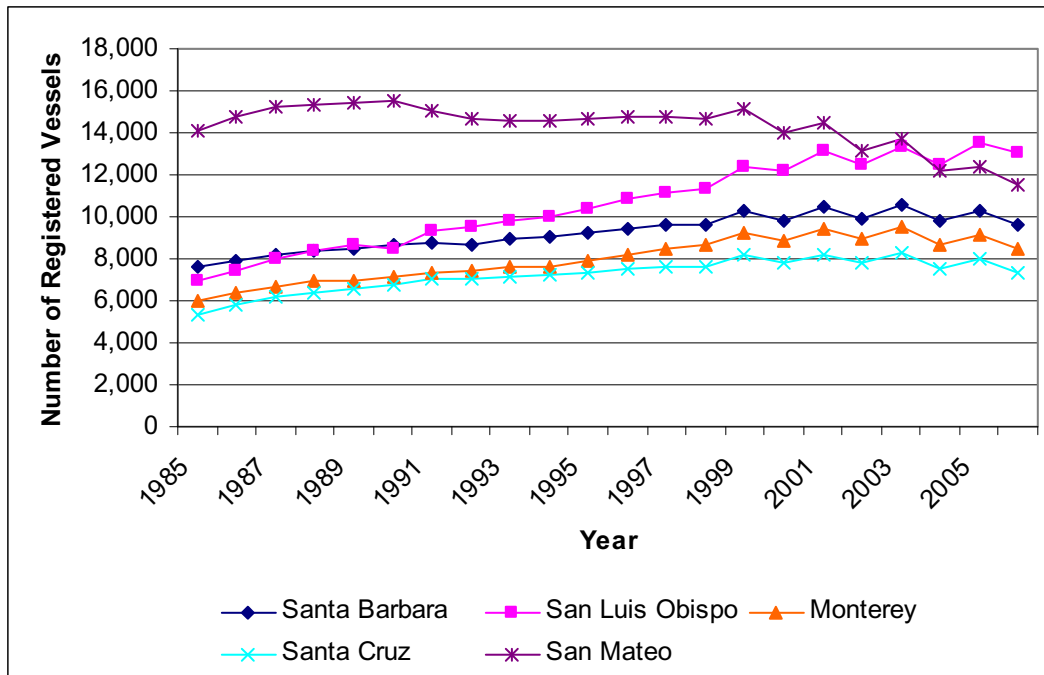


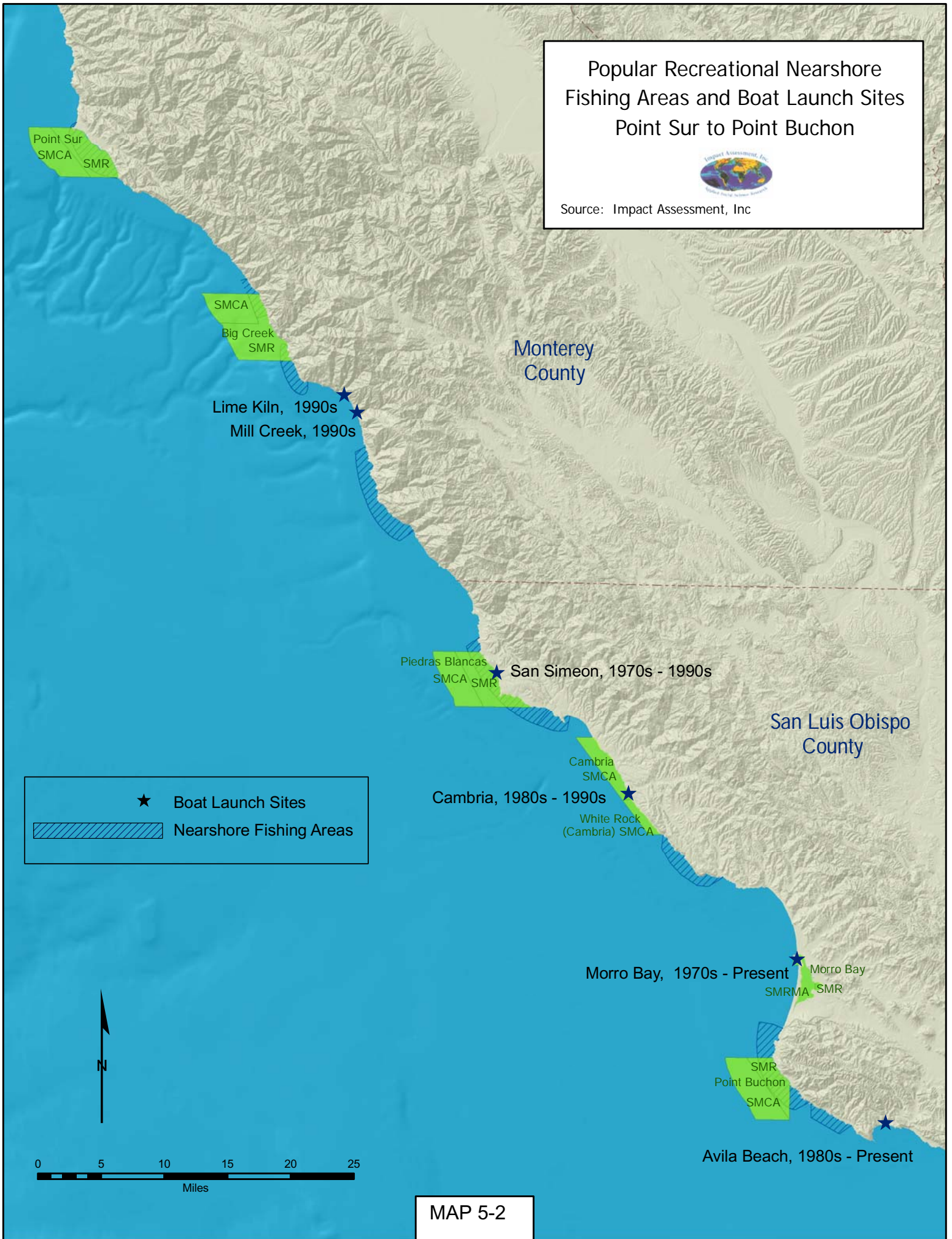
Figure 5-1 Trends in Recreational Vessel Registration in the Study Counties: 1985-2006
(California Department of Motor Vehicles 2007)

The Monterey Bay area is a particularly popular destination for recreational fishermen in search of salmon, rockfish and albacore. Leffingwell Landing, located just north of Cambria at Moonstone Beach, is the most popular launch area for small boat fishermen in the northern part of San Luis Obispo County. William Randolph Hearst Memorial State Beach is also a favorite destination. These locations allow easy access for trailered watercraft. Further south at Avila, recreational fishermen typically remain in the Port San Luis harbor area, head to spots just north of the Port San Luis lighthouse, or travel further south to Pecho Rock. Some anglers will travel as far as Point Sal or Purisima Point to fish for rockfish, halibut, and other nearshore species (Map 5-2).

Popular Recreational Nearshore
Fishing Areas and Boat Launch Sites
Point Sur to Point Buchon



Source: Impact Assessment, Inc



MAP 5-2

Charter Boat Operations. In 2005, commercial passenger-carrying fishing vessels (CPFVs) accounted for 13 percent of recreational fishing activities in the region (CDFG 2006a). Party or head boats can carry as many as 50 persons out at a time, although a maximum of 20 has been more typical since the early 2000s (Air Resources Board 2004). Smaller charters, often called “six-packs,” take six or fewer anglers per trip. In 2005, recreational anglers took 28,811 charter trips in the Central California district (CDFG 2006a).

Charters of varying capacities operate from all major ports in the Central California study area. Point Año Nuevo is a common destination for charters leaving from Pillar Point/Half Moon Bay and Santa Cruz. Charter boats leaving from Monterey Harbor typically head south and will go as far as Point Sur. Charters originating at Morro Bay will travel as far north as Piedras Blancas and as far south as Purisima Point. Charters originating in Santa Barbara will typically travel as far north as Piedras Blancas and as far south as Purisima Point (CDFG 2005).

5.2 Charter Industry Challenges

Overview. Over the last decade, several management measures have affected the capacity of the charter industry to meet the demand for rockfish trips. For example, the establishment of the RCAs in 2003 limited sport fishing to depths of 120 feet or less in order to protect canary and golden eye rockfish.

However, shallow water rockfish are often smaller and therefore less appealing to anglers than large rockfish that dwell in deeper waters. Some charter operators were already dissatisfied by the ten rockfish bag limit and hook restrictions (two per fisherman) when the depth restrictions were enacted. One asserted that customers would “rather buy some fish at Costco than pay money for a charter just to catch a few small fish.”

Seasonal restrictions reportedly are also challenging charter operators since many initially built their businesses around the year-round availability of the species. One charter operator attests that his business dropped by nearly 50 percent when the groundfish season was limited to six months in 2000 (it now is open May 1st to November 1st). With only a six-month window to offer rockfish fishing, some charter operators say they are enduring long stretches of time with limited income.

To compensate for diminished rockfish fishing opportunities, some skippers now offer whale-watching tours during the slow winter months¹ or are otherwise diversifying their operations. Demand for whale-watching tours reportedly has been increasing since the 1980s. Some charter operators have hired naturalists to narrate these eco-tours.²

¹ Humpback whales migrate from Alaska to breeding grounds along the northern coast of Mexico between mid-December and April; grey whales are also present from mid-December through April.

² Some whale-watching charters in Monterey Bay fear that the sport fishing charters will focus more heavily on promoting their own whale-watching tours now that the new MPAs have restricted access to certain historical rockfishing grounds.

In addition to whale-watching, most charter operators along the Central Coast now offer multiple tour packages. Many report that they cannot afford to focus on sport fishing only and offer bird-watching, bay tours, dinner tours, photography tours, corporate team-building tours, and burials at sea.

The charter industry has also been affected by several non-regulatory challenges. Overhead costs, such as fuel and liability insurance, continue to increase and certain goods and services that were formerly readily available in association with a robust commercial fishing industry are now hard to acquire. For instance, bait is now often hard to purchase and, as a result, some charter operators are now catching their own bait—a task which prolongs the workday.

Charter operators also discuss the difficulties of securing and retaining experienced and responsible crew members. The problem is compounded by the seasonal nature of the work. During the cold winter months when work is slow, crew members must seek work elsewhere or apply for unemployment. Once other work is found, many often do not return for crew positions.

Pillar Point Harbor Charter Operations. Recreational boats have had a strong presence in Pillar Point Harbor since the 1980s. The charter fishing industry is still quite active here.

Several charter operations depart from Pillar Point Harbor. Each charter operation promotes a particular specialty, but most also offer eco-tours in order to secure the widest customer base possible. Most of the charter vessels operating from Pillar Point are large party boats, from 38 to 50 feet in length. Most carry between 15 and 50 anglers at a time. There are also a few smaller operations.

Many skippers in the Pillar Point Harbor area focus on a particular niche to avoid too much competition. These include: salmon and albacore; hardheads; rockfish; and shallow water light tackle fishing. Most offer whale-watching and ash scattering services. Combination trips of rockfish/crab and squid/crab are also offered, when the seasons overlap.

Poor salmon seasons, seasonal closures, and a shortened rockfish season in 2007 reportedly have weakened the charter industry in this area. With the loss of the 2008 salmon season, operators anticipate a significant shift of effort to the rockfish fishery. In response, some operators have left the area in search of less restricted fishing grounds, while others say they have turned to commercial fishing to make ends meet.

Charter operators and other marine-related business owners are currently hoping for benefits from development of a new upscale commercial site. The hope is that tourists staying at the new complex will book charter fishing trips and other services. Many business owners are now seeking to increase their “curb appeal” to tourists.

Santa Cruz Charter Operations. Santa Cruz Harbor has long been a popular destination for recreational anglers. Six small charter fishing operations are based at Santa Cruz harbor, along with one large (60-foot) party boat. Sport fishers here tend to pursue salmon, California halibut, rockfish, lingcod, white sea bass, and albacore.

As at Pillar Point Harbor, there is some diversity in services offered by charter operators. For example, one offers marine wildlife viewing, sunset cruises, burials at sea, eco-tours, environmental surveying, special family events, and corporate team-building opportunities. Another specializes in long trips to Smith River in Crescent City and to the southern coast of Oregon. The business also offers tours of the Point St. George Lighthouse. The largest of the six-pack vessels (40 feet) caters to customers seeking luxury accommodations. That operation provides custom charters, such as “boat and breakfast” tours, as well as fishing charters, whale-watching, and coastal cruises. One of the longest running charter operations in the area offers fishing trips, bay cruises, whale- and dolphin-watching tours, and private parties.

Although sportfishing is important to the economic well-being of the harbor, recent regulations and rising fuel costs are said to be constraining the extent of activities undertaken by private vessels and the local charter fleet. Reportedly, many anglers who once targeted saltwater species are increasingly engaging in freshwater fishing. Some participants voice concerns about economic repercussions to the harbor should sport fishing further diminish in importance.

Certain veteran charter operators explain that they have had to adjust in various ways to new regulations. For example, in response to the shortened rockfish season, some charter operators are now trying to provide as many trips per day as possible. Captains also may follow a seven-hour fishing trip (6:30 a.m. to 1:30 p.m.) with a one-hour bay cruise (2 p.m. to 3 p.m.), and another fishing trip from 4 to 8 p.m. Other captains are encouraging albacore fishing charters, although the costs of fishing for albacore are higher than for rockfish; higher fuel costs associated with traveling to remote fishing grounds and USCG-regulated crew work-day requirements are a disincentive.

Historically, salmon fishing has also been important. Now, in the absence of this year’s salmon season, charter operators in Santa Cruz are pushing whale-watching tours and hoping for a strong rockfish season. They are also trying to interest previous salmon anglers to pursue sanddabs, which are plentiful in the area.

Most charter operators in the Santa Cruz area increased their dependence on salmon as a way to compensate for an abbreviated rockfish season and the emplacement of RCAs.³ But, some charter operators hold that the sport fishing industry has been hurt by the negative media coverage of the Klamath disaster, which suggested that sport fishing operations were responsible for the decline. Now, with the 2008 closure, some local charter operators project that they will lose even more of their already challenged business.

Moss Landing Charter Operations. Two large charter operations and numerous smaller operators are located at Moss Landing. One kayak service charters tourists into Elkhorn Slough.

Salmon, rockfish, and albacore are often targeted by sport fishermen in the Moss Landing area. The importance and scale of those fisheries have changed over time. Rockfish was the most lucrative fishery through the 1990s. At that time, there was an extensive clientele of “meat

³ The RCAs limit fishermen to waters between 120 and 300 feet; however, the near coastal substrata around Santa Cruz is largely sandy and not highly productive. With the RCA closures, Santa Cruz charter operators, as well as private recreational fishermen, are limited to fishing smaller rock outcroppings in shallow waters.

fisherman” (that is, fishermen who wanted to fill their freezers and feed their families). However, rockfish fishing opportunities began to subside in the late 1990s in conjunction with the Nearshore Fisheries Management Act of 1998, seasonal rockfish restrictions, and the establishment of RCAs. Charter operators assert that business began to diminish once depth and bag limits were established. The smaller bag limits (10) were also a disincentive. With less opportunity to target rockfish, area charters began focusing on salmon, the abundance of which is relatively less predictable than rockfish.

Monterey Bay Charter Operations. The demand for charter fishing tours in the Monterey Bay area also has diminished over time. During the 1970s, demand for sport fishing tours reportedly was constant during the summer – especially for rockfish charters. Charters departing from Monterey Bay area ports would travel as far north as Pigeon Point on day trips for rockfish, lingcod, and hardheads. Fishing trips for California halibut, salmon, and albacore were also popular. Business was plentiful enough to support multiple charter operations in the same locale through the 1990s. Gradually, however, rockfish fishing opportunities were increasingly limited. Many Monterey Bay area skippers blame the problem on RCAs, a shortened rockfish season, and gill netting pressures.

As recently as 1997, four very active sportfishing firms were operating a total of 16 charter vessels from Monterey Harbor. By 2008, only two firms in the area remained in the charter business, maintaining a total of five vessels. The other businesses rebranded themselves as whale-watching operations. Monterey Bay area charter operators also attribute the decline in business to the shortened rockfish season and establishment of the RCAs. Some skippers in the Monterey Bay area argue that the gentrification of Cannery Row (with upscale hotels, restaurants, and retail shops) attracts fewer potential charter fishing customers to Fishermen’s Wharf.

Similar to charter operations in other Central California ports, Monterey Bay area skippers are diversifying the types of services they offer. Whale- and bird-watching tours have been increasingly common since 1998, as are combination trips which involve pursuit of multiple species. One operator recently began offering visitors access to view sea lions from his pier for a small fee.

One Monterey Bay public official describes the loss of resident charter businesses as a “significant loss of a social asset to Californians.” He points out that party boats make fishing more accessible to those who cannot afford to own a vessel.

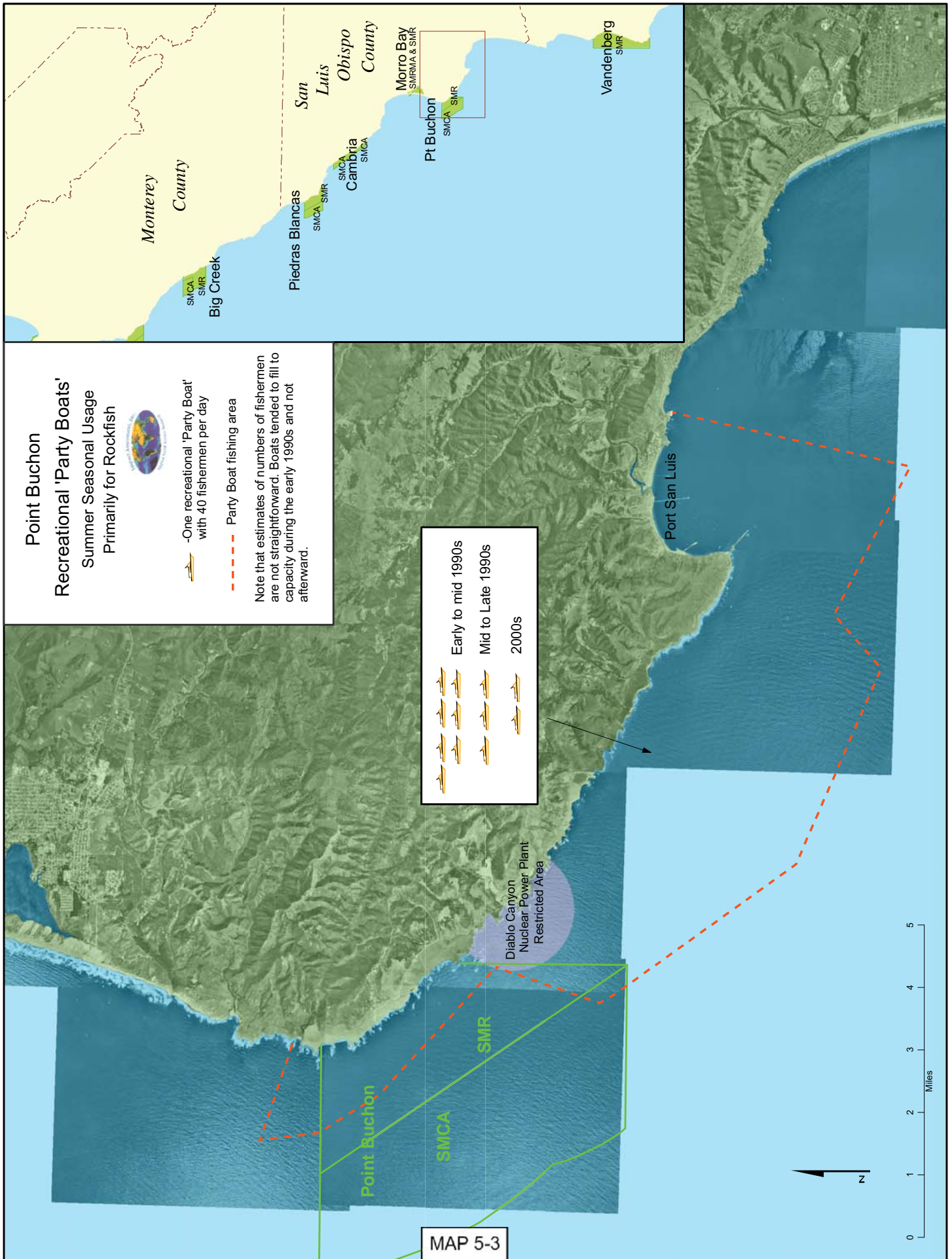
Morro Bay Area Charter Boat Operations. Morro Bay was once a prime destination for sport fishing charters (Map 5-3). During the 1950s and 1960s, approximately 15 charter boats were operating in Morro Bay. Demand was still high in the 1970s, with charters operating on a daily basis during the summer months. In the 1990s, at least four party boats ran at full capacity during the summer. Day trips usually headed south to Point Buchon or Avila. Overnight trips between Point Sur and San Miguel (85 miles to the south) were also common. These were primarily rockfish trips, but albacore trips were also undertaken.

Charter operations were still quite active in the early 2000s, with about 12 businesses servicing sport fishermen and tourists in Morro Bay (Langdon-Pollock 2004). Today, although sport

fishing remains popular, only two charter operations remain. In addition to sport fishing, the remaining operations offer whale-watching, nature tours, and burials at sea. Target species typically include rockfish, albacore tuna, and salmon. The charters now typically operate only on weekends.

Charter operators in this region struggle with regulations that increasingly restrict their industry, contending that it is very difficult to turn a profit now that the rockfish season has been reduced from twelve to six months. Some also report that pressure has increased significantly on rockfish stocks in areas that remain open. One skipper explains that, because electronic fish-finding devices have made it so easy to locate the schools, charter operators and recreational anglers tend to fish the same areas. There is fear that concentration of effort in the remaining areas will add to pressure on the resources.

Spatial restrictions in the Morro Bay area reportedly have impeded charter operations. For measures of national security, a restricted zone was established around the Diablo Canyon generating station following the terrorist attacks in 2001. This one-mile radius extends to and abuts the recently established Point Buchon SMR and SMCA.



6.0 Additional Marine Recreational Activities

A variety of marine recreational activities contribute significantly to the economy of the Central Coast. According to the authors of California's Ocean Economy report (2005), in the year 2000, ocean-related businesses in the Central and South Central Coastal regions¹ employed over 100,000 people or seven percent of the total regional labor force (Kildow and Colgan). State reserves, parks, and beaches attract large numbers of resident and non-resident visitors each year, many of whom engage in activities such as diving, kayaking, surfing, tow-in surfing, kiteboarding, sailboarding, wildlife viewing, tide-pooling, and others. For instance, in Monterey, the Monterey Bay Aquarium has been instrumental in attracting thousands of tourists to the coastal region.² Similarly, the seaside attractions in Santa Cruz, the sights along the coastline of Big Sur, and the elephant seal colonies at Año Nuevo and William R. Hearst State Beach are some of the maritime experiences that make the Central Coast a popular destination and help stimulate the region's economy. This section of the report describes some of the important recreational activities that occur in or near the new MPAs.



Inside the Monterey Bay Aquarium

¹ The Central region includes Monterey, Santa Cruz, and San Mateo Counties. The South Central region includes San Luis Obispo, Santa Barbara, and Ventura Counties.

² In its first year of operation the Monterey Bay Aquarium drew over 2.3 million visitors. According to Conway (2003: 144), "retail sales for the City of Monterey rose 53 percent, transient occupancy tax (hotel) receipts increased 50 percent, other tax receipts increased 225 percent, and local eateries and bars reported a 37 percent increase in the first quarter the aquarium was opened".

6.1 Diving along the Central California Coast

Overview. The Central California coast is an important but challenging destination for free and SCUBA diving. In addition to its cold waters, diving on the Central Coast is difficult in large part because of seasonally rough ocean waters and weather conditions, stretches of particularly rugged coastline, and often relatively poor visibility. Access to the ocean at even the most popular dive sites can be challenging, and boats or kayaks are often needed.

Challenges notwithstanding, the nearshore environment of the Central Coast is particularly rich in sea life. There is a long history of diving for food and aesthetic pleasure along the region's accessible shoreline.

Diving and spearfishing grew in popularity in relation to changes in technology: masks were vastly improved in the 1930s, more efficient rubber fins were introduced in the 1940s, and neoprene wet suits and scuba apparatus were introduced in the 1950s.

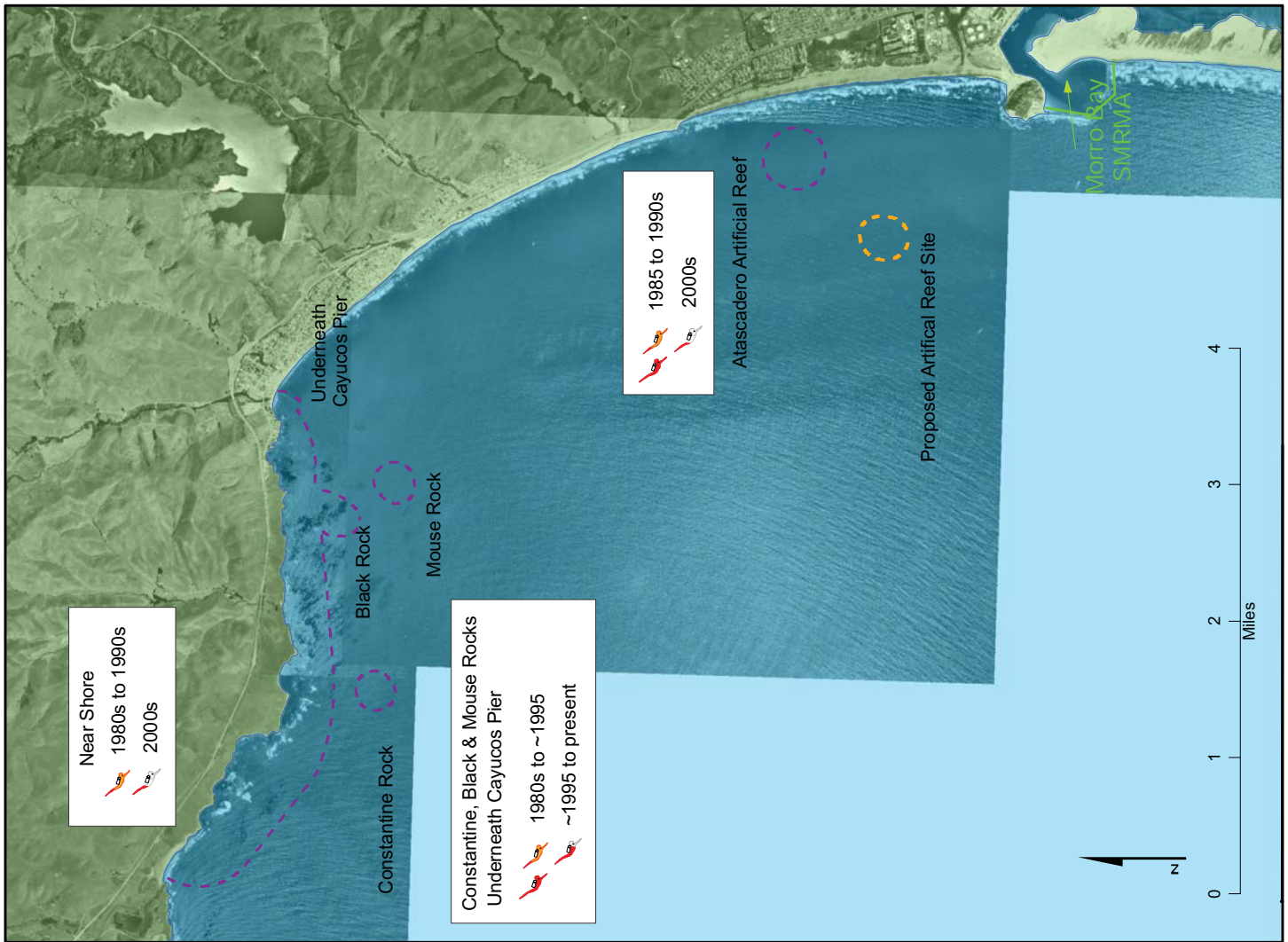
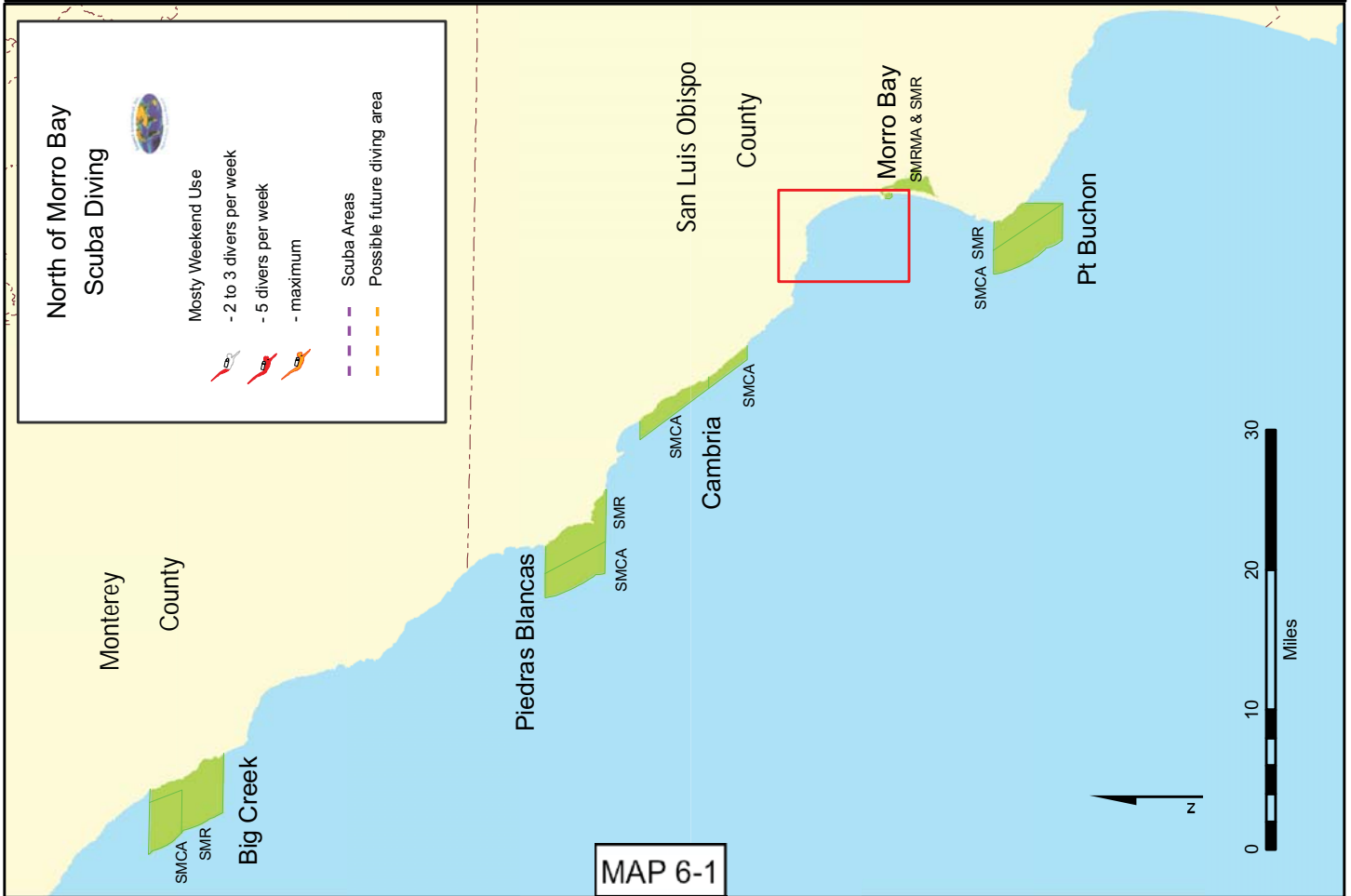
National interest in spear fishing and scuba diving was probably at its peak during the 1960s, when Jacques Cousteau's underwater explorations captured the public's imagination. At that time, there were thousands of dive clubs nationwide, and many divers were using slings and spear guns to capture fish for food. Today, there is renewed interest in free diving and spear fishing in the U.S. and a number of free diving clubs and magazines are available to participants.

Consumptive-Oriented Diving. While scuba tanks are used by some spear fishers, many today do not use breathing apparatus and are thus known as free divers. Such divers can achieve depths of about 100 feet or more, though the record depth is much greater.

Many free divers dive at locations near their place of residence, but also travel within and outside the country to dive. Some free divers have recently begun to spear pelagic species such as tuna and yellowtail. Blue water diving and spearing requires high visibility conditions. This activity is more expensive than nearshore diving as it involves offshore transportation costs and powerful weaponry. Divers often employ GPS technology to map and record new dive spots. One free diver contacted for purposes of this study reported that he pursues lobster in the Channel Islands from about mid-September to mid-March, snapper in Mexico in May, white sea bass in Southern California in June, and California halibut around Moss Landing during June and July. Rockfish is open to spear divers all year-round (with only a short seasonal closure for lingcod breeding). Tournament season runs from May through October.

Abalone diving using scuba gear was popular until the abalone fishery closed in 1997. The Farallones, Año Nuevo, and Pigeon Point were prime abalone gathering spots in the Monterey Bay region. Good spots for abalone in the Morro Bay area included Piedras Blancas, Point Buchon, and Point Estero (Map 6-1).

There are many widely known and more secretive dive spots along the Central Coast. Widely known spots in the Monterey area alone include the following: Del Monte Beach, Coast Guard Pier, McAbee Beach, Hopkins Reef, Lovers Point, Otter Cove, Coral Street Beach, Ocean Pinnacles, Stillwater Cove, Monastery Beach, Mono Lobo Wall, and Point Lobos. Many of these spots are within the boundaries of the new MPAs, and spearing is now therefore prohibited.



Recreational Diving. Mainstream interest in scuba diving was heightened during the 1980s. More females became involved in the sport and certification courses became shorter and less rigorous, thus enabling tourists to scuba dive while vacationing along the coast. A long-time dive shop owner in Monterey reports that in the mid-1970s only about 15 percent of divers were women, but by the early 1980s, this had doubled. Diving also appealed to white-collar professionals from Silicon Valley, many of whom frequented dive spots in Monterey.

While spearing remains popular in some areas, several factors led to a general decline in the sport in the 1990s. These included the closure of the abalone fishery, withered foot disease among certain abalone stocks, a reported increase in marine mammal predation, and water pollution. Some divers also assert that fish stocks had been diminished through various fishing pressures. Some divers went to other locales; some quit diving altogether. Some dive shops also closed.

Non-consumptive sport diving gradually emerged as a popular activity over the last two decades. This form of diving appealed to those interested in exploration, observation, and education. The ethos underlying this form of diving is “look, but do not disturb.”

Underwater photography is a common activity among non-consumptive divers. Currently a number of specialty publications cover underwater photography, including two U.S. print magazines, three online magazines and four major blogs (with some 50,000 readers). Many dive stores in the region carry high-value camera equipment. Many dive magazines present diving as a family activity and part of a travel destination package, rather than as an activity associated with hunting. Marketing has stimulated interest in diving at locations around Monterey Bay.

Dive technology has changed over time. Buoyancy devices now are less bulky and better-fitting. Diving computers, which have become smaller and cheaper than even ten years ago, are now in mainstream use. These provide divers with vital information about air supply, nitrogen levels, and depths.

Other major changes that have furthered participation in the sport include: development and availability of safer, more functional, and better-fitting equipment (especially for women who previously had to make-do with gear designed for men); gear available at a variety of price ranges; and more user-friendly training techniques. In the mid-1990s, the popularization of nitrox, a blend of gases with high oxygen and low nitrogen levels, allowed divers to stay underwater for longer periods of time.

Diving in the Monterey Bay Area. The Monterey Bay area (including but extending beyond the Sanctuary) is a major dive destination. As noted previously, there are many dive spots in or near Monterey Bay, with many located along Cannery Row. Diving groups claim that roughly 65,000 dives take place each year in the Monterey Bay area.

Although storms constrain the activity in winter, diving occurs year-round in the Monterey Bay area. Monterey Bay offers particularly good kelp diving and some night diving. Visibility is best during the fall and winter months, although conditions are calmest during spring and summer.

Monterey is popular with novice divers. Although dive shops are scattered all over California, many offer pool training only. For real ocean experience, new divers often come to Monterey Bay. Many West Coast dive shop operators recommend that novice divers acquire their open water certification requirements in the Monterey area.

Monterey Bay Area Dive Shops. There are now five dive shops, six dive boat charters, and one dedicated underwater photography shop in Monterey. One of the first dive shops in Monterey was established in 1961. The shops sell and rent equipment, and offer repair services, air fills, diving lessons, local tours, and trips to distant dive locations. They also offer PADI and NAUI certification courses. Some shops cater to both consumptive and non-consumptive divers, while others offer more specific goods and services. Training courses range from basic certification to more advanced courses in night diving, navigation, underwater naturalism, underwater photography, instructor certification, and deepwater boat diving.

Monterey Bay Area Dive Charters. The City of Monterey limits the size and number of dive charter vessels working in the Bay. The city defines dive charter boats as “limited use” vessels. This serves to limit competition between dive operations, whale-watching charters, and sportfishing charters. Currently six dive charter vessels operate in the Monterey area.

The internet has changed diving in general. The internet provides easy access to information on dive sites and training materials, allows divers to share experiences through downloaded videos, and provides a way to create social networks.

Many clients who book dive charters in Monterey Bay are already certified. Many reside in San Francisco, Sacramento, or the San Joaquin Valley. International divers also come to Monterey, many from other cold water dive locations such as the U.K., Germany, and Russia, in part because of the favorable exchange rate. The United States is an increasingly attractive tourist/dive destination. Local experts assert that in the fall and winter, 80 percent of the clientele are local - coming from within 300 miles of Monterey, whereas, in the spring and summer 30-40 percent of clientele come from outside the U.S.

Current Trends. Diving is a significant source of revenue for the City of Monterey. As such, the city and local businesses often actively support dive tournaments and routine recreational diving activities. Some local hotels offer discounts to divers and provide rinse tanks and showers. The City recently built a spacious park area near the Monterey Breakwater with facilities and space dedicated for use by divers.

Some in the local dive community have been lobbying for an artificial reef in Monterey Bay since the late 1990s. Similar proposals are underway in the Morro Bay area as part of the “California Ships to Reefs” program. Funding for such a project is available; there are government programs that would donate both the wreck and the money. According to owners of local dive businesses, however, the program has not moved forward in part because some believe that the bay should remain “pristine.”

Changes in Human Use Patterns. Many long-time divers assert that the marine space available for diving has changed over time. First, they perceive that a bias against divers in some Central Coast locations has reduced access to certain dive spots.

Second, the increased presence of elephant seals in areas such as Año Nuevo—along with the sharks that eat them—has changed how divers use certain marine areas. White sharks are a particularly acute problem during the seals’ whelping months, which overlap the spear diving tournament season between July and December.

Some consumptive and non-consumptive divers report a lack of nearshore rockfish in the Monterey Bay area, which is said to detract from the diving experience. One informant traced his perceptions about a decline in nearshore fishery resources to several factors including: the commercial live fish fishery which moved into the same inshore areas as recreational fishermen during the 1990s; the entry of hook-and-line kayak fishermen into the nearshore zone in the late 1990s; and nearshore fishing methods that employ multiple hooks. Other divers contend that, due to increasing regulations in the nearshore fisheries, some species, such as certain rockfish, crabs, California halibut, cabezon, and lingcod, are increasing in abundance.

Many divers, regardless of recreational emphasis, now prefer to dive in warm water locations rather than the cold waters of Monterey Bay. As such, many of those who can afford the added expense of traveling to mid-latitude dive spots, do so and forego local or regional trip(s).

Diving Use Areas and MPA Locations. The majority of dive sites in the Monterey Bay area are located in and around the southern portion of the Bay, including the Point Lobos area (Table 6-1). There are relatively few suitable dive locations north of Monterey Bay. Although there is some diving in the Mendocino area, the waters tend to be rough and suitable primarily for experienced divers only. As one long-time diver explains, “north of Monterey is just not safe and there is nothing in Santa Cruz . . . the Farallones experience extremely rough weather and have lots of sharks.” Additionally, while there are areas south of Point Lobos/Point Pinos that afford dive experiences, these become progressively less protected from westerly and northwesterly swells. There is a small dive community in San Luis Obispo County and a renowned diving area is the Channel Islands.

Table 6-1 Overlap between MPAs and Popular Dive Spots in the Monterey Bay Area

MPA(s)	County	Dive Spot(s)
Edward Rickett’s SMCA, Lovers Point SMR, Pacific Grove Marine Gardens SMCA, Asilomar SMR	Monterey	Del Mar Beach, MacAbee Beach, Monterey State Beach, Metridium Fields, San Carlos (Breakwater) Beach, Hopkin’s Reef, Lovers Point, Otter’s Cove, Coral Street Beach
Carmel Pinnacles SMR, Carmel Bay SMCA	Monterey	Ocean Pinnacles, Stillwater Cove, Cooper Roof House, Monastery Beach, Mono Lobo Wall
Point Lobos SMCA/SMR	Monterey	Point Lobos State Reserve, Bluefish Cove, Whaler’s Cove
Big Creek SMCA/SMR	Monterey	Partington Canyon Trail

Morro Bay Area Diving. Although there are a few favorable diving spots in San Luis Obispo County, divers in the Morro Bay area more typically travel to Big Sur in southern Monterey County or to the Channel Islands. In the Big Sur area, Plaskett Creek, Sand Dollar Beach, and Jade Cove provide adequate points of access. An abundance of game fish continues to attract a small group of divers to these areas. A dive charter operator from Santa Barbara stages multi-day dives at Big Sur once or twice a year. These tours are frequently cancelled because of rough ocean conditions.

Diving at many spots in Morro Bay is tide-dependent. When the tides cooperate, Target Rock and the two piers at the northern end of the bay provide good diving. The 10E buoy outside of the bay is also favored for recreational diving and spear fishing.

There are diverse diving opportunities south of Morro Bay at Point Buchon and Port San Luis south of Morro Bay (Map 6-2). The Pinnacles at Point Buchon offer divers the chance to explore some well-developed kelp beds. This area is accessible by kayak from launches at Spooner's Cove or by boat from Morro Bay. There has been no direct access to the waters between Coon Creek and Avila Point since PG&E declared that zone off-limits in the 1970s.

Beginning divers in the process of certification are typically introduced to spots at Port San Luis, San Simeon Bay, Spooner's Cove, or Morro Bay. The best spot in Morro Bay is in the back bay area at Fairbanks Point where there is a good hole for training. Fairbanks Point is known for skates, rays, boring clams, and nudibranchs. Shell Beach, Avila, and Pirate's Cove are popular with more experienced free divers.

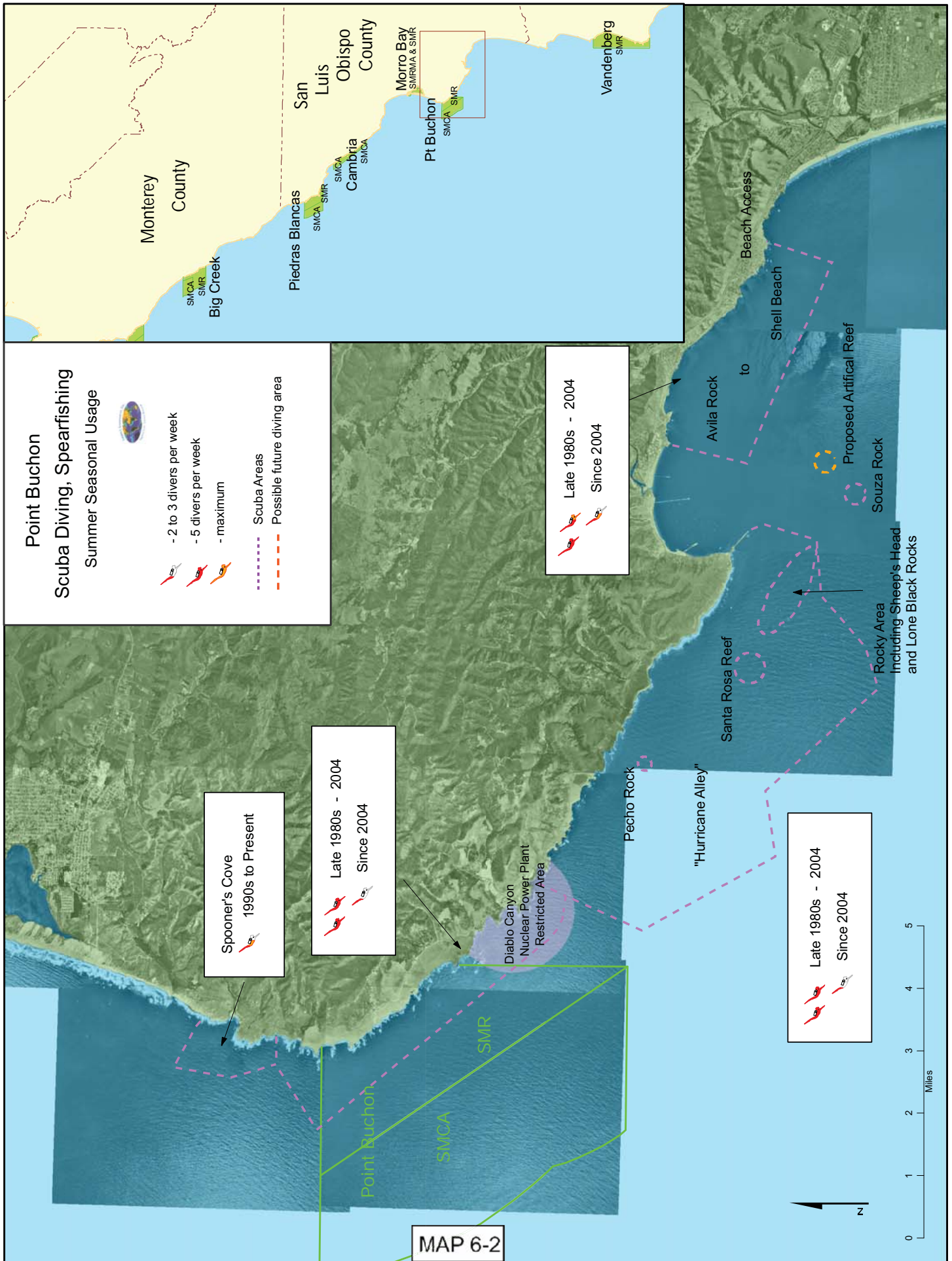
Morro Bay Area Dive Shops. Historically the majority of divers in the Morro Bay area were local-coastal or inland valley-based spear divers who frequented the rocky inshore areas north of Port San Luis, Point Buchon, Montaña de Oro, Piedras Blancas and Big Sur. During the 1970s, there were eight different dive shops and four dive clubs in the area between San Luis Obispo and Santa Maria. In the 1990s, approximately 100 divers frequented sites between Piedras Blancas and San Simeon in the north to Point Arguello in the south. Between 1990 and 1997, CDFG hosted an annual spear fishing derby at Piedras Blancas. The agency obtained data for purposes of species monitoring.

Currently, there are two dive shops in San Luis Obispo. One serves the professional diver, such as CDFG biologists, salvage divers, the Sheriff's Department, and technical divers for Pacific Gas and Electric. The other serves the full range of divers and provides services including instruction and certification, equipment sales/rentals, and dive tours. Nearly 90 percent of clients reside between Paso Robles and Santa Maria. Some 40 percent are women. Owners of both shops report a shift from consumptive to non-consumptive diving over the last fifteen years.

Current Trends. The issue that stands to have the most significant impact on the southern Central Coast diving industry is the proposed installation of two artificial reefs in Morro Bay and Port San Luis. The project would involve the sinking of a decommissioned ship at each location. Divers hope that the resultant reefs will provide ideal conditions for cold water reef diving.

Changes in Human Use Patterns. Abalone diving was popular in the Morro Bay area until the late-1990s. Some of the most popular abalone dive spots in the San Luis Obispo area were Point Buchon, Point Estero, and Cambria. Piedras Blancas, in particular, was favored for its large abalone and lobster populations.

Historically, there was excellent kayak diving and spearfishing between Port San Luis and Shell Beach. However, this is no longer the case since the breakwater at Port San Luis has led to a build-up of sand in the bay.



In the late 1990s, the designation of Piedras Blancas as a protected zone for elephant seals limited access to beach goers. In an effort to prevent seals from clambering up from the beach to Highway 1, Cal Trans installed fences and rerouted the highway several hundred yards inland. This also limited access to divers and boaters who previously made frequent use of Piedras Blancas. Prior to the closure, divers could park within 25 feet of the beach and, therefore, did not have to lug heavy gear any great distance. This area is now the second largest elephant seal rookery on the West Coast.

Diving Use Areas and MPA Locations. Leffingwell Landing provides good access to the ocean and historically has been a popular area for boat anglers, kayak fishermen, kayakers, and divers. Mouse Rock and Constantine Rock were especially popular with kayak divers and dive clubs in the early 1980s through the early 1990s. As noted in Table 6-2, Target Rock, Coleman Beach, Shell Beach, Hartford Pier, Point Buchon, and Pismo Beach are dive locations that are within or near new MPAs along the southern Central Coast.

Table 6-2 Overlap between MPAs and Popular Dive Spots in the Morro Bay Area

MPAs	County	Dive Spots
Morro Bay SMRMA & SMR	San Luis Obispo	Target Rock, Coleman Beach, Shell Beach
Point Buchon SMCA/SMR	San Luis Obispo	Hartford Pier, Point Buchon, Pismo Beach

6.2 Surfing along the Central California Coast

Monterey Bay Area Surfing. There are at least 100 known surf spots along the Central California coast and approximately 45 well-known surf breaks in the Monterey Bay area. The table below identifies the roughly 34 major surf spots that fall within or adjacent to one of the newly established MPAs (Table 6-3). This section highlights some of the well-known breaks that are within or near the new MPAs.

Table 6-3 Overlap between MPAs and Popular Surf Spots in the Monterey Bay Area

MPA(s)	County	Surf Spot(s)
Año Nuevo SMCA, Greyhound Rock SMCA	Santa Cruz	Pigeon Point, Spot X, Año Nuevo, Waddell Creek, Big Creek, Waterfalls, Scott's Creek, Davenport
Natural Bridges SMR	Santa Cruz	Spot Y, Scaroni's, Four Mile, Three Mile, Natural Bridges, Spot Z, Swift Street, Mitchell's Cove
Elkhorn Slough SMCA/SMR Moro Cojo Estuary SMR	Monterey	Moss Landing
Edward F. Rickett's SMCA, Lovers Point SMR, Pacific Grove Marine Gardens SMCA Asilomar SMR	Monterey	Sand Point, Turkey Lane Del Monte Beach, Lovers Beach, Boneyards, Asilomar State Beach
Carmel Pinnacles SMR, Carmel Bay SMCA	Monterey	Spanish Bay, Mole Point, Ocean Road, Carmel Beach
Point Lobos SMCA/SMR	Monterey	Garrapata State Park
Point Sur SMCA/SMR	Monterey	Point Sur, Big Sur Rivermouth, Andrew Molera, Fullers
Big Creek SMCA/SMR	Monterey	Sand Dollar Beach (Plaskett Creek), Willow Creek

Año Nuevo and Greyhound Rock. There are at least eight surf spots between the Año Nuevo and Greyhound Rock SMCAs. The Año Nuevo break is described as an out of the way and

“sharky” spot frequented by only five to ten advanced surfers on a good weekend day. This number of enthusiasts can vary depending on the quality of the surf and other factors.

The surfing population at Waddell Creek has reportedly doubled since 1995. Waddell Creek is popular with beginning and intermediate level surfers because it offers consistently well-formed waves and easy beach access. On a good weekend with well-formed waves, there might be as many as 100 surfers here; whereas in 1995 there may have been only 40. This is also a popular kite-board spot. Both south and northwest swells are favorable.

Scott’s Creek is located about four miles south of Waddell Creek. This break is best on west and northwest swell directions and can handle large swells. Davenport, a former whaling station, is described as a “fickle” surf spot. It is also known for sharks. Nevertheless, informants report that it has drawn many surfers for the last 15 years. Davenport is close to Four-Mile Beach, which is described as a popular and “always crowded” surf spot.

Natural Bridges. Further south and closer to the city of Santa Cruz, at least eight surf spots are within or in close proximity to Natural Bridges SMR. When it breaks, Natural Bridges can produce a good right-hand ride. West and northwest swells are ideal. There are many surf spots in Santa Cruz and at least 15 well-known surf spots between Santa Cruz and Moss Landing. None coincide with a MPA.

Elkhorn Slough and Moro Cojo Estuary. The Moss Landing surf break in Monterey County coincides with the Elkhorn Slough SMCA, the Elkhorn Slough SMR, and the Moro Cojo Estuary SMR. The popularity of the beach break at Moss Landing has greatly increased since the 1980s. Informants report that, at that time, there may have been 15 to 30 surfers out in the water during a good swell. Now, it is common to find more than 60 surfers at the break on a good day. The outside bar has also become known as a big wave spot for tow-in surfers, as waves there can exceed 20 feet.

Soquel Canyon and Portuguese Ledge. The substrate at these MPAs is too deep for surfing.

Edward F. Rickett’s, Lovers Point, Pacific Grove Marine Gardens, and Asilomar. On the southernmost tip of the Monterey Bay, six surf spots are within the boundaries of four of the newly established MPAs: Edward F. Rickett’s SMCA, Lovers Point SMR, Pacific Grove Marine Gardens SMCA, and Asilomar SMR. Lovers Point is a popular left point break. Some spots in the general area, such as Boneyards and Cats’, break during large swell events. The entire area is very rocky and can be dangerous for novices for that reason. One exception is the sandy beach at Asilomar – a particularly popular surf zone in this area. Asilomar breaks on a variety of wind and swell directions.

Carmel Pinnacles, Carmel Bay, Point Lobos, and Point Sur. Approximately one dozen surf spots are also located in or are adjacent to MPAs between Carmel Pinnacles SMR and Big Creek SMCA/SMR (north of Point Lopez). there are commonly used by surfers that are also located in or are adjacent to MPAs. Carmel Beach is popular during the summer months. Informants report that, in the mid-1990s, a good day would bring about 25 surfers to the beach. Today, it is not unusual for 40 surfers to recreate here. A big wave break known as “Ghost Tree” is adjacent to the Carmel Pinnacles SMR.

Big Creek. Local surfers from both Monterey and San Luis Obispo Counties surf in the Big Sur area. Although ocean access is challenging, an increasing number of surfers frequent Big Sur River mouth, Sand dollar Beach, and Willow Creek. Informants report that Sand Dollar beach has averaged 25 surfers per weekend since the mid-1990s.

Morro Bay Area Surfing. The San Luis Obispo County region has been an important destination for surfers since at least the mid-1980s. During the 1970s, there reportedly were fewer than 300 resident surfers here. Most surf shops stocked no more than 12 boards at a time. Toward the end of that decade, surfers discovered a few breaks beyond Pismo Beach and Morro Bay. These include Montaña de Oro, Cayucos, Cambria, Pico Creek, and Exotic Gardens. Windsurfing was also popular at the time.

A residential development and a growing student body at Cal Poly brought a steady stream of surfers to the beach during the 1980s. By 1985, the local surfing population reportedly had climbed to nearly 5,000. Since the 1980s, there have been many more surfers in the southern portion of San Luis Obispo County than in the northern portion, mainly a function of the size of the adjacent population.

A local surf shop owner estimates that there are now about 15,000-20,000 surfers in San Luis Obispo County. College students attending Cuesta College and Cal Poly make up the bulk of surfers in the area. Pismo Beach has become particularly popular. The number of surfers coming from inland towns, such as Atascadero and Paso Robles, are also increasing. One surf shop owner in San Luis Obispo estimates that nearly 90 percent his clientele come from the Inland Valley.

There are at least 45 surf breaks of varying popularity along the San Luis Obispo County coastline. Of those, 24 are located within or adjacent to MPAs (Table 6-4).

Table 6-4 Overlap between MPAS and Popular Surf Spots in the Morro Bay Area

MPAs	County	Surf Spots
Piedras Blancas SMCA & SMR	San Luis Obispo	San Carpoforo, Sierra Nevada Point, Cadis, Arroyo Laguna, Castles, San Simeon Cove
Cambria SMCA & White Rock SMCA	San Luis Obispo	Pico Creek, Cardiacs, San Simeon Creek, Exotic Gardens, Leffingwell, Spooks, Moonstone
Morro Bay SMRMA & SMR	San Luis Obispo	Toro Creek, Atascadero Beach, The Signal, The Rock, Morro Bay Harbor, South Jetty
Point Buchon SMCA/SMR	San Luis Obispo	Sandspit/Sharks, Cable Landing, Hazard Canyon, The Left Spot, Spooner's Cove

Piedras Blancas. Six known surf spots coincide with the Piedras Blancas SMCA and SMR: San Carpoforo, Sierra Nevada Point, Cadis, Arroyo Laguna, Castles, and San Simeon Cove (Map 6-3). San Carpoforo and Sierra Nevada Point are regarded as particularly challenging surf spots.

Cambria. In the Cambria area, Moonstone and Leffingwell Landing are particularly popular areas; both are within the Cambria SMCA. It is not unusual for upwards of 70 surfers to use these breaks during good swell events. Pico Creek, Cardiacs, San Simeon Creek, Exotic Gardens, and Spooks are also located in close proximity to the Cambria SMCA & White Rock SMCA.

The big wave spot called Cayucos attracts a particularly large number of surfers. The Cayucos surf breaks are located south of the Cambria area MPAs and north of the Morro Bay SMRMA/SMR. A good day can bring up to 100 surfers between Cayucos Pier and Cayucos State Beach. Killers and Piedras Blancas Lighthouse are popular.

Mouse Rock is located roughly a mile offshore Cayucos. The spot is now typically crowded during big swell events with numerous small boats, jet skis, and tow-in surfers.

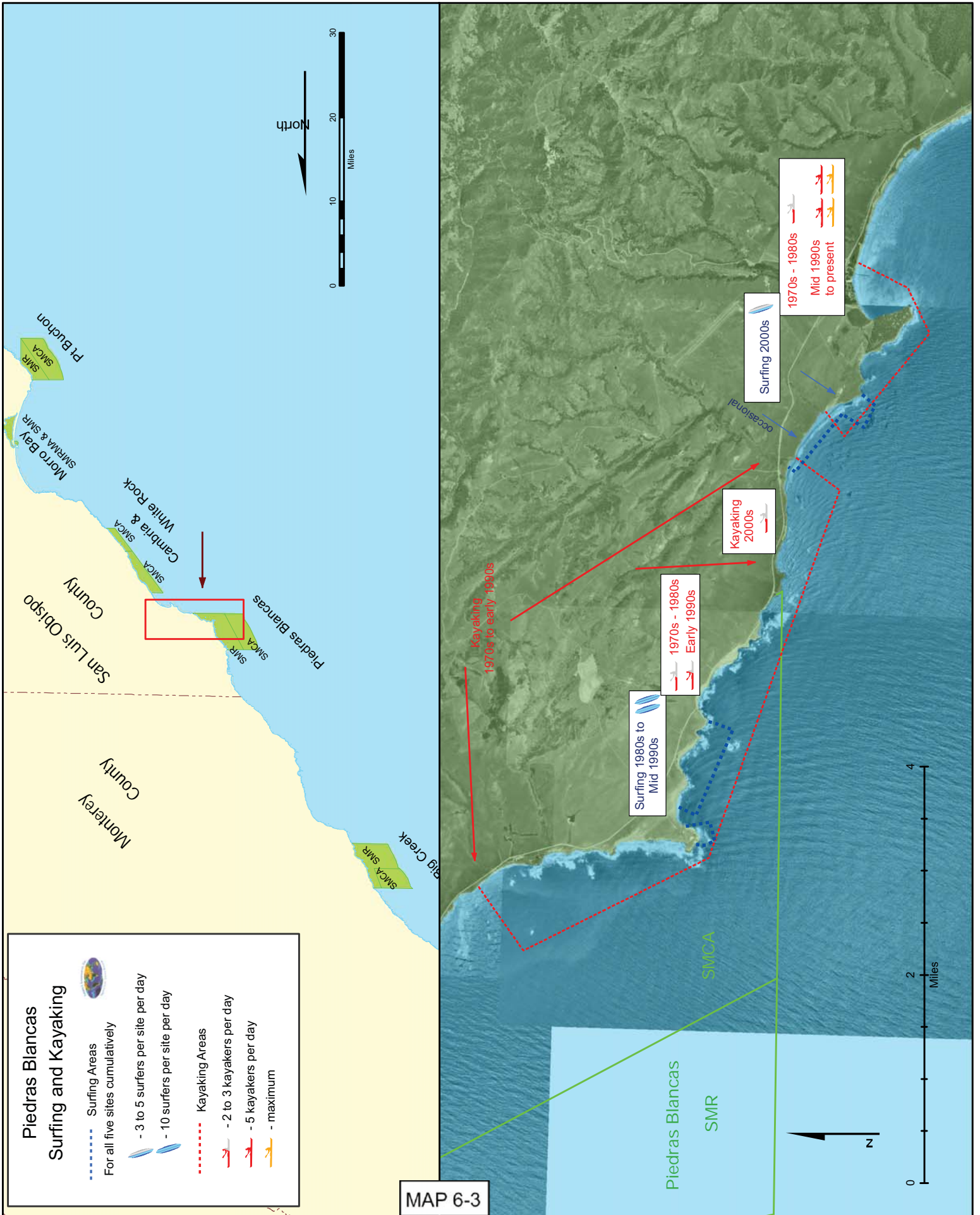


Morro Strand

Morro Bay. The long stretch of beach between Cayucos and Morro Rock attracts surfers on certain days. The south side of Morro Rock and the South Jetty are particularly popular. Large swells break here during winter. Six breaks on the strand are in or very close to the Morro Bay SMRMA and SMR (Map 6-5).

Point Buchon. A number of spots are located at Montaña de Oro. These include Hazard Canyon, Cable Landing, and Left Spot. Montaña de Oro surf spots are considered by some to be highly challenging. The popularity of Montaña de Oro has reportedly grown in recent years (Map 6-6).

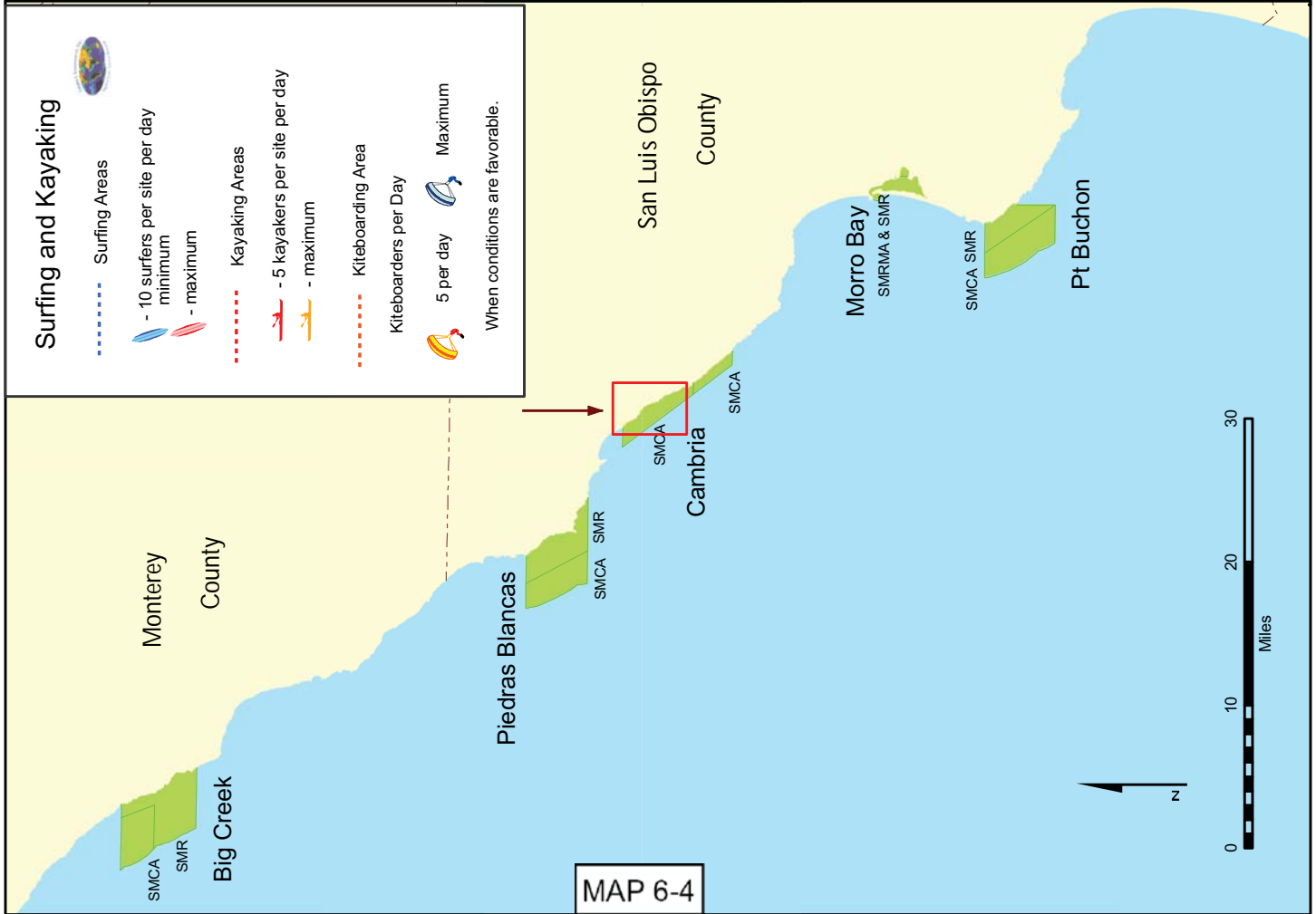
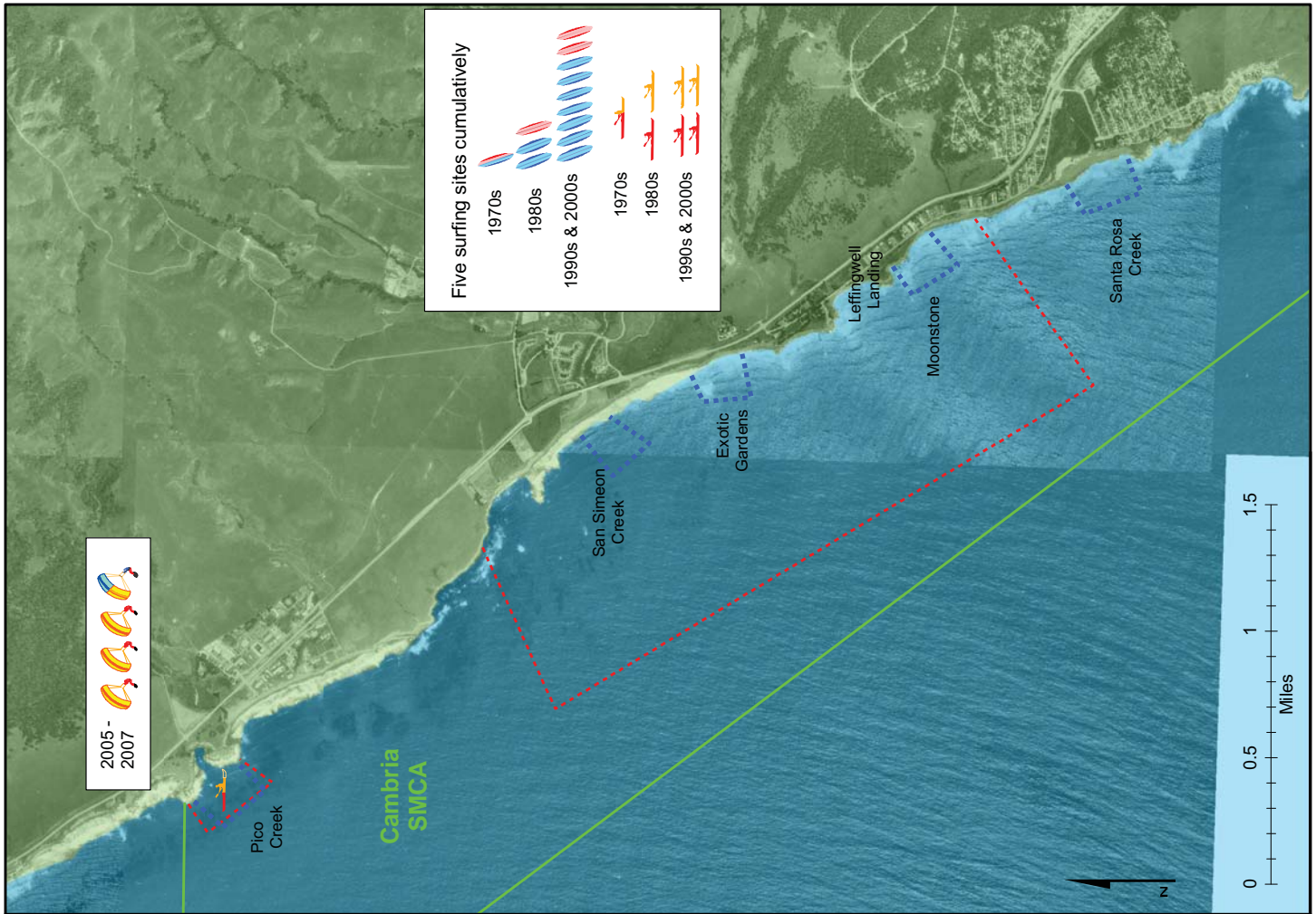
Pismo State Beach is located just south of the Point Buchon SMCA/SMR. Pismo Pier is one of the most popular surf spot on the South-Central Coast.

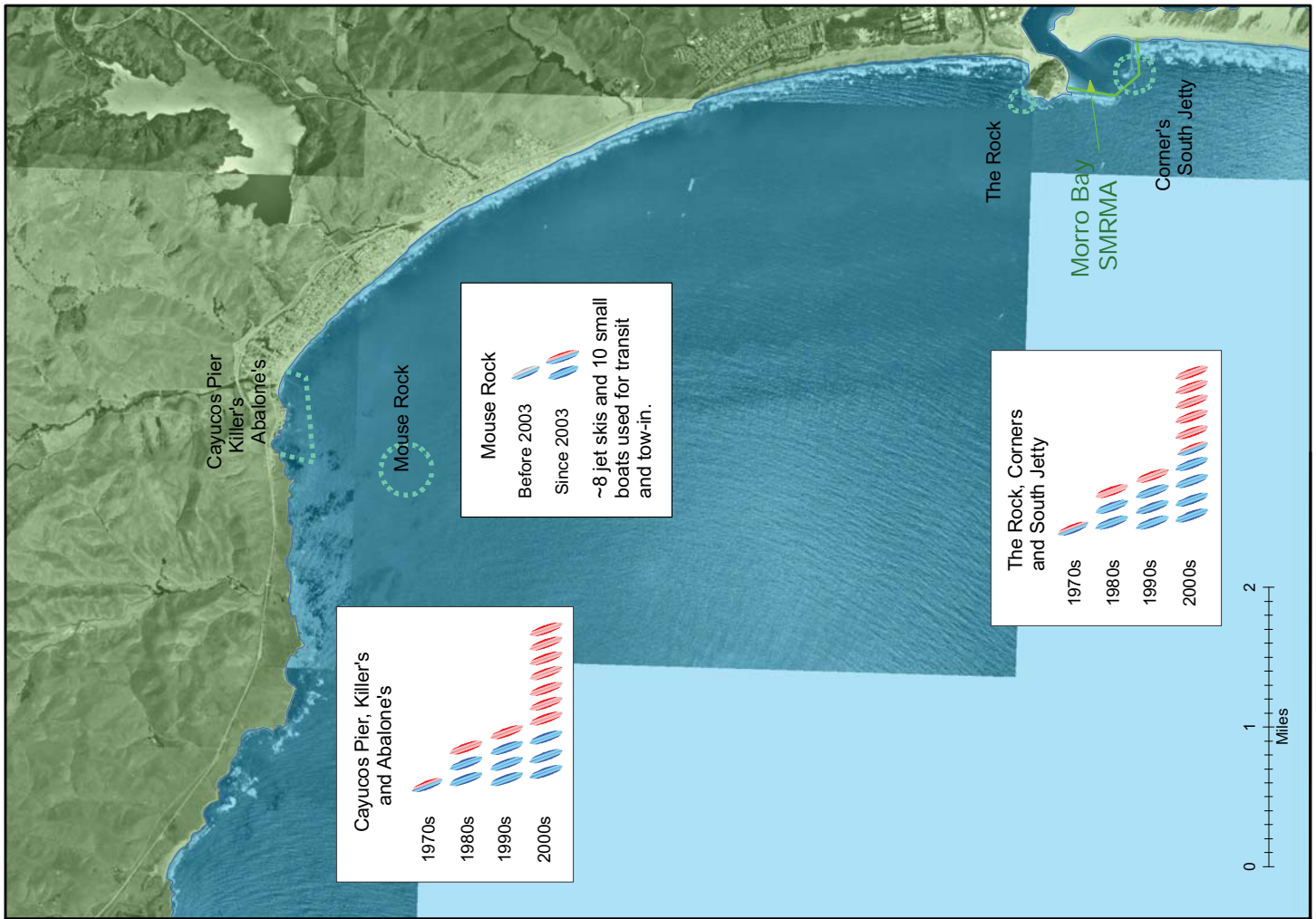


Piedras Blancas Surfing and Kayaking

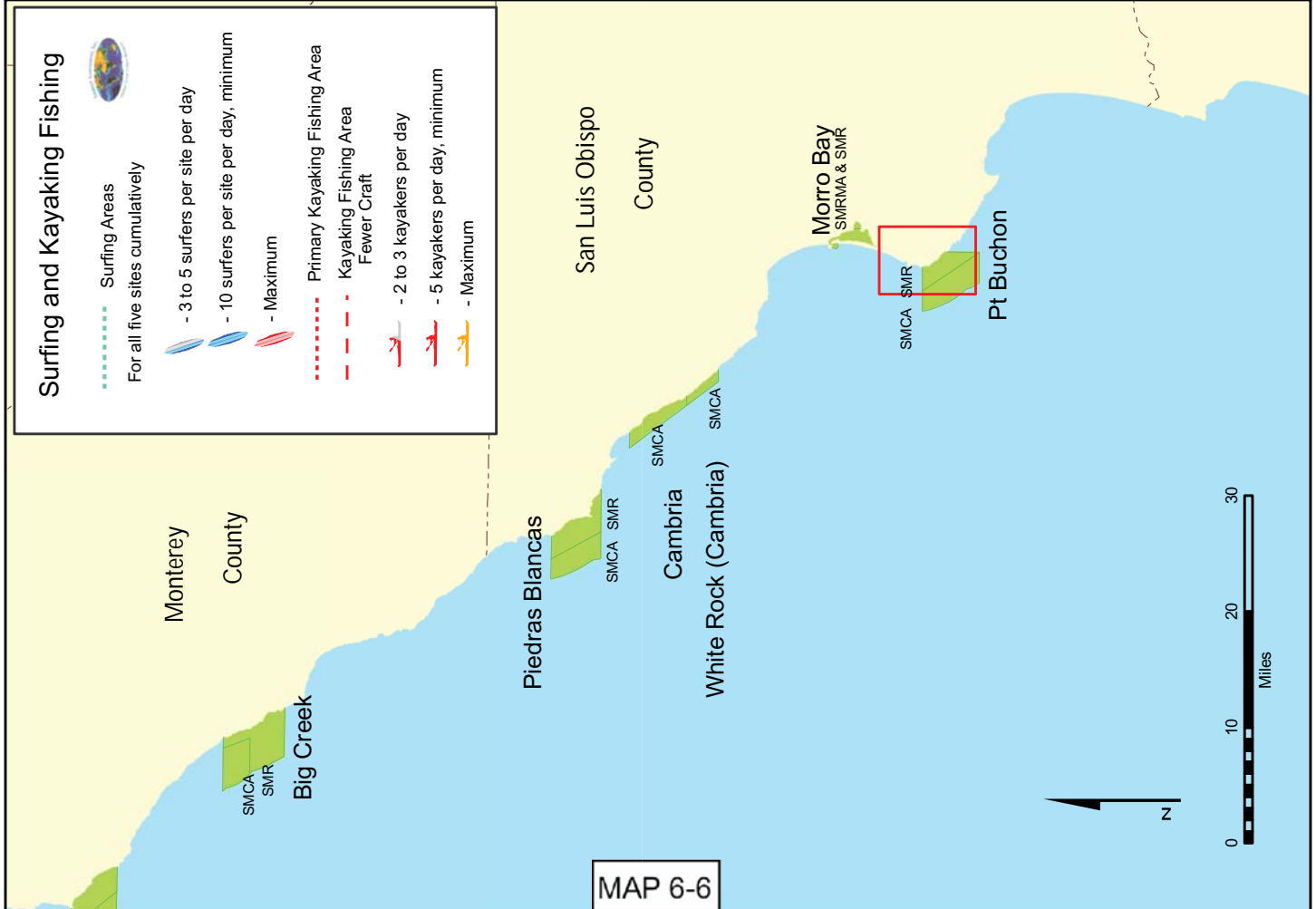
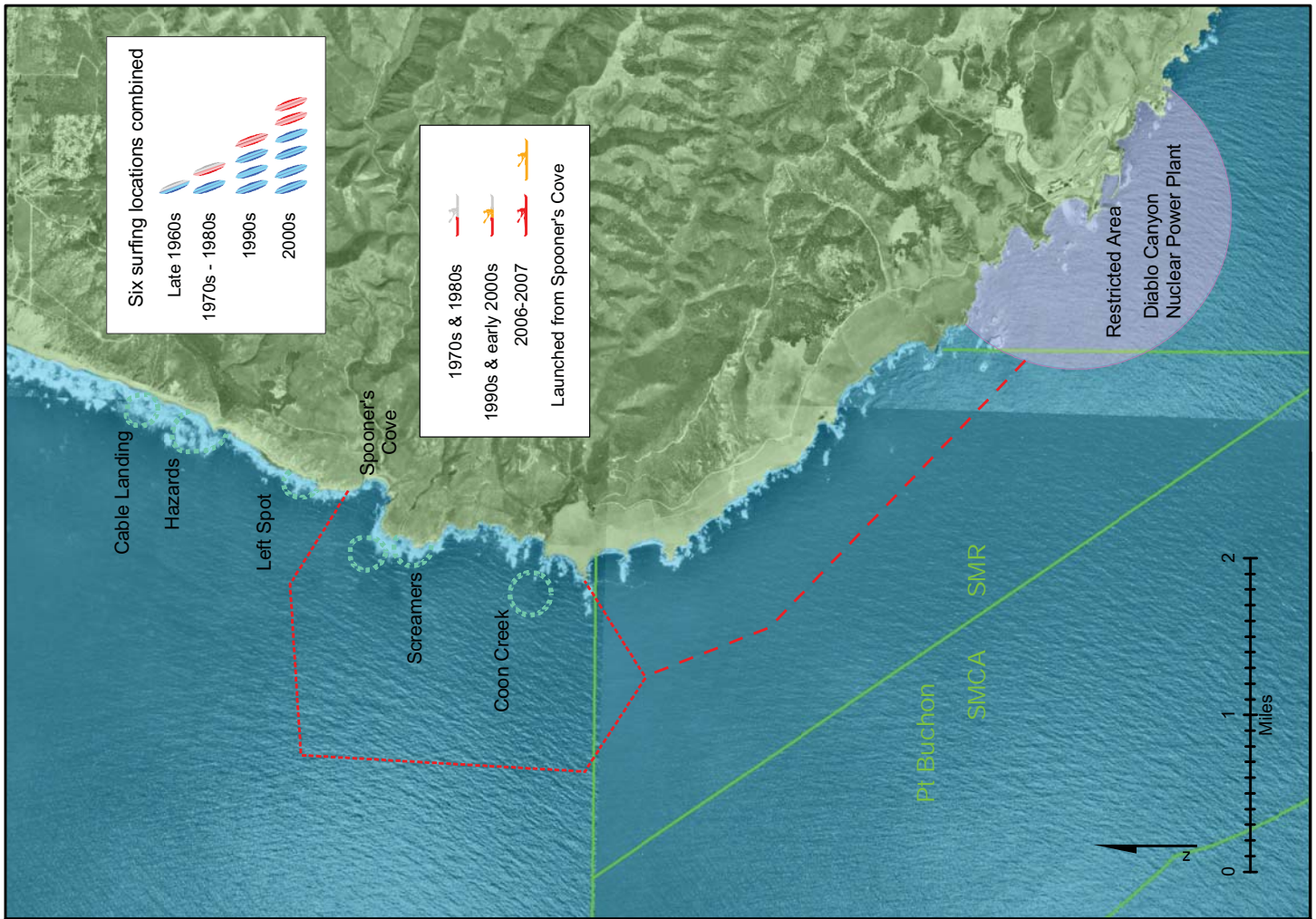
- Surfing Areas
- For all five sites cumulatively
 - 3 to 5 surfers per site per day
 - 10 surfers per site per day
- Kayaking Areas
 - 2 to 3 kayakers per day
 - 5 kayakers per day
 - maximum

MAP 6-3





MAP 6-5



MAP 6-6

6.3 Kayaking

Overview. Kayaking is one of the fastest growing marine recreational activities along the Central Coast. Kayaking presents a unique opportunity to view marine wildlife and the rugged coastal geography of Central California. The ideal kayak put-in location is a semi-sheltered beach where the surf does not usually exceed three feet in height. Most kayakers do not generally travel more than five miles from their launch site (KFASC 2005).



Sit-on Top Kayak: Shell Beach, Morro Bay

Monterey Bay Area Kayak Shops. There are several kayak shops in Monterey Bay area. Kayak rental shops are located near the Breakwater Marina and Municipal Harbor in Monterey. There are also two kayak rental locations near the mouth of the popular kayaking area at Elkhorn Slough. Most shops sell and rent kayaks, and offer kayaking lessons, fishing tours, and nature tours.

Kayaking is also popular in Santa Cruz where nature and whale-watching tours are in demand. Capitola and Natural Bridges are frequent destinations for kayakers leaving from Santa Cruz Harbor. Demand for tours and rentals in the Santa Cruz area has reportedly increased significantly over the last 20 years. Shop owners attributed increasing demand to a general interest in kayaking, nationwide. They report that, unlike ten years ago when many customers were first time kayakers, the majority now are experienced.

Kayaking is less popular in Half Moon Bay than in either Monterey or Santa Cruz. One shop owner explains that his shop caters to locals rather than tourists since nearly 90 percent of Bay Area kayakers launch out of San Francisco. Because harbor tours comprise 90 percent of kayak business in the Half Moon Bay area, the offshore MPAs do not negatively impact the industry.

Monterey Bay Area Kayak Use Areas. There are kayak launch areas along much of the Central Coast with the majority clustered around Monterey. At least 30 sites used by kayakers are located within or very close to an MPA (Table 6-5).

Table 6-5 Overlap between MPAs and Popular Kayak Spots in the Monterey Bay Area

MPA(s)	County	Kayak Launch Spot(s)
Año Nuevo SMCA, Greyhound Rock SMCA	Santa Cruz	Pigeon Point, Scott Creek, Greyhound Rock
Natural Bridges SMR	Santa Cruz	Santa Cruz Harbor, Cowell Beach, Mitchell's Cove, Natural Bridges State Beach, Wilder Beach
Elkhorn Slough SMCA/SMR, Moro Cojo Estuary SMR	Monterey	Elkhorn Slough-Moss Landing State Beach, Moss Landing Marina
Edward F. Rickett's SMCA, Lovers Point SMR, Pacific Grove Marine Gardens SMCA, Asilomar SMR	Monterey	Monterey Beach, Pt. Pinos, Lovers Point, Hopkins State Marine Reserve, San Carlos Beach, Del Monte Beach, Stillwater Cove, Pebble Beach, Pescadero Point, Asilomar State Beach
Carmel Pinnacles SMR, Carmel Bay SMCA	Monterey	Yankee Point Beach, Monastery Beach, Carmel Highlands, Carmel River State Beach
Point Lobos SMCA/SMR	Monterey	Soberanes Point, Monastery Beach
Point Sur SMCA/SMR	Monterey	Andrew Molera State Beach, Pt. Sur Historic State Park

Año Nuevo and Greyhound Rock. The northernmost launch area is at Pigeon Point, located north of the Año Nuevo MPA. The protected cove around the lighthouse is a popular kayaking area, and some kayakers come to see the migrating grey whales in the offshore zone. Scott Creek and Greyhound Rock are also popular places to paddle.

Natural Bridges. Santa Cruz Harbor offers a protected launch site from which to access Natural Bridges. Kayakers here often paddle among sea otters and some will disembark to view the tide pools.

Elkhorn Slough and Moro Cojo Estuary. Elkhorn Slough-Moss Landing State Beach attracts many kayakers over the course of the year. Many come to view the sea otters, seals, and birds which abound in Elkhorn Slough. Two rental companies are based here.

Edward F. Rickett's, Lovers Point, Pacific Grove Marine Gardens, and Asilomar. There are at least ten kayak launch sites in or near these MPAs. Monterey Beach is a particularly popular launch site for beginning and intermediate paddlers. Pacific Grove and Stillwater Cove are favorite areas for many kayak anglers.

Carmel Pinnacle, Carmel Bay, and Point Lobos. There are at least six commonly used launch sites in and around these MPAs. With its easy access, Monastery Beach attracts many kayakers.

Point Sur. Andrew Molera State Beach and Point Sur Historic State Park are frequently used by kayakers in this areas.

Morro Bay Area Kayaking. Many locations are ideal for kayaking in the Morro Bay area. Some of the most renowned are William Randolph Hearst State Park, Spooner's Cove in Montana de Oro State Park, Morro Bay, Olde Port Beach, Shell Beach, Avila Beach, Mallagh Landing ("Cave Landing" or "Pirate's Cove"), and Port San Luis (Map 6-7). Other popular

launch areas in the county include: Morro Strand, Cayucos State Beach, Estero/Cayucos Bluffs, Abalones, Lampton Cliffs County Park, Cambria Pines area, Shamel County Park, San Simeon Creek, San Simeon Cove, San Simeon Beach State Park, Leffingwell Landing and Piedras Blancas Point (Lebowitz et al. 2005).



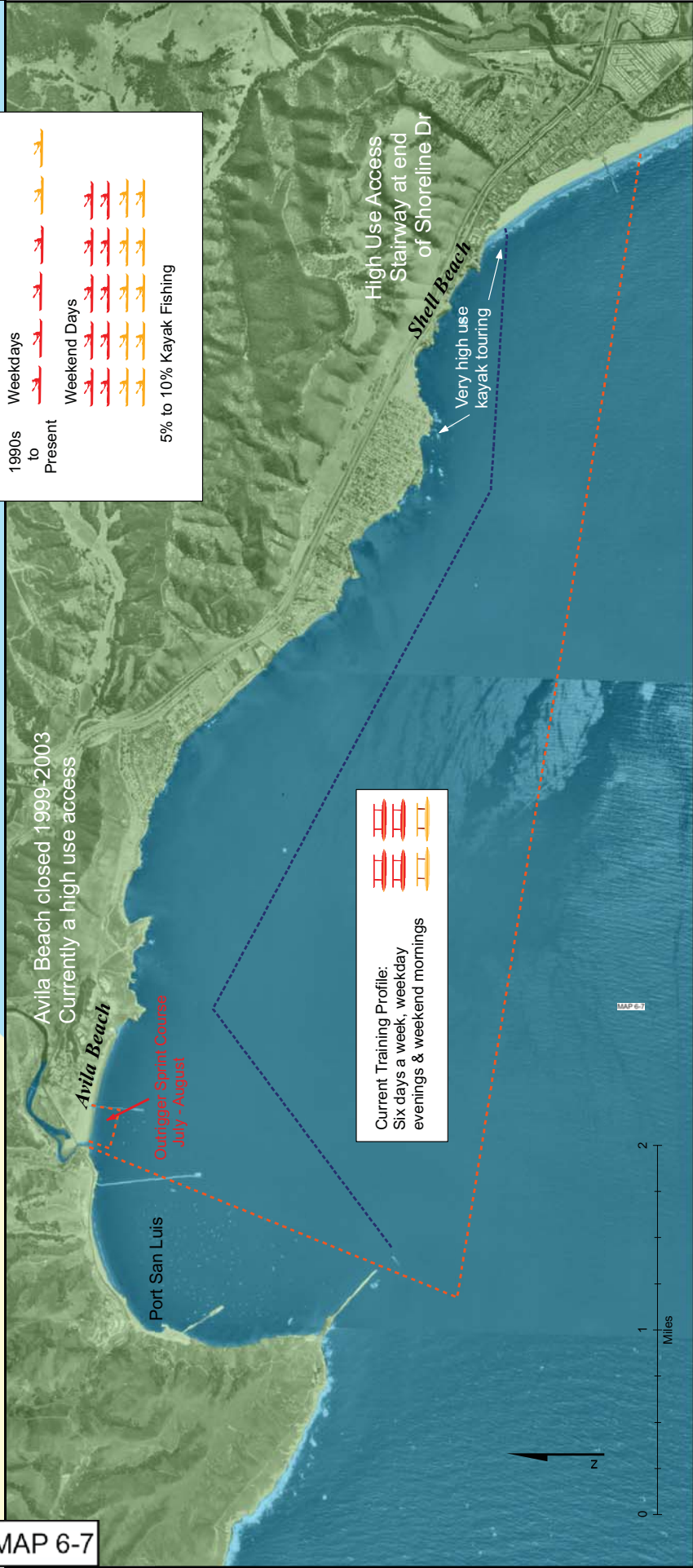
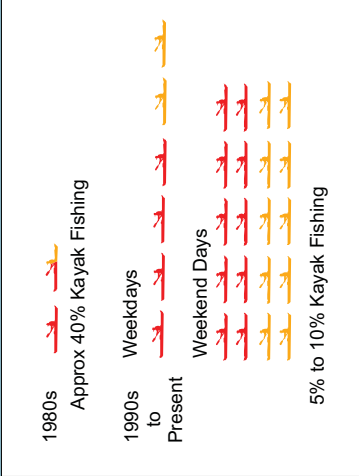
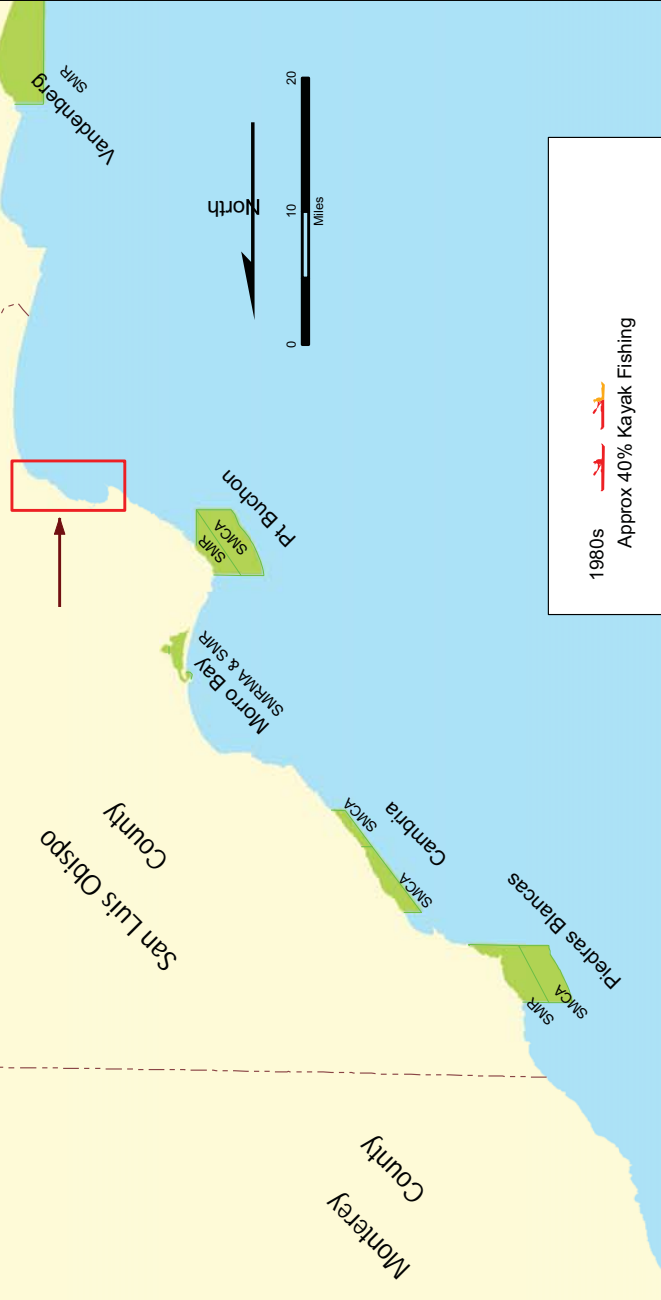
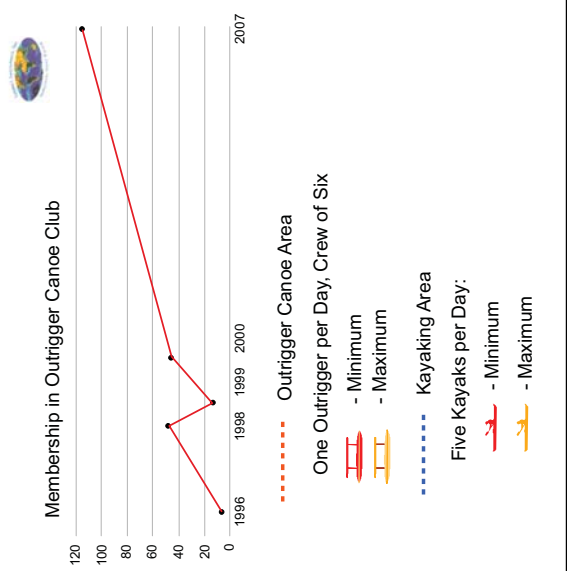
Kayaking in Morro Bay

The number of kayakers in the Morro Bay area is said to have been increasing since the early 1990s, especially between Avila Beach and just south of Point Buchon (Map 6-8). Shell Beach is a popular destination given its easy access and proximity to Dinosaur Caves. The protected waters at San Simeon Cove make it an ideal paddling location. Kayakers and eco-tourists are drawn to the sea caves and kelp forests just outside the bay. A parking lot and boat ramp facilitate easy entry.

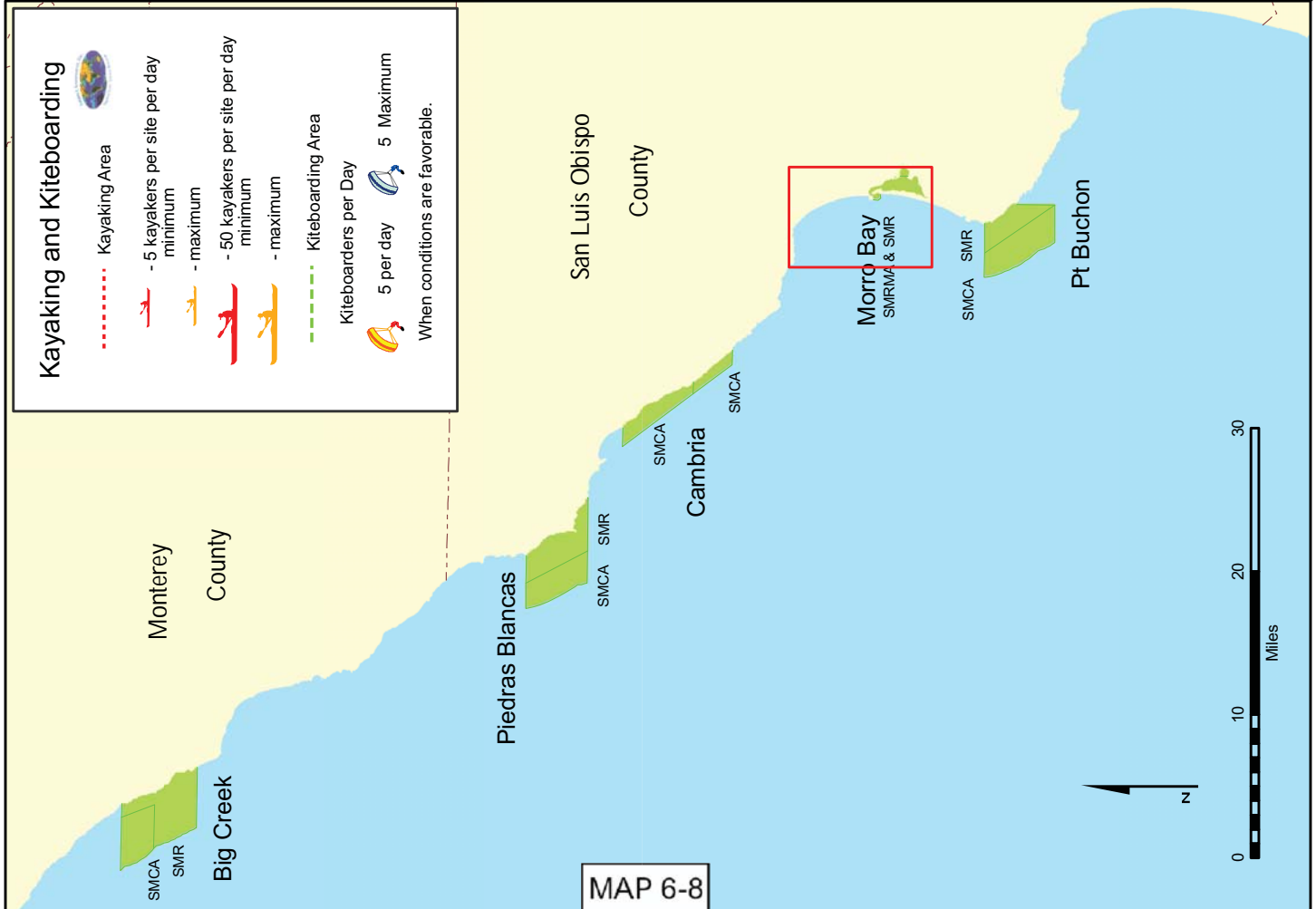
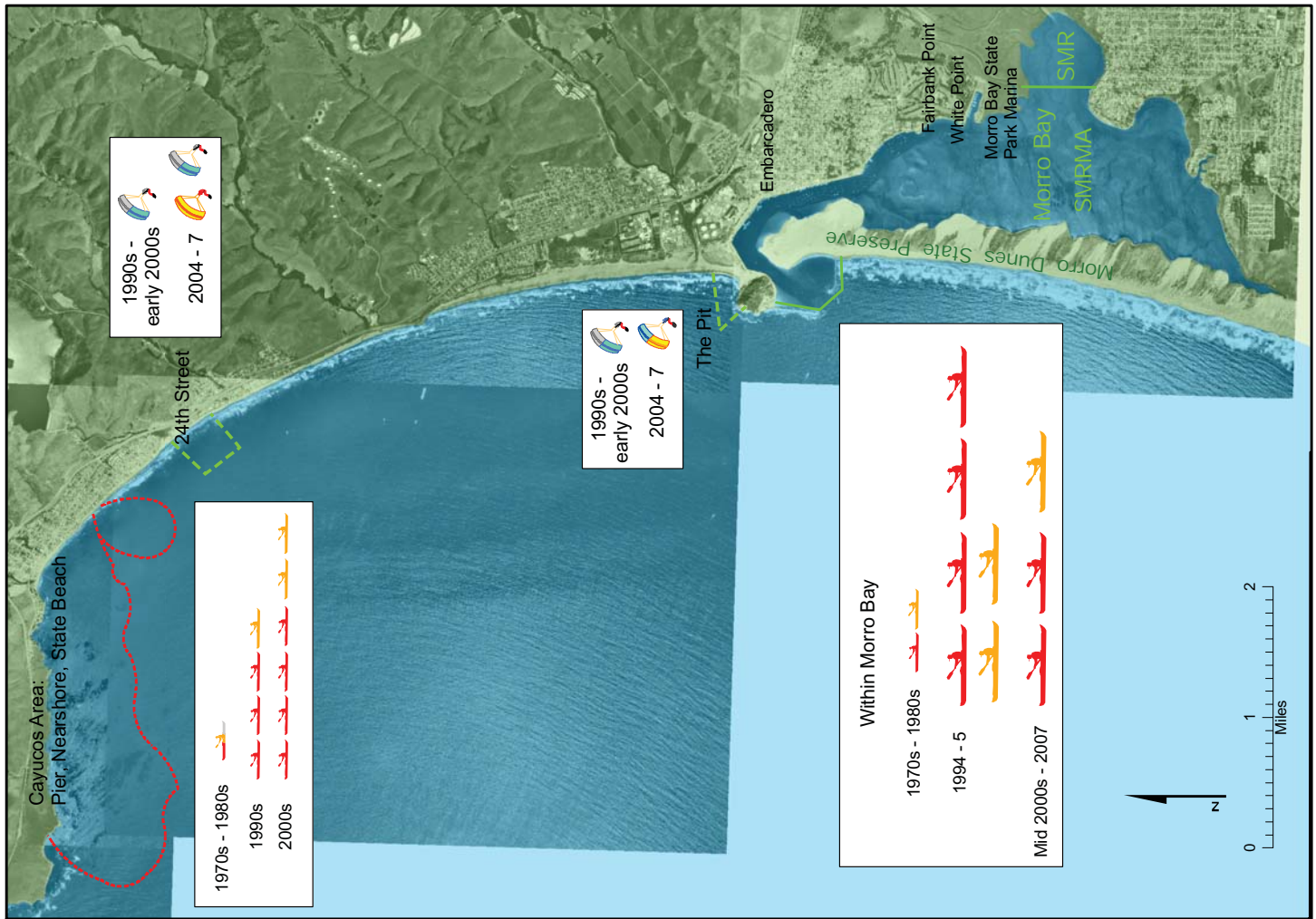


Easy Access for Put-In at Shell Beach

Outrigger Canoeing and Kayaking



MAP 6-7



Kayaking and Kiteboarding

- Kayaking Area
 - 5 kayakers per site per day
- minimum
- maximum
 - 50 kayakers per site per day
- minimum
- maximum
 - Kiteboarding Area
 - Kiteboarders per Day
 - 5 per day
 - 5 Maximum
- When conditions are favorable.

MAP 6-8



Kayaking at Dinosaur Caves in Shell Beach



Dinosaur Caves

According to kayak shop operators in San Luis Obispo, rentals comprise approximately 75 percent of the kayaks on Morro Bay on any given day. Renters usually procure their crafts from the outfitters at the embarcadero and paddle in the front bay and around the Sand Spit. Locals and kayak owners, by and large, prefer the back bay and estuary areas. Kayak rentals fluctuate by season and weather conditions. Kayak owners tend to be less averse to paddling in cloudy, colder, or wetter conditions.



Kayaks and other Recreational Vessels at Sand Spit, Morro Bay

Morro Bay Area Kayak Shops. Morro Bay supports several kayak-related businesses. On busy summer days, up to 100 kayakers may be observed in Morro Bay. Those who are serious about the sport typically rely on high-end outfitters to meet their kayaking needs. In contrast, hobbyists tend to purchase their equipment at general retail stores.

The geographic range of kayaking tours offered through the kayak shops in Morro Bay encompasses Cayucos, Cambria, and San Simeon to the north of Morro Bay; and Avila, Pismo Beach, and Edna Valley to the south. Custom tours sometimes extend as far north as Sonoma County and as far south as Santa Inez in Santa Barbara County. Although the kayak industry has grown during the last several decades, at least three outfitters in San Luis Obispo County have gone out of business since 1998 (one each in San Simeon, Cambria, and Morro Bay).

Changes in Human Use Patterns. Proximity to marine wildlife draws a significant number of kayak enthusiasts to the area, but regulations that constrain access to the ocean can have a negative impact on the kayak rental industry. Access to the Oceano Dunes Preserve is restricted during snowy plover nesting season between March and September. Kayak tour operators must strike a balance between providing their clients with the experience they desire and following various regulatory requirements.

Morro Bay Area Kayak Use Areas. Vandenberg Air Force Base limits public beach access north of Point Conception. The first kayak launch site north of Vandenberg is Point Sal, although the rocky coast and lack of public pathways leading to the beach constrain access. Many of the launch sites in San Luis Obispo County are located near or within the boundaries of a new MPA (Table 6-6). These include Cambria SMCA and White Rock SMCA. Although there are a few put-in sites north of the Piedras Blancas elephant seal closure area, kayakers often describe that area as sharky, with frequently rough sea conditions and poor visibility.

Table 6-6 Overlap between MPAs and Popular Kayak Spots in the Morro Bay Area

MPAs	County	Kayak Launch Spots
Piedras Blancas SMCA & SMR	San Luis Obispo	Arroyo Laguna, Piedras Blancas (north of)
Cambria SMCA & White Rock SMCA	San Luis Obispo	Spooner's Cove, Montana de Oro State Park, Lampton Cliffs County Park, Cambria Pines, Shamel County Park, Santa Rosa Park, San Simeon State Park, Little Pico Creek, William R. Hearst State Park
Morro Bay SMRMA & SMR	San Luis Obispo	Santa Maria Rivermouth, Oceano Memorial County Park

6.4 Kiteboarding

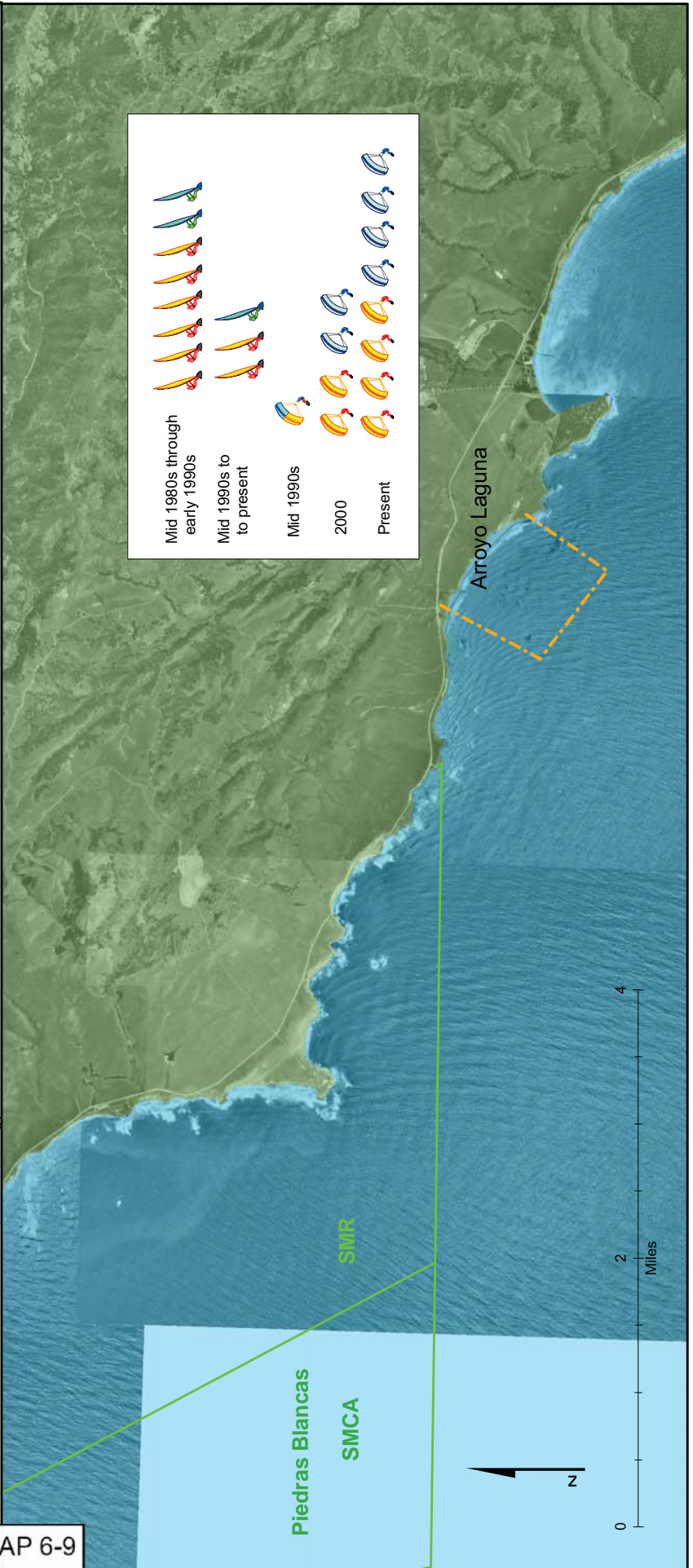
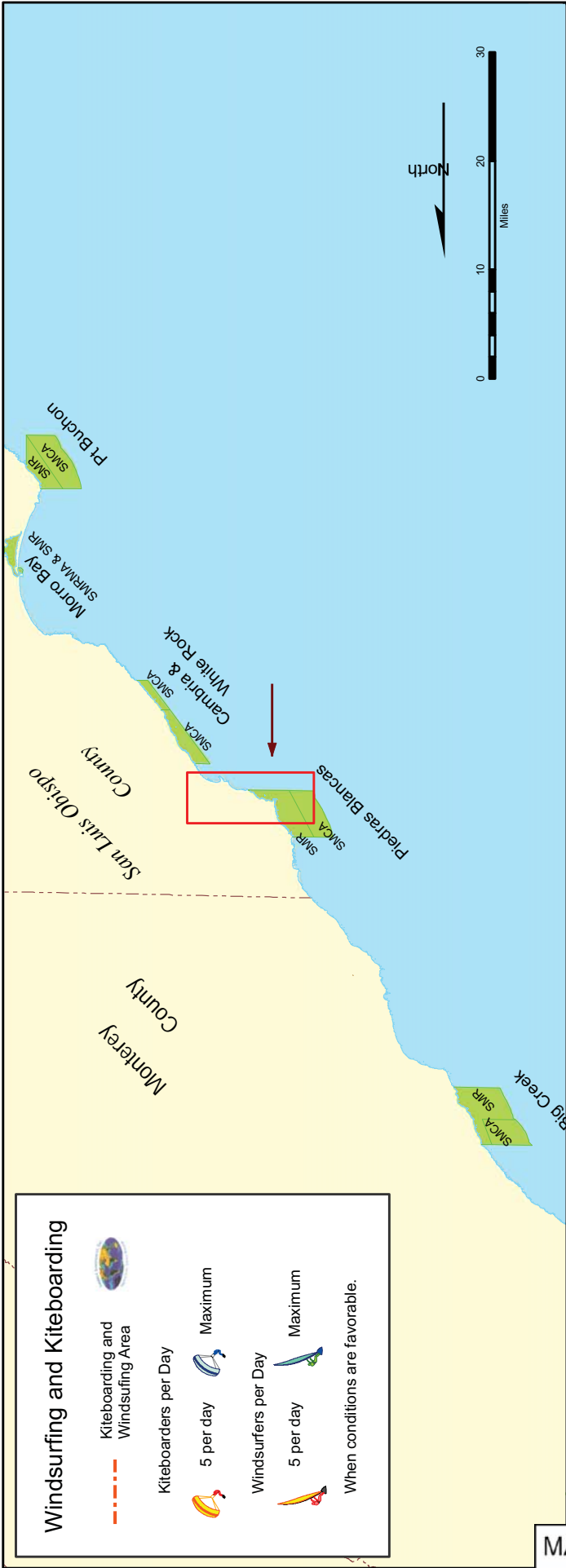
Overview. Following worldwide media exposure in the 1990s, kiteboarding became one of the fastest growing ocean sports on the Central Coast. The sport has specific gear requirements and requires mobility. As one kitesurfer explains, “you have to be able to follow the wind.” There are two kiteboard businesses in San Luis Obispo County: one in Pismo Beach and one in Shell Beach. There are also two shops in Santa Cruz.

Monterey Bay Area Kiteboarding Sites. Kiteboarding was introduced to Santa Cruz in 1998. Waddell Creek and Scott’s Creek are known as prime spots for kiteboarding and windsurfing. Consistent wind and good wave conditions attract many enthusiasts at Waddell Creek. A four-day kiteboarding contest has been held every May at Waddell Creek since 1999. The contest attracts competitors and spectators from around the world and, as such, is beneficial to the local economy.

Morro Bay Area Kiteboarding Sites. Kiteboarding in San Luis Obispo County takes place in two general locations (Map 6-9). Pismo Beach-Oceano Beach is the primary site in the southern portion of the county. The beach is long and wide and the winds are fairly consistent most of the year. However, access can be limited during snowy plover nesting season. In the north, Arroyo Laguna is the most popular spot.

The north end of Morro Bay strand around 24th Street and the southern end of the strand north of Morro Rock are also popular.

Current Issues. Currently, the principal access issue for kiteboarders in this area relates to seasonal use restrictions designed to protect snowy plover habitat. Since 2005, kiteboarders have been prohibited from accessing a six-mile stretch of beach south of Arroyo Grande Creek. During the summer months, kiteboarding is limited to a small stretch of beach between Arroyo Grande Creek and the southernmost lifeguard station on Pismo Beach.



MAP 6-9

Windsurfing and Kiteboarding

- Kiteboarding and Windsurfing Area
- Kiteboarders per Day
- 5 per day
- Maximum
- Windsurfers per Day
- 5 per day
- Maximum

When conditions are favorable.

- Mid 1980s through early 1990s
- Mid 1990s to present
- Mid 1990s
- 2000
- Present

7.0 Historic and Contemporary Patterns of Use of the MPAs

This chapter is focused on the description of relationships between the various resource users and the new system of MPAs. As such, it also serves to relate previous descriptions of the fleets and harbors to the offshore zones encompassed by and surrounding the new reserves. Interview data, data of observation, user mapping exercises, fisheries license and landings data, and various published reports are used to describe and depict the following: (a) the location and physical nature of the MPAs; (b) the specific form of regulation associated with each reserve; (c) the principal fleets and recreational groups known to use the MPAs and adjacent ocean areas, and the changing nature of those uses; and (d) the nature of the physical environmental, economic, and regulatory factors that have conditioned use of marine resources in and around areas that are now MPAs. Chapter 8 will address the nature of initial social, economic, fishing-specific, and environmental changes indicated by data collected after establishment of the new MPAs.

This chapter is organized both geographically and chronologically. Each MPA and adjacent ocean area is discussed in geographic sequence, beginning with those in San Mateo County in the northern part of the study area, and moving southward through each MPA to the southernmost reserve in Santa Barbara County. An overview of the basic nature of each MPA introduces the discussion. This is followed by discussion of historic linkages between the various resource users and what are now the MPAs and adjacent ocean areas. Historical-use maps for the primary fisheries that have historically occurred in these areas are provided at the end of the chapter for ease of viewing. The final portion of each section synthesizes description of historical and recent trends and conditioning factors for each major use of the marine environment.

Notes on Sampling, Interviewing, Mapping, and Spatial Aspects of Fishing Activity. An important aspect of this project involved the use of social network sampling, in-depth interviewing, and user-based mapping of historic and contemporary use patterns. The basic sampling process involved working with the harbor masters to identify highly knowledgeable fishermen who would likely be amenable to interacting with the research team, and eliciting from the interviewees the names of other knowledgeable fishermen in the area, each of whom were subsequently contacted.¹ In some cases, randomly encountered fishermen and fishermen who identified themselves as interested in participating in the project were also interviewed, as time permitted. The latter methods led to some surprising information from the social margins of the fishing world, such as: a young commercial spot prawn fisherman; one fisherman who still launches his skiff from the beach at Big Sur; a wealthy entrepreneur who owns four boats and hires a skipper to run them; and a number of fishermen who fish commercially as second careers.

All fishermen interviewed were asked about the effect of the MPAs on their fishing operations, and depending on the willingness of the respondent, each was asked to indicate this effect on a base map. Information was subsequently transferred to NOAA nautical charts #18022 and #18680 (northern zone) and #18700 (southern zone). Fishermen responded to the questions in different ways: identifying the impact of the MPAs on their own current fishing activities and/or

¹ See Hanneman and Riddle (2005) for discussion of social network sampling methods.

providing information in terms of more general fleetwide impacts. In some cases, projected effects were noted.

From this larger pool of respondents, a select number of more knowledgeable and longtime fishermen were asked to participate in a historical mapping exercise. These experts were asked to chart their fishing activities through the decades and to explain what fisheries they had participated in and where, their methods of fishing, and the way their strategies changed over time. Respondents were also encouraged to chart not only their own fishing grounds but also those of the fleets in general.

Respondents tended to provide both general and specific spatial information. Level of specificity related to the nature of the fisheries in question, varied fishing methods, and the ability or willingness to be specific about certain locations. Technological advancements in marine electronics have allowed fishermen to accurately calculate locations, navigate through hazardous waters, read the ocean substrate, trace temperature clines, and record particular fishing spots. It is now common for fishermen to record the location of very particular areas and features. The result was seen in certain maps which indicate highly specific fishing grounds and which cannot be provided in this report given their proprietary nature.

Spatial changes in fishing patterns can be accounted for in different ways. As a fishery becomes more profitable, the general tendency is to invest in larger boats with greater range. Sometimes patterns change due to competition or a decline in abundance. For example, the northward migration of rock cod fishermen in the 1970s and 1980s and trawl captains in the 1980s and 1990s was due to increasing fishing pressure in Monterey Bay. The trawlers eventually did move back to Monterey Bay as competition decreased and as technology enabled more productive fishing. It is unclear whether the northward movement of crabbers during the period was due to competitive pressure or a regime shift or both factors.

It should be noted too, that market demand has had a strong influence on resource use patterns in the study region. Species that at one time did not warrant much interest have become major fisheries in part because of growing demand for new kinds of seafood. As mentioned in Chapter Four, the development of a market for live fish in the 1990s encouraged trawlers to focus on once-obscure species, such as thornyheads. Deepwater trawling was additionally facilitated by the development of more efficient vessels and refrigeration systems, which facilitated transfer of higher quality seafood to the marketplace. Market forces also encouraged exploitation of the nearshore fisheries by captains of smaller vessels.

Finally, the influence of fishing regulations on historical fishing patterns cannot be overstated. Gear regulation, limited entry, and time and area closures exert obvious constraints on the ability of fishermen to participate in the various fisheries. Establishment of the new network of MPAs is merely the most recent vector of change affecting fishing activities across the region.

7.1 Año Nuevo and Greyhound Rock

Location and Environment. Año Nuevo SMCA is about 25 miles south of Half Moon Bay and approximately the same distance north of Santa Cruz. The Año Nuevo SMCA encompasses an area of 11 square miles, with a shoreline span of 8.4 miles and water depths up to 175 feet.

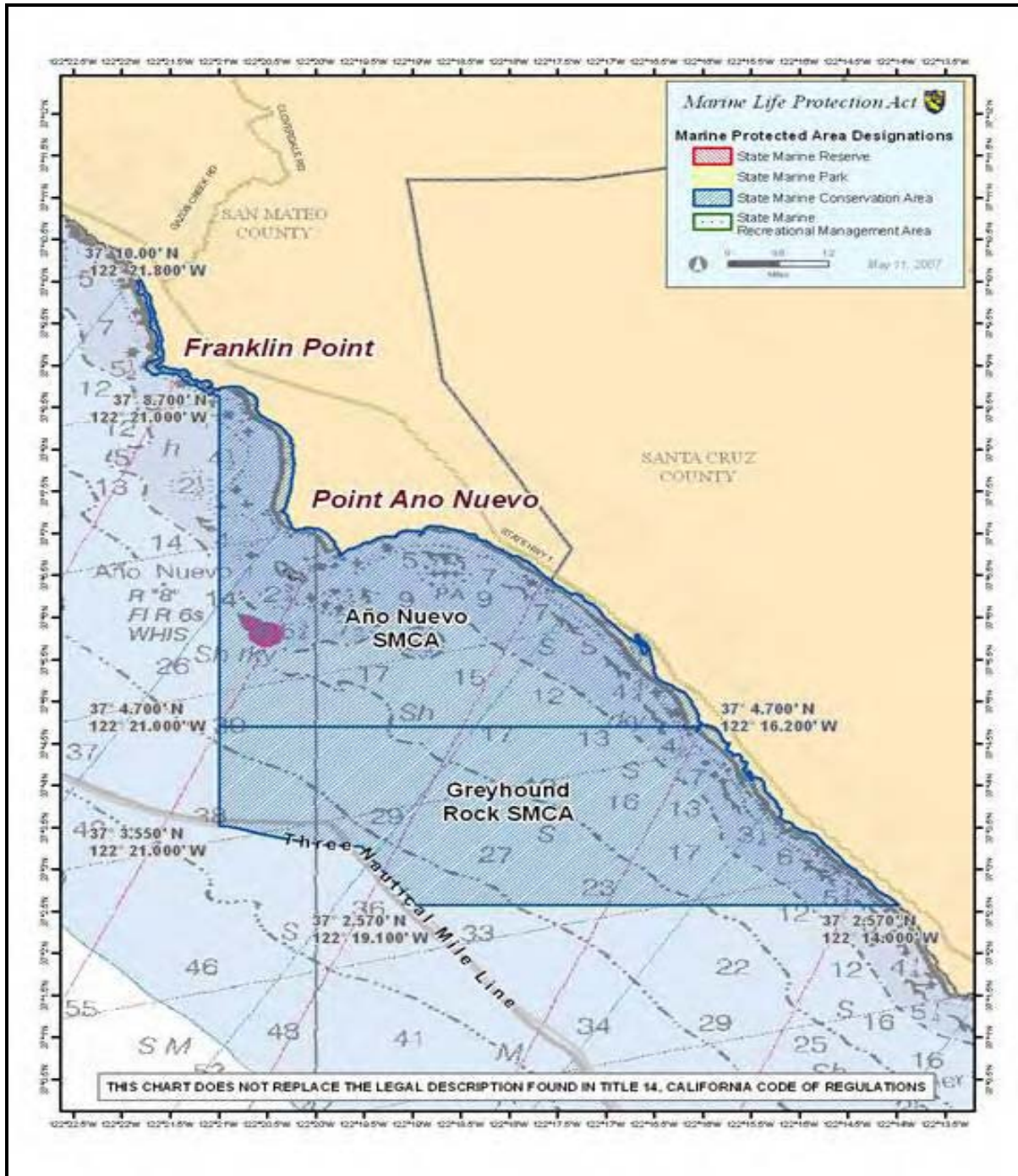


Figure 7-1 Chart of Año Nuevo SMCA and Greyhound Rock SMCA
(Courtesy of CDFG)

The area is characterized by low-relief shale and low rocky islets. This makes the area particularly hazardous in bad weather. Point Año Nuevo is the location of one of two principal areas of upwelling in the MBNMS. This provides dense forage areas for marine mammals. Año Nuevo SMCA has been designated a recreational no-take zone.

The Greyhound Rock SMCA, adjacent to Año Nuevo on the south, encompasses 11.8 square miles, with a shoreline of over three miles and waters up to 216 feet deep (Map 7-1). The SMCA allows for the recreational and commercial take of giant kelp, salmon, and squid. Finfish, other than salmon, may be taken by hook-and-line from shore only.

The primary habitats in the two contiguous MPAs are: sandy beaches, rocky intertidal zones with shallow rocky reef, surfgrass beds, shallow hard and soft bottoms, and kelp beds. The newly protected habitats may benefit nearshore and shelf rockfishes, lingcod, cabezon, kelp greenling, surfperches, sardines, mackerel, anchovies, California halibut, sanddabs, Dungeness crab, littleneck clams, squid, murre, and shearwaters.

Outlying areas to the northwest contain similar bathymetric and habitats characteristic of rocky intertidal zones with shallow rocky reef. Areas to the southeast are predominantly sandy and gravel beaches. Broad shelves extend offshore. Two “fingers” from a deep outlying canyon called the “horseshoe” extend five miles southwest. With depths of about 1,000 feet, the “horseshoe” reportedly is a highly productive area for groundfish.

Previous to designation as an MPA, this general area was within the bounds of a three-mile no-trawl zone. Areas further offshore have been and continue to be regulated by the commercial trawl RCA (100-150 fathoms), the commercial non-trawl RCA (30-150 fathoms in areas south of Pigeon Point and 20-150 fathoms in areas to the north), and the recreational RCA (40-150 fathoms in areas south of Pigeon Point).

History of Use of the Año Nuevo/Greyhound Rock Areas. The Año Nuevo/Greyhound Rock area has long been used by various commercial fishing fleets.

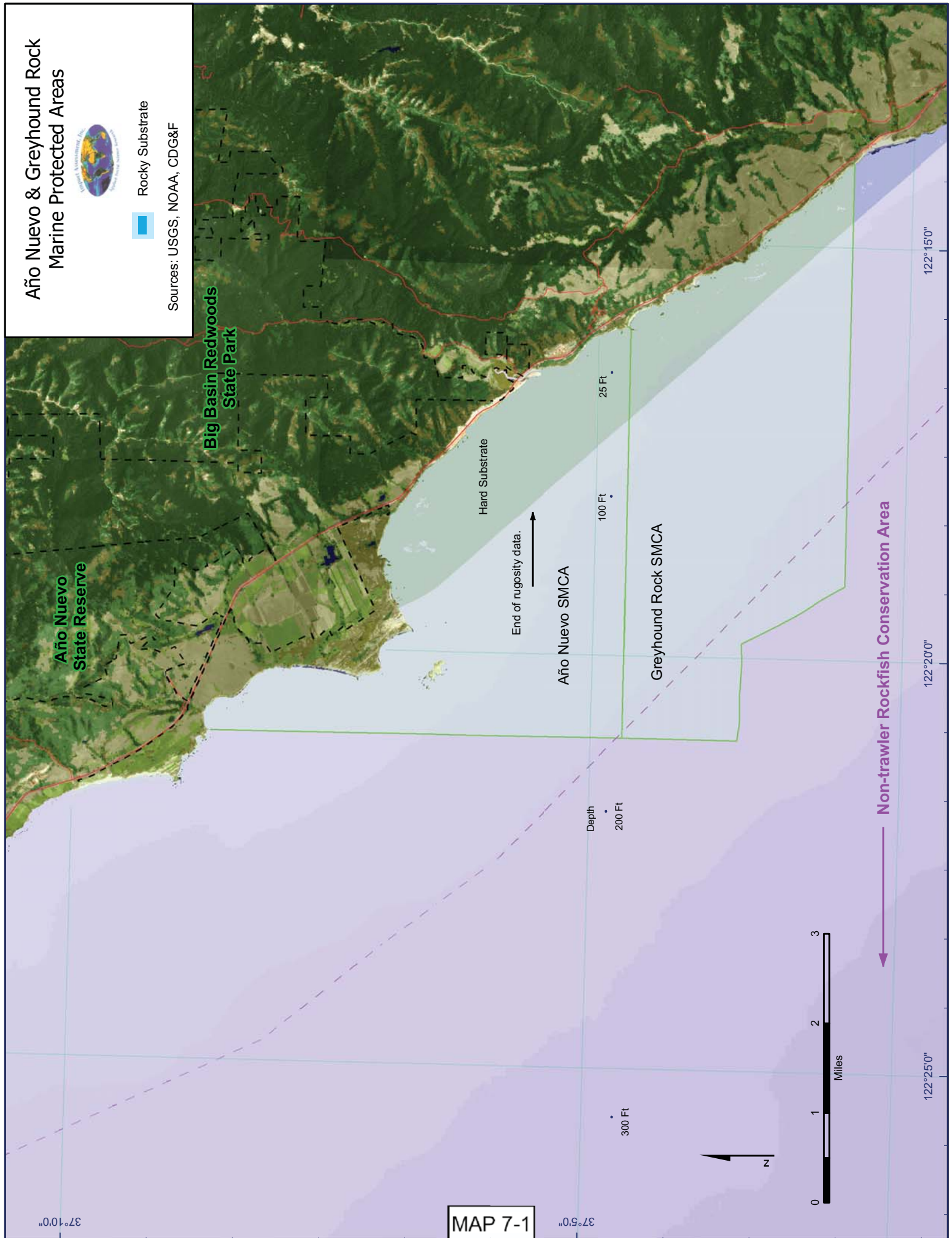
Half Moon Bay sardine vessels fished here, though to a lesser extent than those from Monterey Bay. Purse seiners hailing from Monterey recall fishing as far north as Half Moon Bay, and along Año Nuevo and Greyhound Rock in the 1930s and 1940s. This fleet later moved south to the Channel Islands and the Southern Bight to pursue anchovies and mackerel.

Año Nuevo & Greyhound Rock Marine Protected Areas



Rocky Substrate

Sources: USGS, NOAA, CDG&F



MAP 7-1



Lighthouse Ruins and Pinniped Inhabitants of Año Nuevo Island

(Photo courtesy of www.Californiacoastline.org²)

In the 1990s, sardines reappeared in the Half Moon Bay area, and along Año Nuevo and Greyhound Rock, but not as extensively as in years past. The fisheries were also more tightly regulated than in decades past. Readers are referred to Chapter 4 for current regulations governing sardine, and to Map 7-8 at the end of the chapter for depiction of spatial aspects of the sardine fishery in the region.

The Año Nuevo/Greyhound Rock area is a prime habitat for rockfish. Trawlers from the north and south fished the shelf areas offshore Año Nuevo/Greyhound Rock since at least the 1970s. The fleet typically fished at approximately 40 fathoms to 400-plus fathoms. Like the purse seiners of the 1930-50s, the fleet in the more recent era had an extensive range; some captains plied waters as far north as Seattle or as far south as Point Sur.

Sanddabs and rock cod were plentiful along the nearshore zone of Año Nuevo, and deepwater groundfish species were especially plentiful in the horseshoe area. Trawlers and longline fishermen gradually moved out of Monterey Bay in the 1970s. They attribute this to growing competition within the trawl fleet and the increasing use of gill nets.

In the late 1980s, trawlers moved back to Monterey Bay as technological improvements enabled more subtle trawls in biomass rich areas, such as the horseshoe. Many fishermen turned to new or different fisheries in the 1990s. Some fishermen began participating in the highly profitable

² All photos contained in this report attributed to "www.Californiacoastline.org" are copyrighted as follows: Copyright (C) 2002-2008 Kenneth & Gabrielle Adelman, California Coastal Records Project.

live fish fishery (Maps 7-9 and 7-10, located at the end of this chapter, depict spatial patterns of the region's critically important trawl and rockfish fisheries).

Salmon and Dungeness crab are currently the primary fisheries for commercial fleets in Half Moon Bay, Santa Cruz, and Moss Landing. Chinook salmon run through the deeper waters offshore Año Nuevo and Greyhound Rock.

The salmon troll fishery does not require a great deal of capital investment and typically involves both full- and part-timers. Different size vessels can successfully participate. As with many other fisheries, the development and widespread availability of various electronic devices have enabled fishermen of all skill levels to locate and follow salmon fairly easily. See Chapter Four for an in-depth discussion of current salmon regulations, and Map 7-11 for a depiction of the salmon harvest by decade in the Northern portion of the study region.

The San Francisco area and points north are considered to be more productive areas for crabbing than are locations to the south. As such, crabbers from Half Moon Bay tend to travel north to set their pots. Similarly, many crabbers from Santa Cruz and Moss Landing set their pots north of Pillar Point.

The region's crab fishery has expanded since the 1980s as other fisheries (such as rockfish) have become more tightly regulated. Other factors include a growing market demand for crab, a shift of some groundfish trawlers into the crab fishery following the establishment of the RCAs, and the federal buyback program.

In the early 1980s, a number of local fishermen began participating in the highly lucrative squid fishery. An influx of squid purse seiners from the Monterey Bay area resulted in Half Moon Bay fishers pressing for regulations against the use of squid light boats north of Pigeon Point. Some Half Moon Bay purse seine captains report the last good squid year was in 2002-03 (Map 7-13 depicts squid fishing patterns in the region between 1980 and the 2000s).

Squid are usually found within three miles of the coast at about five to 30 fathoms (30-180 feet) between July and September. A productive area for squid, when they appear, is Año Nuevo. Currently the fleet, which has been primarily based in Monterey, concentrates its fishing effort in the Channel Islands and California's Southern Bight.

Until the commercial take of abalone was banned in 1997, the Año Nuevo area was an important abalone harvest area. Abalone shell collecting is also banned here. The closest spot where one can legally collect shells in this area is at the cove, south of Pigeon Point Lighthouse (to the north of Año Nuevo).

Recreational fishers have also long visited the Año Nuevo area; and the area has continued to be an important site for charter services and independent anglers (both ocean- and shore-based). Outside of Point Año Nuevo is favorable for rockfish and lingcod; the rocky kelp beds around Greyhound Rock are good for rockfish, croaker, and cabezon; and the sandy shores south of Greyhound Rock are a good area for California halibut fishing. Spear divers have also utilized the area, but divers report that an increase in the white shark population has effectively closed Año Nuevo to consumptive diving. Previous to the establishment of the MPAs, Año Nuevo and Greyhound provided shoreline fishing for striped bass, white sea bass, kelp bass, yellowtail,

rockfishes, surfperch, striped sea perch, cabezon, and lingcod at Cove Beach and Waddell Creek. Shore-based fishing for those species is still permitted at Greyhound Rock, but ocean-based angling and offshore diving for those species is prohibited.

The primary non-consumptive recreational activities in the Año Nuevo/Greyhound Rock area are surfing, kayaking, and kiteboarding. The Año Nuevo SMCA has a number of popular surf locations that have enjoyed popularity over the years: Pigeon Point, Spot X, Año Nuevo, and Waddell Creek. Surf spots in the vicinity of Greyhound Rock include: Big Creek, Waterfalls, and Scott's Creek. However, Año Nuevo also has a reputation for being sharky.

North of Año Nuevo SMCA, Pigeon Point is a popular kayak site; the protected beach at the lighthouse provides kayakers with an opportunity to see migrating grey whales in season. Greyhound Rock SMCA has two popular kayak sites: Scott's Creek and Greyhound Rock.

History of Land Use. Remains of the ancestral camps and villages of the Quiroste people are protected within the reserve. Some sites have been dated to 5000 B.P. (Año Nuevo State Reserve Historic Placard).

At the turn of the 18th century and after the establishment of Mission Santa Cruz, Año Nuevo was used as pastureland by missionaries until it was purchased by ranchers in the mid-19th century. In 1861, the Steele brothers, dairy ranchers from Marin, expanded their operations by buying the Año Nuevo property. In the 1920s, the area was used by bootleggers to smuggle liquor from Canada to Half Moon Bay and San Francisco (Año Nuevo State Reserve Historic Placard). The area was farmed from the 1930s to the 1960s. Between 1962 and 1971 various pieces of the Año Nuevo property were purchased by the state and designated as the Año Nuevo State Reserve.

In 1872, the federal government built a foghorn on Año Nuevo Island. A five-story lighthouse was built on the Point in 1880. The lighthouse was inhabited for 76 years, until it was automated in 1948. The island was gradually overrun by sea lions. Today the island is the breeding and resting ground for four species of seals and sea lions: the Northern Elephant Seal, the California sea lion, the harbor seal, and the Stellar sea lion. An estimated 3,000 elephant seals come to Año Nuevo annually to birth, breed, and molt (Año Nuevo State Reserve Historic Placard). Researchers have been studying elephant seals for 40 years. There is no public access and only researchers are permitted on the island.

A Marine Education Center was established at Año Nuevo State Reserve with funding from the California State Parks Foundation, California Coastal Conservancy, the David and Lucile Packard Foundation, and other private individuals and foundations. The Center is housed within an old building on the Steele dairy ranch.

Recent Use of the Año Nuevo/Greyhound Rock Areas. Commercial and recreational fishing in the Año Nuevo/Greyhound Rock area has been heavily regulated since the early 2000s. In addition to area closures, gear restrictions, quotas and/or bag limits, most fisheries also involve seasonal regulations.

Depending on the season, the area was utilized by a diverse range of commercial fishermen. From November 15 through June 30, crabbers from Santa Cruz and Moss Landing set pots in the

area. At the beginning of the commercial salmon season in May, many crabbers pulled out their pots either to participate in the salmon fishery or to avoid entanglement. Fishermen participating in the nearshore hook-and-line fishery began visiting the area in the beginning of May and fished through the end of February. Should squid appear in the area, purse seiners would ply the waters from July through September.

Recreational ocean fishermen also fished in this area for rockfish, cabezon, and lingcod—typically from May through November. Shore-based fishermen and divers targeted rockfish and cabezon year-round, and lingcod from April through November. Other popular recreational fisheries, such as sea bass, California halibut, and surfperch, were open all year. Some argue that the creation of a recreational rock cod conservation area in 2004 increased pressure on shallow nearshore rockfish fishing areas, such as Año Nuevo.

Non-consumptive recreational activities peak during popular holidays and the more temperate summer months. However, some enthusiasts are drawn to the area year-round. The Park has a four-mile hiking loop to the main area where elephant seals can be viewed.



Juvenile Male Elephant Seals

7.2 Natural Bridges

Location and Environment. The southern boundary of Natural Bridges State Marine Reserve (SMR) lies on the northwestern edge of Santa Cruz, 3.5 miles from Santa Cruz Harbor (Figure 7-2). Reserve boundaries extend only 200 feet seaward of mean low water, but nearly four miles northwestward along Natural Bridges State Park, Three Mile Beach, Four Mile Beach, Wilder Beach, and Wilder Ranch State Park. Natural Bridges is named for bridge-like rock arches that were formed by eons of swell energy along this rugged shoreline. El Niño-related storm swells have destroyed all but one arch in recent decades.

The Natural Bridges SMR encompasses a total of four square miles and waters to a depth of 21 feet. The principal habitats in this shoreline zone include: sandy beaches, rocky intertidal zones, and surfgrass beds. Harvesting of any living marine resources for any purpose is not permitted under the rules of this SMR.

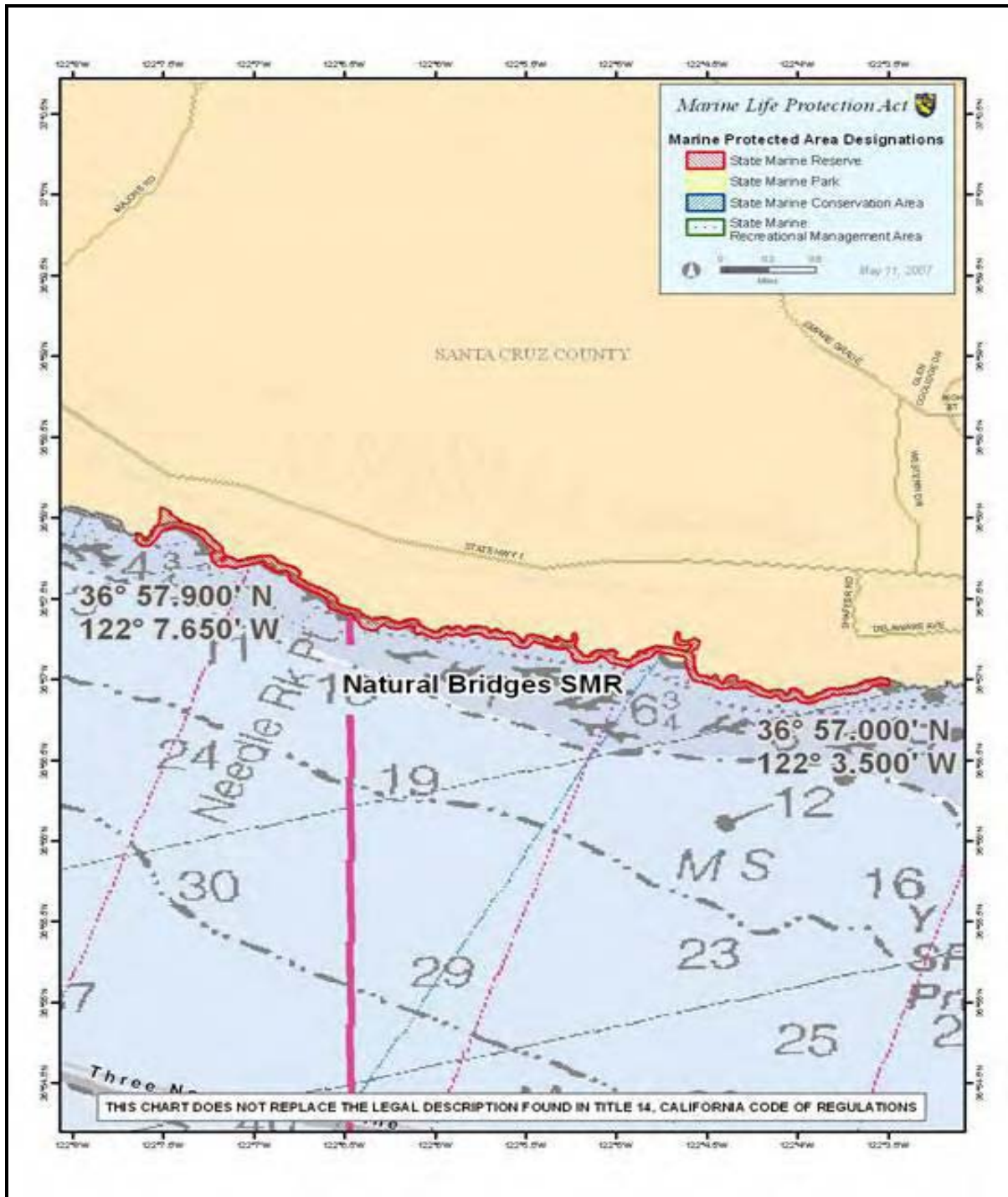


Figure 7-2 Chart of Natural Bridges SMR (courtesy of CDFG)

History of Use of the Natural Bridges Area. Evidence suggests that indigenous tribes fished, collected shellfish, and hunted marine mammals for food and fur throughout this region. Such groups may also have supplemented their diets with local marine algal species (MBNMS 2000:19).

Two species of kelp are found in the area around Natural Bridges – giant (*Macrocystis*) and bull (*Nereocystis*) kelp. The former has a long history of harvest, first as a source of food for Chinese immigrants in the mid-19th century and later as a source of livestock and mariculture feed, and as an emulsifier for processed foods. In the 1980s, extraction of giant kelp occurred in relation to the Japanese herring roe market as female herring deposit their eggs on the fronds of giant kelp. Giant kelp is typically harvested in the southern regions of the MBNMS. Large-scale operations are able to harvest as much as 600 tons of giant kelp per day, but small-boat operations harvest much less.

Although bull kelp is the dominant undersea canopy in the Santa Cruz area, little harvesting occurred in the region until the 1980s. Since the closure of the California commercial abalone fishing industry, restaurants and other retailers must rely on farmed abalone. The cultivation of abalone requires bull kelp. Two facilities were processing kelp in the Santa Cruz area during the late 1980s through 1990s.

History of Land Use. For much of the early historic period, the area around Natural Bridges was used for cattle grazing in support of Mission Santa Cruz. Schooners once anchored in Old Landing Cove to load and offload lumber and supplies. This area is now known as Four Mile Beach. In the 1880s, the ranch lands around Natural Bridges were acquired by the Wilder family. A dairy was established and operated here for nearly a century. The land was later used for cultivating brussel sprouts, for housing farm workers, and as a movie set (California State Parks 2009). The beaches have long been popular recreational areas for residents of Santa Cruz.

In 1933, the State of California purchased the land which would later become Natural Bridges State Beach. The beach was surrounded by open space until the 1970s, when subdivided parcels began to be developed for suburban housing. In 1974, the California Department of Parks and Recreation acquired adjacent lands to the northwest and established the Wilder Ranch State Historic Park. This park preserves some 4,000 acres of beach, bluffs, and inland canyons. The Department has also preserved and is gradually restoring ranch buildings, barns, gardens, and a Victorian homestead. With the assistance of the Benthic Ecology Research Group of Moss Landing Marine Lab, some 110 acres of land has been restored to a state that was typical of the Central Coast region prior to the historic era (California State Parks 2009). Eucalyptus groves and milkweed patches provide food and shelter to monarch butterflies migrating along the California and northern Baja coastlines, and in 1983, CDPR established a monarch butterfly preserve here.

Recent Use of the Natural Bridges Area. Although there is an extensive history of commercial bull kelp harvest in this area, only one operation was harvesting bull kelp in 2008. Bull kelp is typically harvested in this part of MBNMS by hand from small skiffs. CDFG manages commercial harvest of the resource through a kelp bed leasing arrangement.



Natural Bridges SMR (courtesy of www.Californiacoastline.org)

In terms of consumptive recreational uses, and prior to implementation of SMR rules, Natural Bridges was a popular site for shoreline fishing with rod and reel. This was a popular area for pursuit of sea bass, kelp bass, yellowtail, various rockfishes, surfperch, sea perch, and cabezon. Spear fishing and mussel gathering was also popular. The Central California Council of Diving Clubs, Inc. (“CenCal”), which has hosted spearfishing tournaments since 1958, has held numerous tournaments around Natural Bridges in years past.

Tourists and local residents continue to use Natural Bridges State Beach, Three Mile, Four Mile, and Wilder Ranch State Beach for a variety of non-consumptive recreational activities. These include viewing harbor seals, otters, a variety of shore birds, and intertidal life such as sea stars, crabs, and anemones. Park naturalists provide guided tours. Summer activities include sunbathing, swimming, and picnicking. Runners and bikers also use the park. Year-round water sports include surfing and kiteboarding.

There are surf breaks at Natural Bridges, Three Mile Beach, and Four Mile Beach. The right point break at Natural Bridges is particularly challenging to beginners in that the wave is quick and surrounded by treacherous rocks. The right point break at Three Mile is also challenging to newcomers. It is accessible by hiking west from a trailhead located along Highway One. The break at Four Mile is also a right point, also accessible by hiking, and likewise challenging to beginners. Each of these spots has been increasingly frequented by surfers seeking relief from crowded surf breaks in urban Santa Cruz.

The restored buildings in Wilder Ranch State Park are open for public tours. Other activities include hiking on coastal trails, wildlife viewing, and exploring a fern-filled sea cave at the Old Landing Cove along Four Mile Beach.



The Iconic Rock Structure at Natural Bridges State Park



Tide-pooling and Surfing at Natural Bridges

7.3 Elkhorn Slough

Location and Environment. Elkhorn Slough is the largest coastal wetland between San Francisco Bay and Morro Bay (Silberstein et al. 1989:9). It was designated as the Elkhorn Slough Ecological reserve in 1980 (National Estuarine Research Reserve System 2005). The slough runs west and north for some seven miles from Moss Landing Harbor (Figure 7-3) (Silberstein et al. 1989:12). The agricultural towns of Castroville, Salinas, Prunedale, and Watsonville are adjacent. One can access the slough by both land and water; there are public launch ramps in the harbor area and at Kirby Park. Two kayak rental operations and a nature tour company are located in the northern section of the reserve.

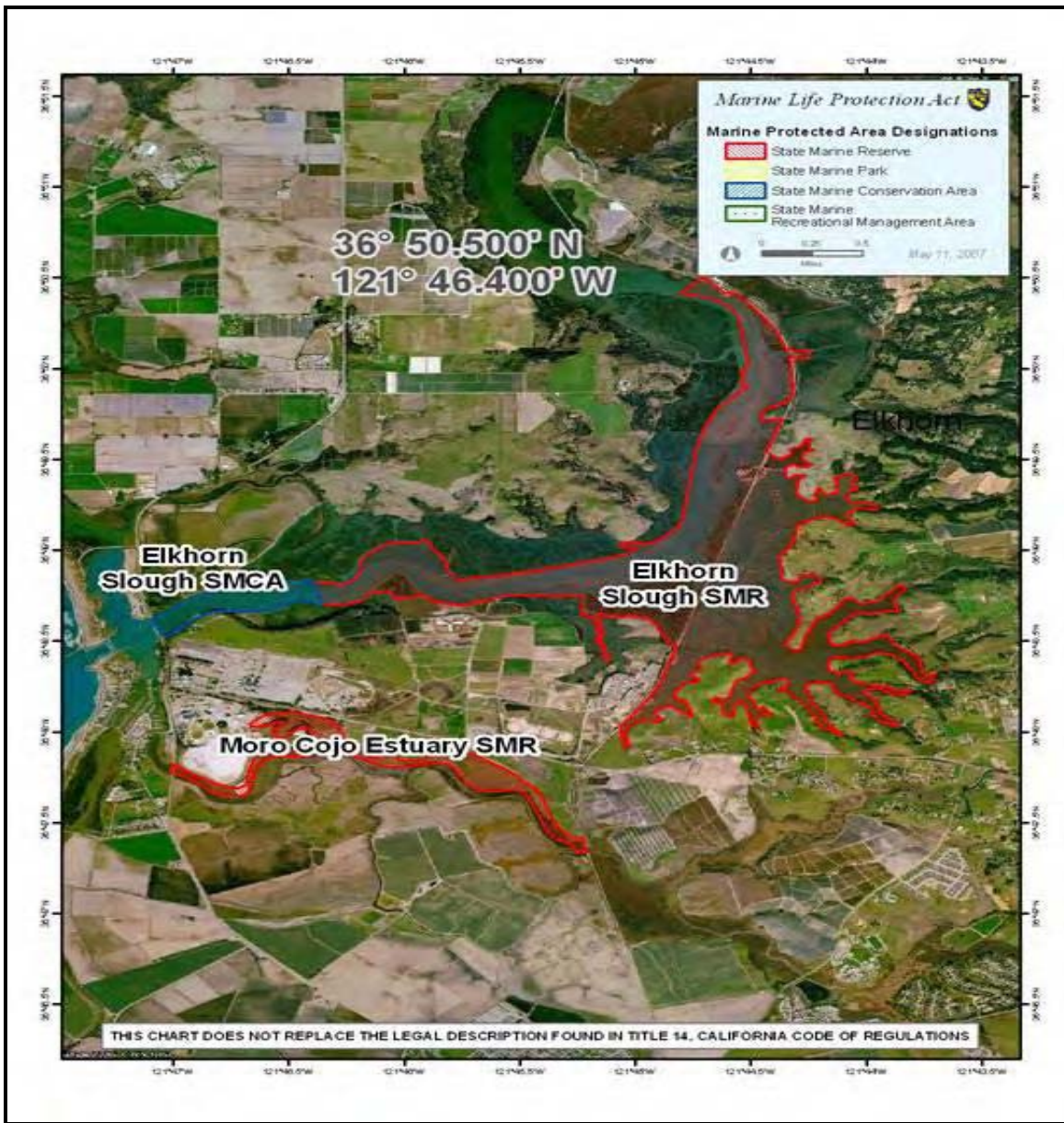


Figure 7-3 Aerial Photo of Elkhorn Slough Area MPAs (Courtesy of CDFG)

Sandy beaches flank Moss Landing Harbor. The main channel of the slough is wide and relatively deep – 700 feet across and 25 feet deep at the mouth. If traveling by small boat at high tide one can navigate the salt marshes. At low tide, both sides of the main channel reveal flat plains of mud that are as much as 20 feet deep in some places and much shallower in others. Crabs, shrimps, snails, and clams are common in the mud flats. Upland terrain of tall grassy hills, chaparral, and native oak and non-native eucalyptus trees typify the inland extremes of the slough.

For those on foot, the Visitor Center located off Elkhorn Road is the main point of access. The Center is the starting point for five miles of trails. Further along Elkhorn Road at Kirby Park (managed by The Nature Conservancy), is another access point and trails parallel the marsh. Moss Landing State Beach is situated on the western or ocean end of the slough. From here one can walk north and follow a former route between Salinas River and Elkhorn Slough. Further along Highway 1, one mile north of Jetty road at the Moss Landing Wildlife Area, there is an additional four miles of trails.

Three MPAs were established in the general Elkhorn Slough area. The Elkhorn Slough SMCA comprises approximately 0.1 square miles of wetland areas and includes 1.4 miles of shoreline. The Elkhorn Slough SMR encompasses approximately 1.5 square miles and includes 4.4 miles of estuarine shoreline. The Moro Cojo Estuary SMR covers approximately 0.5 square miles within the slough and contains five miles of estuarine shoreline.

Part of this area had been designated as the Elkhorn Slough Ecological Reserve in 1980. The boundary of the no-take ecological reserve ran halfway down the main channel of the slough and encompassed approximately 2.25 square miles of slough waters and three miles of shoreline.

The taking of all living marine resources is prohibited within the Elkhorn Slough SMCA, with the exception of harvest of clams, and finfish with hook-and-line. Clams may be taken only along the northern shoreline of the slough in the area adjacent to the Moss Landing State Wildlife Area. The take of all living marine resources is prohibited in the Elkhorn Slough SMR and Moro Cojo Estuary SMR.

History of Use of the Elkhorn Slough Area. Archeological evidence suggests that tribal groups in the area hunted shellfish here (Silberstein et al. 1989: 50). Middens are full of marine invertebrates, shells, and the bones of birds and mammals. Chert from the Año Nuevo area has also been found here (Silberstein et al. 1989:50).

Also, in the mid-1800s, ranchers and farmers drained marshland for pastureland and crops, loggers stripped hillside for logs, whalers put out at Moss Landing, and a processing plant was built onshore (Silberstein et al. 1989:53). Evidence of the pioneer homesteads can still be seen in the slough area (Van Dyke and Hofman n.d.).

During the mid- to late 1800s, produce bound for San Francisco was transported on the slough and into the Pacific. Charles Moss, for whom Moss Landing is named, had plans to build shipping facilities and a pier until the Southern Pacific built its main rail line along the edge of the slough in 1872 (Silberstein et al. 1989:53). Prosperous oyster farmers built a bridge across

the slough around 1900. In the 1930s, Elkhorn Slough was the second largest oyster supplier in the state, and salt ponds provided salt to local canneries (Silberstein et al. 1989:54).

In 1946, the Army Corps of Engineers constructed the harbor and, in the 1950s, PG&E built a steam-generating power plant. The opening of the harbor increased the tidal flow in the area and has contributed to significant erosion in the main channel and bordering mudflats (Silberstein et al. 1989: 54).

The Moss Landing Marine Lab was established in 1966. Since the 1970s, the Sea Life Supply Company has raised sea hares (a species of sea slug) in pens near the mouth of Elkhorn Slough (Silberstein et al. 1989:34). The sea hare are used for neurophysiological research.

The Nature Conservancy bought 400 acres of the slough in the 1970s (Silberstein et al. 1989:61). Since then 3,600 additional acres have been added; Ducks Unlimited has contributed extensively to the conservation effort.

Conservation efforts preclude a variety of planned development projects during 1960s and 1970s. These included a 50,000 barrel-a-day at Moro Cojo Slough and a PG&E nuclear power plant (Elkhorn Slough Foundation 2004).

In 1983, CDFG began returning several hundred acres of pastureland to its natural wetland status. About the same time, scientists from Hopkins Marine Station began restoring eelgrass beds in the area. More recently the MBARI, Elkhorn Slough National Estuarine Research Reserve, and Elkhorn Slough Foundation initiated management of the 3,600-acre slough.

Recent Use of the Elkhorn Slough Area. Although commercial fishing has been restricted since the establishment of the Elkhorn Slough Ecological Reserve in 1980, the area has long been used for recreational angling. Elkhorn Slough is particularly well-known for its rubber-lipped perch, bat rays, and leopard sharks.

Beginning in 1946, shark derbies were sponsored by neighboring rod and gun clubs. Over subsequent years, scientists have monitored and collected data (on size, weight, sex, stomach content, and stage of sexual maturity) at the Elkhorn Slough shark derby. In the 1980s, scientists from Moss Landing Marine Laboratories were instrumental in turning the derby away from hunting and toward a catch, tag, and release competition (Carlisle et al. 2007). Although the last shark derby was held in 1995, leopard shark and bat ray fishing is still popular in Elkhorn Slough. A local fisherman reports that he typically sautés and serves bat ray much as one would cook and serve scallops.

Elkhorn Slough is also a popular recreational clamming location. The slough is listed as one of the top five localities in California for Washington and Gaper clams (Leet et al. 2001). Both the northern and southern beaches of the SMCA are popular sites for recreational clamming. Skiffs are sometimes used to access intertidal areas where the clams are found, though some are accessible by foot. Water quality problems limit recreational harvest opportunities. Although abundant, clams absorb much of the bacteria and pesticide run-off from upland areas; there are annual shellfish quarantines from May 1 to October 31 (Silberstein et al. 1989:61).

Hunting also has a lengthy history in the area. Wealthy sportsmen from San Francisco would come by train to Elkhorn, often staying at the Del Monte Resort which had its own train station

(Van Dyke and Hofman n.d.). While not allowed in the Reserve, hunting is allowed in certain parts of Elkhorn Slough during waterfowl season. In recent years, more visitors have to come to the area to view rather than kill waterfowl.

Many visitors come to the area to view wildlife. Harbor seals, California sea lions, and sea otters can be found near the mouth of the harbor.

Many birdwatchers visit Elkhorn Slough each year. More than 250 species of birds inhabit the slough or its immediate vicinity for at least some part of the year (Silberstein et al. 1989:35). Brown pelicans, cormorants, grebes, and mallards inhabit the main channel. Snowy egrets, blue herons, and other species can be found on the margins. Myriad shorebirds – plovers, avocets, marbled godwits, and red-breasted mergansers rest on the mudflats. In the upland areas, California quail, kestrel, golden eagles, northern harriers, and endangered peregrine falcons are common. In the spring and fall, migrating birds use the slough on their journey north and south.

Kayaks are an especially popular means of viewing birds and wildlife. People also sail the slough.

Surfing is somewhat popular on the ocean side, though the waves and surf zone can be challenging. Some local surfers report that they enjoy the solitude of the challenging and uncrowded conditions in winter.



Kayaker's View of Seals at the Mouth of Elkhorn Slough



Winter Swells Breaking on the Ocean Side of Elkhorn Slough, January 2007

7.4 Soquel Canyon and Portuguese Ledge

Location and Environment. The center of the Soquel Canyon SMCA is approximately 9.5, 12, and 16 miles from the harbors of Santa Cruz, Moss Landing, and Monterey, respectively (Figure 7-4). The protected area encompasses approximately 23.5 square miles and is some 7.2 miles in length. Protected waters range from depths of 247 to 2,113 feet.

The center of Portuguese Ledge SMCA is approximately 10.5, 13.5, and 16 miles from the harbors of Monterey, Moss Landing, and Santa Cruz, respectively. This reserve encompasses almost 11 square miles. Waters in the MPA reach depths from 302 to 4,838 feet.

The numerous ledges of the Monterey Canyon complex provide favorable habitat for a variety of species, and thus constituted productive fishing areas. The sandy ledges along the edge of the canyon are said to be ideal for placement of crab pots. Various rock formations are favored by rockfish. The area is also ideal for spot prawns (see Map 7-14 for depiction of recent spot prawn trapping patterns in the region).

Within the last five years, fishing activities in large sections of both SMCAs have been regulated through establishment of commercial non-trawl RCAs and recreational RCAs. Smaller areas within the SMCAs have been regulated by the trawl RCA (100-150 fathoms), and considerable areas outside of the bay were designated as an Essential Fish Habitat and, in 2006, were closed to trawling. The SMCA does not allow the taking of living marine resources in either offshore area, with the exception of the commercial and recreational take of pelagic finfish.

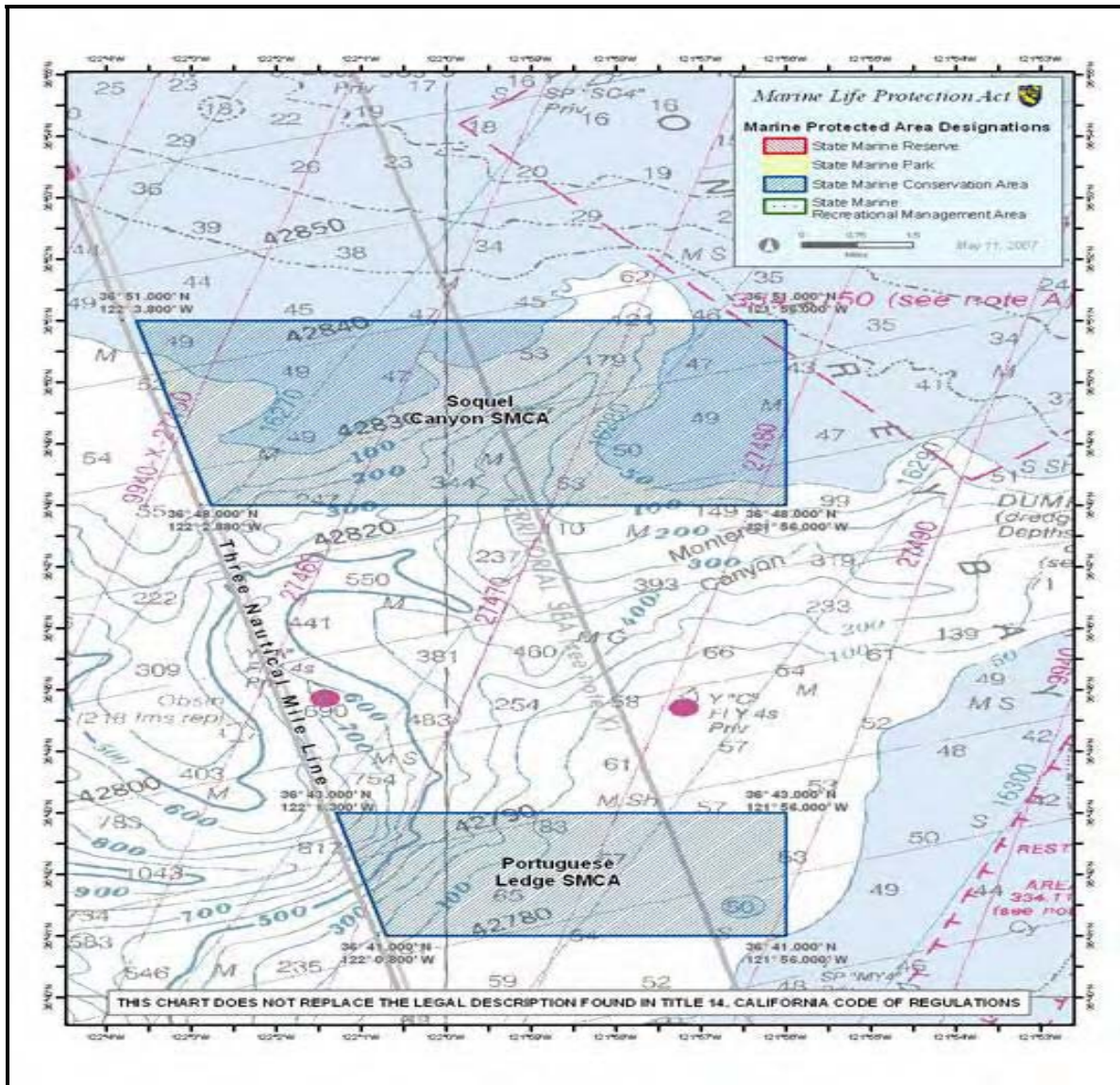


Figure 7-4 Chart of Soquel Canyon and Portuguese Ledge (Courtesy of CDFG)

History of Use of the Soquel Canyon and Portuguese Ledge Areas. Sardines, deepwater groundfish, rockfish, salmon, Dungeness crab, spot prawn, sablefish, and California halibut have all been fished in the Soquel Canyon and Portuguese Ledge areas. Most major fisheries typical of the region have occurred here over time.

Salmon. Sailboats were originally used to fish for salmon in Monterey Bay. Salmon were an important part of the commercial fisheries of Monterey Bay in the 1970s. The species was fished largely as an adjunct to the more lucrative rock cod fishery. Gradually, the size of the fleet increased as part-timers joined the summer fishery to augment their income. One respondent suggests that the profitability of salmon amongst part-time fishermen started an influx of “non-ethnic, non-immigrant” fishermen. Commercial fishing in Monterey Bay had previously been the role of immigrant populations: Japanese, Portuguese, Chinese, Sicilians, Italians, and Norwegians.

Local fishermen interviewed during the study traced their involvement in the salmon fishery over time. They charted major fishing areas in terms of coastal runs along, for example, Año Nuevo, Point Sur, and within Monterey Bay.

Monterey fishermen report fishing for salmon from Oregon down to Morro Bay, but periodically focus operations in Monterey Bay. Many salmon fishermen fish in groups, and communicate using the same radio channel to notify each other when and where the fish are biting.

Salmon fishery participants note several major challenges in the industry. These include market competition from farmed salmon, periods of under-abundance, and regulations that constrain fishing effort. Some fishermen participate in direct sales of wild salmon to help increase their profit margin.

Sardines. Our oldest respondents began fishing Monterey Bay for sardines in the 1940s, although they recall their fathers' stories of fishing in the 1920s. Sardines are normally landed at depths between 5-50 fathoms (30-300 feet) over sandy bottoms; large sections of the Soquel Canyon MPA are ideal for sardine fishing. By the early 1940s, most sardines were caught by large purse seiners that ranged between Año Nuevo to Pigeon Point in the north and Point Sur in the south. The sardine fishery began in August and ended in mid-February. Many purse seiners also participated in the salmon fishery. Some fished the Alaskan salmon fishery during June and July.

In the 1950s, many purse seiners followed the sardines moving south from Avila to the Channel Islands. Some purse seiners also pursued tuna, which took them even further south to San Pedro and San Diego between January and August. At the time, tuna sold for \$300 per ton while sardines sold for \$100 per ton (Colletto 2000). When the sardine catch began to dwindle, purse seiners adapted by shifting into other fisheries, including mackerel and anchovies during the 1960s, squid during the 1970s, and herring in the San Francisco Bay during the 1980s and 1990s.

The sardines rebounded by 1980 and continue to be a major commercial fishery in the area today (Map 7-8). While the local fleet has decreased in size, larger vessels are now being used. Technology for locating schools has also improved, which helps counter the dampening effect of more stringent regulations.

Groundfish. Soquel Canyon and Portuguese Ledge continued to be important grounds for Monterey Bay area fishermen throughout the 20th century. By the 1970s, when the majority of our respondents began their fishing careers, the dominant fisheries were California halibut, rockfish, sablefish, and thornyheads—species of minor importance during the 1940s when sardines dominated the industry.

Traditionally, trawl captains fished for California halibut in the shallow ledge areas of the Soquel Canyon MPA (see Map 7-9). Sanddabs are also found in that area.

Overcapitalization of the trawl fleet, coupled with several technological advancements, resulted in regulatory agencies declaring several species of groundfish- including California halibut- overfished. This resulted in an increasingly stringent regulatory environment for groundfish. Federal limits were introduced in 1982, and, in 1994, the federal Groundfish Restricted Access Program split the *Sebastes* complex into limited entry and open access fisheries, each with their

own quotas. Also in 1994, gill net fishing was banned within one mile of the shoreline, while longlines used within one mile of the coast between Point Conception and Point Mugu were limited to a maximum of 150 hooks per boat, and 15 hooks per line. More recently, the creation of non-trawling and trawling RCAs have curtailed the landing of rockfish. Currently, California halibut trawlers are also regulated with a minimum mesh size of 7.5 inches, seasonal closure of trawling areas during the spawning season (March 15-June 15), and area closures of essential fish habitats (Leet et al. 2001).

Quotas, limited access, and RCAs have significantly reduced the size of the Monterey Bay groundfish fleet. Many who remain in the industry have shifted into the live fish market. A few respondents who were able to acquire limited entry permits due to their history in the groundfish fishery have since sold or are leasing their permits, primarily to sablefish fishermen. Quotas in the groundfish fishery and the establishment of non-trawl areas have also impacted sport fishing operators who once frequented the Soquel Canyon area.

Crab and Prawn. Crab fishermen from Santa Cruz and Moss Landing have been setting pots on the sandy ledges of Soquel Canyon and Portuguese Ledge since the 1980s (Map 7-12). Portuguese Ledge has often been favored because it is a particularly productive area, and it is relatively close to port.

The Monterey spot prawn fishery became increasingly lucrative in the late 1980s when the species began to be sold in the live market (Map 7-14). Spot prawns are found in hard, soft, and mixed bottom habitats above the canyon areas and along submarine canyons throughout the Monterey and Carmel Bay area. They are landed by trawl, trap, and rock-hopper gear. In 2003, the spot prawn fishery became a limited entry fishery and trawlers were prohibited from participating.

Finally, some fishermen have pursued hagfish in the Soquel Canyon and Portuguese Ledge areas. The market first appeared in the late 1980s, when Korean buyers sought hagfish skins for use in the apparel industry. But those buyers pulled out complaining of low quality skins, perhaps due to poor handling and hasty transport (Love 2006). The second incarnation of the fishery occurred in the mid-2000s, when Korean buyers once again approached California fishermen, this time for live hagfish for the restaurant market. Some fishermen who were having trouble making a living with low open access quotas for sablefish and no salmon season entered the fishery.

Some local fishermen began participating in the lucrative squid fishery following the lift of the light ban in 1987. The use of lights as squid lures changed the nature of the fishery. Lights made it possible to fish day *and* night for squid, which, in turn, increased pressure on the resource (Map 7-13 depicts squid fishing patterns in the region between 1980 and the 2000s).

Recent Use of the Soquel Canyon and Portuguese Ledge Areas. Crabbers, spot prawn fishermen, sablefish longliners, trawlers, salmon trollers, and hagfish fishermen continue to utilize the area. Because of Essential Fish Habitat closures in neighboring areas, sablefish fishermen and California halibut trawl captains have been using this area relatively intensely. Poor salmon seasons and regulations on rockfish fishing also have motivated some fishermen to

shift into the crab, hagfish, and sablefish fisheries, arguably increasing fishing pressure on those species.

Squid has not been a significant fishery in recent years. Some local purse seiners report the last really good squid year was in 2002-03. However, when the squid appear, wetfish fishermen tend to switch from sardines to squid.

Non-consumptive users of the Soquel Canyon and Portuguese Ledge areas are also on the increase. Whale-watching, in particular, has grown in popularity since it was first introduced in the Monterey Bay area by charter fishing operators in the 1960s. Those skippers initially offered whale-watching charters in the slow winter months as a way to supplement their income between the rock cod and salmon fishing seasons. Whales migrate through Soquel Canyon and Portuguese Ledge, given the large amount of krill available in those areas. In the 1980s, however, a marine biologist and new charter operator realized that whales were actually present in the area year-around and that the other charter businesses were not fully capitalizing on the market.

Increasing regulations and a growing tourist industry, including eco-tourism, have elevated the economic importance of whale-watching tours. The most common whale-watching routes leaving from the Monterey Harbor include: (1) west and north of the wharf out to three miles and through the lower half of the Portuguese Ledge MPA; (2) along the inner bay – north and east of the wharf – up to Moss Landing; and (3) around the Monterey Peninsula to the inlet to Carmel Bay.

The presence of marine researchers in the Monterey Bay area — including Soquel Canyon and Portuguese Ledge—has been increasing since the 1980s with the establishment of the Monterey Bay Aquarium and the private non-profit Monterey Bay Aquarium Research Institute (MBARI). Research in the canyon takes place through a number of methods: remotely-operated vehicles, cables on the sea floor, and monitoring buoys. Research in the immediate canyons areas have focused on sediment movement, benthic habitats, and the abundance and distribution of fishes and invertebrates.

MBARI has grown significantly since its inception. It now has a staff of nearly 200 persons. In 1989, MBARI extended its Pacific Grove office and laboratory operations to Moss Landing, building both a dock and a marine operations facility.

7.5 Monterey Peninsula

Location and Environment. The Monterey Peninsula is the location of four newly designated MPAs (Map 7-2). From east to west, those are: Edward F. Ricketts SMCA, Lovers Point SMR, Pacific Grove Marine Gardens SMCA, and Asilomar SMR. The Monterey Peninsula MPAs are in close proximity to Monterey Harbor (2-6 miles). The principal habitats within all the Monterey Peninsula MPAs include: sandy beaches, rocky intertidal zones, surfgrass beds, shallow hard and soft bottoms, and kelp beds.

Edward F. Ricketts SMCA encompasses approximately .25 square miles, with one mile of shoreline and waters up to 74 feet deep. The SMCA prohibits the take of all living marine resources, except the recreational take of finfish by hook-and-line. The commercial take of giant kelp (*Macrocystis pyrifera*) and bull kelp (*Nereocystis spp.*) is allowed by hand in specified areas, but the permitted individual may not take more than 12 tons of kelp from the portion of Administrative Kelp Bed 220 within the Edward F. Ricketts State Marine Conservation Area during any calendar month.

Lovers Point SMR encompasses 0.30 square miles with a shoreline span of less than one mile and depths up to 88 feet. The taking of all living marine resources is prohibited.

Pacific Grove Marine Garden SMCA encompasses just under one square mile, with a shoreline measuring 3.8 miles and depths up to 172 feet. The SMCA prohibits the take of all living marine resources, except the recreational take of finfish by hook-and-line, and the commercial take of giant kelp and bull kelp by hand.

Finally, the Asilomar SMR encompasses 1.51 square miles with a shoreline distance of 2.3 miles and depths up to 172 feet. This is a no-take area.

Prior to the new designations, there existed two smaller protected zones along the Monterey Peninsula. The Hopkins State Marine Reserve, established in 1984, was a no take zone of approximately 0.2 square miles with a shoreline length of 1.1 miles and waters up to 60 feet deep. The Pacific Grove State Marine Conservation Area, also established in 1984, encompassed an area of 1.5 square miles with a shoreline span of 2.9 miles and depths to 60 feet. Recreational take of finfish and invertebrates, other than mollusks or crustaceans, are permitted. The commercial take of sardines, mackerel, anchovies, squid, and herring by ring net, lampara net, or bait net are also permitted.

Recreational and commercial non-trawl RCAs are located in close proximity to the outer boundaries of the MPAs. Large areas on all sides of the MPAs are closed to trawling.

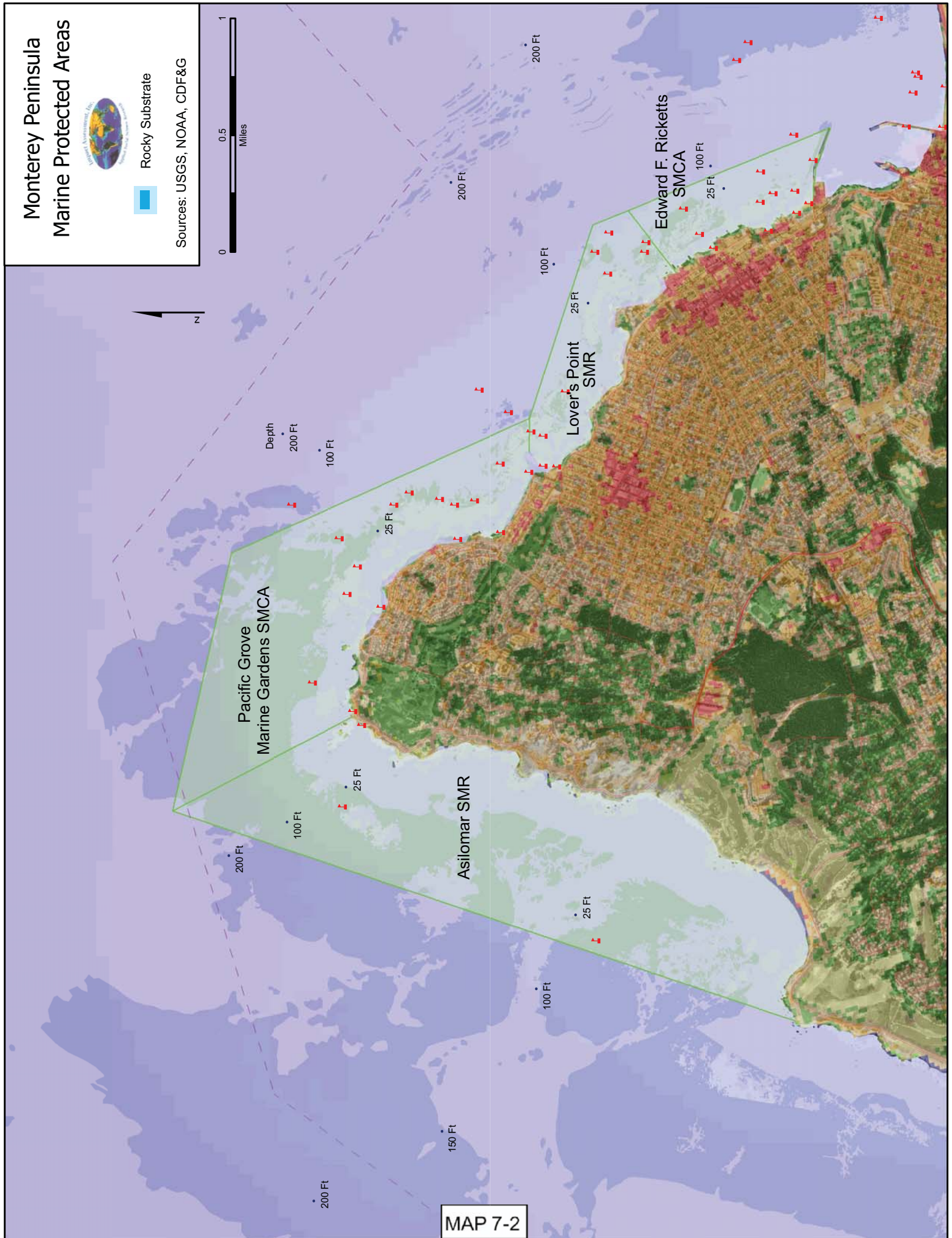
A coastal road runs along the Monterey Peninsula, permitting travel by auto, bicycle, or foot and affording vistas of the ocean. On the shore side of the Edward F. Ricketts SMCA and Lovers Point SMR, bike and pedestrian pathways wind past Monterey Bay Aquarium and Fisherman's Wharf. Seals, otters, and various kinds of seabirds are commonly seen here; deer from the parks of Monterey commonly make their way down to the water.

Monterey Peninsula Marine Protected Areas



Rocky Substrate

Sources: USGS, NOAA, CDF&G



MAP 7-2

History of Use of the Monterey Peninsula Area. In the mid-1800s, the Monterey Peninsula was the site of the largest Chinese village on the West Coast, stretching roughly from Hopkin’s Marine Station in Pacific Grove to Point Alones, the current site of Monterey Bay Aquarium (Lydon 1985). The immigrants came for abalone but soon discovered other fisheries. The group is credited with introducing the squid fishery to California. Fishing from flat bottom boats that were launched from the shore, the Chinese fishermen used pitch fires to attract the nocturnal squid to the surface, and then gathered them from the surface in baskets. The squid were dried and exported to China.

The first documented historical harvest of marine algae in the area is also attributed to Chinese immigrants. As early as the 1850s, Chinese immigrants were drying and exporting algae to China via San Francisco (MBNMS 2000). Laws were passed in 1875 and 1900 to end the participation of the immigrants in commercial fishing. When the Sicilians entered the thriving sardine fishery in Monterey Bay, the Chinese turned to work in the canneries. Squid and algae reemerged as important fisheries in the 1980s and 1990s.

Favorable rockfish habitats in the nearshore areas have attracted commercial rockfish fishermen since the 1870s. As in many regions, fishing pressures were initially heaviest in waters nearest port, but gradually expanded outward as facilitated by better hulls and engines. The development of the otter trawl fishery in the 1950s and the gill net fishery in the 1970s increased pressure on nearshore species and motivated fishermen to discover new grounds further from the harbor.



Surfing at Pacific Grove Marine Gardens SMCA, December 2007



Kelp beds at Lovers Point and Edward F. Ricketts SMCA

Recent Use of the Monterey Peninsula Area. Despite numerous regulations, the Monterey Peninsula continues to be an important area for commercial and recreational fishing. Commercial fleets primarily focus on squid and nearshore species, such as rockfish. Recreational fishermen primarily target rockfish, but also salmon, California halibut, and tuna in the offshore zones. The area also remains popular with spear divers in allowable zones. Now consumptive diving is also significant. The advent of digital technology and high-tech cameras has brought many underwater photography enthusiasts to the kelp beds along the northeast side of Lovers Point and adjacent areas.

There are at least ten recognized kayak launch sites in the Monterey area. The launch areas at Monterey Beach and Lovers Point are particularly popular with beginning and intermediate paddlers during low swells.

There are numerous surf spots on the southernmost tip of the Monterey Bay. Lovers Beach is a left point break. There are numerous breaks in the Asilomar area. All can be challenging as the beach is rocky and the ocean difficult to access. Winter swells can be particularly challenging.

7.6 Carmel Bay and Point Lobos

Location and Environment. Four new MPAs have been designated along the coast of Carmel: Carmel Pinnacles SMR, Carmel Bay SMCA, and Point Lobos SMR and SMCA (Figure 7-5). The Carmel Bay MPAs lie approximately 15 miles from Monterey Harbor, 25 miles from Moss Landing Harbor, and 30 miles from Santa Cruz Harbor.

Carmel Pinnacles SMR is a no-take zone encompassing approximately .5 square miles, with a corresponding shoreline of one mile and depths of 69 to 233 feet. Rocky pinnacles and kelp beds are the primary habitats. The Carmel Bay SMCA encompasses 2.1 square miles, with depths to 471 feet. The shoreline in the protected area spans 3.5 miles along the bay front. Primary habitat types are sandy beaches, rocky intertidal zones, surfgrass beds, shallow hard bottoms, shallow soft bottoms, submarine canyons, and kelp beds. The take of living marine resources is prohibited, with the exception of recreational take of finfish. Commercial take of giant and bull kelp by hand is allowed under regulatory guidelines.

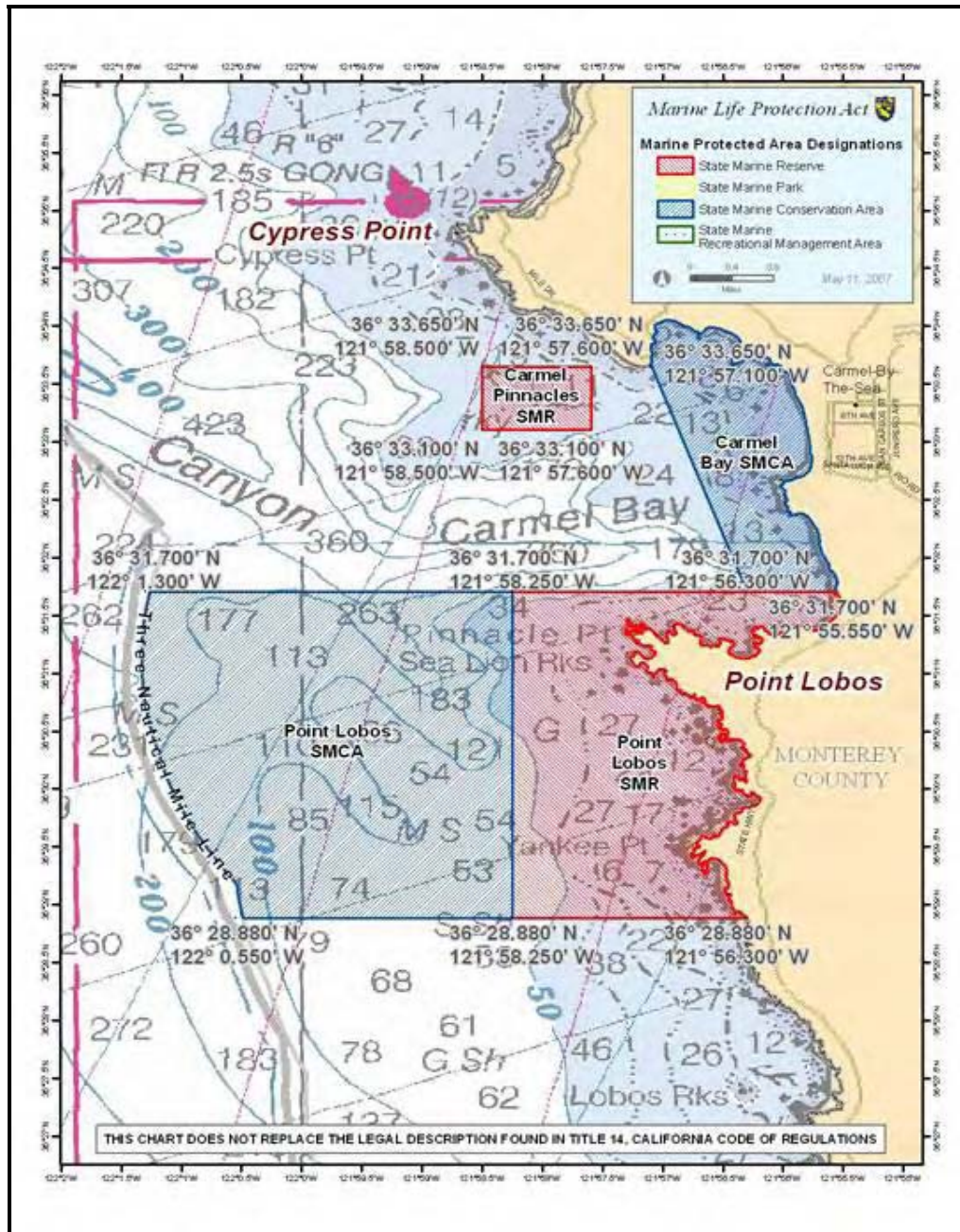


Figure 7-5 Carmel Bay Area and Point Lobos SMRs and SMCAs (Courtesy of CDFG)

Tow-in surfing occurs in certain areas around Central California, including an area adjacent to Pebble Beach along 17-Mile Drive. The break known as “Ghost Tree” near Carmel Pinnacles SMR is a particularly well-known tow-in location. Tow-in surfing was developed to pull surfers into waves that are generally too large and fast-moving to catch by paddling. The surfer is towed by a jet-ski toward the shoreline in synchronicity with the oncoming swell. At the appropriate moment, the surfer lets go of the tow line and drops in on the wave, while the jet-ski operator departs the zone of the breaking wave. Once the surfer has completed the ride, the operator returns to retrieve him (or her). The speed and maneuverability of the jet-ski makes this process possible. Although use of jet skis has not been banned in conjunction with the MLPA, their use has been prohibited in certain areas under the MBNMS Management Plan. Serious tow-in surfers argue that large swells do more damage than the skis and that the craft constitutes a highly effective means for ocean rescue. Most municipalities in the region now use jet-skis for surf zone rescue functions.



Tow-in Surfer Dropping into Massive Swell at Ghost Tree near Carmel Pinnacles SMR
(Photo Courtesy of *Surfer's Journal*, Volume 14, No. 1)

Point Lobos SMR is adjacent to the Point Lobos State Reserve and Point Lobos Ranch State Property. The designated area encompasses 5.4 square miles, with a shoreline span of 4.7 miles. Waters up to 408 feet are protected. Habitats include sandy beaches, rocky intertidal zones, surfgrass beds, shallow hard and soft bottoms, pinnacles, and kelp beds. Take of living marine resources is not permitted within reserve boundaries.

The Point Lobos SMCA encompasses 8.9 square miles, 3.2 miles of shoreline, and depths ranging from 268 to 1,858 feet. The principal habitats are: shallow and deep hard bottoms, shallow and deep soft bottoms, and shallow and deep submarine canyons. The taking of living marine resources is prohibited, with the exception of the recreational and commercial take of salmon and albacore, and the commercial take of spot prawn.

Previous to the new designations, two smaller MPAs existed here. Established in 1976, the Carmel Bay State Marine Conservation Area encompassed 2.5 square miles with an approximate shoreline length of 6.7 miles and waters up to 465 feet. Take of all living marine resources was prohibited except the recreational take of finfish by hook-and-line or spear, and the commercial take of kelp under specific conditions.

Established in 1973, the Point Lobos State Marine Reserve encompassed approximately one square mile with a shoreline length of 7.7 miles and depths to 195 feet. The habitat is mostly granitic reef, sandy bottoms, pinnacles, and extensive kelp beds. No take of any living marine resource is allowed.

Recreational and commercial non-trawl RCAs overlap the newly designated Point Lobos MPAs. These form a small ribbon west of the Carmel Pinnacles and Carmel Bay MPAs. Large areas west of the MPAs and Carmel Bay itself are closed to trawling.

History of Use of the Carmel Bay Area. In the 1880 report to the United States Census Bureau, Point Lobos was described as ranch land. A group of Chinese fishermen lived here in the 1850s and a small group of Portuguese whalers used the area in the 1860s. The Chinese immigrants targeted California halibut, flounder, yellowtail, sardines, abalone, shark, shellfish and squid: fish was salted, dried, and sold to markets in San Francisco and exported back to their home province of Canton (Kemp 1995).

The Portuguese whaling community on the south shore of Whaler's Cove numbered approximately 60 persons. The whalers used small boats rigged with sails. The whalers hunted from October through March, when Gray and Humpback whales migrated through the area.

In the 1890s, Japanese marine biologist Gennosuke Kodani and two divers from Japan established an abalone industry in Monterey. Japanese divers utilized helmets and hand pumped compressors that allowed them to descend to depths of up to 60 feet. In the 1920s, the introduction of gas-powered compressors enabled longer dives (Monterey Maritime Museum 2008). Aided by the funding of a wealthy businessman, the divers were able to establish a successful diving company, export business, and cannery. The cannery processed abalone for the next thirty years.

In addition to salmon and squid respondents note two commercial fisheries of historical significance within Carmel Bay: groundfish and spot prawn. Trawling was permitted in the Bay and off Point Lobos until quite recently. The spot prawn fishery began in the coastal waters between Monterey and Carmel. An old Sicilian fisherman used weighted and baited wicker baskets, invented in his home country, to catch the prawns. The method was later adopted for use in the giant octopus fishery; by the 1930s, Monterey fishermen were landing more giant

octopus than in any other port in California (see species Maps 7-9, 7-11, 7-13, and 7-14 at the end of this chapter) (Monterey Maritime Museum 2008).

A variety of recreational pursuits have long occurred in Carmel Bay. These include offshore and shoreline angling, spear fishing, diving, and surfing. Recreational fishermen have commonly landed yellowtail, white sea bass, redbtail surfperch, yelloweye rockfish, California halibut, kelp bass, cabezon, striped sea perch, and lingcod.

Recent Use of the Carmel Bay Area. Contemporary commercial fisheries in the Carmel Bay area include spot prawn, squid, salmon, and rockfish. Recreational anglers primarily target rockfish. Recreational and kayak fishermen often launch from Stillwater Cove. This area is also popular with surfers. Approximately one dozen spots commonly used by surfers are located in or are adjacent to Carmel Pinnacles SMR and Big Creek SMCA/SMR. Carmel Beach is especially popular during the summer months.

There are at least six kayak launch sites in and around the Carmel Bays MPAs. Monastery Beach, with its easy access and small waves, attracts numerous kayakers.

In the Carmel Bay/Point Lobos area, divers have a choice of ten popular points of access. Carmel Pinnacles is frequented both by boat divers and recreational anglers. Monastery Beach, with its high surge, is not recommended for novice divers; many swimmers have drowned in these waters. It is sometimes called “Mortuary Beach.” Whaler’s Cove is known as a good diving area.

The Point Lobos State Reserve, established in 1933, encompasses 554 acres of land. Walking trails provide visitors with a vista of pine ridges, meadows, coves, tidal pools, and wildflowers. Sea lions, sea otters, and a variety of shore birds are commonly seen here.

7.7 Big Sur Coastline

Location and Environment. The Point Sur SMR/SMCA area is approximately 30 miles from Monterey Harbor, 40 miles from Moss Landing Harbor and 45 miles from Santa Cruz Harbor. The reserve encompasses 9.8 square miles and 5.2 miles of shoreline. Water depths in the reserve reach up to 178 feet. Primary habitat include: sandy beaches, rocky intertidal zones, surfgrass beds, shallow hard and soft bottoms, kelp beds, and canyons. The take of all living marine resources is prohibited (Map 7-3).

Point Sur State Historic Park and Andrew Molera State Park are located east of the marine reserve. Point Sur Light Station, commissioned in 1889, was automated in 1974. The site is now an active U.S. Coast Guard and Naval facility. The water tower, barn, carpenters shop, and light house have been restored and are open to the public through guided tours. No other beach activities are permitted. Andrew Molera State Park is popular for hiking, biking, beachcombing, and fishing.

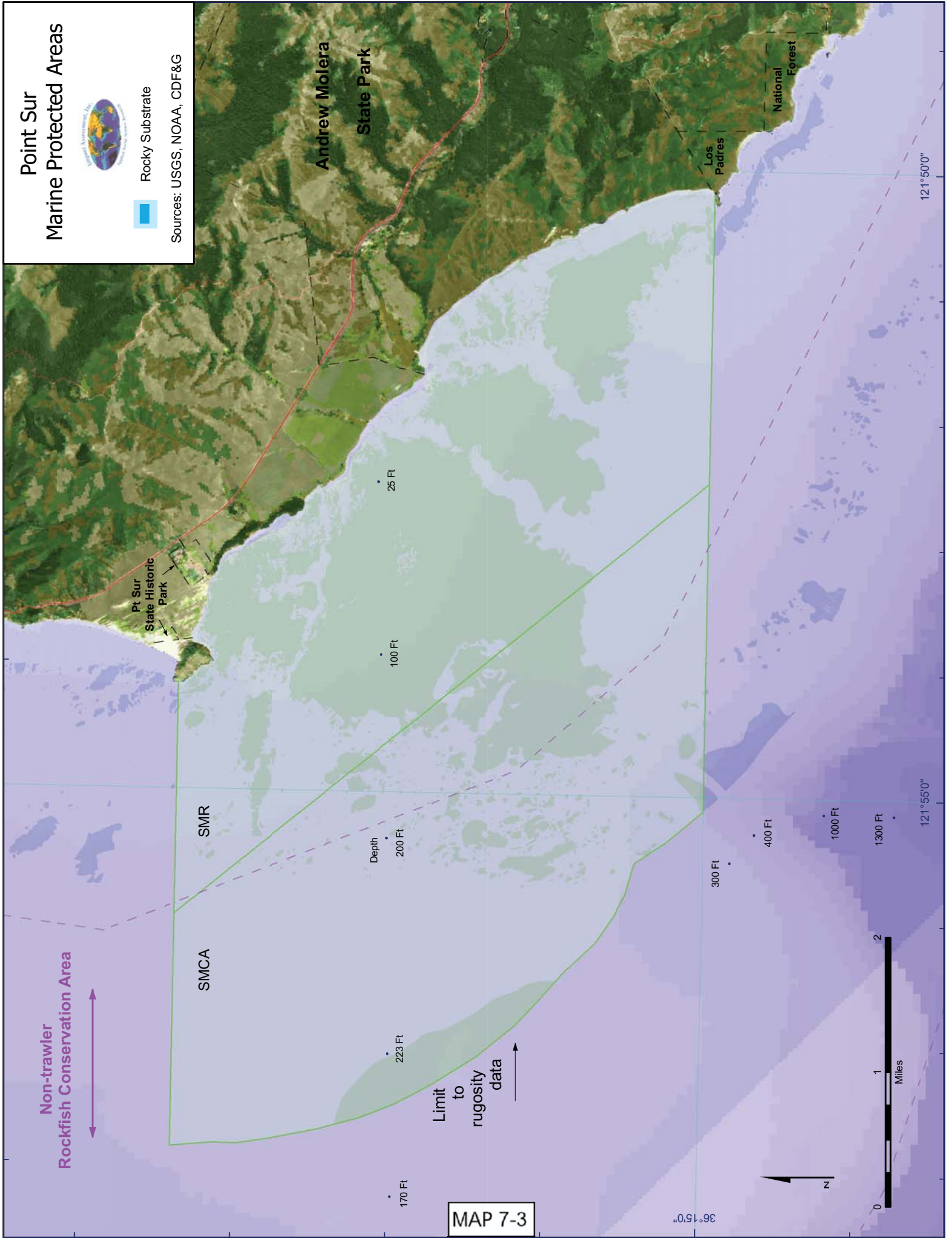
Point Sur Marine Protected Areas



Rocky Substrate



Sources: USGS, NOAA, CDF&G



MAP 7-3

The Big Creek MPA is approximately 55 miles from Monterey Harbor, 65 miles from Moss Landing Harbor and over 70 miles from Santa Cruz Harbor. Morro Bay Harbor is some 60 miles south (Map 7-4). The reserve encompasses a total of 12.35 square miles, with a shoreline span of 3.3 miles. Deep nearshore waters typify this area. Primary habitats include: sandy beaches, rocky intertidal zones, surfgrass beds, shallow hard and soft bottoms, deep hard and soft bottoms, shallow and deep submarine canyons, pinnacles, and kelp beds. Take of all living marine resources is prohibited.

The Big Creek SMCA comprises approximately 10 square miles with a shoreline span of 2.5 miles. Waters reach depths up to 1,964 feet. The principal habitats in the conservation area include: sandy beaches, rocky intertidal zones, surfgrass beds, shallow hard and soft bottoms, deep hard and soft bottoms, shallow and deep submarine canyons, pinnacles, and kelp beds. Harvesting of living marine resources is prohibited, with the exception of the commercial and recreational take of salmon, albacore, and the commercial take of spot prawn.

The new MPAs are flanked by conservation areas. The 3,848-acre Landels Hill-Big Creek Reserve is directly inland.

The Julia Pfeiffer Burns State Marine Conservation Area lies between the new reserves. Established in 1970, the Julia Pfeiffer Burns SMCA encompasses approximately 2.7 square miles and a shoreline span of 4.5 miles. Depths range to 710 feet and habitat types include: hard and soft bottoms, kelp beds, underwater cliffs and pinnacles, diopatra tube beds, unstable gravel and boulder fields, and surge channels. Similar habitats can be found to the south. Finfish, chiones, clams, cockles, rock scallops, native oysters, crabs, lobsters, ghost shrimp, sea urchins, and mussels may be taken recreationally. Finfish, crabs, ghost shrimp, jackknife clams, sea urchins, squid, and kelp may be taken on a commercial basis.

The Big Creek SMR/SMCA area was previously under the protection of the Big Creek State Marine Reserve. Since 1994, no take has been allowed here and all public entry was restricted to protect bottom habitats from disturbance. No boats were permitted except for teaching or research purposes. The Big Creek State Marine Reserve boundaries were extended north, south and west as a result of the MLPA siting process.

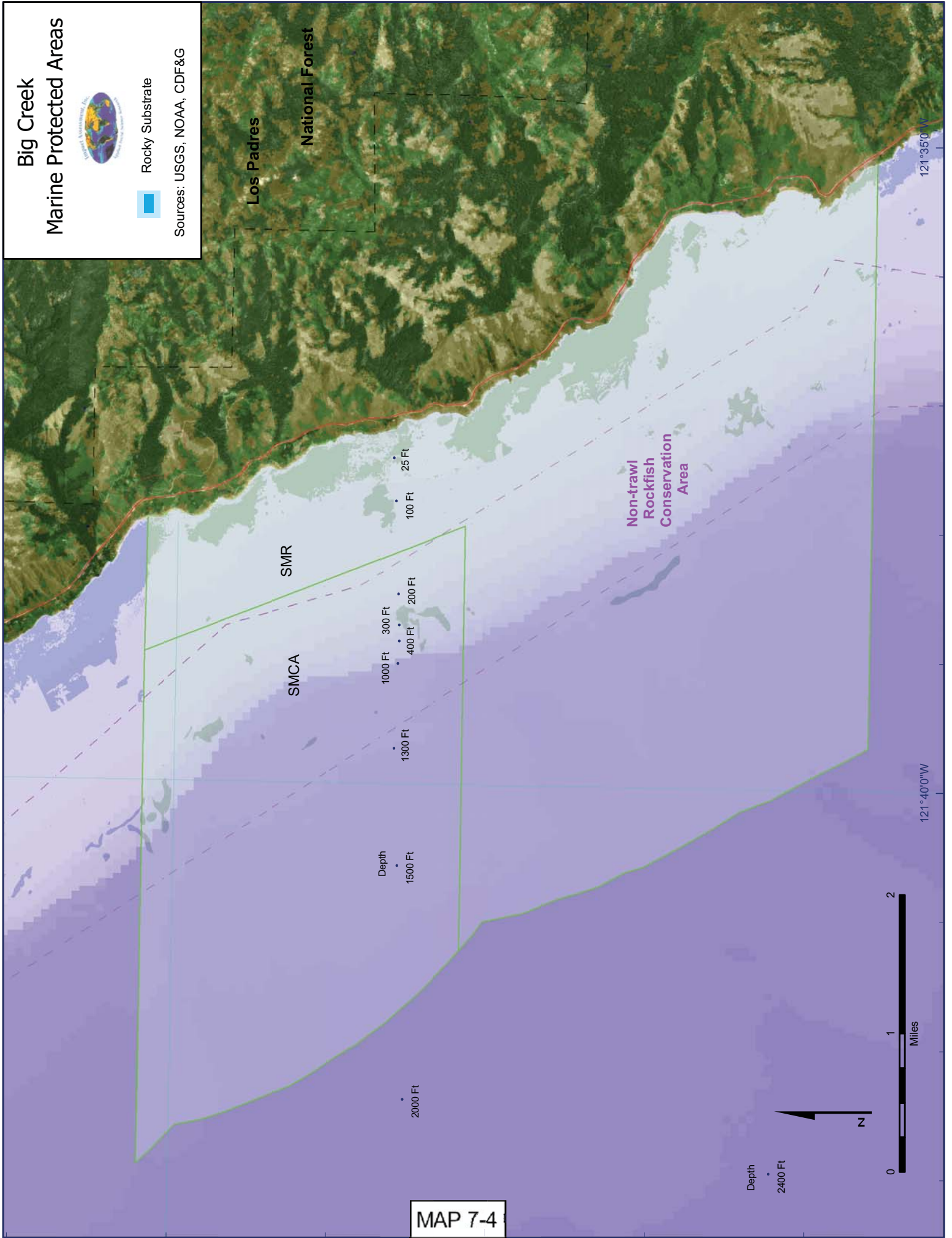
Commercial and recreational non-trawl rockfish conservation areas overlap with the Big Sur MPAs. Large areas southwest of the MPA are closed to trawling under the Essential Fish Habitat closure; a small ribbon-like area to the northwest is closed to trawling under the RCA.

Big Creek Marine Protected Areas



Rocky Substrate

Sources: USGS, NOAA, CDF&G



MAP 7-4



Looking North toward Point Sur from Andrew Molera State Park



View of Big Creek Area, April 2007



View of Big Creek Bridge and Big Creek SMR (courtesy of www.Californiacoastline.org)

Overview of the Big Sur Area. After 18 years of construction, the Carmel-San Simeon Highway was completed in 1937. According to Walton (2007), completion of the highway led to much debate about what Big Sur should become. The rugged terrain presented significant challenges to developers. Many argued that the land should be conserved.

Conservation efforts were undertaken by government agencies and private individuals. The U.S. Forest Service established a series of forest preserves, and, by 1936, the Los Padres National Forest was established to manage two million acres of land. In 1934, John Pfeiffer sold 706 acres to the state. This would form the heart of the Pfeiffer Big Sur State Park. The lands that became the Julia Pfeiffer Burns State Park and Andrew Molera State Park were donated or purchased for conservation purposes. In the late 1930s, the Hearst estate sold over .25 million acres to the federal government. Part of this was added to the Los Padres National Forest and part was used to create the Hunter Liggett Military Reserve.

In the 1960s, writers of the Coast Master Plan opted to keep Highway 1 a two-lane highway and to create a series of coastal parks. The Monterey County Board of Supervisors reaffirmed those priorities in 1985. In 1978, the Big Sur Land Trust was established to allow “tax write-offs and the purchasing or receiving of land for preservation and partnering with public and private agencies” (Walton 2007:57). In the 1980s, Proposition 70 was passed to provide public funding for wildlife and coastal preservation.

Political will and public consensus led to a unified preservation effort in Big Sur. The result today is evident: there are few residential areas along Highway One and most of the non-coastal land is used for cattle grazing. Commercial areas are situated primarily in the Big Sur Valley, Gorda, and Lucia. Approximately two-thirds of the Big Sur Coastal Zone is managed by the U.S. Forest Service, the California Department of Parks and Recreation, the U.S. Navy, the U.S. Coast Guard, and the University of California.

Tourism has long been the principal defining characteristic of the Big Sur economy. Land is expensive, and the population growth rate tends to be around one percent.

The ocean around Big Sur Coast is characteristically rough, and there are few sheltered areas or launch sites. The area is also a good distance from established ports and fishery infrastructure. Despite these limitations, commercial, recreational, and subsistence fishing have been important for many years in this area. Early settlers fished from skiffs with hook-and-line gear and engaged in some commercial abalone harvesting. Commercial fishermen, operating from Monterey and Morro Bay, have targeted sardines, squid, Dungeness crab, spot prawn, and groundfish here since the 1980s (Pomeroy 1999).

The nearshore reefs and kelp beds around Big Sur provide important habitat for several commercially valuable nearshore finfish such as black-and-yellow, blue and gopher rockfish; cabezon, and lingcod.

History of Use of the Point Sur Coast. Most of the Point Sur coast is comprised of sheer cliffs and deep canyons. Beaches and ocean access are limited. Settlement of the area began in the late 18th century with two large land grants of approximately 9,000 acres each. Ranch and timber products were transported by schooners from settlements at Palo Colorado Canyon, Notley's Landing, Bixby Creek, the Big Sur Valley, and Partington Canyon (Walton 2007).

Outdoor recreation activities grew in popularity after about 1900. Residents often served as hunting and fishing guides. Artists and writers were also drawn to the area and established a Bohemian culture for which the area is still known. Resorts were established here early in the 20th century.

Commercial and recreational fishing fleets have historically targeted rockfish and salmon in the Point Sur area. The sardine fishery was historically significant here.

History of Use of the Big Creek Area. Pomeroy (2000) describes the Big Creek skiff fishery as it was conducted in the late 1980s. Skiff operators then typically sold their catch directly to a distributor who would then sell to neighboring restaurants or to buyers from Morro Bay and Monterey. With the retirement of a primary distributor in the 1990s, some fishermen procured their own licenses and began to transport the catch directly to the region's seafood markets. Some undertook live fish sales to markets in San Jose, Oakland, and San Francisco. As competition for fishing grounds intensified in the Morro Bay area, fishermen headed north to expand their grounds. One fisherman describes the situation:

When I first started fishing I would make \$1.00 to \$1.50 a pound...With live fish, you can make \$10.50 a pound for the same fish and it goes to Chinatown in Oakland or El Monte in Los Angeles. The live market started in the early 90s, but it didn't hit Big Sur until about '95. I was the first one to take live fish out of Big Sur.

The emergence of the live fish market allowed some skiff fishermen to earn a reasonable income. But the fishery is challenging and only a small group was to succeed. Numerous part-timers supplemented their fishing income with work as butchers, teachers, or construction workers (Pomeroy 2000).

Prior to the establishment of the live market fishery, fishermen around Big Sur targeted a mix of shallow, mid- and deepwater rockfish. Many now focus on shallow water species that have lower mortality rates when brought to the surface, and smaller fish that can be served whole at restaurants.

The regulatory environment has affected skiff fishermen in a variety of ways. The gill net ban in 1994 is also said to have had a positive outcome; many participants in the skiff fishery explain that it eliminated a source of competition at the marketplace and reduced spatial conflict on the ocean. Longline hook limits also reduced competition.

Beginning around 1999, however, spatial, seasonal, quantity, and minimum size regulations began to negatively affect many skiff fishermen. In 2000, areas south of Point Lopez were closed during January and February and areas around Big Creek were closed during March and April. A new licensing system subsequently confined skiff fishermen to a specific region. Species-specific catch limits have also been added. Fishermen explain that, taken individually, many of the regulations were not highly detrimental to their operations. For example, when Big Creek areas were closed to fishing, skiff operators were still able to motor north. As Pomeroy notes (2000:10), with the many and diverse nearshore, shelf, and slope species found off the Big Sur coast and good markets for many of them, most of the fishermen were able to adapt by shifting effort to alternative species.

But, regulations have had a significant cumulative effect on the fleet. Seasonal fishermen estimate that the fleet declined from about 15 skiffs during the 1990s to three by 2008. This is attributed to the establishment of a limited entry program in 1994, regulations requiring participants to buy two nearshore permits, and a general aging of the fleet. The aging of the fishing fleet is consistent with trends in the California commercial fishing fleet in general; few young persons are now getting involved in this challenging industry.

The Big Creek area spot prawn fishery was lucrative during the late 1980s. The predominant grounds for spot prawn fishing lie roughly three miles north of Julia Pfeiffer Burns and extend south to Big Creek (Map 7-16). There are also spot prawn grounds roughly four miles south of Point Lopez. But, the spot prawn fishery is now highly regulated. Management measures include trap limits, limited entry access, and quotas. One seasoned spot prawn fisherman explained that he must catch 300-400 pounds per trip to justify the effort and earn a profit.

Recent Use of the Point Sur Area. Commercial fishermen continue to pursue salmon and squid in the Point Sur area. Both fisheries have recently been challenged by a lack of abundance. Experienced participants in the salmon fishery often discuss problems associated with farmed salmon, cycles of under-abundance, and regulations that constrain fishing effort.

Point Sur is also popular with recreational anglers from the Morro Bay area. One well-established Morro Bay charter operation runs a trip to Point Sur that continues down to Big Creek, Point Lopez, and Piedras Blancas. The captain traditionally attracted fishermen from Southern California as well as the Central Valley. However, regulatory changes in the rockfish

fishery, including quota reductions and seasonal closures, have recently presented significant challenges to the operation.

A handful of recreational fishermen from the San Luis Obispo area occasionally access Point Sur, launching their skiffs from Mill Creek, Willow Creek, or Limekiln Creek. Fishermen rarely go further north. The distance and associated fuel costs are prohibitive, and ocean conditions are more challenging. Access is difficult at both Mill Creek and Willow Creek.

Recent Use of the Big Creek Area. Commercial fisheries in the Big Creek area include rockfish, spot prawn, and salmon. This is not a popular destination for boat-based recreational anglers. It is simply too far from neighboring harbors. Shore-based fishermen do, however, fish at Andrew Molera Beach, Partington Cove, Jade Cove Beach, Pfeiffer Beach, Sand Dollar Beach, and the Willow Creek Picnic Area. Consumptive and non-consumptive diving occurs at Partington Canyon Trail, Jade Cove, Limekiln Creek, Mill Creek, and Sand Dollar Beach.

7.8 Piedras Blancas

Location and Environment. The Piedras Blancas SMR is located north of William R. Hearst Memorial State Beach. The SMR encompasses 10.4 square miles, with a shoreline span of 6.4 miles. Waters protected by the reserve range up to 157 feet in depth. The take of all living marine resources is prohibited. The SMCA encompasses 8.8 square miles and a shoreline span of 4.9 miles. Protected offshore waters are up to 337 feet deep. Take of living marine resources is prohibited, with the exception of salmon and albacore. The southern boundary of the Piedras Blancas MPAs is located approximately 33 miles from Morro Bay, but only 2.5 miles from Leffingwell Landing in San Simeon State Park.

The area supports the largest bull kelp canopy in Central California. Rockfish species are prominent. These include black rockfish, yellowtail rockfish, olive rockfish, copper rockfish, gopher rockfish, and grass rockfish. Cabezon is also present. Marine mammals, such as northern fur seals, harbor seals, California sea lions, and sea otters are abundant here. The area is well-known for its elephant seal haul-out.

History of Use of the Piedras Blancas Area. Salinan tribes used San Simeon and Piedras Blancas prior to the Mission Period, harvesting abalone, mussels, and other resources. Russian fur traders and enslaved Aleut hunters also made use of Piedras Blancas. Working from canoes and hunting with spears and clubs, they traveled along the coastline of California as far south as Santa Barbara for the pelts of sea otters (CDFG 2001). Spanish colonists established San Miguel Mission in 1797.

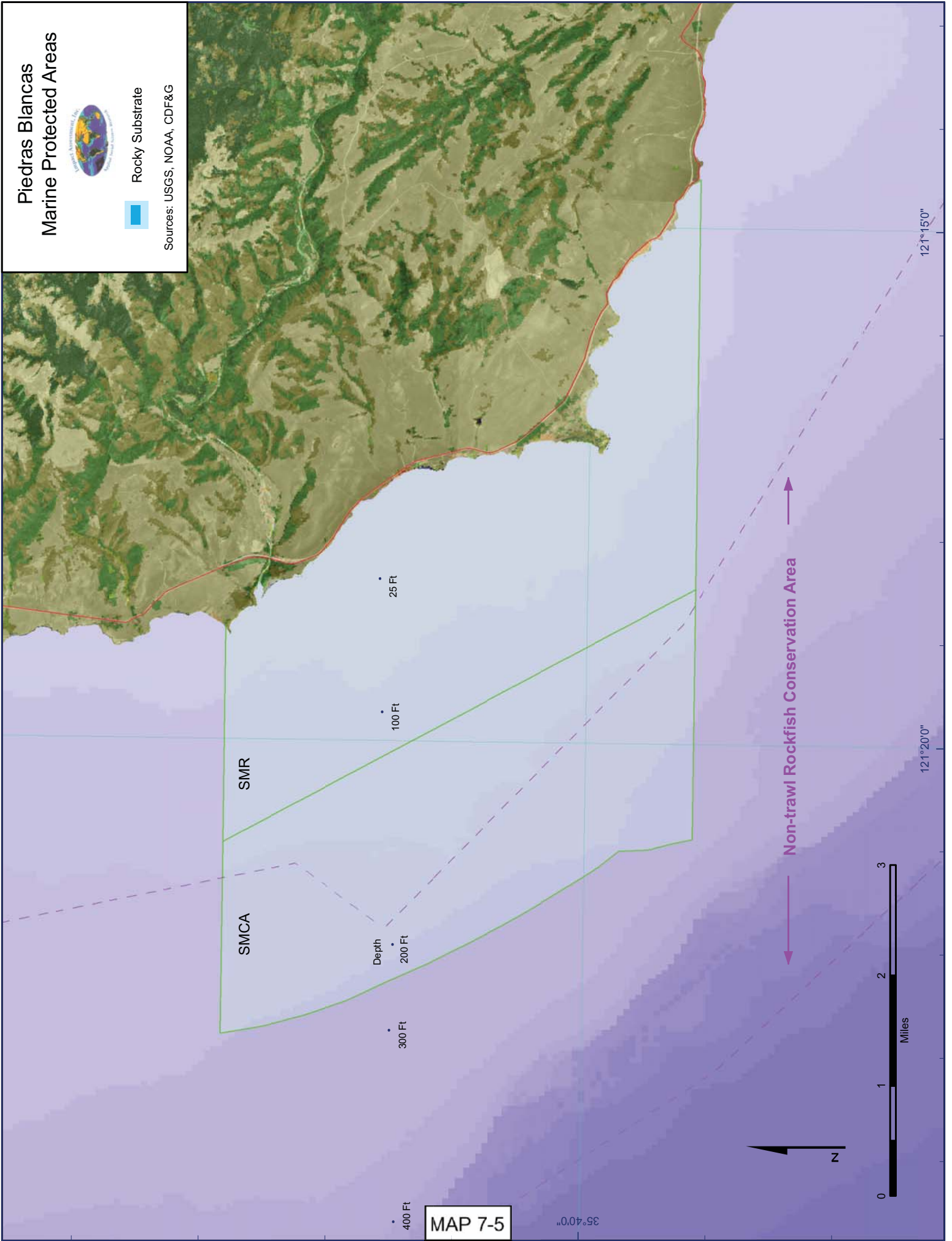
In the early 1800s, the waters of Piedras Blancas were exploited for whales, which supplied San Francisco markets with lamp oil. Grey whales were favored as they traveled south to Baja or north to Alaska. By 1852, a whaling station was established in San Simeon Cove. The high bluffs here once served as lookouts for whalers (Murray 1971).

Piedras Blancas Marine Protected Areas



Rocky Substrate

Sources: USGS, NOAA, CDF&G





Piedras Blancas Lighthouse, Established in 1875 (www.Californiacoastline.org)

A pier was constructed in San Simeon Cove in the 1880s for steamers carrying goods to and from Mission San Antonio in Monterey. A large hotel followed. The pier also served the Hearst estate on the inland hillside (Murray 1971). With the growth of the neighboring community of Cambria, the marine area eventually became popular grounds for commercial and recreational fishing.

Between 1900 and the mid-1950s, the rockfish fishery increased in economic importance in the area. In the 1950s, at least three commercial fishermen from San Luis Obispo County worked the Piedras Blancas area. Launching their small skiffs from Piedras Blancas, they fished with hook-and-line, earning \$0.25 for “red rock cod.” The rockfish fishery grew significantly during the 1960s.

Between the late 1950s and 1980s, captains of trawl and gill net vessels fished for flatfish, rockfish, and shrimp in the offshore zone; there was relatively little interest in the nearshore. Just outside of what is now the Piedras Blancas SMCA where the shelf falls off to roughly 140 fathoms, a number of trawl captains targeted shelf and slope rockfish during the 1970s and 1980s (see Map 7-15). Prior to the advent of roller gear in the 1980s, which enabled trawling further offshore, the area was important for captains pursuing chilipepper and widow rockfish. A substantial hook-and-line fleet targeted the shallower waters of Piedras Blancas for rockfish and other nearshore species.

Through the 1990s, reportedly between 25 and 30 commercial captains typically would access the Piedras Blancas area, with another 10 to 15 private recreational fishermen joining the fleet on weekends. According to one seafood dealer in the area, Piedras Blancas was highly productive and contributed extensively to rockfish landings attributed to Morro Bay.

The Piedras Blancas area was favored for two reasons. First, the intertidal areas, dense kelp beds, rocky substrate, and rock pinnacles provided good habitat for a variety of species, including the favored grass rockfish, which was sought for its increasing market price. Secondly, access to Piedras Blancas has always been relatively easy. Fishermen were able to park alongside the road and launch skiffs directly from the beach.

In the 1980s and 1990s, Morro Bay fishermen also pursued salmon and squid in the waters that now constitute the Piedras Blancas SMCA (see species Maps 7-17 and 7-18). Sardines and squid were often landed in Monterey, where facilities were more conducive to the wetfish fishery.

Sport fishing was well established by the 1970s in this area, with many boats launching from San Simeon, through the 1990s. A sport fishing operation owned by a family in Morro Bay was established in the early 1970s. A concession was leased from San Simeon State Park and during good weather, one or more of the company's six boats – with capacities of 40 to 75 persons – operated from the cove. Captains typically accessed Piedras Blancas and Cambria during half-day trips. During the winter season, the firm kept its boats in Morro Bay and ran operations from there. In the late 1980s, the company gave up its concession lease to another operator who moored boats in the cove during the winter. Within a few years, a storm swept through the area, leaving the vessels damaged along the shore. The concession was reacquired by the first operator for a short period. By the end of the 1990s, however, the operation relocated to Morro Bay year-round. The Piedras Blancas area was then accessed only during extended day and overnight trips on the weekends.

The departure of the sport fishing operation from San Simeon Cove paralleled a trend that had been occurring in both Morro Bay and Port San Luis. Rising operating costs that stemmed from increasing insurance rates and rising fuel prices led to diminished profit margins. Whereas in the 1970s as many as nine charter operations were based in Morro Bay, by the end of 1990, only one was operational. This operation concentrated on half-day trips to Point Buchon, Point Estero, and White Rock.

The 1990s marked the beginning of an era of the new commercial fishing rockfish regulations. Many of the large commercial operators adapted by diversifying permit holdings and fisheries. Some smaller operations entered the live fish fishery.

From another perspective, the 1990s were a time of change in how the Piedras Blancas area was conceived. As elephant seal populations grew during the 1990s, an increasing number of sightseers began to visit the area. At about the same time, Piedras Blancas and adjacent waters were designated as part of the MBNMS. Sanctuary rules furthered the protection of elephant seals and sea otters, and the marine environment was increasingly viewed as a passive use area.

A number of education and research institutions were also active in the Piedras Blancas area, including the California State University at San Luis Obispo, the MBNMS, and *Friends of the Elephant Seals*. The political landscape of the area changed markedly, as did ideas of how the marine zone should be managed. As one San Simeon State Park representative commented: “it’s a sign of the times . . . we went from a fishing spot to an educational and conservation venue.”

The area has also been used for non-consumptive recreational activities. Surfing and diving have regularly occurred here. Point Piedras Blancas reportedly attracted as many as 20 surfers during good swell events during the 1980s and 1990s. Some diving also occurred here in years past, but visibility tends to be poor, limiting the annual number of dive days to about 80 per year.

From 1970 to the mid-1990s, the occasional kayaker could be seen enjoying Piedras Blancas. An area resident reported that, on a given summer day with good weather, one to three kayakers would typically be seen touring the areas around Harlech Castle Rock (the site of a historic shipwreck) south to the islets around Point Piedras Blancas. Some paddled south to Arroyo Laguna. Since the mid-1990s, however, the presence of the elephant seal colony has tended to limit kayaking around Arroyo Laguna and San Simeon Bay.

San Simeon Bay has generally been a more popular area for recreational activities than Piedras Blancas. In the 1970s and 1980s, many windsurfers would use the cove on windy days. In the 1990s, both windsurfing and kiteboarding were popular, with roughly 15 kiteboarders seen on a windy day. Boardsailing around Arroyo Laguna also grew in popularity, with up to 40 windsurfers in the 1990s and 15 or so kiteboarders when that sport became popular in the early 2000s.

Recent Use of the Piedras Blancas Area. The NFMP, instituted in 2002, regulated the region's rockfish fishery by limiting entry, by closing the fishery on a seasonal basis, and by limiting take. The RCA closed the outer reaches of the area to trawling. But captains and crew using hook-and-line gear in the nearshore zone around Piedras Blancas were most significantly affected — the fleet reportedly diminished by two-thirds following implementation of the NFMP.

Despite the decline in fleet size, the fishery itself remained viable for those who remained. One fisherman stated that “there was the same amount of fish in the ocean but fewer guys to catch them.” Conditions became increasingly challenging when bag limits were instituted in the years that followed. Fishermen stated that a period of good fishing early in this decade could yield \$10,000; however, increasing costs of living and rising fuel prices have required many fishermen to supplement their income through land-based work.

The Morro Bay-based sport fishing operation that ran its longer charters to the Piedras Blancas area was also affected by the NFMP. Throughout the early 2000s, the operation ran at its 40-person capacity. But the NFMP affected the business in part by reducing the number of trips that could be made per year. The operator adapted by offering whale-watching trips during the closed periods, and by fishing as much as possible when the closures were not in effect. At the same time, however, NFMP-induced quotas reduced the number of fish that could be caught by fishermen during a given trip. This ultimately led to a decline in the number of interested anglers.

Regarding non-consumptive recreational activities in the Piedras Blancas area, by the mid-2000s, the presence of the elephant seal colony precluded further participation in the majority of recreational activities undertaken prior to their arrival. Surfers, in particular, report that elephant seals and accessibility issues have diminished use of this area. Several surfers now surf at Arroyo Laguna instead. Since the early 2000s, few kayakers or divers have been active around

Piedras Blancas, and Arroyo Laguna has surpassed San Simeon Bay in terms of the number of active kiteboarders and sailboarders.

7.9 Cambria

Location and Environment. Cambria SMCA encompasses 6.3 square miles, with an adjacent shoreline area of 5.8 miles (Map 7-6). White Rock SMCA encompasses 2.3 square miles, with an adjacent shoreline of 3.5 miles. Together, the MPAs encompass 8.6 square miles and cover 9.3 miles of shoreline between San Simeon State Park and Cambria Village. Protected waters range in depth from the shallows to 105 feet.

The Cambria SMCA is 1.5 miles offshore at its widest point. Commercial take is restricted while recreational harvesting is allowed. White Rock SMCA is directly south of the Cambria SMCA. Here, the taking of living marine resources is prohibited, with the exception of the commercial take of giant kelp and bull kelp by hand (persons with a valid permit may take 125 tons per month); all recreational take is prohibited.

The MPAs both lie directly adjacent to San Simeon State Park and the communities of Cambria and Moonstone Beach – the Cambria SMCA abuts Cambria North and Moonstone Beach; the White Rock SMCA abuts Cambria South. The MPAs encompass a rich variety of habitats and species. Long stretches of rocky substrate and kelp beds- suitable rockfish habitat- characterize the majority of the area. Sand and rocky bottoms and rock pinnacles characterize the offshore portion of the reserves. Steelhead trout streams empty into the area from a variety of locations.

Proximity to Morro Bay and Leffingwell Landing has traditionally made this area a popular destination for commercial and recreational fishermen alike. It is roughly 18 miles from Morro Bay to the southern boundary of the White Rock SMCA. Nearby Leffingwell launch provides recreational and commercial fishermen with direct access to the northern portion of the two marine reserves.



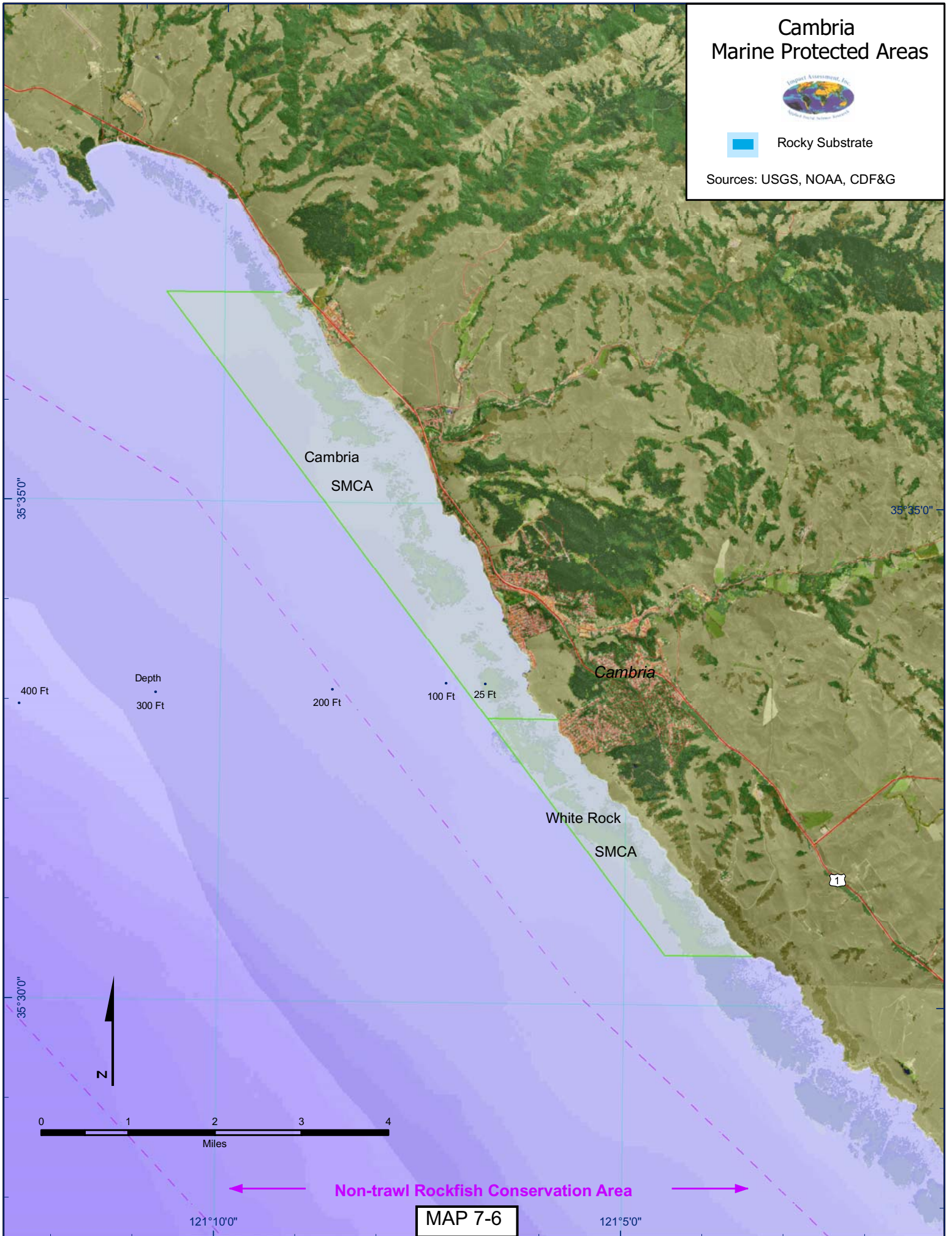
View of the Cambria coast (www.Californiacoastline.org)

Cambria Marine Protected Areas



 Rocky Substrate

Sources: USGS, NOAA, CDF&G



MAP 7-6

History of Use of the Cambria Area. Elderly residents discuss the history of Cambria and retell old stories about the 700-foot-long pier that was built into San Simeon Cove. When this was destroyed in a storm, a second 1,000-foot long pier was built to help supply the Hearst Estate. A third pier was built in 1956 after the second became dilapidated following a series of storms and earthquakes. The Hearst family ultimately granted the pier to the State and it became a public fishing pier.

Abalone was abundant along the Cambrian coast during the latter 19th and early 20th centuries. It was harvested and transported to markets and restaurants in San Francisco. A small abalone processing plant was located in the Cambria area until 1920, when it was moved to Morro Bay.

Diving became the primary means of abalone harvest in the 1930s. From the 1940s through the 1970s, three to four abalone processing plants were operating in Morro Bay. Each plant employed upwards of 30 processors. According to one fisherman, “everyone in town (Morro Bay) had some connection to commercial fishing in the ‘50s and ‘60s.” By the late 1970s, abalone stocks had become depleted and the last processor left the area.

The rockfish fishery has long been of importance in the Cambria area. The species was fished in the 1940s, when the price per pound is reported to have been \$0.07. But the fishery did not become significant until the late 1950s and early 1960s when the Morro Bay fleets were using a variety of gears to harvest the species. At that time, small-boat fishermen often worked the nearshore waters of Cambria.

Through the 1970s and 1980s, hook-and-line gear was often used in the Cambria area (see Map 4-8b in Chapter 4). Most vessels were smaller than 50 feet. One veteran fisherman reported that over 100 vessels provided a steady supply of rockfish to the area’s processors during the 1970s. A large trawl fleet was also operating in the offshore zone around Cambria and Piedras during this time. The fleet typically harvested rockfish, sole, and California halibut.

In the late 1980s, the live fish industry was introduced in the Morro Bay area, and it was soon discovered that the Cambria area provided excellent conditions for the fish. Key informants report that fishermen from San Francisco came to Cambria to fish for gopher rockfish. They marketed the species in ethnic enclaves in Little Korea and Chinatown. A buyer explains that this led to competition in the rockfish fishery, and for the average fisherman to keep pace with market demand, he, too, had to take part in the new fishery. Market prices reportedly rose quickly.

In the early years of the live fish fishery, the primary species were gopher and blue rockfish. But interest gradually shifted to cabezon, grass rockfish, and black-and-yellow rockfish. The 1990s were the heyday of the live fish business.

The price of live fish was largely driven by market conditions in Los Angeles and San Francisco. With \$10.50 per pound being paid for grass rockfish, \$7.00 per pound for cabezon, and \$2.00 per pound for lingcod at the Morro Bay offloading docks, live fish fishermen remained very active into the early 2000s. Live fish fishermen tend to use small skiffs since prime rockfish habitat can be found immediately offshore, requiring little travel. This fishery also favors kayaks.

According to one fisherman, “some kayakers do as well as small skiffs.” Today, kayak fishermen often bring in between 50 and 100 pounds of fish with hook-and-line gear and traps.

Several regulations instituted during the early 2000s affected the region’s live fish fishery. First, quotas preceding and following implementation of the NFMP are said to have seriously constrained the fishing industry here. Quotas regulating landings of the *Sebastes* complex in 1999 and other species in the 2000s (particularly cabezon and greenling) reportedly had a detrimental effect on the market and the fleets. Prior to these regulations many fishermen reportedly could fill their quota in about 10 to 20 days of fishing. One fisherman stated that “now, at most you can make is \$10,000 every two months.”

RCAs established between 30 and 60 fathoms appears to have led to a reduction in the size of the Cambria area rockfish fleet. Fishermen with larger vessels who wished to persist in the industry found they had to either switch fisheries or downsize their vessels.

Control dates for the NFMP limited entry program were set as 1994 to 1999. Fishermen were required to have landed 500 pounds of fish in three out of the six years. According to one offloader, “a lot of guys got aced out because they didn’t fish in the right period.” Indeed, it is noted that the live fish catch has been whittled down to a third of what it was, and nearshore permits in general contracted to roughly 50 in the Morro Bay/Port San Luis/Cambria area.

Regulations, quotas, and rising operating costs also affected the charter industry operating in the Cambria area. In the 1970s, as many as nine charter vessels leaving from Cambria, San Simeon, and Morro Bay on a given weekend fished Cambria waters for rockfish and California halibut. One operation remains active today.

At the same time, non-consumptive activities have grown in popularity. Surfing is now an established activity in the Cambria area. In the 1970s, ten surfers reportedly would surf at Pico Creek, San Simeon Creek, Exotic Gardens, Moonstone, and Santa Rosa Creek during good swell conditions. This is said to have increased to 20 to 30 surfers in the 1980s, and to as many as 70 surfers in the 1990s. The sport continues to grow in popularity across the region.

Scuba gear is often used for spear fishing; from one to two divers speared in the Cambria area in the summer months in the 1970s, and eight to 12 in the 1980s and 1990s. The most frequented spots were Pico Rock, Cambria Rock, and Von Helm Rock, all of which held an array of fish and marine life.

Kayaking in the Cambria area has been both non-consumptive and consumption-oriented in nature; this sport has also grown in popularity. In the 1970s and 1980s, only one or two kayakers might be seen here on a summer’s day, whereas in the 1990s, as many as ten kayakers paddled or fished here.

The San Simeon Creek Campground was established in the mid-1900s. A 3.3 mile trail provides scenic overlooks along the coastline. There are a number of launch sites for vessels and points of access for divers and surfers. The most active of these is Leffingwell Landing, a protected launch at the mouth of San Simeon Creek, located in what is now the Cambria SMCA.



Leffingwell Landing Day-Use Area

Recent Use of the Cambria Area. The Cambria area is often used for commercial and recreational fishing, surfing, kayaking, and diving. The live fish fishery also remains active. Approximately 30 commercial fishermen pursue rockfish and other nearshore species in the area. The primary target is grass rockfish, as the ex-vessel price ranges from \$10.50 to \$12.50 per pound. In recent years, between 3,000 to 4,000 pounds of grass rockfish were offloaded each week during the months of June and July.

The rising cost of fuel and current market prices continue to make this fishery popular for those who hold nearshore permits. Kayak fishermen, in particular, have had an advantage with respect to rising fuel prices and ease of access. According to the Pacific States Marine Fisheries Commission (2008), fuel prices in 2005 were four times higher than in 1999. In May 2008, diesel fuel was selling for \$3.95 per gallon at Morro Bay, and for \$4.38 per gallon in the Monterey area.

The Leffingwell launch ramp is popular with private boaters. Today, on a typical summer weekend, roughly six small skiffs and up to two dozen recreational kayaks will launch from Leffingwell's to fish around Cambria. Many anglers come from the inland communities of Paso Robles or Atascadero, as the Leffingwell launch is conveniently located near Highway 46.

The popularity of surfing remains constant; as many as 75 surfers can be seen in this area during good swell events. Divers also use this launch area on a regular basis.

Cambria's rocky intertidal areas have been the subject of institutional research interests. In 2001, the University of California established the Kenneth S. Norris Rancho Marino Reserve which is comprised of three kilometers of rocky shoreline, nearshore kelp forests, coastal grasslands, coastal live oaks, and pine forests.

The addition of the boardwalk alongside Cambria has brought new forms of activity. The boardwalk was constructed in 2001 by the California Conservation Corps. It provides visitors with nearly one mile of coastal viewing opportunities. The boardwalk runs between the coast and a line of hotels and restaurants in Moonstone Beach to San Simeon State Park and Cambria North.



Elephant Seals Observed from Viewing Area at Cambria SMCA, April 2007

7.10 Morro Bay

Location and Environment. Morro Bay is a 2,300-acre estuary, fed by Chorro and Los Osos Creeks. Throughout the years it has been a safe harbor for sea-going vessels. Agricultural lands surround the creeks and the bay. Morro Rock is one of the sacred sites of the Chumash People (Gates and Bailey 2001).

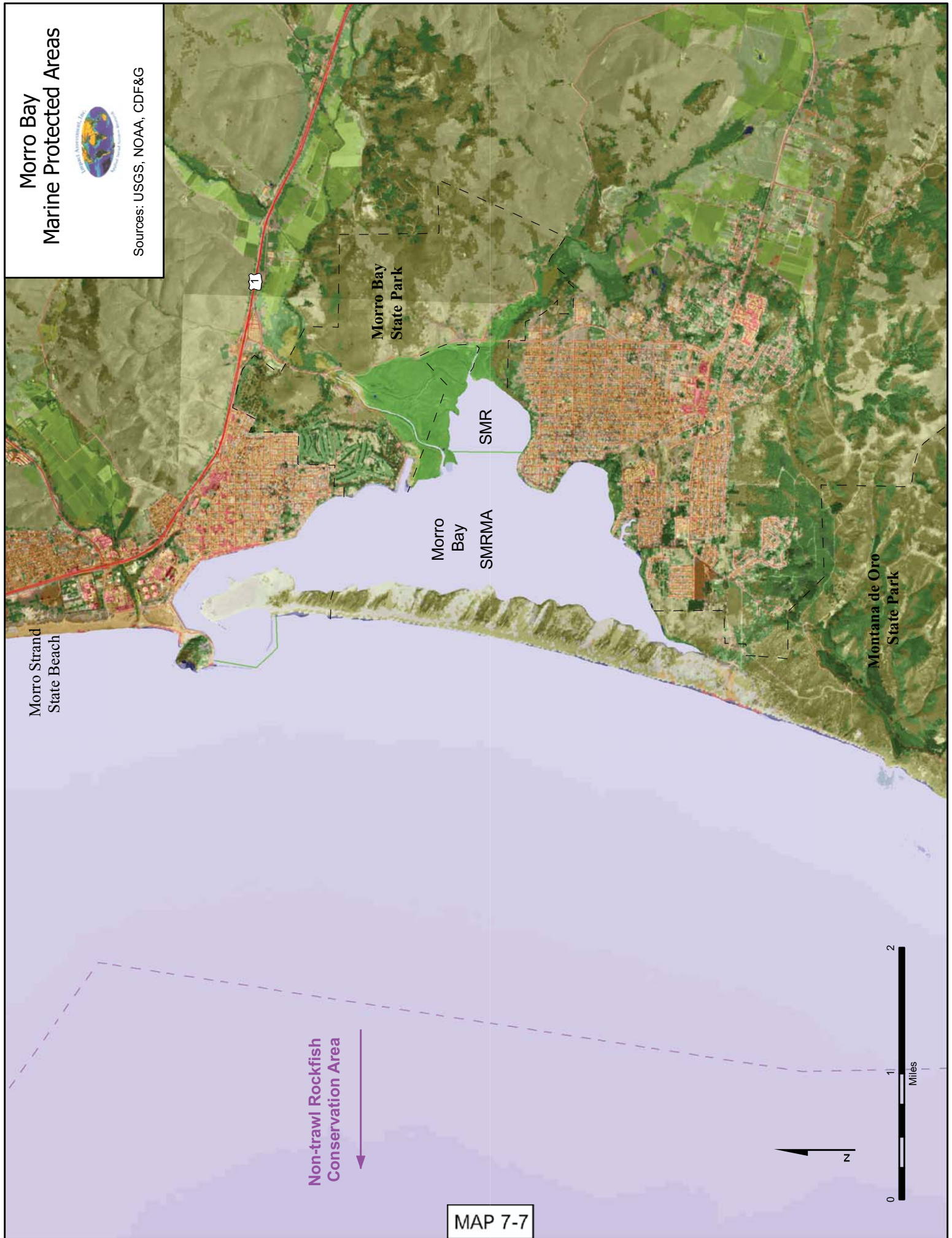
Morro Bay constitutes one of the most important wetland systems along the California Central Coast. It supports a range of diverse habitats including mudflats, eelgrass meadows, salt marshes, and tidal channels. Many avian species nest here.

The Morro Bay SMR is adjacent to Morro Bay State Park (Map 7-7). The reserve encompasses 0.3 square miles, with a shoreline span of 1.4 miles. Protected waters reach depths of 10 feet. Take of all living marine resources is prohibited.

Morro Bay Marine Protected Areas



Sources: USGS, NOAA, CDF&G



MAP 7-7

The Morro Bay SMRMA encompasses 3.0 square miles and 9.4 miles of shoreline waters in the management area range up to 22 feet in depth. Recreational hunting of waterfowl is allowed as is the recreational take of finfish. Aquaculture of oysters is permitted with a valid bottom lease and permit.

Morro Bay is the only all-weather small-boat harbor between Santa Barbara and Monterey. Although it is a natural embayment, the harbor was enhanced by the U.S. Army Corps of Engineers. The bay silts in and must be dredged every three to four years. Sedimentation naturally fills up the back-bay area and naturally occurring erosion alters the shape of the bay over time.

History of Use of the Morro Bay Area. Long before the arrival of the Spanish, Chumash Indians relied upon marine resources in and around Morro Bay. Fish, seals, and sea otters were taken with nets, traps, hooks, spears, and plant poisons. Abalone, oysters, and mussels were also gathered in and around the waters of Morro Bay (Morro Bay Chamber of Commerce n.d.).

The geology of Morro Bay is one of extensive volcanism. Morro Rock was given the name, “Gibraltar of the Pacific” by Juan Rodriguez Cabrillo, who sailed here in 1542 (NOAA n.d.). The Spanish used the bay through the 18th century. Following establishment of the town in the late 1800s, the harbor served as a mooring place for schooners. Jetties and breakwaters were eventually constructed to enhance the protective attributes of the bay.

An *embarcadero* or wharf was constructed in the late 1800s. Large amounts of albacore and salmon were landed here in the 1930s. The wharf was used by the U.S. Navy, which began operations in Morro Bay in 1940, securing the coastline from attack during World War II. After the war, the presence of the Navy gradually diminished.

The town of Morro Bay supported a significant abalone processing industry between 1920 and 1970. Abalone was harvested by shore-picking in the bay and rocky coastal areas. From about the 1930s on, harvesters from Morro Bay to San Simeon began to dive for abalone, increasing the volume of landings. The industry grew through the Depression years then diminished during the 1940s when many divers went off to war, only to resurge in the 1950s upon their return (Gates and Ream 2006).

The abalone industry eventually began to wane. Numerous factors are blamed by local informants: a growing sea otter population in and around the bay; withering foot disease; pollution from the wastewater treatment plant; run-off from coastal farms; and, finally, wastewater from the Diablo Canyon Nuclear Power Plant. Clearly, human pressure on the stock was also a factor. Landings dropped from 655,653 pounds in 1968 to 45,678 pounds in 1976 (Gotshall et al. 1976).

Other shellfish were harvested in the area between 1930 and 1960. The Pacific oyster, not native to the bay, was farmed on a commercial basis beginning in the 1930s, after attempts at planting the eastern oyster had failed. In the 1940s, Morro Bay became the leading oyster-growing region in California. Beginning in the early 1950s, several new growers acquired lease areas inside the bay and furthered the region’s oyster industry. The majority of the oysters were marketed in the

San Joaquin Valley. By the 1960s, the El Morro Oyster Company and Browns Oyster Farms were the main producers in Morro Bay, with the former operating a shucking and packing plant (Barrett 1963).

Clams were also harvested in and around Morro Bay. Local residents harvested clams for personal consumption beginning in the late 1800s and for commercial purposes in the 1920s. The Fish and Game Commission began to manage the region's clam resources in the mid-1930s (Gates and Bailey 2001). But by the mid-1970s, clam resources had begun to disappear. One community member stated that:

We used to go clamming for Pismos in '67 and '68 with the family. They always got limit but by the mid '70s the number of clams dropped, we couldn't find big clams. One of the factors was the arrival of the sea otters. My father was a biology professor at Cal Poly so these issues have always been evident . . .there was so much life in the ocean back then . . . clams, wild oysters in the bay. There's so little now. It's sad to see a dry ocean.

Albacore and salmon were prominent fisheries in the area from the 1950s onward. Peaks in production occurred during the first half of the 20th century and in the 1970s, when one ton of albacore fetched \$2,000 in ex-vessel value.

In the 1970s, several large trawlers were moored in Morro Bay Harbor, with another two or three at Avila, generating enough landings to warrant a large buying station for Starkist and Van de Kamps. Two trawlers came from Texas in the late 1970s to pursue pink shrimp, and these were joined by vessels from Oregon.

Three more trawlers came to Morro Bay in the 1980s. Many trawlers reportedly came from Monterey and Moss Landing, mooring in Morro Bay on a seasonal basis. Trawling was eventually pushed offshore (Maps 7-15 and 7-19 depict spatial patterns of the trawl fishery in the region since the 1960s.)

The Dover sole industry diminished in the 1980s and 1990s. This reportedly related to new regulations restricting the trawl fishery, failing market conditions, and the departure of six Morro Bay processing plants in the late 1990s.

Marine recreational activities have long been important around Morro Bay. Sailing, kayaking, and surfing have occurred in the area since the 1970s.

Divers have traditionally used the waters around and outside of the bay. Atascadero artificial reef, located off Morro Beach, was used by six to ten divers from the mid-1980s to the mid-1990s. Another six or ten divers could be found on summer weekends in the 1990s at Constantine Rock, Mouse Rock and Cayucos Pier. Diving inside the bay itself has never been popular, largely due to poor visibility.

Historical Changes Affecting Use of the Morro Bay Area. The viability of seafood processing along the Embarcadero diminished in relation to national economic recessions, state and federal regulations on the activities of the local fleet, and economic constraints specific to the conduct of

marine fisheries in the region. Factors associated with the departure of the processors included, but were not limited to:

- 1) The price of local water resources- in short supply across the region;
- 2) A diminishing labor pool and the rising cost of labor;
- 3) Workman's compensation laws and costs;
- 4) Rising fuel costs;
- 5) Low market values for seafood;
- 6) The rising number of seafood processors in Thailand, Japan, and Western Samoa; and
- 7) Fishing regulations.

Regarding (7) above, spatial, temporal, and gear-type regulations heavily affected fleets across the region through the 1980s and 1990s. Regulations continue to affect Morro Bay fleets in significant ways.

From the late 1950s through to the late 1980s, Morro Bay was also home to charter and party boat fleets. Captains targeted rockfish, salmon, and albacore. Initially, trip prices were relatively low, but with the rising costs of gas and insurance, these rose dramatically. The decline of the commercial fishing industry in Morro Bay harbor directly affected the sport fishing industry. As commercial fishing operations went out of business, the capacity of gas, tackle, and bait services also diminish.

The acquisition of bait has become a significant challenge for sport fishing operations. Bait – predominantly anchovies – has long been caught at the mouth of the harbor of Morro Bay. In the 1990s, sport fishermen could buy bait from high-volume bait distributors which primarily sold to commercial fishermen. But more recently, charter companies and tackle retailers must now find their own bait, making their work day substantially longer and substantially less cost effective. This alone can be a deciding factor in keeping a business open.

As the U.S. economy improved in the late 1990s and more residents had disposable income, and as ocean and coastal lifestyles increased in popularity, Morro Bay Harbor became increasingly geared toward recreational boating enthusiasts. More yachts and pleasure craft and fewer commercial vessels were moored in the area than in decades past (Sneed 2008).

While regulations associated with offshore trawl fisheries did not have an impact on the way or extent to which fishing was conducted in Morro Bay itself, these did eventually alter the form and function of the Embarcadero. The commercial fleet began to diminish in the 1990s, giving way to the skeletons of rusting fishing boats, empty dock and retail spaces, and recreational vessels. Moreover, with the departure of the last processor in the 1990s, more space was available for restaurants and shops. As the Morro Bay trawl fisheries began to decline, however, participation in the nearshore finfish fishery and the live fish fishery significantly increased. Thus, space on the offloading docks that was once used for processing trawl caught species became a staging area for processing live fish.



Commercial Fishing Vessels Moored in Morro Bay, May 2007

Growth in neighboring San Luis Obispo relates to positive and negative changes in Morro Bay. For instance, increasing rates of tourism have been beneficial in economic terms, but inland growth has also led to increased pollution from up-stream sources (Lisa Wise Consulting 2008).

Morro Bay fishermen and public officials who were contacted during the course of this study often discussed the effects of the Marine Mammal Act of 1972. Some report that seal and sea lion populations have risen dramatically since the Act was passed, and that this is having a major impact on the region's marine ecosystems, including reductions in juvenile fish and shellfish in the Morro Bay area.

A number of land use changes occurred in and around Morro Bay in the 1990s. Real estate prices increased significantly, bringing in affluent residents and leading to property tax increases. One seasoned fisherman asserted that real estate values are orders of magnitude higher than in the 1950s, and that commercial fishermen who can afford to purchase land or homes are few and far between.

After the mid-1990s, the Morro Bay economy became increasingly dependent on tourism. Yet there was and is a strong understanding that the growth of tourism related partly to the local heritage of fishing. According to the Mayor of Morro Bay, fishing provides community identity and a critically important topic for educational groups and programs. She cites the example of school groups which come from Los Angeles to Morro Bay to learn about the fishing industry. Another example is the nearby juvenile detention home which runs programs for detainees to learn about the occupation of fishing, and to gain a sense of "normal" life.



Natural and Human Features of the Morro Bay Landscape, May 2007

In the beginning of the 2000s, trawlers were still fishing in the region. The fleets required large amounts of ice. The Central Coast Joint Cable/Fisheries Liaison Committee financed a 32-ton, \$980,000 ice machine to assist the fleet. But with growing regulations and rising costs of fuel throughout the mid-2000s, trawl captains were seriously challenged. As discussed elsewhere, the Nature Conservancy and the Environmental Defense Fund, and the City of Morro Bay worked to purchase and decommission the fleet and to develop programs to establish high-value, low-volume sustainable fisheries in the region. Public officials hope that such programs may also offset problems resulting from reduced fisheries revenue, such as loss of harbor infrastructure.



South End of the Embarcadero at Morro Bay: June 2008

Recent Use of the Morro Bay Area. Since 2000, the Morro Bay area continues to be used for commercial and recreational fishing, and for shellfish aquaculture.

Kayaking remains popular with marine recreationalists. Now as many as 300 kayakers may be observed on the waters of Morro Bay on summer weekends; three kayak rental shops operate along the Embarcadero and the number of kayakers in neighboring areas such as Cayucos also has increased.

Surf spots at the mouth of the harbor – The Rock, Corners, and South Jetty – as well as along Morro Strand State Beach, have steadily grown in popularity. Today, scores of surfers may be observed at these breaks when conditions are good. Morro Strand State Beach is used consistently throughout the spring, summer, and fall months. On a good day in the summer, as many as 100 surfers will surf in the area from South Jetty to north of Morro Strand State Beach. Even on small or windy days in the summer, 40 to 50 surfers can be spotted using these areas. To the north, surfers access a number of Cayucos surf spots, including Cayucos Pier, Killer’s, Abalone’s, and Mouse Rock. As many as 100 surfers frequent Cayucos State Beach during good swell events.

North and seaward of The Rock is an area known as “The Pit,” which is used by kiteboarders. Between three and five kiteboarders commonly used this area during good days in the 2000s. Comparably, in 2000, between five and eight kiteboarders ride the swells at 24th Street in Cayucos.

According to dive shop operators, the popularity of scuba diving has apparently diminished in the area since the start of the 2000s. The reasons for this change are not apparent.

The land area around Morro Bay continues to be used for recreational and educational purposes. The Morro Bay State Park’s Natural History Museum receives 65,000 visitors annually. It provided educational programs to 14,000 children in 2007. The Morro Bay Audubon Society promotes bird watching in and around the bay, and provides monthly trips and programs to its members.

7.11 Point Buchon

Location and Environment. The Point Buchon SMR encompasses 6.7 square miles, with a shoreline span of 2.9 miles (Figure 7-6). Waters within the protected area reach depths of 208 feet. Take of all living marine resources is prohibited. The Point Buchon SMCA encompasses 11.6 square miles, with a shoreline span of 5.9 miles. Waters range from 191 to 377 feet in depth. Take of living marine resources is prohibited here, with the exception of commercial and recreational take of salmon and albacore.

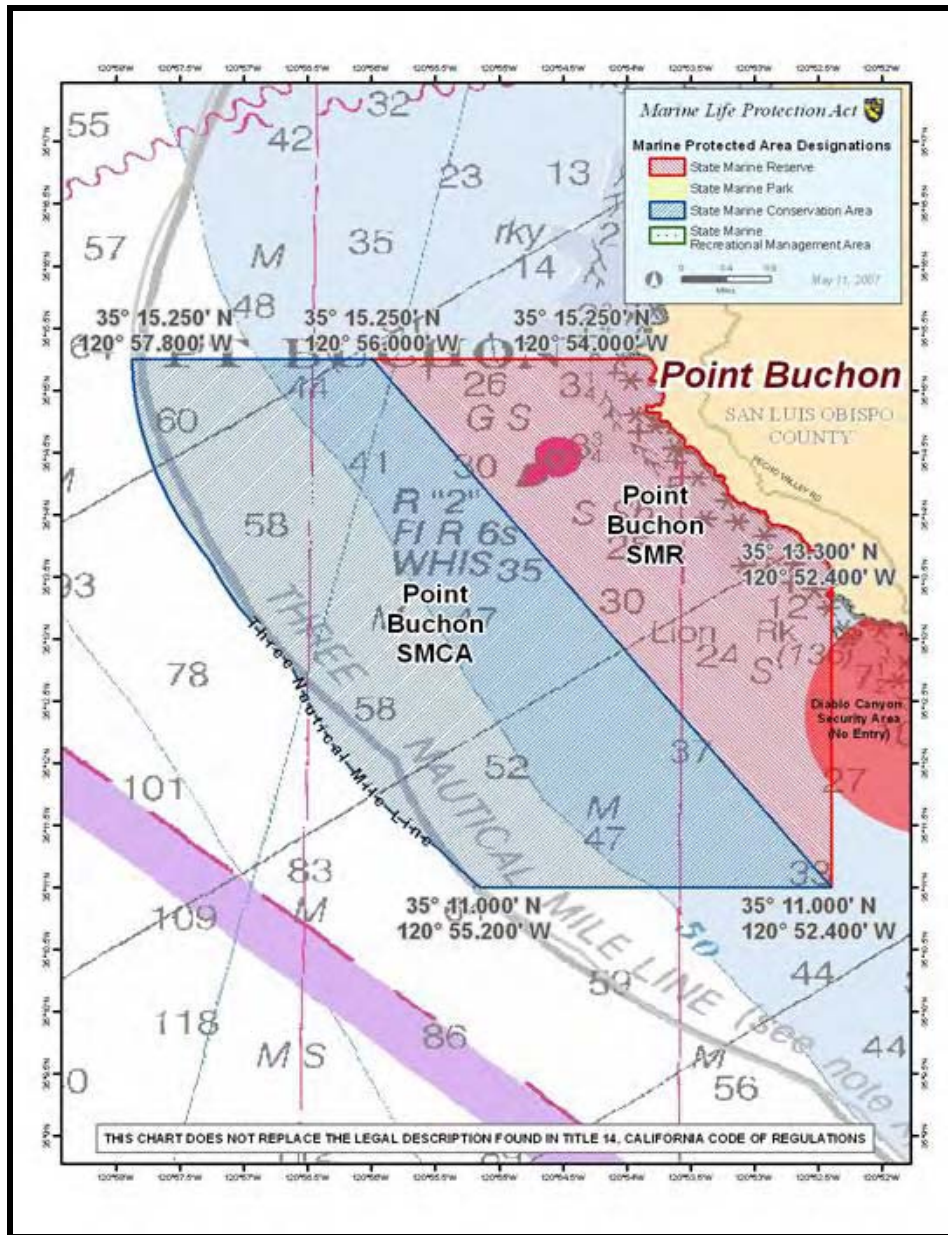


Figure 7-6 Point Buchon MPAs (Courtesy of CDFG)

These MPAs are situated roughly 16 miles from Port San Luis, with the northern boundary roughly eight miles from Morro Bay. Montaña de Oro State Park and the PG&E Diablo Canyon Nuclear Power Plant are adjacent along the shoreline. This area is characterized by terraced bluffs, rocky coastline, and coastal mountains. While the rugged shoreline and private ownership make ocean access difficult, proximity of the MPAs to both Morro Bay and Port San Luis make the area a favored fishing location. The northern boundary is two miles from Spooner's Cove, a protected natural cove feature along Montaña de Oro State Park. The cove is a popular put-in spot for kayaks and skiffs. It is also a popular entry spot for divers, and there are adjacent surf spots.

Substantial rocky substrate, coral reefs, and rock outcroppings comprise the nearshore section of the SMR. These features run the full length of the Reserve. Large sea otter populations frequent the area's nearshore kelp beds. The Diablo Canyon Power Plant has established a restricted area that extends in a one-mile radius around the plant.

History of Use of the Point Buchon Area. As with other coastal areas in south-central California, the Chumash Indians were the first users of the marine area, fishing, harvesting abalone and mussels, and trapping seals and otters. The waters subsequently went largely unused until around the turn of the 20th century, when both Morro Bay and Avila had become established fishing ports (California Department of State Parks 2005).

In the late 1800s and early 1900s, a wharf at Spooner's Cove accommodated numerous freight vessels. But it was not until the mid-1900s that this became a popular area for sport and commercial fishermen. The area between the Point Buchon buoy and the shoreline has historically been one of the more popular spots for the pursuit of nearshore species. The location was convenient for both Morro Bay and Port San Luis fishermen.

Squid appeared in the area on a periodic basis through the 1980s and 1990s (Map 7-18). This brought fishermen from Monterey and Moss Landing. A few captains reportedly also steamed up from Ventura.

The waters off Point Buchon and areas north of Morro Bay provided good salmon fishing from the 1960s through the 1990s. Between 15 and 20 local salmon fishermen used these areas on a regular basis during the period. Salmon were commonly caught at depths between 20 to 40 fathoms in the Point Buchon area, although some fishermen report catches in waters as shallow as 10 fathoms and as deep as 50 fathoms. Local fishermen consider the 1970s as the peak era for salmon and albacore. One longtime fisherman in Morro Bay reported that "at times, you could see a couple hundred boats along the coast here [mainly hailing] from other places."

Salmon are only periodically present in the Point Buchon area. This typically occurs in May and June.

Rockfish and other nearshore species were also commonly harvested around Point Buchon, though between 1970 and the early 1990s, most rockfish were taken by trawl vessels in the offshore zone (Maps 7-15 and 7-19). Informants report that a good percentage of total landings from this area derived from recreational rather than commercial fishing effort.

During the 1950s and 1960s, the Point Buchon area was regularly used by two or three commercial urchin fishermen who harvested the creatures in the rocky zones along the shoreline. But by the 1970s, many urchin harvesters moved to grounds in the Channel Islands. Abalone was also harvested in the Point Buchon waters, until the fishery closed in 1998.

At the time the Diablo Canyon Nuclear Power Plant was being constructed in the early 1970s, 25 to 30 commercial and recreational captains were fishing around Point Buchon. From 1970 through the 1980s, the fleet also included six party boats operating from Morro Bay. Weather permitting, each boat carried an average of 40 passengers at a time. By the 1990s, the number of

party boat operations had dwindled to one, which operated around Point Buchon for daily half-day trips in the summers, and carried an average of 60 passengers. Avila-based operators ran party boats daily between Port San Luis and Point Buchon at 40 person capacity. Rockfish were typically targeted. By the mid to late 1990s, the number and volume of operations had decreased significantly. Informants attribute this change to regulations which limited the number of fish that could be taken by each patron. Seasonal closures also affected the industry.



Live Fish buying and Selling Station, Harford Pier, Port San Luis, Avila, June 2008

During the mid- to late 1980s, the live fish industry became increasingly popular for commercial captains working from Avila and Morro Bay. The often clear, shallow, and rocky features of the Point Buchon area were particularly favorable for trapping grass rockfish. The Harford Pier at Port San Luis in Avila reportedly bustled with live fish fishermen. Four buyers and retailers were based in the area at the time.

In terms of non-extractive recreational uses, the waters in the Point Buchon area have generally not been used extensively. From the late 1980s to about 2000, dive boats accessed the area from Spooner's Cove to Port San Luis with patrons diving along the nearshore reef structures. The boats were usually filled to ten-person capacity. Divers typically have a 20- to 30-day window in the summer months in which they can dive in this region, due to frequently undesirable and/or unsafe weather and sea conditions.

Difficult access and often rough conditions have often deterred kayakers from using these waters. Kayakers accessing the ocean near Point Buchon have typically departed from Spooner's Cove, roughly two miles distant. Knowledgeable informants report that, in the 1970s and 1980s, only one or two kayakers fishing between Spooner's Cove and Pismo Beach, accessed the area via Spooner's Cove, Avila Beach, or Pismo Beach.



Deep Blue Waters around Point Buchon (www.Californiacoastline.org)

Regarding use of land in the region, Montaña de Oro State Park and Diablo Canyon Nuclear Power Plant abut the area that now forms the Point Buchon MPA. Montaña De Oro is one of the largest state parks in California. Its name, meaning “Mountain of Gold,” was intended to represent the terrain, the grasslands of which are golden in autumn.



Diablo Canyon Nuclear Power Plant between Avila Beach and Montaña de Oro State Park
(www.Californiacoastline.org)

Recent Use of the Point Buchon Area. Point Buchon has been consistently accessed in recent years for both commercial and recreational fishing activities. The waters from Point Buchon out to roughly 160 feet and along the coast to Lion Rock hold a number of good fishing spots for rockfish, lingcod, and cabezon. The area directly offshore Point Buchon encompasses a variety of habitats, including kelp beds, shallow rocky areas, point bars, and deep rocky structure conducive to bottom-dwelling species. The southern portion of the area around Diablo Canyon and including Lion Rock holds rockfish, lingcod, cabezon, and California halibut. Warm water from the power plants coupled with shallow rock reefs and kelp beds provide good habitat for bottom-dwelling fish. Nearshore rockfish and bottom-dwellers have thus been a principal target, especially for commercial live fish fishermen and recreational anglers (Map 7-19).

Squid and salmon anglers have been caught in the Point Buchon area on a periodic basis through the 2000s (see species Maps 7-18 and 7-20). In 2005, Morro Bay fleets landed substantial volumes of salmon during the first month of the season before heading north to fish around Monterey. Another good run of salmon was pursued in 2007.

Squid landings in the area have also been substantial in recent years, particularly during 2005 and 2006. One fisherman reports taking in 1,000 tons in 2005. The catch was landed in Monterey.

The live fish and nearshore fisheries have continued to be important around Point Buchon, although the market took a slight downward turn. Lingcod and cabezon were targeted in these waters mostly with skiffs, though sometimes with kayaks. On a good day with tranquil seas, anywhere from five to eight live fish fishermen accessed the area, bringing their catch either to Morro Bay or Port San Luis. Despite the advent of the limited entry program and subsequent regulations on size and gear, the live fish fishery continued to thrive.

The number of hook-and-line recreational kayak fishermen fishing around Point Buchon increased from two to three on any given summer's day during the period 2000 to 2006, to five to ten between 2006 and 2007.

Party boat captains also made significant use of the area in the 2000s. The operation working from Port San Luis continued to run several boats a week during the summer, but reportedly with a reduced clientele – far less than the 40 person capacity. The Morro Bay captains also continued to make trips here, accessing the area on good weather days with one or two 40-person capacity vessels for half-day trips. As can be expected, the number of patrons varied with weather conditions and time of year.

Boat-based recreational anglers fished Point Buchon waters during the 2000s. On a good weather weekend day in the summer, upward of 50 vessels used this area. On average, 25 to 30 percent of recreational captains using the Port San Luis launch ultimately fished the Point Buchon area.

Non-extractive uses of the area are limited. Recreational diving and kayaking are not commonly undertaken here.

With regard to surfing, a new break called Coon Creek began to be frequented during the 2000s. On a good day, roughly five surfers might surf here. In waters north of Point Buchon, surfing at the break called Hazards has grown considerably in popularity. Between 20 and 30 surfers might surf this spot. Left Spot and Screamer's are also surfed during favorable swells and wind conditions.

Montaña de Oro remains a popular State park, with miles of trails and views of the scenic coastline. PG&E has created public use trails on adjacent land and is planning to extend Point Buchon Trail out to a viewing platform atop the point, with stairs heading down to Coon Creek. This will enable foot access to the Point Buchon shoreline.

7.12 Vandenberg

Location and Environment. In 1941, some 86,000 acres of open lands in the Lompoc-Guadalupe-Santa Maria region were appropriated by the United States Army. A large military encampment called Camp Cooke was quickly established here. This was used as a training center for armored and infantry troops preparing for overseas duty against German and Japanese forces. The installation was used again in 1950 to facilitate training during the Korean War. Transformation of Camp Cooke into the nation's first space and ballistic missile training base began in 1957 when it was transferred to the United States Air Force. The facility was renamed Vandenberg Air Force Base. Vandenberg AFB is the only military base in the United States from which unmanned government and commercial satellites are launched into polar orbit. It is also the only site from which intercontinental ballistic missiles are test fired into the Pacific (Vandenberg Air Force Base 1995).

The Vandenberg SMR is situated roughly 27 miles from Port San Luis (Figure 7-7). The SMR encompasses 32.8 square miles, with a shoreline span of 14.3 miles. Protected waters reach depths of 127 feet. The reserve is immediately adjacent to Vandenberg AFB.³ Roughly 2.5 miles of the northern portion of the SMR consists of shallow rocky substrate with depths ranging from the shoreline shallows to 90 feet. Another smaller area of rocky substrate and shallow reef extends out to a maximum of .5 miles in the southern portion. Sandy bottom comprises much of the remaining areas. The area supports abundant rockfish and marine mammals.

The Vandenberg AFB has established nine security zones along the coast, extending from Point Sal to Point Conception. Since the terrorist attacks of 2001, the mid-to-southern section of the Vandenberg MPA from Santa Ynez River to Point Arguello Lighthouse (Zone 4) has remained permanently closed to all users.⁴

³ Fishing was prohibited in the Vandenberg MPA Ecological Reserve in 1994.

⁴ Within Military Danger Zone 4 off Vandenberg Air Force Base, per 33 CFR 334.1130, the stopping and loitering of any person or vessel is expressly prohibited between the mouth of the Santa Ynez River and Point Arguello unless prior permission is obtained (CDFG 2006:4-21).

The shallow rocky substrate around Purisima Point and Point Arguello is favorable habitat for a variety of nearshore species. The offshore supports a number of important species, including English sole, petrale sole, California halibut, squid, rockfish, pink shrimp, spot prawns, and Dungeness crab.

History of Use of the Vandenberg Area. The Chumash Indians were the earliest known inhabitants of what is now the Vandenberg AFB. Catholic missionaries arrived in the mid-1800s.

The waters off of Vandenberg remained largely unused even after the town of Lompoc was established in 1888. This section of the California coast has been referred to as the “Graveyard of the Pacific.” Over 50 ships have been lost along the rocky coast here. Point Arguello Lighthouse was established in 1901 to help reduce the loss of lives and vessels.

With the establishment of Vandenberg AFB in 1941, and subsequent designation of weapons testing zones around the base, ocean access was increasingly restricted. Sophisticated ballistic weaponry was developed at the base following World War II.

Commercial fishermen have pursued rockfish, brown rock crab, and Dungeness crab since the 1970s. The crab fishery has been particularly important (Map 7-21 depicts spatial patterns of action by the region’s crab fleet).

The area from Purisima Point to Point Arguello has been an important trawl zone since the 1970s. The deeper waters outside Purisima Point have been trawled extensively for California halibut, petrale and English sole, shrimp, spot prawn, rockfish, sablefish, and Dover sole. From the 1970s through to the 1980s, one or two petrale sole trawlers occasionally trawled in two general trajectories within what is now part of the Vandenberg SMR (Maps 7-15 and 7-19). Trawling here reportedly diminished in the 1990s, when processing companies left Morro Bay.

Rockfish was also targeted in waters now encompassed by boundaries of the Vandenberg SMR. Between 12 and 15 Avila-based live fish fishermen worked in this area during the late 1980s and into the early 1990s (see Map 4-9b in Chapter 4). Vessels ranged from 20 to 40 feet in length.

The Vandenberg area reportedly has been reliably productive for many years. Some fishermen report having filled 75 percent of their quota on a single trip to the area. Vandenberg was considered by some a “safety valve” for satisfying buyers attempting to meet the demand of a growing market. The disadvantage was and is that weather and sea conditions are often challenging here. Fishermen remark that weather conditions naturally manage fishing effort in the area.

Crab has been harvested in the area southwest of Purisima Point since the late 1970s. Nearly 75 percent of the annual brown rock crab harvest purchased by Morro Bay/Port San Luis area buyers is said to be trapped there. It is typical to find 60 to 80 traps here during the active season. A fisherman from the Morro Bay area continues to set traps in these waters as market conditions warrant. He rotates between the San Francisco area in winter and between Point Sal to Point Arguello in spring and summer. Rock crab grounds formerly included parts of what is now the Vandenberg MPA.

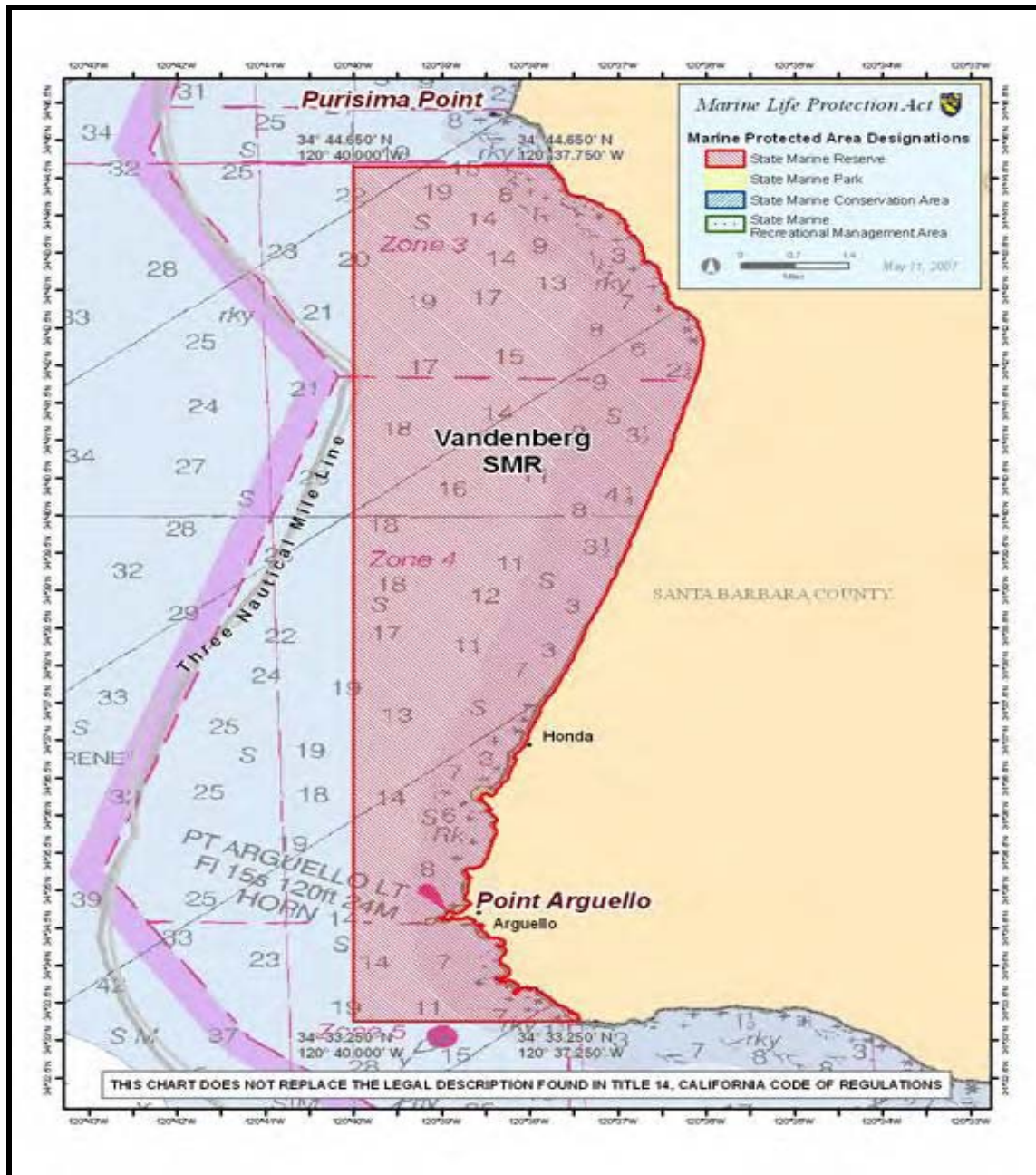


Figure 7-7 Chart of Vandenberg SMR (Courtesy of CDFG)

Regulatory changes reportedly have not significantly and directly affected the Dungeness crab fishery in the region. The average size and abundance of crabs reportedly remained consistent from the late 1970s, through the 1980s and 1990s.

Given distance from port and often challenging weather and sea conditions, boat-based recreational fishing activities are not as common in the Vandenberg area as at other spots along the Central Coast. But some fishermen do make the trip on occasion. Surf fishing is sometimes undertaken in areas open to the public. Barred perch is often landed. Surfing, windsurfing, kiteboarding, and other ocean and shore-based recreational activities are popular at Jalama Beach

County Park, which lies to the south of the Vandenberg SMR. While surf conditions can be ideal at times, and scores of surfers have been making the scenic trip from Highway 1 for many years, wind conditions can be frustrating. The area is typically closed during missile tests.



Purisima Point
(www.Californiacoastline.org)

Recent Use of the Vandenberg Area. In recent years, brown rock crab and various nearshore and rockfish species have been pursued in the nearshore area around Purisima Point. Bolina rockfish reportedly are particularly abundant in deeper waters in this area. Purisima Point remains important for 10 to 12 small-boat fishermen from Port San Luis, many of whom report that they harvest some 75 percent of their quota from an area that extends about one mile northwest and three miles southwest of the headland. This includes a portion of what is now the Vandenberg SMR.

Brown rock crab continued to be harvested in the Vandenberg area. As is the case with the bolina fishery, the area has been important for harvest of crab during periods of high demand, such as national holidays. Vandenberg is reportedly one of the most productive rock crab grounds in the region. Harvesters report that regional demand for local crab has led to favorable market conditions and that this is strong incentive for persisting in the fishery around Vandenberg. But some also report that rising fuel costs and a deteriorating national economy are associated with the recent attrition in the size of the fleet.



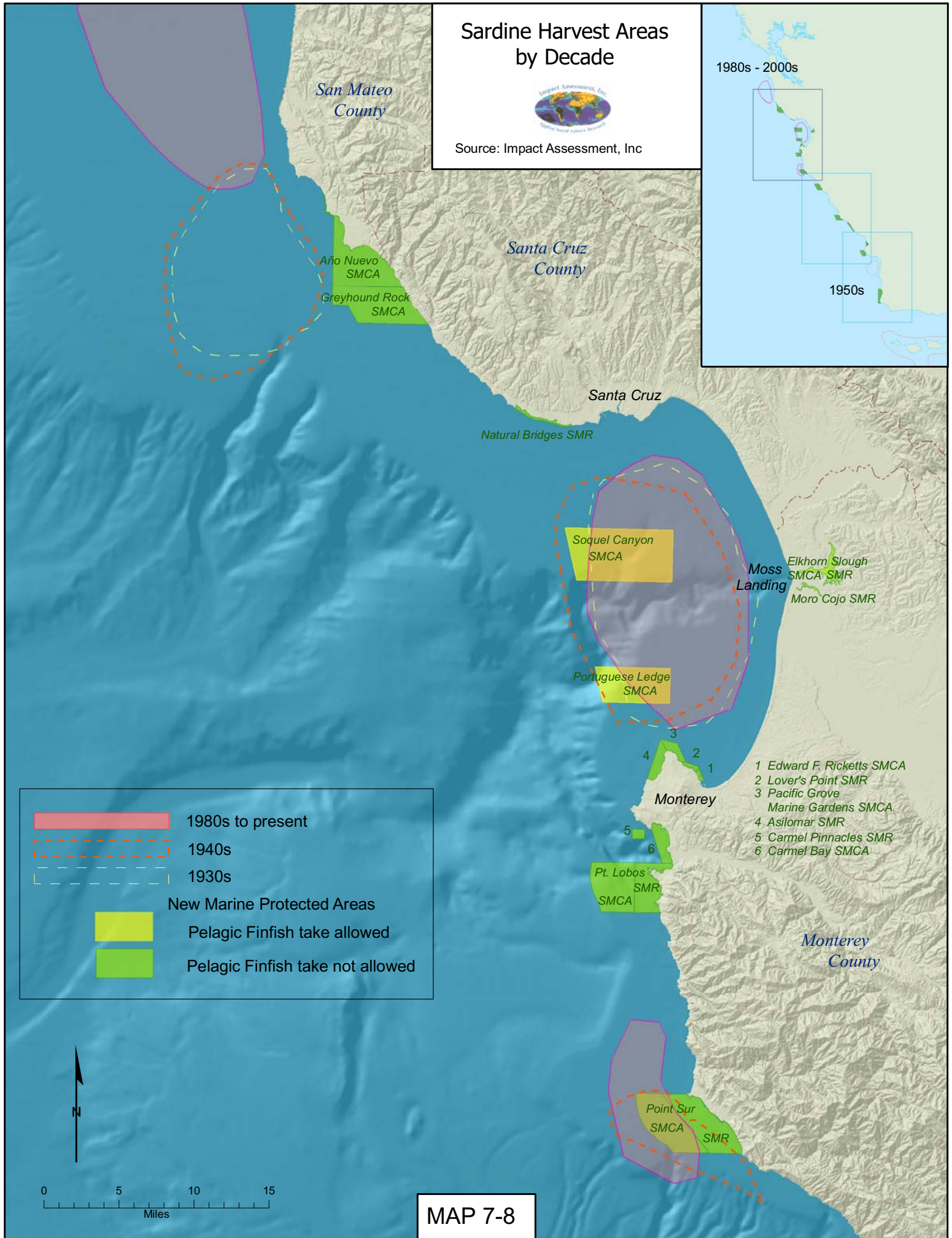
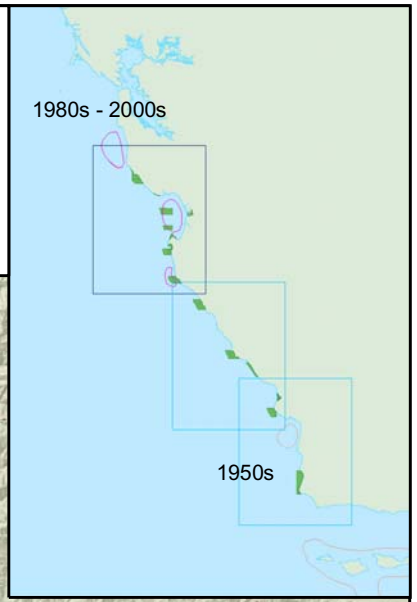
Jalama Beach with Purisima Point in the Distance

MAPS OF CENTRAL COAST HARVEST AREAS BY SPECIES AND DECADE

Sardine Harvest Areas by Decade

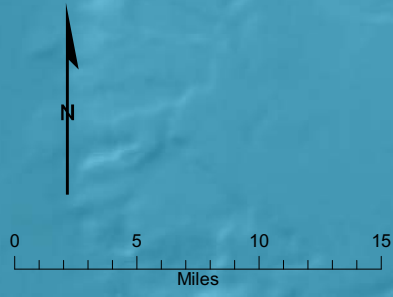


Source: Impact Assessment, Inc



	1980s to present
	1940s
	1930s
	New Marine Protected Areas
	Pelagic Finfish take allowed
	Pelagic Finfish take not allowed

- 1 Edward F. Ricketts SMCA
- 2 Lover's Point SMR
- 3 Pacific Grove Marine Gardens SMCA
- 4 Asilomar SMR
- 5 Carmel Pinnacles SMR
- 6 Carmel Bay SMCA

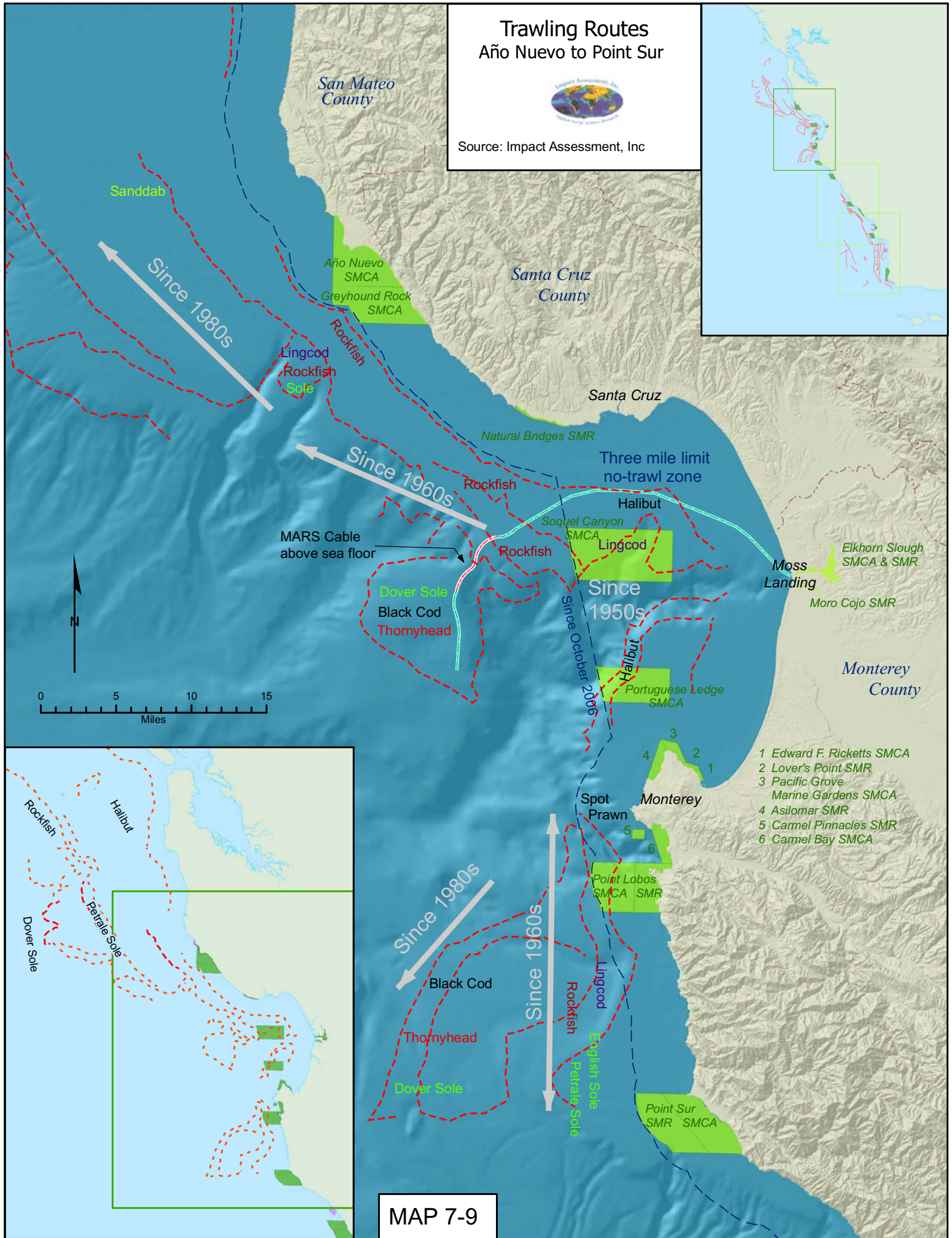
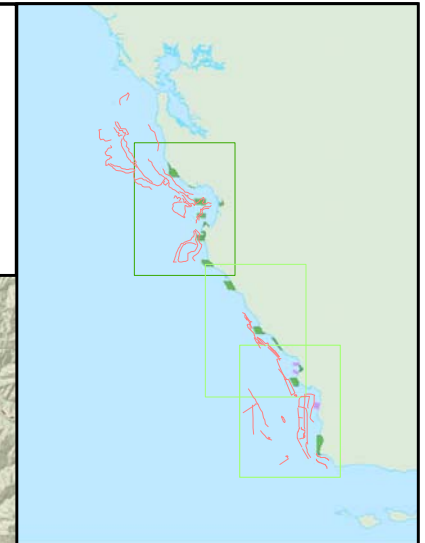


MAP 7-8

Trawling Routes Año Nuevo to Point Sur



Source: Impact Assessment, Inc



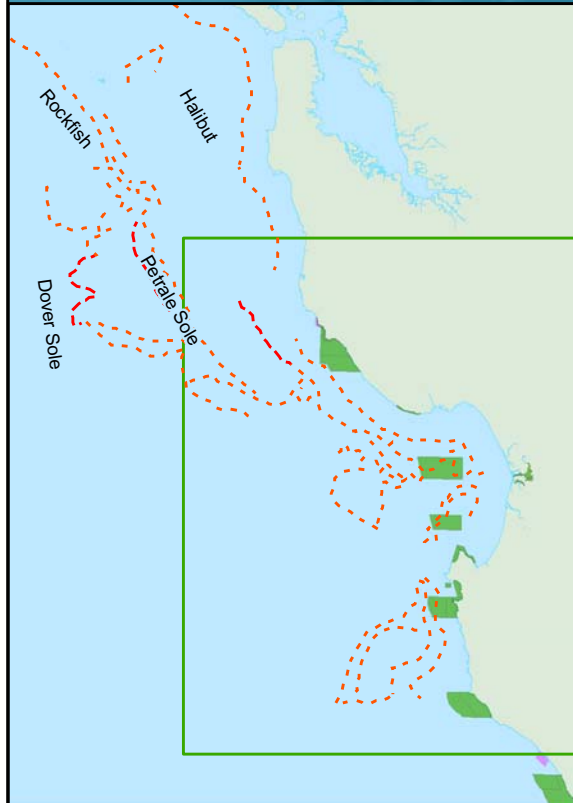
Since 1980s

Since 1960s

Since 1950s
Since October 2005



- 1 Edward F. Ricketts SMCA
- 2 Lover's Point SMR
- 3 Pacific Grove Marine Gardens SMCA
- 4 Asilomar SMR
- 5 Carmel Pinnacles SMR
- 6 Carmel Bay SMCA



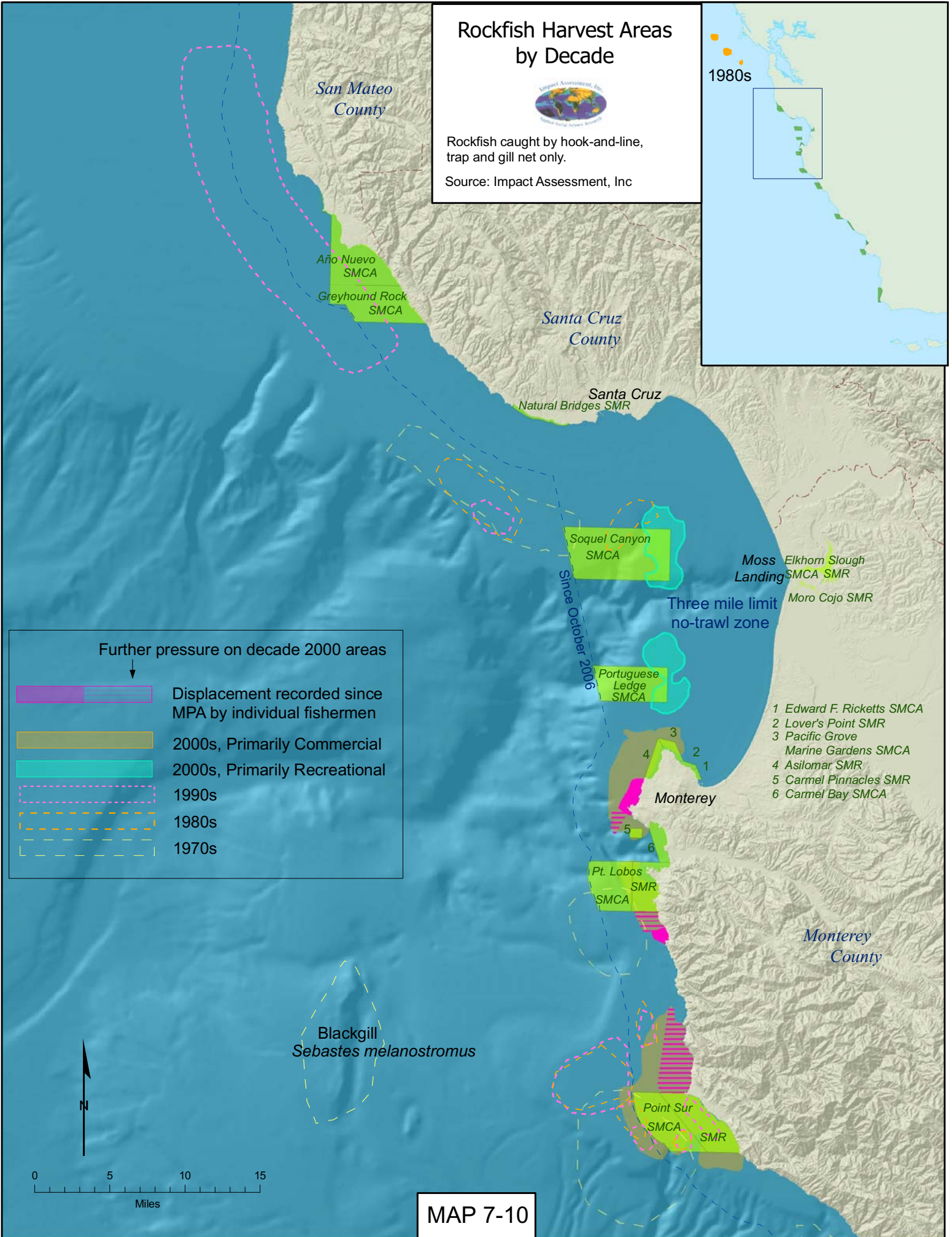
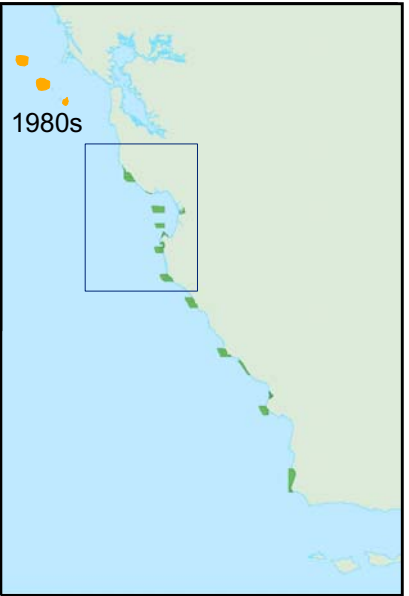
MAP 7-9

Rockfish Harvest Areas by Decade



Rockfish caught by hook-and-line, trap and gill net only.

Source: Impact Assessment, Inc



Further pressure on decade 2000 areas

- Displacement recorded since MPA by individual fishermen
- 2000s, Primarily Commercial
- 2000s, Primarily Recreational
- 1990s
- 1980s
- 1970s

- 1 Edward F. Ricketts SMCA
- 2 Lover's Point SMR
- 3 Pacific Grove Marine Gardens SMCA
- 4 Asilomar SMR
- 5 Carmel Pinnacles SMR
- 6 Carmel Bay SMCA

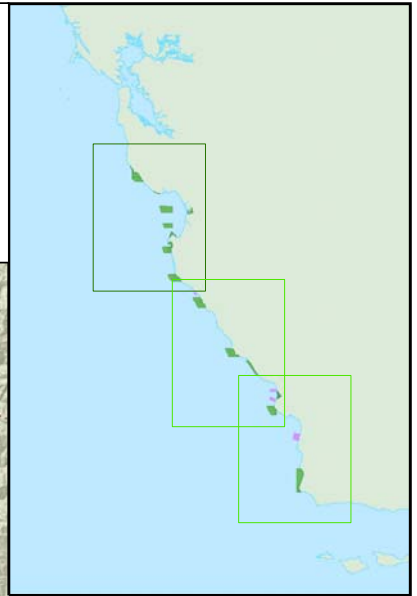
Blackgill
Sebastes melanostromus

MAP 7-10

Salmon Harvest Areas by Decade



Source: Impact Assessment, Inc



San Mateo County

Santa Cruz County

Santa Cruz

Natural Bridges SMR

Soquel Canyon SMCA

Moss Landing

Elkhorn Slough SMCA & SMR
Moro Cojo SMR

Portuguese Ledge SMCA


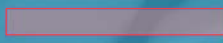



Monterey County




Monterey

Point Lobos SMCA SMR

Point Sur SMCA SMR

Note that decade 2000s and displacement data pertains to both commercial and recreational fishing.

-  Projected displacement after MPAs
-  2000s
-  1990s
-  1980s
-  1970s

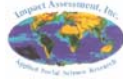
-  New Marine Protected Areas
-  Salmon fishing not allowed
-  Salmon fishing allowed

- 1 Edward F. Ricketts SMCA
- 2 Lover's Point SMR
- 3 Pacific Grove Marine Gardens SMCA
- 4 Asilomar SMR
- 5 Carmel Pinnacles SMR
- 6 Carmel Bay SMCA

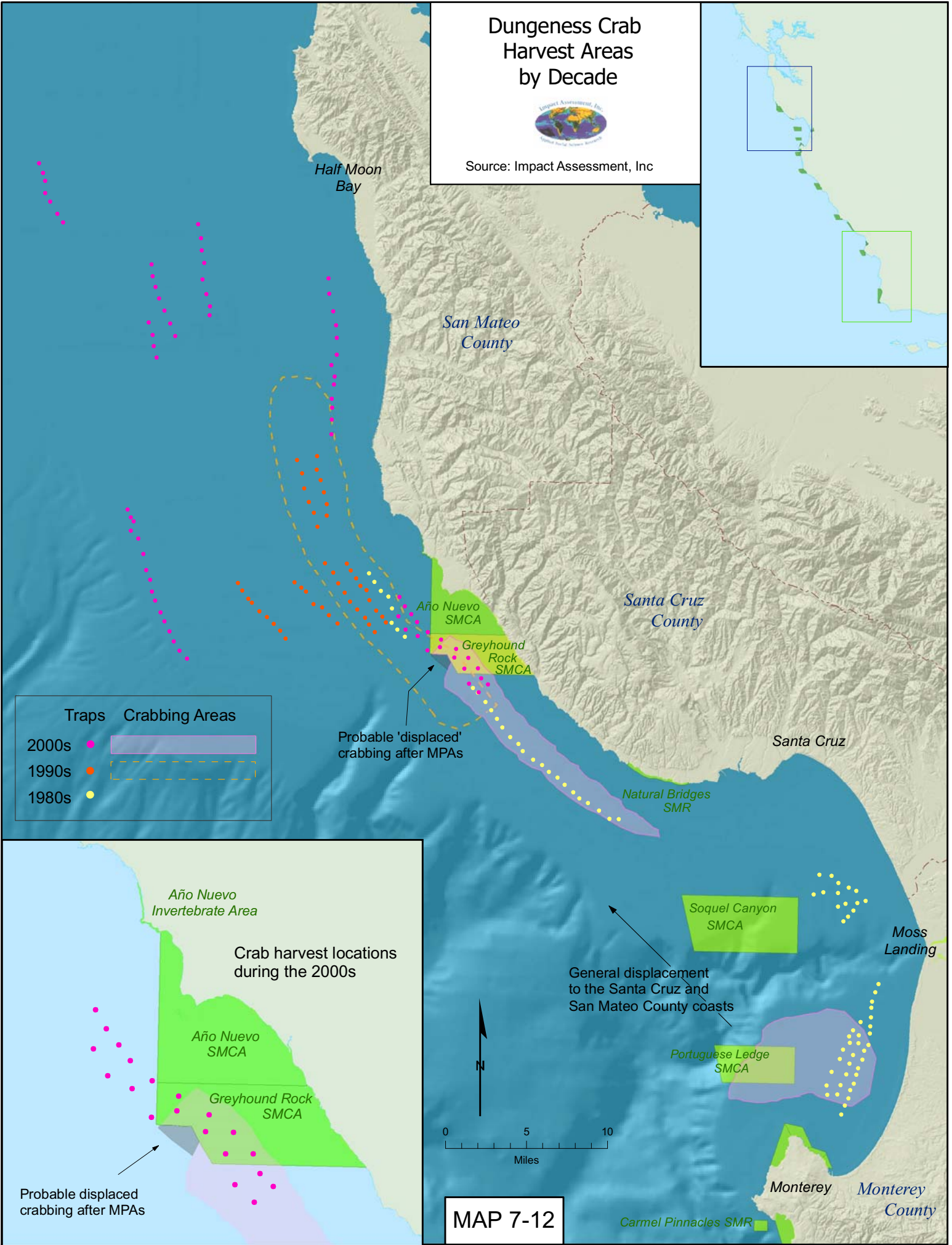
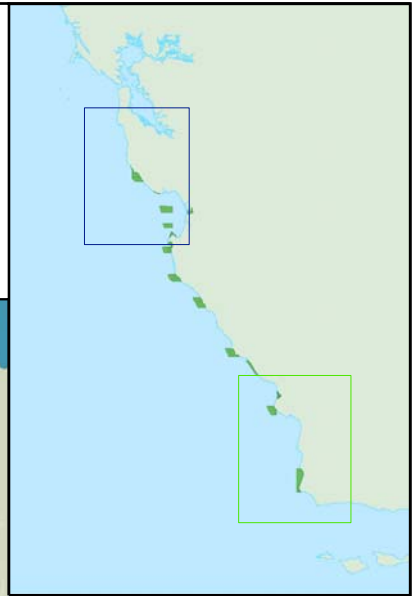


MAP 7-11

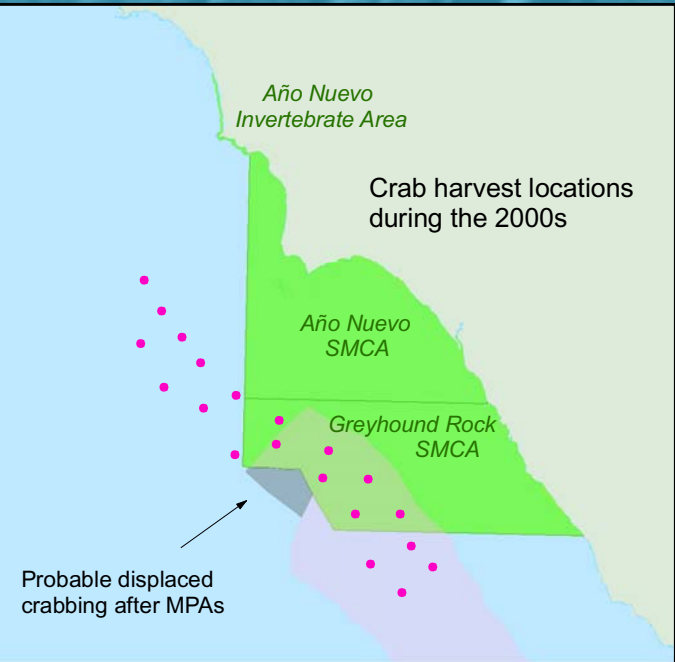
Dungeness Crab Harvest Areas by Decade



Source: Impact Assessment, Inc



Traps	Crabbing Areas
2000s	
1990s	
1980s	

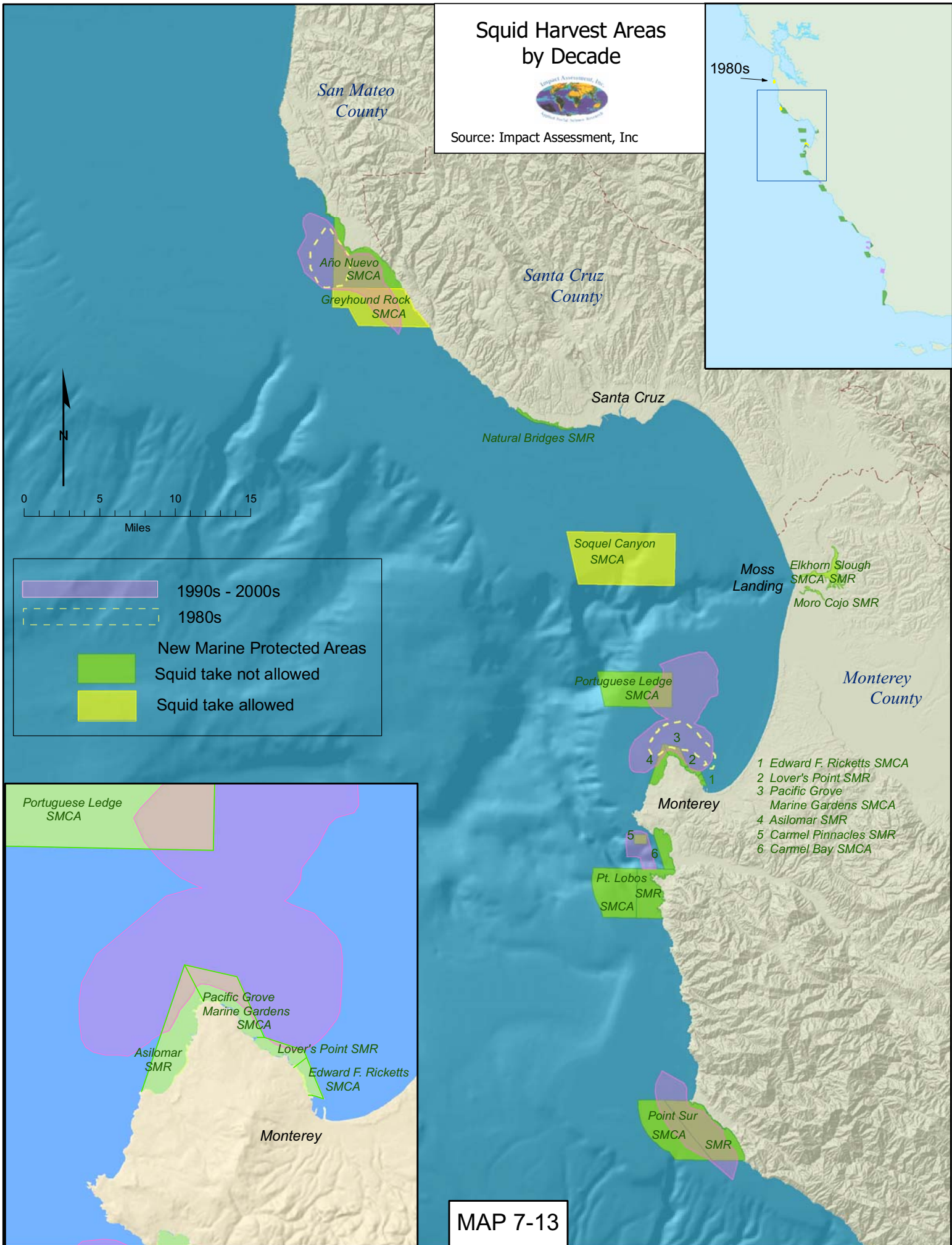
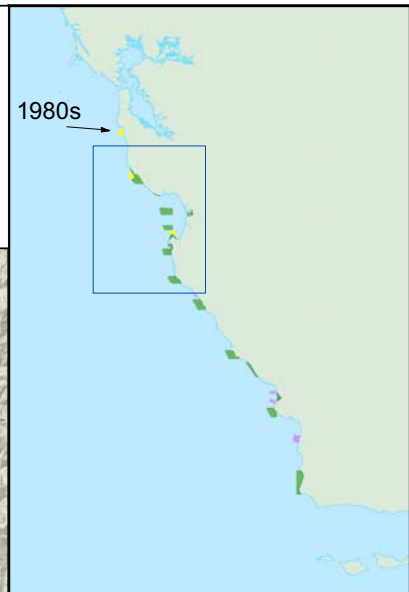


MAP 7-12

Squid Harvest Areas by Decade



Source: Impact Assessment, Inc



1990s - 2000s
 1980s
 New Marine Protected Areas
 Squid take not allowed
 Squid take allowed

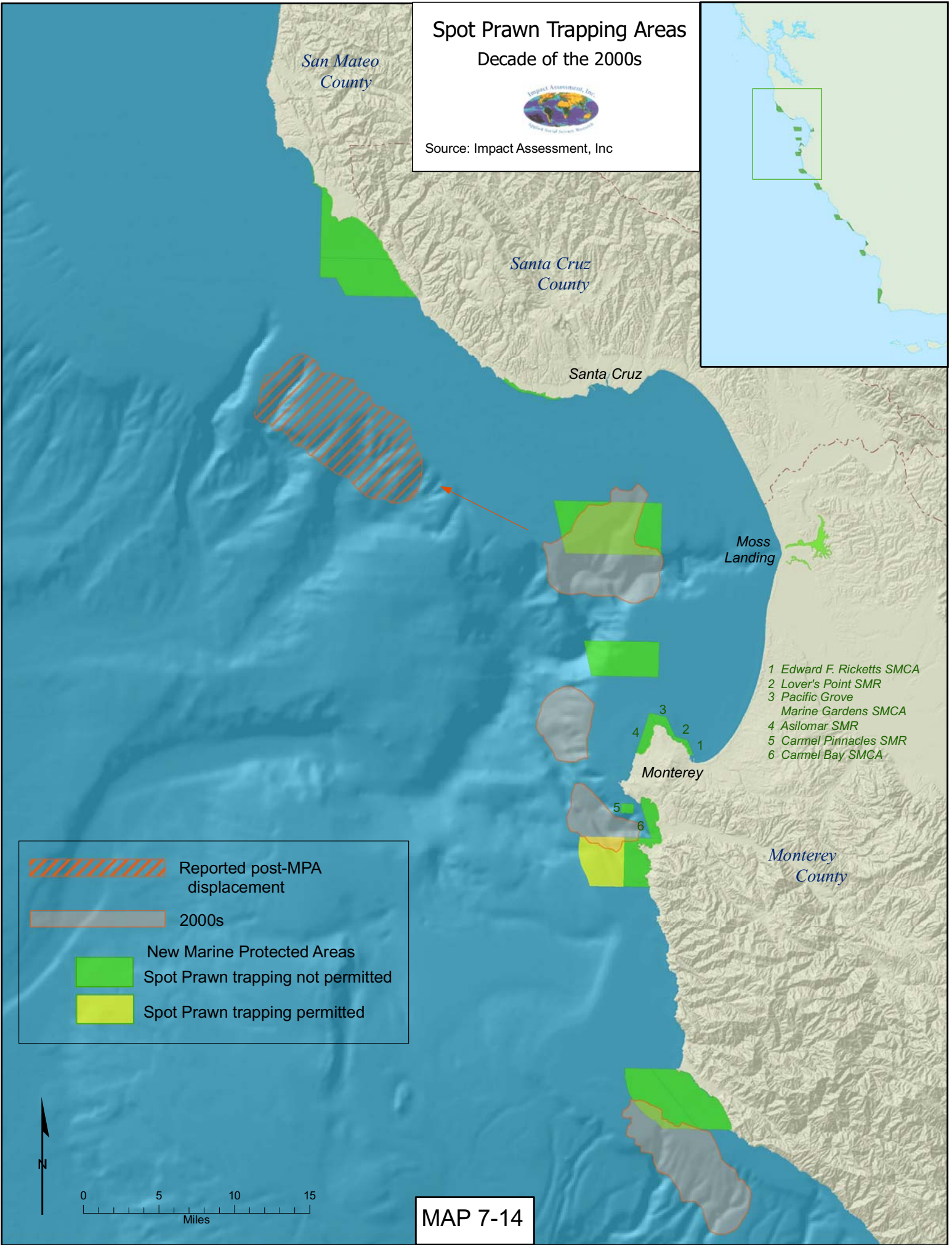
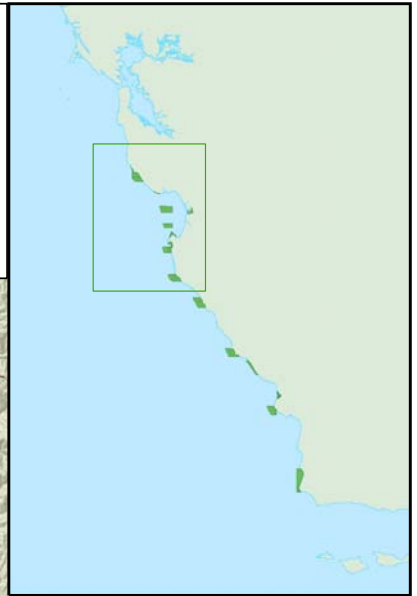
- 1 Edward F. Ricketts SMCA
- 2 Lover's Point SMR
- 3 Pacific Grove Marine Gardens SMCA
- 4 Asilomar SMR
- 5 Carmel Pinnacles SMR
- 6 Carmel Bay SMCA

MAP 7-13

Spot Prawn Trapping Areas Decade of the 2000s



Source: Impact Assessment, Inc

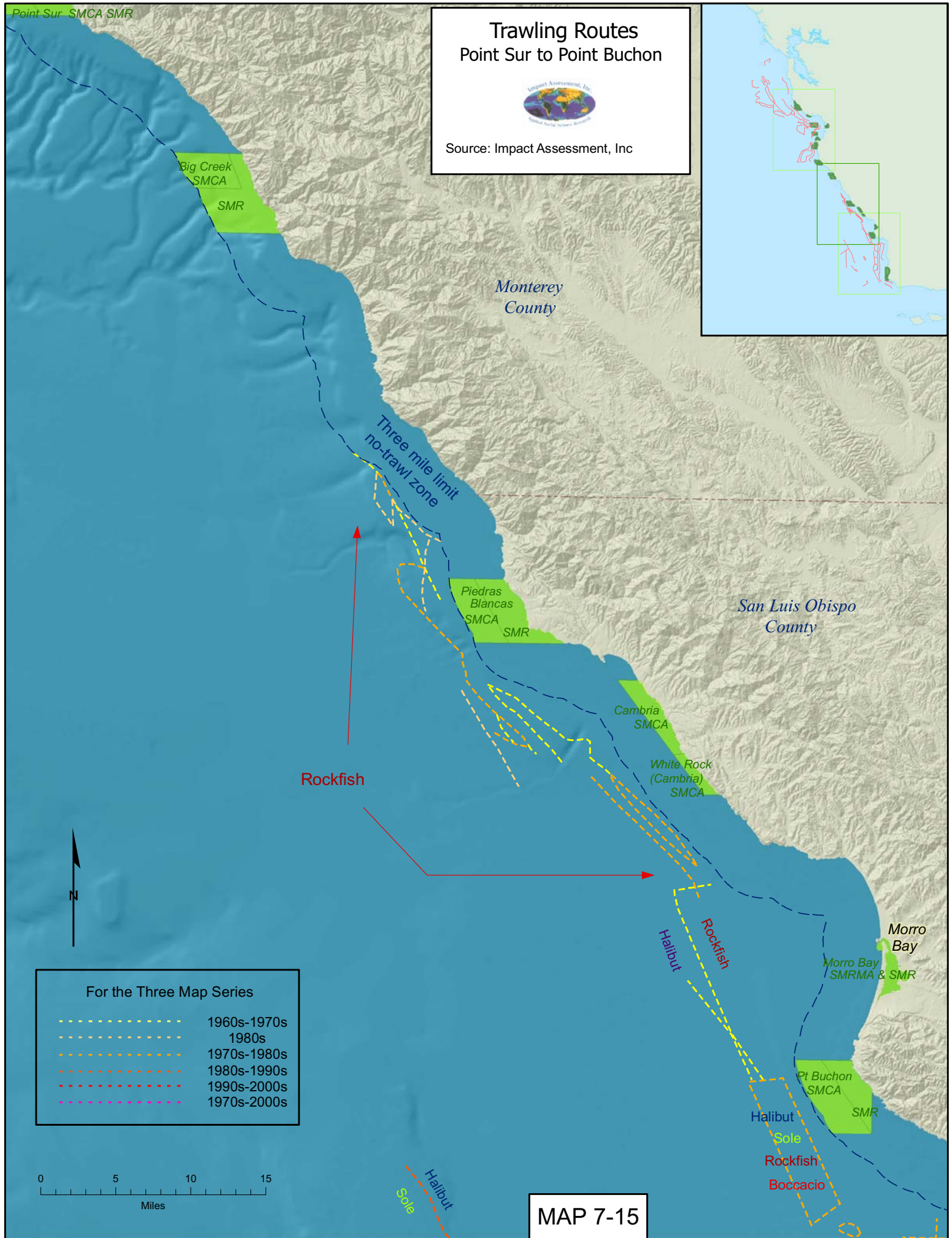


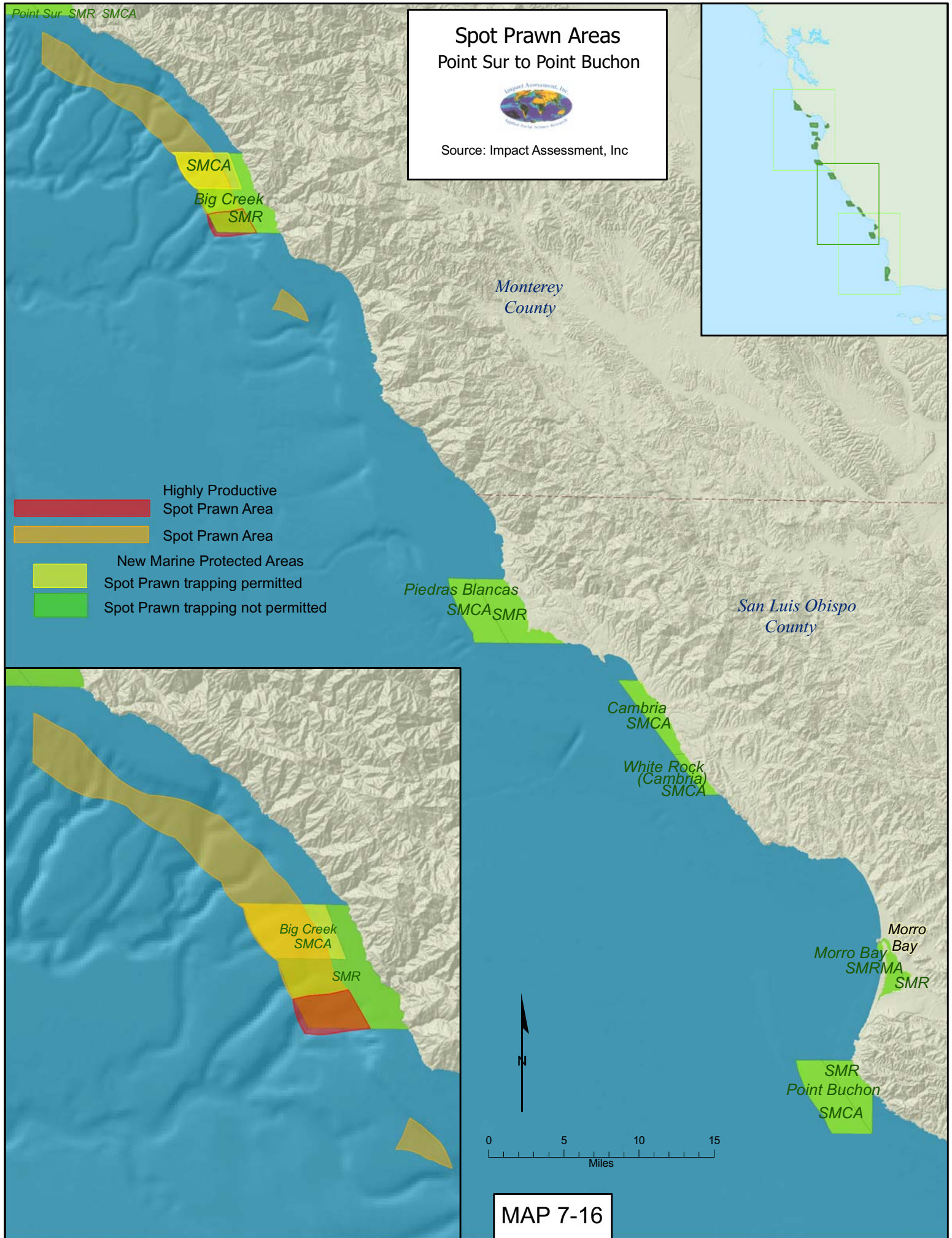
- 1 Edward F. Ricketts SMCA
- 2 Lover's Point SMR
- 3 Pacific Grove Marine Gardens SMCA
- 4 Asilomar SMR
- 5 Carmel Pinnacles SMR
- 6 Carmel Bay SMCA

- Reported post-MPA displacement
- 2000s
- New Marine Protected Areas
- Spot Prawn trapping not permitted
- Spot Prawn trapping permitted



MAP 7-14



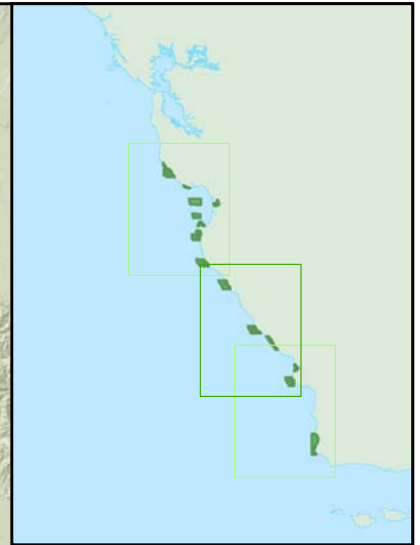


Point Sur SMR SMCA

Salmon Fishing Areas Point Sur to Point Buchon



Source: Impact Assessment, Inc



SMCA

Big Creek
SMR



Monterey
County

Piedras Blancas
SMCA SMR

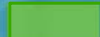


San Luis Obispo
County

Cambria
SMCA

White Rock
(Cambria)
SMCA

-  Productive Salmon Areas
-  General Salmon Areas
Mostly between 10 and 50 fathoms

Note: South of Point Sur salmon are highly episodic.
Productive runs occur about once in five to seven years.

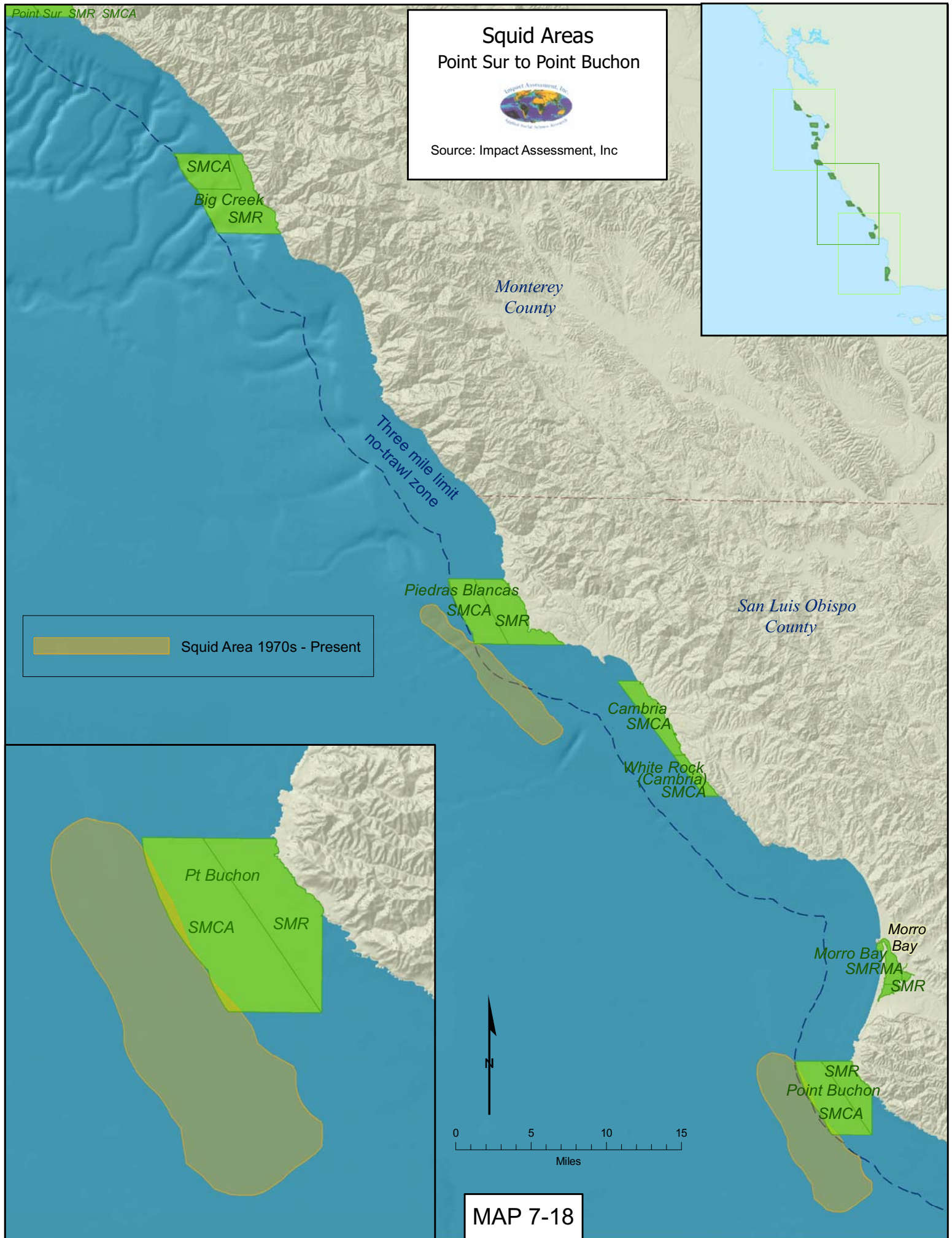
-  New Marine Protected Areas
-  Salmon fishing not allowed
-  Salmon fishing allowed

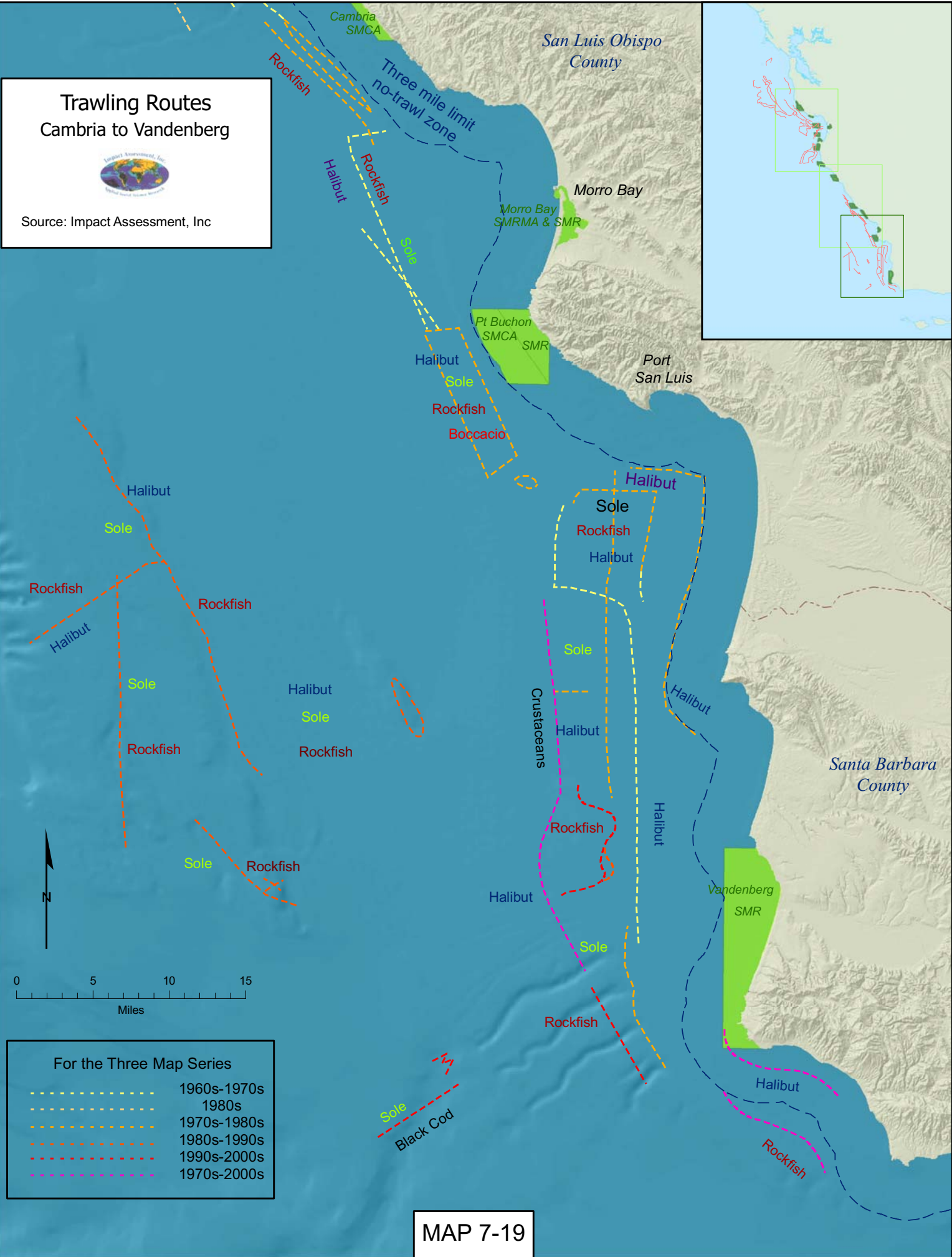
Morro Bay
SMRMA
SMR

SMR
Point Buchon
SMCA



MAP 7-17





Salmon Fishing Areas Cambria to Vandenberg



Source: Impact Assessment, Inc

White Rock
(Cambria)
SMCA

San Luis Obispo
County

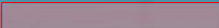




Morro Bay
SMRMA
SMR

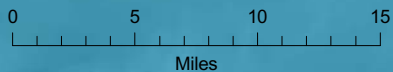
SMR
Point Buchon
SMCA

Port
San Luis

Santa Barbara
County

Vandenberg
SMR

-  Productive Salmon Areas
-  General Salmon Areas
Mostly between 10 and 50 fathoms
- Note: South of Point Sur salmon are highly episodic.
Productive runs occur about once in five to seven years.
-  New Marine Protected Areas
-  Salmon fishing not allowed
-  Salmon fishing allowed



MAP 7-20

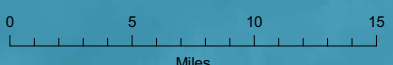
Crabbing Areas Cambria to Vandenberg



Source: Impact Assessment, Inc



- Dungeness Crab, 1990s - 2000s
- Rock Crab, 1990s - 2000s
- Rock Crab, 1950s - 1980s



MAP 7-21

8.0 Summary Conclusions: Initial Human Effects and Implications of the MPAs

This chapter summarizes some of the important initial socioeconomic and other human effects and implications of the newly established network of MPAs. Although it is obviously the case that insufficient time has elapsed for a full accounting of the outcome of the new reserves, IAI field staff members have worked closely with commercial and recreational fishery participants, public officials, and others who know and use or formerly used the ocean areas now encompassed by MPA boundaries. Many such persons reported recent changes in fishing operations and offer their concerns and insights about the future. The following discussion of these experiences and observations derives from interviews and mapping exercises conducted with persons who revealed extensive knowledge and expertise during the course of this project, and from our own field-based observations of fishing and other uses of the marine environment immediately prior to and following establishment of the MPAs.

The chapter is organized in the same fashion as Chapter Seven. Proximate MPAs have been grouped together for ease of analysis. The MPAs are discussed in geographic sequence, beginning with those in San Mateo County in the northern part of the study area, and moving southward through to the southernmost reserve in Santa Barbara County. We briefly review permitted and prohibited activities for each MPA, and then outline the preliminary positive and negative effects that have been noted to date for each of the three primary user groups – commercial fishery participants, recreational fishermen, and non-consumptive recreational users.

After outlining the current situation for each MPA, we then present a more analytical and generalized discussion of effects and implications. Because the new MPA-specific regulations are just the latest in a long series of laws, policies, regulations, rules, and guidelines affecting human use of the marine environment, this discussion seeks to address MPA effects in the larger context of regulatory, economic, environmental, and other sources of change. The chapter concludes with discussion of key variables that will need to be monitored during future months and years in order to effectively assess the long-term social, economic, and fisheries-specific implications of the new reserves.

8.1 Año Nuevo and Greyhound Rock MPAs

Año Nuevo SMCA has been designated a recreational no-take zone; giant kelp may be taken commercially by hand. The Greyhound Rock SMCA allows the recreational and commercial take of salmon, squid, and giant kelp by hand. Finfish, other than salmon, may be taken by hook-and-line from the shoreline only.

Commercial Fisheries. The closure of the Año Nuevo and Greyhound Rock areas has thus far affected the Dungeness crab and sardine fisheries to a slight extent, and has the potential to impact the squid and salmon fisheries in the future. Although these waters are rich in rockfish, they are not extensively utilized by commercial rockfish fishermen due to high fuel costs and limited quotas.

A few crab fishermen have been displaced from their traditional fishing grounds by the Greyhound Rock SMCA. Some crabbers who formerly set crab traps along a reef area within the SMCA report that they will now place those traps just west of the MPA.

However, other commercial participants explain that much of the area in this MPA is too shallow for their brand of operations and that there are reasonable options in the region. For example, more productive grounds reportedly are found northwest of Santa Cruz and north of Pigeon Point. But it should be noted that travel to these areas will require additional fuel costs for some operators.

The northern portion of the Año Nuevo SMCA is a known squid fishing area. The impacts of this closure on the squid fishery are as yet uncertain, as squid have not appeared here since establishment of the MPA.

Squid fishery participants contacted during the course of this study say they will continue to fish for squid in the Año Nuevo area in future years, likely positioning their efforts just outside MPA boundaries. However, some such participants expressed concern about potential fines or other sanctions should their gear inadvertently drift inside MPA boundaries due to currents or wind.¹ Some purse seiners and crabbers assert that they will need to give the MPAs a wide berth in order to avoid inadvertent drift of seine gear and crab pots into the reserves.

Chinook salmon cyclically appear in the deeper waters near Año Nuevo and Greyhound Rock. In some years, however, salmon runs occur close to the shoreline. Seasoned salmon fishermen report that when the next run of salmon appears and the current closure is lifted, they will likely pursue the species along the outer edge of the SMCA. Fishing close to reserve boundaries is reportedly more feasible for this fleet given the possibility of spatially precise use of troll gear.

Recreational Fisheries. The rocky bottom conditions between Franklin Point and Waddell Creek in the Año Nuevo SMCA are particularly productive rockfish fishing grounds. Restrictions here are significantly affecting recreational fishermen who formerly targeted various rockfish species in the area. Affected participants are primarily from Santa Cruz and towns further south (Map 8-1).

To date, charter captains and recreational anglers operating from privately owned vessels have not shifted their efforts significantly north or south of the reserve, though some fishing may be continuing on the fringes. Increased travel time and fuel costs are tending to deter charter operators from heading north of Año Nuevo. Depth restrictions for the RCA in this area start at 30 rather than 40 fathoms and thus also deter fishing to the north. The habitats south of the Greyhound Rock SMCA reportedly do not support large schools of rockfish and thus there is less incentive for fishing there.

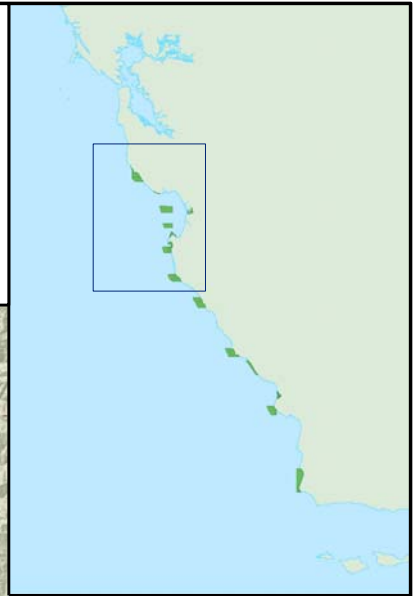
Few recreational anglers travel from Half Moon Bay to Año Nuevo to fish for rockfish. The 25-mile travel distance is comfortable only in favorable sea conditions and only for those with vessels of an appropriate size. Moreover, more accessible and productive rockfish grounds are available just south of Pillar Point Harbor, and around Pigeon Point. Therefore, the impact of the Año Nuevo SMCA on recreational fishermen from the Half Moon Bay area is not likely to be substantial.

¹ MPA regulations generally permit transiting, drifting through, and anchoring in the reserves, even with catch onboard (see Section 632 (a)(7) and (8), Title 14, California Code of Regulations). But deployment of any gear that is capable of harvesting prohibited species is not allowed within reserve boundaries.

Rockfish Fishing Hook and Line by Recreational Boat Anglers



Source: Impact Assessment, Inc



*San Mateo
County*

*Santa Cruz
County*

Santa Cruz

Moss
Landing

Monterey

*Monterey
County*

- 1 Edward F. Ricketts SMCA
- 2 Lover's Point SMR
- 3 Pacific Grove Marine Gardens SMCA
- 4 Asilomar SMR
- 5 Carmel Pinnacles SMR
- 6 Carmel Bay SMCA

- Recorded Displacement since MPAs
- 2000s, Primarily Recreational
- Recreational Rockfish Areas 1970s - Present
- + Points of Rockfish Fishing, 1980s - 2000s



MAP 8-1

Charter boat operators from the Santa Cruz area who were the primary users of the Año Nuevo and Greyhound Rock grounds assert that they may now head south to fish around Carmel Bay or north to Half Moon Bay, but that fuel costs associated with the longer trips may constrain them. Other captains report that they may be forced to suspend operations.

Santa Cruz charter boat captains interviewed during this study explain that the new MPA restrictions combined with RCA restrictions has reduced available rockfish fishing grounds in the region from 150 square miles to about two square miles. Reportedly, the most viable area is now between Scott's Creek and Davenport, out to 25 fathoms. Some skippers stated that they were barely making ends meet prior to establishment of the new MPAs in 2007. For some, the RCAs present more of a challenge to the economic viability of their operations than do the MPAs. One captain stated that "they can have their MPAs; just give me back the RCA [grounds]." Thus, for these charter captains, the new spatial closures have added to already existing challenges.

Some boat-based fishermen predict that the MPAs here will increase fishing pressure on rockfish in the few remaining productive grounds. Others assert that with fewer rockfish fishing opportunities, fishermen will increase pressure on California halibut stocks. However, because California halibut is most commonly fished with live bait, commercial fishermen who catch and sell live bait may benefit to some extent from the MPA-related rockfish closures.

As shoreline fishing is prohibited in the Año Nuevo MPA, shore-based fishermen who frequent the popular Waddell Creek area are most likely to be affected by the new regulations. Alternative shoreline access is available at Scott's Creek, two miles south, but as noted above, the habitat in this area is less amenable to rockfish than areas to the north. Given the increased and relatively recent presence of white sharks in the region, few persons are now using the area for diving; therefore, spear divers are not likely to be significantly affected by the new reserves.

Non-consumptive Uses. The primary non-consumptive recreational activities occurring in the Año Nuevo and Greyhound Rock areas include surfing, windsurfing, kiteboarding, and kayaking. These occur primarily around Waddell Creek and Scott's Creek, with relatively less activity occurring along the shoreline at Año Nuevo. Given the relatively isolated location of the MPAs and the ongoing presence of white sharks, the frequency and extent of in-the-water sports has been relatively low. Establishment of these MPAs has not yet and is not in the future expected to significantly affect non-extractive recreational uses of the marine environment.

8.2 Natural Bridges MPA

New regulations for the Natural Bridges SMR do not allow commercial or recreational take of any kind.

Commercial Fisheries. Recently, a few commercial participants harvested kelp in this area. Efforts will likely be moved to one of the many adjacent kelp beds. Other extractive commercial activities in this reserve area are minimal.

Recreational Fisheries. The Natural Bridges SMR encompasses a narrow strip of ocean along the coastline at Natural Bridges State Beach. Given the challenge of navigating in the immediate shoreline area, boat-based anglers generally are not significantly affected by the new regulations. However, the new regulations are affecting shoreline anglers and mussel gatherers. One long-time user of the area explains that “there is no shoreline of that kind [for intertidal mussel collection] anywhere else in Santa Cruz.” Some other known shellfish harvest areas in the region, such as spots north of Waddell Creek and Point Año Nuevo, are now also no-take areas. Shoreline anglers have numerous nearby alternatives, including: Davenport Beach; Bonny Doon Beach; Panther Beach; Red, White, and Blue Beach; and numerous spots to the southeast.

Natural Bridges SMR was once popular with spear and tournament divers who accessed the nearshore zone from the beach. Many such divers have more recently preferred to launch from the public boat ramp at Santa Cruz Harbor.

Non-consumptive Uses. Surfing and kayaking are popular non-consumptive activities in the Natural Bridges SMR. These users may benefit from a decrease in competition for space with recreational shore-based fishermen. Competition for available parking spots may also diminish.

8.3 Elkhorn Slough MPAs

With the exception of the recreational harvest of clams and finfish by hook-and-line, the take of all living marine resources is prohibited in the Elkhorn Slough SMCA. Clams may be taken only along the northern shoreline of the slough in the area adjacent to the Moss Landing State Wildlife Area. The take of all living marine resources is prohibited in the Elkhorn Slough SMR and Moro Cojo Estuary SMR.

Commercial Fisheries. Commercial fishing has been prohibited in the Elkhorn Slough area since the establishment of the Elkhorn Slough Ecological Reserve in 1980 (now managed as a component of the National Estuarine Research Reserve System). As such, the immediate environs of Elkhorn Slough have not recently been used for commercial fishing and the new designation has no effect on the industry.

Recreational Fisheries. Recreational anglers who fished from the shoreline within what are now newly protected areas will be affected. Various sharks and rays were formerly caught in the area that is now the Elkhorn Slough SMR.

Recreational anglers have since moved from the main channel to the mouth of the slough or to the northern end of Kirby Park where the pier is located. However, because the pier is relatively small, only a limited number of anglers are able to use the structure at a given time.

Although bat ray and leopard sharks tend to be captured in greatest frequency at Elkhorn Slough, alternative angling opportunities are available in the general area at Sunset State Beach, Palm State Park, Zmudowski State Beach, Moss Landing State Beach, Kirby Park, Moss Landing Harbor, Salinas River State Beach, and Salinas River Wildlife Refuge.

Clams are found in abundance in the Elkhorn Slough area. Although clamming is no longer permitted in the SMCA, some people continue to clam in the more accessible southern portion of the slough.

Non-consumptive Uses. Sea otters, seals, and birds abound in Elkhorn Slough. Abundant wildlife viewing opportunities attract many kayakers to the area. Establishment of the MPAs has not yet had an observable effect on this population of users.

8.4 Soquel Canyon and Portuguese Ledge MPAs

Harvest of living marine resources is prohibited in both the Soquel Canyon and Portuguese Ledge SMCAs, with the exception of certain pelagic finfish.

Commercial Fisheries. New restrictions on the use of historically productive fishing grounds in the Soquel Canyon and Portuguese Ledge State Marine Conservation Areas have significantly affected the spot prawn, Dungeness crab, sablefish, and California halibut (trawl) fisheries. The hagfish fishery has been moderately impacted in that some displaced fishermen are now pursuing this species. The sardine and squid fisheries are not expected to be affected, as these tend to occur in waters not restricted by the MPAs.

The most productive grounds for the spot prawn fishery are now off-limits. Spot prawn fishermen report losing as much as 80 percent of their historically favored grounds to the new restrictions. As a result, a few fishermen are considering leaving the industry as they realize fewer landings. However, recouping vessel and permit costs is a valid concern. Shifting into the California salmon fishery is not an option for displaced fishermen this year, and the prohibitive cost of fuel is tending to preclude participation in the Alaskan salmon fishery.

Crabbers who formerly used the Portuguese Ledge area are also being impacted by the closure. Increased competition for crab in the remaining open areas has been observed. Fishery participants contacted during this study voiced concerns about the potential for conflict between crabbers who are established in areas not affected by the new MPAs and displaced crabbers who must seek new grounds. Participants often express concern that their crab pots may drift into the MPA during storm events, thereby subjecting them to fines. Many crabbers, especially those from Moss Landing, are shifting their focus further north.

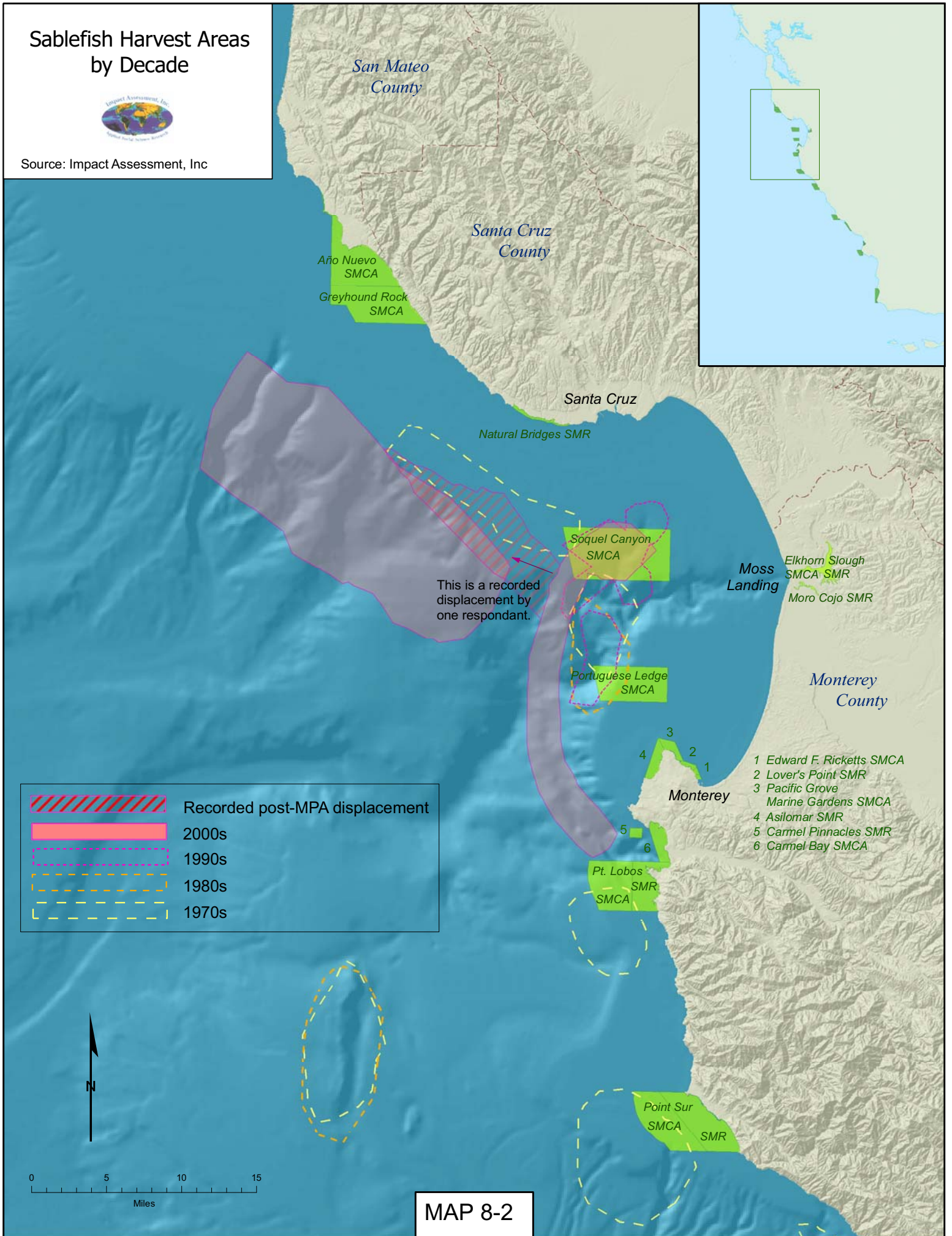
Sablefish fishermen also lost some productive grounds to the Portuguese Ledge MPA (see Map 8-2). Key participants report that they must now travel further west to find sablefish, thereby incurring increased fuel costs and more time at sea. Greater personal safety risks are also involved when fishing in closer proximity to busy shipping lanes. These factors reportedly are diminishing the interest of certain fishermen from persisting in the industry.

Two sablefish fishermen are relocating from Monterey Bay area to Morro Bay with the intent of adapting to the new regulatory changes at Portuguese Ledge. The participants report being encouraged by the higher open access quotas that are available for qualifying fishermen willing to fish south of 36° N latitude.

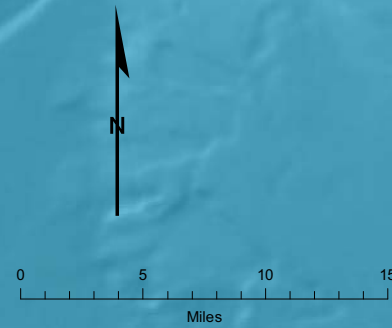
Sablefish Harvest Areas by Decade



Source: Impact Assessment, Inc



	Recorded post-MPA displacement
	2000s
	1990s
	1980s
	1970s



MAP 8-2

The establishment of the Soquel Canyon and Portuguese Ledge MPAs co-occurred with the MBNMS ban on trawling. Trawling was previously conducted within the state jurisdiction waters of Monterey Bay, especially in areas where soft bottom conditions provide good habitat for flatfish. Trawling is additionally curtailed by the recent establishment of Essential Fish Habitat areas. The combined effects of these regulations are significant for participants in the trawl fishery. Some fishermen have subsequently shifted to other fisheries, such as the open access sablefish fishery. Others have opted to pursue California halibut west of Monterey Bay. Key participants related that the new regulations may lead to increasingly concentrated fishing activity along the western boundaries of the Portuguese Ledge SMCA.

Recreational Fisheries. Soquel Canyon and Portuguese Ledge were historically popular for recreational rockfish fishing. These grounds are targeted primarily by charter operators based in Monterey, Moss Landing, and Santa Cruz (see Map 8-1).

Portuguese Ledge, in particular, contains numerous rock formations that are favored by rockfish. The areas are now closed to recreational take of rockfish either through regulations related to the newly designated reserves and/or RCAs that were established in 2003.

Prior to the designation of the MPAs, depth restrictions associated with the RCAs deterred recreational fishermen and charter boats from fishing shelf areas along Soquel Canyon and Portuguese Ledge. The new MPA designations merely overlay the previous RCA depth restrictions. It should be noted that while charter fishermen viewed the RCAs as temporary regulations that could be lifted should stocks sufficiently re-populate, they envision the MPAs as a permanent constraint on their operations.

Non-consumptive Uses. The SMCAs are located in deep water and are not, therefore, suitable for recreational kayaking, kiteboarding, diving, or surfing. Whale-watching and other eco-tours are the primary non-consumptive activities occurring in this area.

Currently, two dedicated and several diversified whale-watching enterprises operate from Monterey Harbor.² A few of these operations sometimes cruise in the areas around the new SMCAs. The visual absence of fishing vessels and the reduced potential for spatial conflicts between tour vessels and fishing vessels in the immediate vicinity of the new MPAs may be considered positive human effects of the new reserves. One eco-tour operator perceives the potential for increased competition from sport fishing charter operators who now also offer whale-watching tours.

² Several charter operations additionally offer whale-watching tours.

8.5 Monterey Peninsula MPAs

Monterey Peninsula is the location of four newly designated marine protected areas. From east to west, these are: Edward F. Ricketts SMCA, Lovers Point SMR, Pacific Grove Marine Gardens SMCA, and Asilomar SMR. The two SMCAs prohibit the take all living marine resources except the recreational take of finfish and the commercial take of giant kelp and bull kelp by hand in specified areas and in limited amounts. The two SMRs prohibit all commercial and recreational take of living marine resources.

Commercial Fisheries. The commercial fisheries most likely to be affected by the new MPAs along the Monterey Peninsula involve pursuit of nearshore species, primarily rockfish, cabezon, and squid.

Commercial fishermen consider much of the nearshore zone along the Monterey Peninsula to be prime rockfish habitat. Areas in close proximity to Monterey Harbor are particularly favored. Participants in the nearshore fisheries therefore naturally perceive the new spatial restrictions to be constraining. Seasoned local fishermen report that closures following from establishment of the four new Monterey Peninsula MPAs will likely shift commercial fishing effort south to areas between Point Joe and Pescadero Point.

Purse seiners have operated in this area in decades past. The SMCA designation could potentially impact squid fishermen if and when the squid return. Longtime local squid fishermen report their concerns that a small but productive area just south of the Asilomar MPA will now be overfished. Stipulations regarding use of seine gear reportedly are also a concern. Fishermen voice concerns about their vessels or nets drifting into MPAs during poor weather and sea conditions and thus being subject to fines.

The Edward F. Ricketts SMCA neighbors Hopkins Marine Reserve, an area already off-limits to recreational and commercial fishing. The new SMCA designation is viewed as an extension of the boundaries of the pre-existing reserve, and therefore no significant effects are anticipated.

Recreational Fisheries. The new MPAs are likely to affect the area's recreational rockfish fishery. One veteran fisherman predicts that recreational anglers will be particularly affected by the closures of Spanish Bay off Asilomar and Chase Reef off Lovers Point since both areas are close to the harbor and frequently productive. It is likely that the closures will encourage recreational fishermen to shift their efforts either south or northeast where recreational fishing of finfish by hook and line is still permitted (i.e., in the Edward F. Ricketts and Pacific Grove Marine Gardens SMCAs) (see Map 8-1). Some crowding and increased focused on nearshore resources can be expected in certain areas.

One longtime recreational fisherman offered his informed perspective that in conjunction with closures at Carmel Pinnacles SMR and Point Lobos SMR, the closures at Lovers Point SMR and Asilomar SMR will impact shore-based anglers more than it will boat-based anglers. He bases his prediction on the lack of easy shoreline access to nearshore grounds from Point Lobos down to Point Sur. This relates to the toll road along Pebble Beach, and to steep cliffs and long stretches of private property along much of the region's coastline.

Spear divers have been displaced from Lovers Point, which is known as a high-visibility area for California halibut. Some divers are now spearing along the western boundary of the SMR south to the Pacific Grove Marine Gardens SMCA. There are numerous alternative locations for spear diving in the region. Non-extractive divers believe they may ultimately benefit from enhanced fish populations in and around the new reserves.

Rockfish were traditionally targeted west of Point Pinos, and thus kayak anglers, spear divers, and shoreline anglers are being affected by the Asilomar SMR. Enthusiasts are responding to the new no-take policies by concentrating their efforts in and south of the Pacific Grove Marine Gardens SMCA.

Non-consumptive Uses. The Monterey Peninsula is frequented by many non-consumptive recreational divers. Divers access at least 15 spots within the vicinity of the new SMCAs and SMRs. Dive shop and charter operators believe businesses will likely benefit from the MPAs, if the reserves are successful in increasing the presence of fish, seals, and otters in Monterey Bay. More fish and marine mammals, they assert, will attract more divers (patrons) to the area.

Non-consumptive divers in the Monterey Bay tend to support MPAs in the region. According to one diver, “we are thrilled to have what we got, but there should be more . . . protection around Cannery Row is meager.”

Surfers and kayakers also utilize a number of popular sites within the new MPAs. To date, such users report no positive or negative impacts from the new regulations.

8.6 Carmel Bay and Point Lobos MPAs

Four newly designated MPAs are located in Carmel Bay and around Point Lobos: Carmel Pinnacles SMR, Carmel Bay SMCA, Point Lobos SMR, and Point Lobos SMCA. Take of any living marine resources is prohibited in both SMRs. The recreational take of finfish and the commercial take of giant kelp and bull kelp by hand under regulatory guidelines is permitted at the Carmel Bay SMCA. Recreational and commercial take of salmon and albacore, and commercial take of spot prawn are permitted at the Point Lobos SMCA.

Commercial Fisheries. Commercial fishermen pursuing squid, salmon, and nearshore species such as rockfish and cabezon, will likely be impacted by the MPAs in the Carmel Bay and Point Lobos areas. The pursuit of deepwater species such as albacore is less likely to be affected. Spot prawn and California halibut fisheries are also likely to be minimally affected.

Nearshore fishermen who launch from shore with small boats and skiffs are minimally impacted by the Carmel Bay SMCA. While this area is now closed to commercial take, fishermen have the option of departing from Stillwater Cove to other productive grounds beyond Pescadero Point. As one skiff fisherman confided “I can live with that sacrifice.”

Point Lobos, an area typified by high relief and highly complex substrate, is known as a fecund rockfish habitat (CDFG 2006). The extension of the no-take reserve in this area will likely displace effort to areas south of Yankee Point.

The purse seine fleet formerly fished the Carmel Pinnacles area. Seasoned participants report that in future years they will likely fish the edges of the MPA, using lights to attract the squid into unregulated waters. There are concerns that currents and wind may push vessels or gear over the bounds, thereby incurring penalties.

Chinook salmon occasionally run through the deeper waters around Point Lobos, but in some years they appear closer to the shore. When the salmon reappear close to shore, fishermen report that they will likely fish the MPA boundary areas.

Historically, Carmel Canyon has been a productive spot prawn area. Spot prawn fishermen currently set their pots within the Carmel Canyon area, outside of the Carmel Bay SMCA; these participants are thus not directly affected by the MPA. Spot prawn fishers are similarly minimally affected by the Point Lobos SMR, as this designation does not overlap with traditional grounds.

Recreational Fisheries. The region's recreational rockfish fishery is being affected by the Carmel Pinnacles SMR. The headlands in this area offer some protection from the wind, enabling anglers to continue fishing rather than return to port. But the SMR now limits the amount of grounds available to this fleet.

Charter operators leaving from Monterey and Moss Landing Harbors commonly pursue rockfish around Monterey Peninsula and the Point Lobos areas. The Monterey Peninsula closures are therefore likely to lead to more concentrated activity south of Point Lobos. According to longtime charter operators, alternative fisheries also tend to be increasingly regulated or are relatively less attractive to patrons. One skipper noted that it is difficult to interest his clients in fishing for species other than rockfish or salmon; in his experience "mackerel are only popular amongst Japanese [consumers], sanddabs are bony and hard to eat, and California halibut has been devastated by draggers."³ The salmon fishery was closed at the time of this writing.

Boat- and kayak-based anglers also used the Point Lobos area. Kayak fishermen report that they have been fishing south of Yankee Point following the closure. Shoreline anglers may continue to fish in Carmel Bay SMCA, and therefore are negligibly affected. Local spear divers contacted during this study report that they have not historically used the reserve areas to any great extent and therefore have not been significantly affected by the new designations.

Non-consumptive Uses. Certain areas around Carmel Pinnacles SMR and Carmel Bay SMCA are often favored by non-consumptive divers. Popular dive spots include: Ocean Pinnacles, Stillwater Cove, Cooper Roof House, Monastery Beach, and Mono Lobo Wall. Popular dive sites in the Point Lobos area include: Point Lobos State Reserve, Bluefish Cove, and Whaler's Cove.

³ However, there is a strong commercial market for sanddabs and, according to a report by the California Fish and Game Commission, the viability of the halibut trawl fishery is much improved (California Department of Fish and Game Marine Region State Fisheries Evaluation Project [<http://www.dfg.ca.gov/marine/pdfs/chtg-report.pdf>]).

Some non-consumptive divers welcomed the new spatial regulations for the Carmel Pinnacles area. They now reportedly enjoy less competition for space and are free from dangers associated with hook-and-line fishing and spearing. Divers argue that the level of biodiversity around the Point Lobos MPA (which has been partially protected since the 1960s and fully protected since 1973) has increased the quantity and size of fish relative to adjacent areas. One seasoned diver asserts that these conditions afford better subject matter for underwater photography, and will ultimately improve the status of fish populations in waters adjacent to the MPAs.

Other non-consumptive activities in the area include: tow-in surfing at Ghost Tree near Carmel Pinnacles; surfing at Carmel Beach; and kayaking at Monastery Beach and Carmel River State Beach at Soberanes Point. There is now potential for reduced vessel traffic in those locations.

8.7 Big Sur MPAs

The Point Sur SMR and Big Creek SMR are no-take zones. The commercial and recreational take of salmon and albacore are permitted within the Point Sur and Big Creek SMCAs. The Big Creek SMCA also permits the commercial take of spot prawn.

Commercial Fisheries. Nearshore fishery participants who target rockfish, cabezon, and other nearshore species are being affected by the SMRs. This relates to the fact that there are optimal bathymetric features for rockfish around Point Sur and the headland offers protection from wind and seas on the southern leeward side. Although rockfish are plentiful in state waters west of the Point Sur SMCA boundary, these areas are regulated under an RCA designation. Commercial fishermen must therefore concentrate their efforts elsewhere.

Due to the price of fuel and limited quotas, Monterey area fishermen are shifting their efforts north of Point Sur, rather than south. This includes the area between Malpaso Creek on the southern end of Point Lobos SMR and Point Sur. In short, the closure of Point Sur, Point Lobos, and other MPAs further north will likely increase pressure in the Malpaso Creek to Big Sur area. According to local fishery participants, the new MPAs are not likely to affect the crab and sardine fisheries.

Partly because of the new MPA restrictions, several small-boat fishermen who trailer their vessels are re-focusing their efforts both north and south of Point Sur. One has sold his nearshore license.

The Big Creek SMR/SMCA closures are similarly impacting nearshore fishermen from Morro Bay. Commercial skiff fishermen are most heavily impacted and are now displaced to locations further south. Fishermen who formerly accessed Big Creek through the Vincent Creek point of access shifted their efforts to reef areas south of Point Sur, such as Lopez Point, Cape San Martin, and Mill Creek. The rugged coastline here offers few places to launch; accessible areas will likely receive the greatest concentration of new effort. Fishermen traveling from the Morro Bay area to Point Sur fishing grounds are faced with greater travel time and fuel expenses.

Squid is another prominent fishery around the Point Sur area. During years when squid appear off Point Sur, six to 12 captains from harbors north and south fish the area from Monterey to Ventura. These participants report that they are likely to pursue squid alongside new MPA boundaries.

The impact of the SMR on the region's salmon fishery remains to be seen. Salmon fishermen differ on the possible impacts – some say that salmon are not typically targeted in the nearshore zone within the boundaries of the new SMR. Others say that when the salmon reappear, and if the fishery is reopened, they will likely fish along the boundaries of the MPA.

The establishment of the Big Creek SMR has significantly affected the Morro Bay area spot prawn fishery. Morro Bay area fishermen report that significant losses in net revenue have resulted from a loss of spot prawn grounds. Fishermen who have shifted their efforts to grounds around Point Lopez report difficulty catching enough prawns to justify associated expenses. Buyers report a relative lack of prawns subsequent to the closure.

Although not currently utilized, the Sur Canyon— which lies within the Point Sur SMCA—has been a historically important source for spot prawn. The designation of the area as an SMCA may thus limit options for displaced spot prawn permit holders who may have considered shifting their efforts to this area.

Salmon runs sometimes occur in the Big Creek area. The SMR designation now prohibits salmon fishing. One longtime fisherman reports that if salmon return to this area, he and his fellow salmon fishermen will likely fish the line between the SMR and SMCA.

Recreational Fisheries. The Point Sur area has historically been favored by charter operators for its abundant rockfish and other nearshore resources. The new closures are therefore affecting charter operators who formerly traveled to the area from Monterey and Morro Bay.

Squid were also formerly pursued on a recreational basis around Point Sur. Although this is a small and variable fishery, at least one Morro Bay-based charter vessel operator formerly offered squid fishing during the summer months and is therefore affected by the new MPAs. Shoreline anglers are now fishing elsewhere, often at accessible locations north of the Point Sur SMR.

Charter operations from the Monterey area did not historically undertake multi-day trips to the Big Creek area and therefore will not be affected by the SMR/SMCA. However, Morro Bay charter operators did occasionally fish in the Big Creek area and will be affected by MPA-associated closures.

Non-consumptive Uses. Surfing occurs around the Little Sur and Big Sur rivers. Given the relatively isolated location of these areas, however, the frequency of use is relatively low. In any event, establishment of the MPAs does not significantly benefit or burden this user group.

Kayakers occasionally launch from Andrew Molera State Beach and Point Sur Historic State Park. The areas are far from significant population centers and thus the number of kayakers using the area is relatively small. The number of non-extractive divers using the area is also minimal. Impacts are not being reported at this time.

8.8 Piedras Blancas MPAs

The Piedras Blancas SMR prohibits the take of all living marine resources. The Piedras Blancas SMCA allows the commercial and recreational take of salmon and albacore.

Commercial Fisheries. The Piedras Blancas SMR has led to a refocusing of fishing effort to other areas. For example, nearshore kayak fishermen have shifted into the rocky substrate area between the Piedras Blancas SMR and Cambria SMR; to an area south of the Cambria SMCA; and to an area around Point Estero. Several kayak fishermen are now also fishing just offshore Morro Bay Harbor.

The live fish fishery in general has been affected by establishment of the Piedras Blancas and Cambria SMRs. The closed areas were formerly favored by the small vessel live fish fleet since these are typified by shallow, rocky substrate and could be readily accessed from Highway 101 and the public launch sites. Fishermen have responded to the closures by fishing closer to the ports of Morro Bay and Avila.

The area now comprised by the Piedras Blancas SMCA has not been heavily fished in recent years. The majority of the offshore waters have been protected by a no-trawl RCA and, moreover, bottom conditions generally are not favorable for rockfish. The area has been accessed on a periodic basis for salmon and squid. Salmon fishing is permitted in this area. The squid fishery may be affected in the years to come.

Recreational Fisheries. The closure of the Piedras Blancas SMR has had a significant effect on Morro Bay charter operations, particularly with regard to the length of the trips that the operators are able to offer. A couple of charter operators have replaced 10-hour trips with 12-hour trips that facilitate access to distant grounds that remain open. This adds to fuel costs, however, and the longer trips reportedly are not as popular.

Since the establishment of the elephant seal colony in 1994, spearfishing has been limited in the waters that now constitute the Piedras Blancas SMR. Similarly, the Piedras Blancas area is not frequently used by shoreline anglers. No MPA-related impacts to either group have been reported.

Non-consumptive Uses. Surfers, windsurfers, and kiteboarders were also displaced by the elephant seal colony. Since 1994, these user groups have tended to favor Arroyo Laguna. Kayakers have also tended to recreate to the south; the area most typically used for kayaking is now between Arroyo Laguna and San Simeon Bay. The SMR could potentially benefit non-consumptive kayakers by reducing traffic in the area, though no benefits have been reported to date.

8.9 Cambria MPAs

The Cambria SMCA prohibits commercial take but allows for recreational harvest. The White Rock SMCA prohibits the take of all marine resources, with the exception of limited commercial take of giant kelp and bull kelp.

Commercial Fisheries. Nearshore live fish fishermen are being affected by the Cambria and White Rock SMCAs. The closures have diminished the available fishing area from roughly 15 square miles to four square miles. This has led to more concentrated effort in the area between Cayucos and Point Estero. The closure has particularly affected commercial live fish kayak fishermen who fish in shallow waters that are inaccessible to larger vessels. Kayak fishermen report that they were formerly able to access six or seven areas around Cambria. This group typically targeted grass rockfish, which brought \$10.50 to \$12.50 per pound during 2008. Buyers reported a significant decrease in the volume of available grass rockfish that year.

No other commercial fisheries are reportedly impacted by this closure. Most other species are landed outside the boundaries of the MPAs.

Recreational Fisheries. The Cambria and White Rock areas formerly constituted important fishing grounds for boat-based anglers from Morro Bay, San Luis Obispo, Atascadero, Paso Robles, and San Joaquin Valley. Access to the two SMCAs is afforded by the Leffingwell Day Use Area, which is adjacent to the Cambria SMCA and less than four miles to the northern boundary of the White Rock SMCA.

The impact of the White Rock SMCA on charter fishing operations has been minimal. The effects vary depending on the size of the operation, but most operators have adapted by shifting effort to area outside the White Rock SMCA, such as directly to the south of the MPA and around Moonstone Beach.

There has been an increase in the number of recreational anglers fishing the Estero Point and Cayuco Point areas. One prominent rockfish angler asserted that in 2008 it was common to observe at least eight recreational captains around Point Estero on a rough day, while prior to implementation of the MPA, only three such captains would be observed.

Shoreline anglers who frequent the Cambria area have not been affected by the new designation. Those who fished along what is now the shore of the White Rock SMCA have moved to spots north and south of the MPA.

Diving is a popular sport in the Cambria/White Rock area. The primary MPA-related impact observed to date for consumptive divers is confusion over where the boundaries lie between the “take” and “no-take” zones.

Non-consumptive Uses. Both the Cambria and White Rock SMCAs are popular recreational destinations for non-consumptive kayakers, divers, and surfers. No impacts have been reported to date.

Pico Creek, lying north of Cambria SMCA is used for kiteboarding and kayak surfing. There is also limited non-consumptive kayaking in this area. No impacts have been reported to date.

Further south near Cayucos, divers, surfers and kiteboarders may potentially experience spatial conflicts given increasing numbers of displaced recreational fishermen in the area – particularly kayak fishermen targeting rockfish. Divers in the Cayucos area may be minimally impacted, as both divers and kayak fishermen access the Constantine Rock and Mouse Rock areas from the same points of entry.

8.10 Morro Bay MPAs

The Morro Bay SMR is a no-take zone. The Morro Bay State Marine Recreational Management Area (SMRMA) allows recreational take of finfish, oyster aquaculture, and storing of finfish for bait.

Commercial Fisheries. With the exception of oyster aquaculture, no major commercial fisheries have been conducted in the Bay in recent decades. The SMRMA may potentially benefit the oyster industry; otherwise MPA effects on consumptive user groups will be negligible.

Recreational Fishing. Morro Bay and Morro Bay Pier are popular with recreational anglers. Recreational fishing activities will not be affected by the SMRMA designation. The SMR precludes fishing and other consumptive activities in the shallow waters in the easternmost portion of the bay. Limited fishing activities occurred here in years past and thus MPA effects will be negligible.

Non-Consumptive Uses. The Morro Bay SMR and SMRMA closures have not affected non-consumptive activities. Kayak business operators state that they have been more significantly impacted by land area closures than by the MPAs.

8.11 Point Buchon MPAs

The Point Buchon SMR is a no-take zone. The Point Buchon SMCA permits the commercial and recreational take of salmon and albacore only.

Commercial Fisheries. The SMCA lies entirely within the no-trawl RCA, and thus there has not been a rockfish fishery here for some years. The SMR has significantly affected commercial pursuit of rockfish, squid, and hagfish, and will affect the salmon fishery in future years.

Point Buchon is a favored place to fish since it is both productive and close to port. Close proximity is important since live fish are offloaded as quickly as possible. According to several fishermen, the SMR displaced 10 to 15 live fish fishermen operating from Avila, and another 20 nearshore fishermen operating from Morro Bay. Fishermen from Avila are now fishing predominantly around Point Sal, which is about eight miles further from port than Point Buchon. Although the live fish fishery has been affected by the loss of grounds in the Point Buchon area, several buyers assert that the effects cannot be confidently assessed for some time.

Live fish buyers and retail operators in Avila have noted a decline in the amount of fish that has been delivered since establishment of the MPAs. One buyer notes that the Point Buchon SMR “puts more pressure on fishermen to get the same job done.” However, because fishing effort was constrained by unusually windy weather during much of 2008, he was unable to discern the actual impact of the MPA on the live fish fishery.

Heightened commercial activity has been reported in three areas north of Point Buchon: (1) around Hazards reef; (2) south of the Diablo Canyon restricted zone around Pecho Rock and Santa Rita Reef; and (3) in the small allowable areas remaining between the restricted zone and Point Buchon SMR. Participants are now excluded from fishing the rocky substrate from roughly 35.15.25 N. to 35.11.00 N. However, a small triangular area between Diablo Canyon Security Area and the Point Buchon SMR remains open.

Point Buchon has periodically been a high-yield area for squid. Two squid vessels are based in Morro Bay. However, squid have not appeared since MPA regulations went into effect, and thus the short-term effects of the SMR on the squid fishery remain uncertain.

The observed effects of the Point Buchon SMR on the hagfish fishery have thus far been negligible. With the inception of the Point Buchon MPA, one captain reportedly has moved outside the restricted area into deeper water off the Point, while others have moved their operations closer to port. Although these waters are thought to be less productive, no significant effects on landings have been reported.

The Point Buchon area has traditionally been productive for salmon fishing in years when salmon are running. Given the 2008 closure, the impacts of the Point Buchon SMR on the salmon fishery remain to be seen.

The crab and California halibut fisheries are not impacted by the Point Buchon closures. These species have traditionally been landed outside the MPA boundaries.

Recreational Fishing. Charter captains operating out of Morro Bay have moved operations to the northern outskirts of the SMR. Those offering short day trips to the Point Buchon area have shifted to areas north of Estero Point and offshore Cayucos Pier.

Avila charter operators who formerly frequented Point Buchon are now often traveling south to Point Sal or Purisima Point. The trip can take up to five hours during north wind events. One charter captain observes that when fishing the Hazards area north of Point Buchon, he is now often surrounded by privately owned vessels. The skipper believes this is because recreational captains are tending to follow charter vessels to avoid wandering into the MPA.

With regard to boat- and shore-based recreational anglers, the impacts have varied. Some recreational captains state that they have not fished in the Point Buchon area because of the time and fuel required and/or given ease of accessibility to other fishing areas. Such persons logically are not experiencing MPA impacts. Others claim they now must travel to more distant grounds and are experiencing some economic impacts as a result.

Approximately 50 to 60 recreational captains launch their boats from Morro Bay during good weather weekends; between 20 and 25 launch during the week. These participants now tend to fish in various areas just outside the bay or travel to Hazards or Estero Point.

Fishermen launching from Avila now typically fish around Shell Beach or Pismo Pier. Halibut is frequently targeted. Fishermen interviewed in the Avila area assert that the MPAs have led to a re-concentration of fishing activity in favorable grounds that remain unregulated.

Spear fishing remains popular in the region, although the number of participants reportedly has declined since the 1990s. Spear fishermen affected by the Point Buchon closure have reportedly relocated northward to sites adjacent to the Cambria SMCA, and southward to areas such as Pecho Rock, Santa Rosa Reef, Sheep's Head, Souza Rock, and Shell Beach.

Observers report that an increasing number of consumptive divers and recreational anglers are active in the Shell Beach area. This area is often also used by surfers, outrigger canoe paddlers, kayakers, and kite boarders. The MPAs thus have the potential to increase the overall level of marine recreational activity here.

One dive charter operator notes that he has experienced diminished business following establishment of the Point Buchon MPA, as there are few nearby locations which permit spear fishing. However, this operator is adapting his business model to accommodate divers interested in photography and education. The owner believes he may eventually benefit from the change.

Owners of fishery-related businesses assert that fewer vessels now launch from Avila/Port San Luis. One business owner asserts that the number declined by nearly 30 percent between July 2007 from July 2008. A marina employee attributes this change almost entirely to the Point Buchon closure, and secondarily to the closure at Vandenberg AFB. He believes that fuel costs are not to blame, but rather diminished opportunities for productive fishing

Non-consumptive Uses. There is some potential for space-use conflicts to result from the increased presence of recreational fishermen and divers who have moved into the Shell Beach area following establishment of the Point Buchon MPAs. No such impacts have been noted to date.

8.12 Vandenberg MPA

Take of all living marine resources is prohibited in the Vandenberg SMR, except that which is incidental to Vandenberg AFB operations and to operations associated with the commercial space launch program (where such incidental take is deemed mission critical).

Commercial Fisheries. Participants in the region's nearshore rockfish and crab fisheries may no longer fish in formerly productive nearshore areas from just south of Purisima Point to about two miles south of Point Arguello. Fishermen affected by the closure report that they have begun to fish along the outskirts of the MPA. One seasoned Avila-based fisherman is now fishing in the Point Sur area and in nearshore areas south of the SMR boundaries at Point Arguello. Seasoned participants in the crab fishery report that the closure has not reduced the total number of pots

being deployed in the region. Rather, more pots are being set in smaller areas. One such area is in the small zone between Purisima Point and the northern boundary of the SMR. The Vandenberg MPA could potentially affect the squid fishery in years when squid are present. Impacts are as yet unknown. This is also the case for the salmon fishery.

Recreational Fisheries. Rising fuel costs and closure of grounds around Vandenberg have led Avila-based charter operators who formerly fished south of Purisima Point to frequent the Point Sal area. This has also been the case for certain boat-based recreational anglers who have been displaced from Point Buchon and Cambria. The latter report additional fuel costs associated with travel to Point Sal. Given limited access due to AFB regulations, spear fishing in the waters now encompassed by the Vandenberg SMR has historically been minimal and thus no SMR-related impacts can be expected. There have been some reports of shoreline anglers ignoring the no-take restrictions.

Non-consumptive Uses. Base regulations have historically limited the activities of extractive divers, kayakers, and surfers in the area now encompassed by the Vandenberg SMR. Thus, no significant effects are anticipated for these user groups.

8.13 Overview of Initial Effects on Specific Commercial Fisheries

Crab. Some Monterey and Morro Bay area fishermen have lost productive Dungeness and rock crab grounds as a result of the new area closures. There has been a general shift in effort to favorable grounds north of the new MPAs. Similarly, closure of grounds at what is now the Vandenberg SMR has led to increasingly concentrated deployment of traps in an area immediately north of the reserve, and increased effort in what are said to be relatively less productive grounds around Point Sal.

Crab fishermen voice concerns about traps inadvertently drifting across MPA bounds, which puts them at risk for fines. Certain crabbers report that they are deploying their gear at a distance that would minimize this possibility, effectively creating reserves that are larger than designated. Crabbers tend to gain intimate knowledge of the resource and associated habitat characteristics in highly specific areas. This often leads to mutual respect for the knowledge and established use areas of other crabbers. In short, an informal system of user rights tends to develop in any given area. Some crabbers active in areas where MPA regulations have diminished traditional grounds now anticipate the possibility for increased spatial conflicts. That is, there is an increased likelihood for a period of tension and conflict as the systems are reordered to accommodate displaced participants.

Seasoned crab fishery participants have also stated concern that fishermen displaced from the salmon fishery may enter the crab fishery as did some displaced trawl fishermen. There is concern that this would further increase competition and pressure on limited resources. There are reports of existing participants seeking to forestay losses by investing in more pots.

Spot Prawn. Spot prawn fishermen in both Monterey Bay and Morro Bay have also lost access to historically productive grounds. The loss of landings in both the north-central and south-central zones has reportedly affected local wholesale and retail establishments, the owners of which cannot as easily meet local demand for spot prawn. Market prices for spot prawn increased following the MPA-related closures; thus, fishermen who were able to harvest the species during this time have experienced some economic benefits.

Sablefish. Closure of Soquel Canyon and Portuguese Ledge significantly affected sablefish fishermen in the Monterey Bay area. Some fishermen from Monterey report that they have been unable to make the trip to the remaining Monterey Bay area grounds because those waters are too distant, given the fuel capacities of their small vessels. Fishermen with larger boats reportedly are now traveling to fish in areas up to 900 fathoms in depth. The longer trips have led to increased fuel expenditures in certain cases, and certain fishermen have stated concerns about the dangers of fishing in or in close proximity to busy shipping lanes. The Soquel Canyon and Portuguese Ledge closures have led some Monterey-based fishermen to state that they will either relocate to the Morro Bay area or departure the fishery.

Nearshore. Seasoned commercial fishermen contacted during the course of this study considered the following areas to be productive for nearshore rockfish and other nearshore species in years past: Año Nuevo, Greyhound Rock, Monterey Peninsula, Point Lobos, Point Sur, Big Creek, Piedras Blancas, Cambria/White Rock, Point Buchon, and Vandenberg. Fishermen based in both Monterey Bay and Morro Bay assert that the MPA closures have therefore resulted in a significantly diminished total acreage of favorable nearshore fishing locations that are not already regulated. This has resulted in more highly concentrated effort in specific locations. Participants based in Monterey Bay are tending to fish in allowable and productive locations to the south, although fuel costs and challenging sea conditions limit the distance many captains are willing to travel. Nearshore fishing activity between Point Lobos and Point Sur reportedly increased during 2008 as a result of the new MPA closures.

Closures in the Morro Bay area are affecting commercial nearshore fishermen who participate in the live fish fishery using skiff and kayaks. Although there are alternative grounds, the number of ocean access points is limited and participants report having to travel farther to reach allowable grounds. Closures have constrained pursuit of certain rockfish species that are often sold in the live fish market, such as brown and grass rockfish. Buyers report that the closures reduced the amount of grass rockfish available for purchase in 2008.

Squid. Squid fishermen have lost some traditional fishing grounds in areas now encompassed by the Año Nuevo, Asilomar, Pacific Grove Marine Gardens, Carmel Pinnacles, Point Sur, Piedras Blancas, and Point Buchon reserves. Because squid have not been abundant in recent years, the fisheries-specific effects of the new closures cannot be assessed. Seasoned squid fishermen anticipate displacement of effort. It should be noted that the MPAs may affect the entire California squid fleet, as it is customary for vessels to follow squid as they move along the coastline.

Salmon. The salience of the closure of the 2008 salmon fishery has limited the willingness or ability of many fishery participants to adequately contemplate the effects of the new MPAs. When salmon return to the Central Coast in volume, and if strictures are lifted, salmon fishing

may ultimately be constrained in what are now the Año Nuevo, Greyhound Rock, Point Lobos, Point Sur, Big Creek, Point Buchon, Piedras Blancas and Vandenberg MPAs. Some knowledgeable participants stated that fishermen will likely fish the outer edges of the MPAs for salmon. The 2008 salmon closure increased the number of fishermen participating in the region's crab, sablefish, and hagfish fisheries. Regarding the pursuit of pelagic species such as albacore, knowledgeable fishermen assert that MPAs can disrupt normal trolling patterns. They also expressed concern about the possibility that MPAs will be established in federal jurisdiction waters along the Central Coast.

California Halibut. MPA closures have only minimally impacted the state-managed California halibut fishery. One trawl captain in the Monterey Bay area has left the industry since the establishment of the MPAs, though a variety of factors were associated with his departure.

Hagfish. MPA closures have affected some hagfish fishermen in both the Monterey Bay and Morro Bay areas. In both zones, closures have displaced hagfish fishermen to more distant and reportedly less productive waters.

In the Monterey Bay area, overseas demand for hagfish is creating a business opportunity for some fishermen who are struggling to make ends meet, given the constraining effects of a wide range of regulations. A few sablefish, rockfish, and salmon fishermen are participating in this fishery. Some charter operators have purchased commercial licenses to participate in the fishery.

One fisherman explains that while hagfish will never be a significant source of revenue for persons in the harvest sector, the fishery is helping certain Monterey Bay area sablefish fishermen adapt to recent economic and regulatory challenges. Investment is low and regulations are minimal.

Other Fisheries. No major MPA-specific effects are reported for the albacore, sardine, mackerel, anchovy, thornyhead, or swordfish fisheries. This is largely due to the fact that these species are primarily found well offshore. The fisheries are not discussed further here.

Some fishermen are responding to MPA closures and other regulations by switching to or adding new fisheries to their seasonal round. Some fishermen are considering fisheries that have historically been of minor importance, such as the shark and coon stripe shrimp fisheries. Others are experimenting with new gear (e.g., mid-water trolling for chilipeppers and use of circle hooks for sanddabs). Such experimentation requires capital, time, and optimism in the future of fishing.

8.14 Generalized Initial Effects on Recreational Fishing

Recreational anglers who target salmon, California halibut, and albacore are largely unaffected by the recently implemented MPAs. The degree of effect on other recreational fisheries depends in part on mode of fishing. Boat-based anglers are affected when area closures require additional travel distances and associated increases in time and fuel costs to reach alternative grounds. Persons who trailer their vessels can also be affected by increased time expenditures and fuel costs if grounds are closed near their place of residence. Shoreline anglers may similarly be affected by closures, though they are spared the added cost of fuel associated with towing a vessel.

Kayak and shoreline anglers often discuss ocean access issues. Access to the ocean along the Central Coast is often limited by private property restrictions and/or steep and rocky terrain. In some cases, good access occurs near productive fishing areas that are now closed due to MPA regulations. Although there may be alternative fishing areas nearby, these often are not readily accessible. Thus, MPAs can indirectly complicate patterns of use by certain recreational user groups.

It can be argued that fishermen with the economic means to purchase and maintain their own vessels can also afford to travel more extensively to allowable fishing grounds. Certain avid fishermen contacted during this study admitted that the MPAs will not affect the frequency of their fishing trips, but asserted rather that the closure will affect where they fish. A prominent retail business owner in Morro Bay remarked that “not many guys will totally get out of fishing. . .they will [rather] find other areas and ways to keep fishing.” This situation may ultimately bear implications for the larger ecosystems within which the MPAs are situated.

8.15 Other Overarching Initial Effects

In the case of commercial fisheries, initial effects are being experienced by certain fishermen and their families; buyers and processors; boatyards and marinas; and consumers of seafood. In the case of recreational fisheries, initial effects are being experienced by certain charter boat businesses and their booking agents; gear and bait shop owners; and owners and operators of hotels, restaurants, and other service-oriented businesses.

Economic effects can be envisioned from a variety of perspectives: loss of net revenue due to diminished or lost fishing opportunities and landings; increased trip costs; and layoffs of crew or other employees. Certain commercial sablefish, spot prawn, and rockfish fishermen report loss of revenue due to diminished landings resulting from the new area closures. This has led to losses for some buyers and processors. In some cases, losses have been obscured because fishermen are absorbing them or are increasing fishing effort in other areas and/or fisheries.

There have been isolated cases of loss of employment following from the MPA-related closures. In the Morro Bay area, a third-generation fishing captain, along with two crew members, lost their charter boat positions in July 2008. This was in direct relation to the closure of grounds in what is now the Piedras Blancas MPA and the subsequent loss of income from charter trips to this area. In the northern zone, some spot prawn fishers did not fish for nearly one year, and a halibut fisherman is reportedly out of business due to the concurrent state water trawl closure and MPA closures.

There is some evidence that MPA closures are associated with the decreasing value of permits. In fisheries that are not subject to the additive effects of MPA closures and other regulations, permits appear to be increasing in value. But logically, permits pertaining to fisheries that have been affected by multiple regulations, including area closures, are decreasing in value. For example, nearshore permits in the south central region reportedly depreciated from \$15,000 in

2005 to \$5,000 in 2008. There is also little doubt that the general regulatory environment has led to a depreciation of the value of commercial fishing vessels in the region.

The MPA closures have heightened two important challenges for certain commercial fishermen along the Central Coast - longer fishing hours and the need to travel in poor weather and sea conditions. Clearly, this situation is not solely a result of the closures, but rather the closures are, in certain places, adding to the effects of a series of regulatory requirements that have tended to require that fishermen travel further from port to reach viable fishing grounds. Because more distant grounds favor larger vessels, some fishermen and vessel owners say they are debating whether to invest in larger boats in order to persist in a given fishery.

Although job alternatives are limited in the current economic climate, most commercial fishermen in the region have gradually been forced by a long series of regulations and ongoing economic and environmental challenges to consider their options. The persistent are finding new ways to adapt. Some are entering new fisheries, others are finding new fishing grounds or relocating to new harbors. Some are now selling high-quality seafood directly from their vessels, and buyers are increasingly advancing the concept of locally caught wild seafood products.

8.16 Conclusion

This report has drawn from a large socioeconomic database to describe historic and contemporary aspects of Central Coast marine fisheries. The fisheries have been conditioned by a wide range of biophysical and human sources of change over the course of time. We have repeatedly discussed the importance of various social and economic factors and their constraining and enabling effects on the fleets. Factors such as fuel costs, permit costs, seafood marketing options and channels of distribution, and the capacity of port-related infrastructure to serve commercial and recreational user groups clearly affect the status of fishing fleets across the region.

It should be noted here that gains and losses in the harvest sector can often lead to secondary economic effects in communities where numerous people are engaged in commercial fishing industries. Limited resources and the extensive geographic scope of the current project precluded in-depth research of such effects. This study was focused rather on documentation of the historic background of and contemporary conditions affecting socioeconomic aspects of the Central Coast harvest sector, and on generating a preliminary accounting of the fisheries-specific effects of the new reserves.

The obvious and unavoidable descriptive and analytical focus of this report has been on the regulatory environment and its profound effects on marine resource user groups throughout the region over time. We reiterate that for participants in the commercial fishing fleets, many of the reported and observed effects are in large part the outcome of a long series of regulatory events and processes. These events and processes have continually led to a reordering of relationships between persons in the harvest sector and the natural resources upon which they depend and upon which they exert pressure; and between persons in the harvest and distribution sectors and their home communities. Map 8-3 below provides a visual illustration of the many regulations

used to manage marine fisheries in the region. In this case, the map depicts spatial parameters of the many regulations currently affecting the rockfish fishery and adjacent fisheries along the Central Coast.

In the case of many commercial fisheries discussed in this report, the effects of MPAs are exceeded by other regulations, such as those related to limited entry programs, conservation zones, quotas, and size and bag limits. Moreover, in the first year following formal establishment of the Central Coast MPAs, a variety of events have occurred to confound analysis of the specific effects of the reserves on marine fisheries.

Fuel costs, for example, have risen sharply (see Figure 8-1 below), and the perennially important California salmon fishery was closed due to dramatically poor returns of spawning fish. Of note, the cost of fuel is tending to decrease the distance displaced commercial fishermen, charter operators, and boat-based recreational anglers can travel. This may ultimately lead to increased pressure on the margins of MPAs that are in close proximity to harbors and/or launch sites.

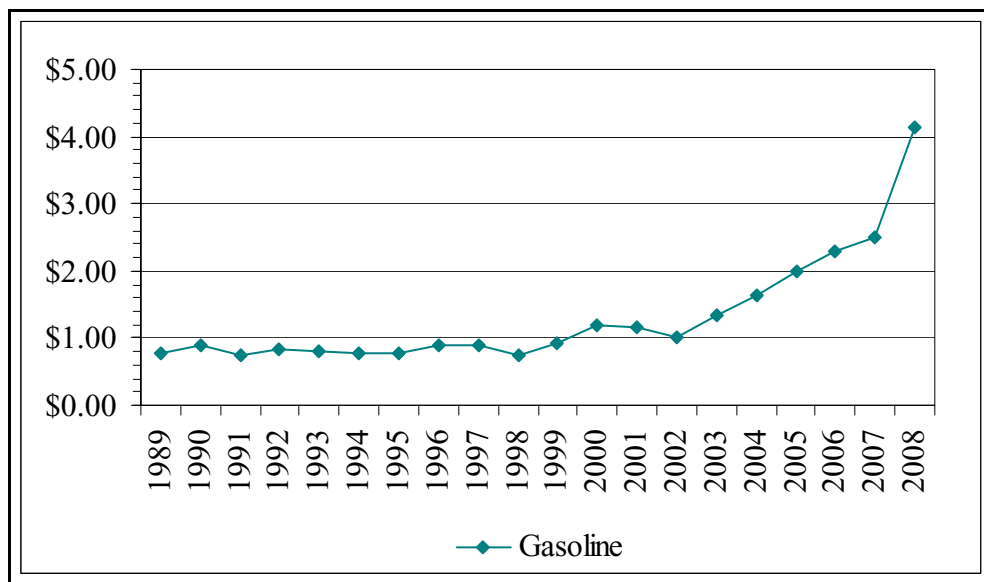
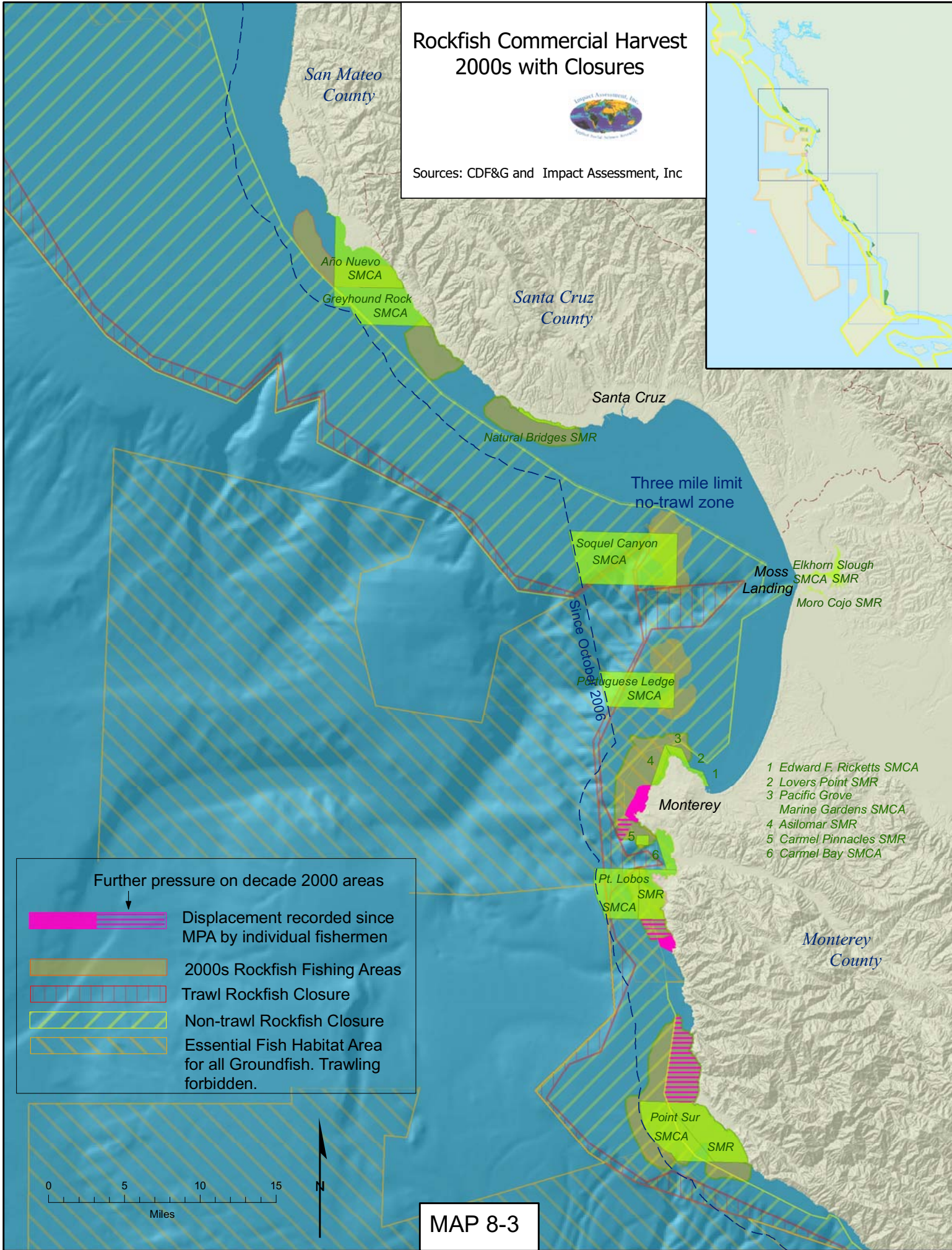
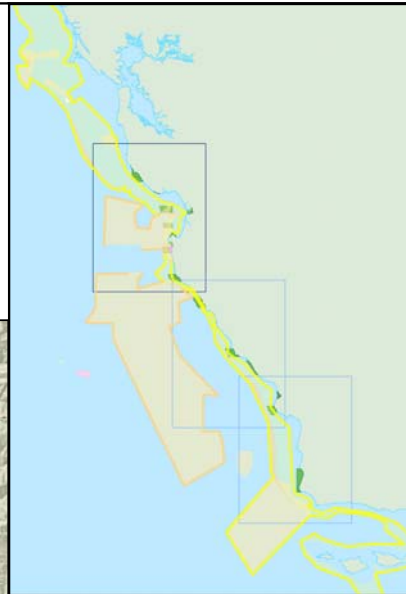


Figure 8-1 Trend Line for “at the Pump” California Fuel Prices

Rockfish Commercial Harvest 2000s with Closures



Sources: CDF&G and Impact Assessment, Inc



- 1 Edward F. Ricketts SMCA
- 2 Lovers Point SMR
- 3 Pacific Grove Marine Gardens SMCA
- 4 Asilomar SMR
- 5 Carmel Pinnacles SMR
- 6 Carmel Bay SMCA

Further pressure on decade 2000 areas

- Displacement recorded since MPA by individual fishermen
- 2000s Rockfish Fishing Areas
- Trawl Rockfish Closure
- Non-trawl Rockfish Closure
- Essential Fish Habitat Area for all Groundfish. Trawling forbidden.

MAP 8-3

Finally, the national and international economies began to enter into a period of severe economic recession during the final months of this study. This inevitably limited and continues to limit the overall capacity of commercial and recreational user groups to engage in normal patterns of activity.

These and other factors undoubtedly confound efforts to confidently parse the specific human effects of the MPAs and to clearly determine the implications of MPA-induced human behavioral changes for the future status of the marine environment in and around the reserves.

But this is not to imply that human dimensions analysis should not be undertaken here, or that it cannot ultimately yield valid results in this setting. Rather, it is a statement on the complexity of such analysis and the need to recognize that such work is as challengingly complex as MPA analysis undertaken through any other discipline. Significantly, it is also a statement on the obvious need to monitor and assess human uses of the MPAs and adjacent areas over the course of future months and years.

Indeed, despite the uncertain effects of a variety of sources of change, there are strong indications that the new MPAs are affecting marine fisheries and other uses of the marine environment across the study region. This is supported both by the reports of knowledgeable persons active in marine industries across the region, and by the ongoing observations of our study team. The situation clearly calls for development of a framework capable of monitoring and assessing the long-term human effects and implications of the new reserves. Based on the findings of the current study, we provide Table 8-1 below which delineates key variables and indicators that will prove useful to the State of California's MPA monitoring program.

Table 8-1: Key Socioeconomic Monitoring Indicators and Variables

MPA Effect	General Indicators	Human Implications	Potential Monitoring Variables ¹	
Displacement of Individuals in the Commercial Harvest Sector	Concentrated and/or mixed use of marine environment, crowding around MPA boundaries, crowded staging areas	Social and social psychological: potential for spatial and/or political and ideological conflicts	Number and type of conflicts between individuals in various user groups; Level of ease of access to ocean; Perspectives and experiences reported in public venues/other points of interaction between government representatives and the affected polity	
	Change in manner and/or extent of fishing along MPA boundaries	Economic: costs associated with increased possibility of fines; potential benefits where MPAs improve fishing in adjacent areas	Number/nature of MPA regulatory violations; Manner and extent of fishing near MPAs; Trip ticket/landings data where such data can be confidently attributed to specific locations	
	Exploration and/or use of new fishing grounds	Economic: increased costs associated with travel; potential benefits from increased and/or more profitable landings; Safety: liabilities associated with more time at sea, increased possibility of exposure to dangerous conditions	Costs of fuel per trip; Cost of outfitting vessel to meet safety requirements for longer/more distant trips; Volume of landings attributable to species areas and ex-vessel revenue associated with those landings; Rates of morbidity and mortality at sea	
	Movement of captains and/or crew to new ports in and out of region and state	Economic: costs associated with setting up operations in new location; potential benefits associated with success therein; Social: challenges associated with adaptation to configuration of fisheries in new area	Numbers and types of fishing operations based at various ports; Nature and extent of sales and leasing activity associated with the commercial fishing industry at those ports; Changes in landings and revenue attributable to specific ports and fleets	
Changes in the Commercial Fisheries Distribution and Support Sectors	Change in overall level of participation in commercial harvest sector	Social: costs associated with loss of or diminished involvement in fishing lifestyle; Economic: costs associated with diminished participation in profitable fisheries, benefits when departure leads to economic gain	Berth vacancy rates; Number of abandoned vessels; Number of vessel registrants; Number of active commercial permits; No. of harvesters engaging in land-based or alternative fishing employment (e.g., sport guides); Individual/collective ratio of full-time/part-time involvement in commercial fishing industry	
	Change in number and/or nature of dominant and niche seafood markets	Economic: costs and benefits associated with reduced availability of some species and increased availability of others; benefits to owners of businesses who successfully develop new markets, costs to those experiencing reduced availability of profitable mainstay products	Degree of availability and ex-vessel/market prices for mainstay and new seafood products; Number/type of wholesale and retail seafood businesses; Number of employees; Gross and net revenue	
	Change in industries supporting harvest and distribution sectors	Economic: benefits to businesses providing gear and distribution/support services for new fisheries, potential costs to those providing gear and distribution/support services for prohibited fisheries		Degree of availability of , and ex-vessel/market prices for mainstay and new seafood products; Change in number of wholesale and retail seafood businesses and type of seafood offered; Change in fishery-specific rates and kinds of employment

¹ A variety of methods would be required to implement long-term monitoring of the variables provided here. These include primary source interview research, direct observation, and use of various forms of information collected through existing data collection programs. A comprehensive monitoring framework would include detailed description of methods needed to gather and analyze these data while controlling for potentially intervening factors and variables.

MPA Effect	General Indicators	Human Implications	Potential Monitoring Variables
Change in Recreational and Non-consumptive Uses of the Marine Environment	Change in manner and/or extent of use of MPA areas	Experiential: benefits to persons experiencing aesthetic aspects of area; benefits to those experiencing less crowded conditions within MPA; Economic: costs to persons traveling greater distances to reach such areas	Frequency and manner of visitation to MPAs; Level of satisfaction with various experiences; Costs of travel to and use of area
	Change in manner and/or level of activity in marine recreational sector	Economic: benefits to business owners providing services & materials useful for experiencing the MPAs	Nature and rate of services and goods provided; Revenue deriving from MPA-attributable sales and service
	Concentrated and/or mixed use of marine environment, crowding at sea or at specific staging areas	Social and social psychological: liabilities for persons experiencing conflicts and crowding at or around MPAs and staging areas; Economic: benefits to business owners such as charter operators; Generalized benefits to coastal businesses and municipalities serving tourism interests	Number, type, and rates of use of MPAs; Number and type of conflicts at sea and staging areas/points of access; Nature and rate of services and goods provided, revenue associated with goods and services to facilitate high or mixed use of MPA
	Competition among businesses engaged in marine recreation and/or related tourism services	Economic: benefits to successful businesses; costs to failed businesses	Number of new businesses and services; Number of failed businesses; Services offered and associated revenue; Level of satisfaction with enterprise
Confusion Regarding New Regulations	Violation of MPA rules	Economic: costs of citations resulting from inadvertent or intentional violation of MPA rules; Social psychological: Increased frustration resulting from inadvertent violations	Number and type of MPA regulatory violations; Nature of reaction to citations for inadvertent violations; Rate of use of MPAs over time; Extent of buffer practiced around MPA boundaries
	Captains following captains (e.g., inexperienced following experienced)	Social psychological: liabilities associated with inter- or intra-fleet conflicts; Economic: costs associated with inadvertent or intentional violation of MPA rules	Manner and rate of conflicts between those using MPAs; Nature, rate, and rationale of violations; Cost of violations
	Failure of recreational groups to engage in allowable uses	Experiential/Dietary: loss of potential benefits of using MPAs	Frequency and manner of visitation to MPAs; Rate of and rationale for avoiding MPA areas
Change in Status of Living Marine Resources in/around MPAs	Change in catch levels in areas adjacent to MPAs	Economic: Assuming sustained improvement, benefits to commercial and recreational participants and generalized benefits to ports and municipalities; Assuming no or negative effects on resources, status quo or diminished benefits; Social: Assuming sustained improvement, bolstering of commercial fishing as a viable way of life; enhanced social experience for visiting recreational anglers; Assuming no or negative effects, status quo or diminished lifestyle and recreational experience	Commercial landings and revenue for individuals and fleets; Revenue generated by fishing-specific support businesses; Overall measures of economic growth or change at harbors/ports/municipalities; Level of satisfaction with commercial and recreational fishing experience
	Change in level of receptivity to establishment of MPAs	Socio-political: assuming improvement, improved relations and trust between governance entities/ officials and affected polity; assuming no or negative effects, status quo or diminished trust & nature of relations	Perspectives and experiences reported in public venues and other points and places of interaction between government representatives and the affected polity

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APPENDICES -

Appendix A: Study Region Demographics - The following tables present selected social, economic, and industry demographics for the five study counties. Statistics for the State of California and the nation are also included as benchmarks for comparison.

Total Population and Selected Demographics of Study Regions by County (in percentages): 2006

County	Pop.	White	Black	Asian	Hisp.	Other*	Speaks lang. other than Eng. at Home	Speaks Eng. less than "Very Well"
SB	400,335	77.8	2.0	4.4	38.2	11.2	37.0	18.2
SLO	257,005	84.5	1.8	3.1	13.3	10.5	15.2	6.4
Mont.	410,206	64.4	3.1	6.9	51.5	27.0	51.9	26.1
SC	249,705	85.8	1.0	4.2	28.3	9.0	28.0	12.8
SM	705,499	61.3	3.2	23.3	23.0	12.2	43.6	17.6
CA State	36,457,549	59.8	6.2	12.3	35.9	21.7	42.5	20.0
U.S.	299,398,485	73.9	12.4	4.4	14.8	9.2	19.7	8.6

Source: U.S Census Bureau 2006

*Combines demographics for American Indian/Native Alaskan, Native Hawaiian/Other API, "Other Race and "Two or More Races".

Select Economic Characteristics by County (in percentages): 2006

County	Age 65+	BA Degree +	Median HH Income (\$)	Per capita income (\$)	Persons below poverty level	Civilian Unemp. rate	Median Home Value (\$)	Median Contract Rent (\$)
SB	12.8	30.4	53,477	27,476	16.3	5.5	685,700	1,151
SLO	14.3	31.1	50,209	27,506	13.6	5.3	581,000	1,044
Mont.	9.9	23.6	55,045	24,012	10.8	10.4	685,100	1,012
SC	10.4	35.9	62,193	31,890	11.6	7.5	717,100	1,168
SM	13.0	44.2	77,914	40,051	7.4	4.8	814,700	1,327
CA State	10.8	29.0	56,645	26,974	13.1	6.6	535,700	1,029
U.S.	12.4	27.0	48,451	25,267	13.3	6.4	185,200	763

Source: U.S Census Bureau 2006

Select Industry Employment Characteristics by County (in percentages): 2006

County	Ag., Fish., Hunting, Forestry & Mining	Manu.	Retail	Tourism	Educ.	Professional & Scientific	Govt.
Santa Barbara	6.9	8.1	10.2	12.2	21.0	12.8	16.8
SLO	3.4	6.5	10.4	12.5	21.3	8.2	20.1
Monterey	14.6	5.3	10.5	9.7	17.9	7.8	17.2
Santa Cruz	5.1	8.9	11.2	9.1	23.1	10.5	16.0
San Mateo	0.9	7.9	10.8	7.3	18.8	16.2	12.8
CA State	1.9	10.7	11.2	9.0	18.7	11.8	13.8
U.S.	1.8	11.5	11.4	8.5	20.8	10.1	14.3

Source: U.S Census Bureau 2006

Occupational Employment Characteristics by County (in percentages): 2006

County	Mgmt.	Service	Sales & Office	Farming, Fishing & Forestry	Construction	Prod. & Trans.
Santa Barbara	32.4	21.9	24.4	5.0	8.3	7.6
SLO	34.9	20.1	24.7	1.5	11.3	7.2
Monterey	29.1	17.4	23.3	11.8	7.7	10.5
Santa Cruz	41.5	17.8	20.3	3.4	9.5	7.1
San Mateo	43.4	15.2	25.7	0.6	6.9	7.9
CA State	34.7	16.7	25.9	1.3	9.5	11.6
U.S.	33.9	16.5	25.8	0.7	9.9	12.9

Source: U.S Census Bureau 2006

APPENDIX B – Study Region, County Demographics

Santa Barbara County Demographics

Factor	1990	2000
Total population	369,608	399,347
Gender Ratio M/F (Number)	185,603/184,005	199,763/199,584
Age (Percent of total population)		
Under 18 years of age	23.2	12.2
18 to 64 years of age	64.5	75.1
65 years and over	12.3	12.7
Ethnicity or Race (Number)		
White	77.2	72.7
Black or African American	2.8	2.3
American Indian and Alaskan Native	0.9	1.2
Asian	4.4	4.1
Native Hawaiian and other Pacific Islander	N/A	0.2
Some other race	14.6	15.2
Two or more races	N/A	4.3
Hispanic or Latino (any race)	26.5	34.2
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	9.6	10.9
Percent high school graduate or higher	80.0	79.2
Percent with a Bachelor's degree or higher	26.6	29.4
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	25.2	67.2
And Percent who speak English less than very well	12.6	32.8
Household income (Median \$)	35,677	46,677
Poverty Status (Percent of population with income below poverty line)	12.8	14.3
Home Ownership (Number)		
Owner occupied	71,053	76,611
Renter occupied	58,749	60,011
Value Owner-occupied Housing (Median \$)	250,000	293,000
Monthly Contract Rent (Median \$)	606	830
Employment Status (Population 16 yrs and over)		
Percent in the labor force	66.5	63.1
Percent of civilian labor force unemployed	3.5	6.7
Occupation** (Percent in workforce)		
Management, professional, and related occupations	28.8	35.4
Service occupations	13.7	17.1
Sales and office occupations	30.6	25.3
Farming, fishing, and forestry occupations	6.3	4.9
Construction, extraction, and maintenance occupations	7.1	7.7
Production, transportation, and material moving occupations	13.4	9.6
Industry** (Percent in workforce)		
Agriculture, forestry, fishing and hunting, and mining†	7.9	6.7
Manufacturing	13.0	9.7
Percent government workers	16.0	16.3

**Differences in the types of data the U.S. Census Bureau used to generate Occupation and Industry percentages in 1990 and 2000 preclude valid comparisons between those census years.

† Mining includes the offshore oil industry workforce.

San Luis Obispo County Demographics

Factor	1990	2000
Total population	217,162	246,681
Gender Ratio M/F (Number)	112,049/ 105,113	126,704/ 119,977
Age (Percent of total population)		
Under 18 years of age	21.9	21.7
18 to 64 years of age	63.9	63.8
65 years and over	14.2	14.5
Ethnicity or Race (Number)		
White	89.1	84.6
Black or African American	3.0	2.0
American Indian and Alaskan Native	1.0	0.9
Asian	2.8	2.7
Native Hawaiian and other Pacific Islander	N/A	0.1
Some other race	4.3	6.2
Two or more races	N/A	3.4
Hispanic or Latino (any race)	13.3	16.3
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	5.5	4.9
Percent high school graduate or higher	83.3	85.6
Percent with a Bachelor's degree or higher	22.9	26.7
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	12.1	14.7
And Percent who speak English less than very well	4.8	5.9
Household income (Median \$)	31,164	42,428
Poverty Status (Percent of population with income below poverty line)	12.9	12.8
Home Ownership (Number)		
Owner occupied	48,035	57,001
Renter occupied	32,246	35,738
Value Owner-occupied Housing (Median \$)	215,300	230,00
Monthly Contract Rent (Median \$)	510	719
Employment Status (Population 16 yrs and over)		
Percent in the labor force	59.1	58.3
Percent of civilian labor force unemployed	3.1	5.9
Occupation** (Percent in workforce)		
Management, professional, and related occupations	25.5	34.3
Service occupations	16.8	18.8
Sales and office occupations	30.3	25.3
Farming, fishing, and forestry occupations	4.9	2.1
Construction, extraction, and maintenance occupations	7.3	9.8
Production, transportation, and material moving occupations	15.1	9.8
Industry** (Percent in workforce)		
Agriculture, forestry, fishing and hunting, and mining†	6.3	3.8
Manufacturing	8.0	7.1
Percent government workers	20.5	20.6

**Differences in the types of data the U.S. Census Bureau used to generate Occupation and Industry percentages in 1990 and 2000 preclude valid comparisons between those census years.

† Mining includes the offshore oil industry workforce

Monterey County Demographics

Factor	1990	2000
Total population	355,660	401,762
Gender Ratio M/F (Number)	184,755/170,905	207,941/ 193,821
Age (Percent of total population)		
Under 18 years of age	27.5	28.4
18 to 64 years of age	62.7	61.6
65 years and over	9.8	10.0
Ethnicity or Race (Number)		
White	63.8	55.9
Black or African American	6.4	3.7
American Indian and Alaskan Native	0.8	1.0
Asian	7.8	6.0
Native Hawaiian and other Pacific Islander	N/A	0.4
Some other race	21.0	27.8
Two or more races	N/A	5.0
Hispanic or Latino (any race)	33.6	46.8
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	15.5	18.9
Percent high school graduate or higher	72.9	68.4
Percent with a Bachelor's degree or higher	21.5	22.5
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	35.5	47.3
And Percent who speak English less than very well	18.6	26.8
Household income (Median \$)	33,520	48,305
Poverty Status (Percent of population with income below poverty line)	11.6	13.5
Home Ownership (Number)		
Owner occupied	57,202	66,213
Renter occupied	55,763	55,023
Value Owner-occupied Housing (Median \$)	198,200	265,800
Monthly Contract Rent (Median \$)	566	776
Employment Status (Population 16 yrs and over)		
Percent in the labor force	68.3	61.6
Percent of civilian labor force unemployed	5.0	8.7
Occupation** (Percent in workforce)		
Management, professional, and related occupations	24.0	29.2
Service occupations	14.0	16.8
Sales and office occupations	29.0	23.2
Farming, fishing, and forestry occupations	6.7	11.2
Construction, extraction, and maintenance occupations	7.6	8.5
Production, transportation, and material moving occupations	12.2	11.1
Industry** (Percent in workforce)		
Agriculture, forestry, fishing and hunting, and mining†	14.2	12.4
Manufacturing	8.4	5.7
Percent government workers	17.9	16.3

**Differences in the types of data the U.S. Census Bureau used to generate Occupation and Industry percentages in 1990 and 2000 preclude valid comparisons between those census years.

† Mining includes the offshore oil industry workforce.

Santa Cruz County Demographics

Factor	1990	2000
Total population	229,734	255,602
Gender Ratio M/F (Number)	114,205/115,529	127,579/128,023
Age (Percent of total population)		
Under 18 years of age	23.8	23.8
18 to 64 years of age	65.0	66.2
65 years and over	11.2	10.0
Ethnicity or Race (Number)		
White	83.9	75.1
Black or African American	1.1	1.0
American Indian and Alaskan Native	0.8	1.0
Asian	3.7	3.4
Native Hawaiian and other Pacific Islander	N/A	0.1
Some other race	10.4	15.0
Two or more races	N/A	4.4
Hispanic or Latino (any race)	20.3	26.8
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	9.4	9.7
Percent high school graduate or higher	81.9	83.2
Percent with a Bachelor's degree or higher	29.7	34.2
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	21.2	72.2
And Percent who speak English less than very well	29.7	27.8
Household income (Median \$)	37,112	53,998
Poverty Status (Percent of population with income below poverty line)	10.7	11.9
Home Ownership (Number)		
Owner occupied	50,052	54,681
Renter occupied	33,514	36,458
Value Owner-occupied Housing (Median \$)	256,100	377,500
Monthly Contract Rent (Median \$)	651	924
Employment Status (Population 16 yrs and over)		
Percent in the labor force	69.0	68.2
Percent of civilian labor force unemployed	3.6	6.1
Occupation** (Percent in workforce)		
Management, professional, and related occupations	32.5	40.3
Service occupations	12.1	14.8
Sales and office occupations	28.4	23.4
Farming, fishing, and forestry occupations	5.0	3.7
Construction, extraction, and maintenance occupations	8.1	8.9
Production, transportation, and material moving occupations	13.8	8.9
Industry** (Percent in workforce)		
Agriculture, forestry, fishing and hunting, and mining†	6.1	4.4
Manufacturing	16.1	12.4
Percent government workers	15.0	15.4

**Differences in the types of data the U.S. Census Bureau used to generate Occupation and Industry percentages in 1990 and 2000 preclude valid comparisons between those census years.

† Mining includes the offshore oil industry workforce.

San Mateo County Demographics

Factor	1990	2000
Total population	649,623	707,161
Gender Ratio M/F (Number)	320,188/329,435	349,651/357,510
Age (Percent of total population)		
Under 18 years of age	21.9	22.9
18 to 64 years of age	65.8	64.6
65 years and over	12.3	12.5
Ethnicity or Race (Number)		
White	71.9	59.5
Black or African American	5.4	3.5
American Indian and Alaskan Native	0.4	0.4
Asian	16.8	20.0
Native Hawaiian and other Pacific Islander	N/A	1.3
Some other race	5.4	10.2
Two or more races	N/A	5.0
Hispanic or Latino (any race)	17.6	21.9
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	6.8	7.2
Percent high school graduate or higher	84.1	85.3
Percent with a Bachelor's degree or higher	31.3	39.0
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	32.1	41.5
And Percent who speak English less than very well	14.2	18.5
Household income (Median \$)	46,437	70,819
Poverty Status (Percent of population with income below poverty line)	6.3	5.8
Home Ownership (Number)		
Owner occupied	145,552	156,133
Renter occupied	96,362	97,970
Value Owner-occupied Housing (Median \$)	343,900	469,200
Monthly Contract Rent (Median \$)	711	1,144
Employment Status (Population 16 yrs and over)		
Percent in the labor force	70.6	66.5
Percent of civilian labor force unemployed	4.2	3.3
Occupation** (Percent in workforce)		
Management, professional, and related occupations	31.5	42.7
Service occupations	12.0	13.5
Sales and office occupations	35.9	27.3
Farming, fishing, and forestry occupations	1.5	0.3
Construction, extraction, and maintenance occupations	6.3	7.5
Production, transportation, and material moving occupations	12.7	8.6
Industry** (Percent in workforce)		
Agriculture, forestry, fishing and hunting, and mining†	1.8	0.4
Manufacturing	12.5	10.3
Percent government workers	11.9	11.2

**Differences in the types of data the U.S. Census Bureau used to generate Occupation and Industry percentages in 1990 and 2000 preclude valid comparisons between those census years.

† Mining includes the offshore oil industry workforce.

Appendix C:

Number of Commercial Fishing Vessels, Landings in Pounds, and Ex-vessel Revenues (2000 constant U.S. dollars) in the State of California (CA) and in Central Coastal California (CCC): 1981-2007

Year	Vessels		Landings in Pounds (in millions)		Revenues (in millions \$)	
	CA	CCC	CA	CCC	CA	CCC
1981	6,908	2,561	791.6	25.9	633.0	31.0
1982	6,592	2,591	697.9	22.5	466.6	26.0
1983	5,834	2,623	523.0	20.9	357.0	23.2
1984	5,179	2,341	447.6	21.0	290.4	24.1
1985	4,813	2,305	358.3	26.9	222.2	30.6
1986	4,853	2,274	416.6	29.7	223.8	33.3
1987	4,720	2,454	442.7	29.3	231.8	31.2
1988	4,815	2,243	495.4	33.8	263.3	32.5
1989	4,887	2,491	487.0	30.9	209.0	34.6
1990	4,606	2,395	395.6	33.4	198.5	38.8
1991	4,394	2,370	371.5	32.8	181.1	41.4
1992	3,877	2,210	299.2	32.3	165.8	41.1
1993	3,658	2,251	320.0	34.1	160.6	44.3
1994	3,643	2,155	330.6	39.0	177.8	46.5
1995	3,435	2,119	425.5	39.4	186.2	42.8
1996	3,321	2,009	461.7	36.0	206.7	41.0
1997	3,206	1,937	492.3	39.0	191.3	41.4
1998	2,741	1,845	284.1	24.7	116.3	26.6
1999	2,812	1,419	472.0	26.7	149.8	31.1
2000	2,669	1,536	550.2	27.4	135.9	30.2
2001	2,393	1,349	443.6	22.3	107.7	24.4
2002	3,554	1,115	394.9	29.2	100.3	31.4
2003	3,024	954	277.8	28.9	121.1	31.1
2004	3,349	1,027	304.4	27.3	121.1	27.7
2005	2,999	1,002	296.3	24.1	96.1	24.9
2006	2,568	778	335.3	20.6	111.0	22.3
2007	2,700	815	293.2	16.6	72.0	18.1

Source: PacFIN 2007

Appendix D:

**State of California, Department of Motor Vehicles: Total Commercial Vessel Registrations by County*:
1985-2007**

Year	Santa Barbara	San Luis Obispo	Monterey	Santa Cruz	San Mateo	CCC Total
1985	184	156	201	122	119	782
1986	188	145	200	112	119	764
1987	203	150	206	105	124	788
1988	197	169	205	105	131	807
1989	199	171	215	108	131	824
1990	211	171	213	106	135	836
1991	215	196	214	105	138	868
1992	217	212	203	89	133	854
1993	232	206	195	87	125	845
1994	235	208	190	83	125	841
1995	243	217	178	77	116	831
1996	243	243	174	73	114	847
1997	248	234	131	67	122	802
1998	238	224	168	70	111	811
1999	243	242	187	75	112	859
2000	230	215	168	68	104	785
2001	239	177	178	76	102	772
2002	215	186	157	69	75	702
2003	215	197	165	69	83	729
2004	196	160	128	61	78	623
2005	199	164	136	65	76	640
2006	179	161	108	63	67	578
2007	193	162	113	66	66	600

* Includes only county residents

Source: California Department of Motor Vehicles 2008

Appendix E:

San Mateo Landings, Revenue, and Related Fishing Effort Data: 1981-2007

Year	Landings in Pounds	Revenue in dollars	Number of fish tickets	Number of trips	Number of Offloading Vessels*	Average Number of Trips per Vessel
1981	1,325,857	1,548,036	4,256	3,861	403	9.58
1982	2,285,589	2,216,902	5,626	5,122	490	10.45
1983	4,147,594	2,175,797	5,162	4,631	501	9.24
1984	3,649,028	2,501,709	5,314	4,867	518	9.39
1985	3,565,306	2,703,324	5,763	5,273	599	8.80
1986	7,413,768	4,150,937	6,303	5,737	547	10.48
1987	5,601,545	4,565,112	5,797	5,375	492	10.92
1988	5,696,779	7,215,558	8,347	7,807	617	12.65
1989	5,695,274	4,926,982	8,353	7,762	747	10.39
1990	7,030,642	5,044,132	6,589	5,963	573	10.40
1991	8,418,477	4,923,218	7,943	7,266	599	12.13
1992	9,778,021	4,891,190	7,759	6,970	515	13.53
1993	6,530,188	4,398,811	8,296	7,349	579	12.69
1994	10,241,994	6,360,688	9,017	8,104	595	13.62
1995	6,984,007	6,779,764	7,687	6,766	511	13.24
1996	5,319,180	4,945,751	6,133	5,314	441	12.04
1997	5,564,024	6,469,339	6,165	5,476	425	12.88
1998	4,752,563	4,579,596	4,742	4,431	374	11.84
1999	5,663,509	4,282,401	4,352	4,092	357	11.46
2000	3,034,784	3,931,744	3,631	3,441	338	10.18
2001	2,971,444	3,285,488	3,225	3,030	294	10.30
2002	5,132,166	4,504,265	3,264	3,061	235	13.02
2003	6,210,561	4,885,154	2,772	2,586	150	17.24
2004	4,387,061	6,646,069	3,638	3,395	262	12.95
2005	3,544,350	5,981,367	3,200	2,974	240	12.39
2006	2,790,599	4,779,409	2,852	2,692	166	16.21
2007	1,396,966	3,246,592	2,273	2,161	206	10.49
Total	139,131,276	121,939,335	148,459	135,506	n/a	n/a
Average	5,153,010	4,516,271	5,498	5,018	436	11.79

* Includes both resident and non-resident vessels that offloaded in San Mateo

Source: PacFIN 2007

Appendix F:

Santa Cruz County Landings, Revenue, and Related Fishing Effort Data: 1981-2007

Year	Landings in Pounds	Revenue in dollars	Number of fish tickets	Number of trips	Number of Offloading Vessels*	Average Number of Trips per Vessel
1981	361,986	539,737	3,887	3,573	324	11.03
1982	360,908	671,200	4,025	3,811	338	11.27
1983	264,500	386,284	2,728	2,547	290	8.78
1984	321,996	445,704	2,089	1,907	263	7.25
1985	477,064	586,994	2,286	2,102	279	7.53
1986	443,521	713,480	2,270	2,097	241	8.70
1987	480,934	979,527	2,452	2,346	495	4.74
1988	1,636,177	3,079,090	4,523	4,344	304	14.28
1989	4,467,910	1,937,712	4,064	3,923	376	10.43
1990	4,473,995	2,254,301	3,650	3,507	327	10.72
1991	2,910,607	1,241,101	2,685	2,584	257	10.05
1992	1,133,950	811,877	2,700	2,565	211	12.15
1993	768,061	848,319	2,060	1,931	184	10.49
1994	1,116,100	1,066,897	2,084	1,941	170	11.41
1995	1,817,357	1,785,168	2514	2,386	224	10.65
1996	1,783,546	1,690,835	2,745	2,642	239	11.05
1997	1,912,775	1,622,809	2,693	2,519	191	13.18
1998	1,119,673	864,036	1,639	1,525	146	10.44
1999	971,285	1,132,507	2,096	1,829	130	14.06
2000	706,621	1,111,788	1,641	1,514	165	9.17
2001	370,236	538,561	1,376	1,272	145	8.77
2002	438,437	618,961	1,472	1,332	95	14.02
2003	444,449	590,565	1,332	1,256	101	12.43
2004	582,005	1,088,240	1,457	1,376	111	12.27
2005	654,048	1,453,661	1,486	1,362	125	10.89
2006	291,487	609,372	871	823	93	8.85
2007	385,819	793,309	801	770	105	7.33
Total	30,695,447	29,462,035	63,626	59,784	n/a	n/a
Average	1,136,868	1,091,186	2,356	2,214	220	10.44

* Includes both resident and non-resident vessels that offloaded in Santa Cruz

Source: PacFIN 2007

Appendix G:

Monterey County Landings, Revenue, and Related Fishing Effort Data: 1981-2007

Year	Landings in Pounds	Revenue in dollars	Number of fish tickets	Number of trips	Number of Offloading Vessels*	Average Number of Trips per Vessel
1981	56,056,710	10,995,034	13,504	11,829	918	12.88
1982	49,934,895	9,003,421	14,695	13,296	781	17.02
1983	32,231,115	8,382,173	12,488	11,550	979	11.79
1984	45,945,817	6,796,249	10,075	9,364	802	11.67
1985	29,120,270	7,376,739	8,890	8,226	690	11.92
1986	31,834,403	8,130,846	12,303	11,214	660	16.99
1987	28,625,284	8,793,801	10,232	9,633	665	14.48
1988	22,687,483	9,346,946	11,367	10,612	567	18.71
1989	25,054,485	7,870,479	10,231	9,468	574	16.49
1990	33,178,875	7,579,359	11,921	11,057	628	17.60
1991	27,538,397	6,778,431	11,139	10,288	615	16.72
1992	29,085,701	5,924,386	9,107	8,411	549	15.32
1993	25,026,461	7,224,145	9,005	8,408	589	14.27
1994	43,412,556	10,613,195	8,306	7,722	429	18.00
1995	32,237,450	11,169,555	9,824	9,316	511	18.23
1996	49,748,454	12,191,726	10,097	9,380	547	17.14
1997	75,461,280	15,397,122	10,319	9,665	571	16.92
1998	34,275,786	6,294,259	6,197	5,565	677	8.22
1999	46,794,406	7,959,663	7,450	6,341	373	17.00
2000	61,479,526	9,876,449	7,867	7,025	465	15.10
2001	63,469,342	8,270,268	6,044	5,395	379	14.23
2002	95,670,393	12,781,405	6,984	6,247	315	19.83
2003	54,159,235	12,771,719	6,116	5,274	281	18.76
2004	59,178,634	8,927,755	6,008	5,557	276	20.13
2005	39,550,145	6,963,777	4,928	4,699	300	15.66
2006	59,655,635	5,781,020	3,128	2,976	175	17.00
2007	75,741,720	5,780,644	2,963	2,881	173	16.65
Total	1,227,154,458	238,980,566	241,188	221,399	n/a	n/a
Average	45,450,165	8,851,132	8,932	8,199	537	15.88

* Includes both resident and non-resident vessels that offloaded in Monterey

Source: PacFIN 2007

Appendix H:

San Luis Obispo County Landings, Revenue, and Related Fishing Effort Data: 1981-2007

Year	Landings in Pounds	Revenue in dollars	Number of fish tickets	Number of trips	Number of Offloading Vessels*	Average Number of Trips per Vessel
1981	9,524,120	6,148,069	8,161	6,866	551	12.46
1982	8,673,932	4,788,953	8,530	6,553	507	12.92
1983	9,473,998	5,374,520	6,861	5,760	486	11.85
1984	9,147,290	5,696,859	6,006	5,152	431	11.95
1985	15,363,054	9,840,447	6,252	5,151	406	12.68
1986	12,177,273	8,859,427	8,048	6,894	457	15.08
1987	13,950,071	8,353,041	8,710	7,166	434	16.51
1988	12,330,784	8,224,893	9,078	7,133	447	15.95
1989	13,537,373	7,449,382	9,628	7,930	441	17.98
1990	14,484,247	8,015,328	10,325	8,485	491	17.28
1991	10,000,671	6,217,736	11,247	8,448	494	17.10
1992	11,707,786	6,913,997	13,241	9,356	515	18.16
1993	14,127,205	6,991,465	12,296	9,535	489	19.49
1994	11,824,137	7,190,084	9,714	7,491	488	15.35
1995	9,901,609	9,488,544	10,730	8,376	492	17.02
1996	8,720,252	7,168,705	10,153	8,054	449	17.93
1997	8,017,559	6,669,759	8,086	6,498	428	15.18
1998	6,207,536	6,426,294	7,524	5,776	363	15.91
1999	3,651,741	4,679,339	5,751	5,121	284	18.03
2000	3,632,875	5,733,828	5,822	5,223	325	16.07
2001	4,039,240	4,841,408	5,803	5,216	313	16.66
2002	4,833,194	4,438,784	4,604	4,018	256	15.69
2003	5,116,331	3,474,284	4,077	3,152	233	13.52
2004	4,860,477	3,505,823	3,633	2,917	187	15.59
2005	1,933,300	2,934,658	3,266	2,718	172	15.80
2006	1,161,385	2,941,761	3,572	3,005	175	17.17
2007	653,281	2,062,163	3,032	2,718	157	17.31
Total	229,050,721	164,429,551	204,150	164,712	n/a	n/a
Average	8,483,360	6,089,983	7,561	6,100	388	15.80

* Includes both resident and non-resident vessels that offloaded in San Luis Obispo

Source: PacFIN 2007

Appendix I:

Santa Barbara County Landings, Revenue, and Related Fishing Effort Data: 1981-2007

Year	Landings in Pounds	Revenue in dollars	Number of fish tickets	Number of trips	Number of Offloading Vessels*	Average Number of Trips per Vessel
1981	17,026,313	6,675,764	10,612	9,406	365	25.76
1982	12,631,239	5,797,568	10,732	9,332	475	19.64
1983	10,242,259	4,550,128	7,868	6,707	367	18.27
1984	10,213,875	5,603,199	8,116	6,926	327	21.18
1985	13,255,981	6,412,546	9,179	7,835	331	23.67
1986	15,017,705	7,835,416	9,893	8,722	369	23.63
1987	9,948,649	6,570,596	8,894	7,882	368	21.41
1988	7,312,559	5,957,898	7,721	6,919	308	22.46
1989	9,816,173	8,672,376	9,342	8,532	353	24.16
1990	11,564,286	10,475,732	11,786	9,886	376	26.29
1991	12,860,375	13,590,045	13,365	10,676	405	26.36
1992	11,147,908	13,727,027	13,924	10,761	420	25.62
1993	10,859,959	14,618,239	15,245	11,274	410	27.49
1994	10,091,604	13,819,030	13,775	10,289	473	21.75
1995	6,971,478	10,216,351	10,736	8,481	381	22.25
1996	10,772,294	9,984,227	10,838	8,559	333	25.70
1997	9,344,942	8,873,596	11,391	8,767	322	27.31
1998	5,094,937	6,544,496	9,986	7,597	285	26.65
1999	6,987,429	8,665,584	10,967	8,268	275	30.06
2000	7,031,673	6,755,140	7,980	6,348	243	26.12
2001	5,273,270	5,397,636	7,218	5,731	218	26.28
2002	6,264,127	6,817,610	9,070	6,939	214	32.42
2003	7,304,570	7,170,077	8,788	6,635	189	35.10
2004	8,138,219	7,124,246	9,381	6,556	191	34.32
2005	7,939,432	6,802,746	8,440	5,699	165	34.53
2006	6,917,094	6,527,002	8,299	5,911	169	34.97
2007	5,753,558	4,759,719	6,216	4,426	174	25.43
Total	255,781,908	219,943,994	269,762	215,064	n/a	n/a
Average	9,473,404	8,146,073	9,991	7,965	315	26.25

* Includes both resident and non-resident vessels that offloaded in Santa Barbara
Source: PacFIN 2007

Appendix J: Top Species Landed at Central California Study Region Ports: 2000-2006

Top Five Species Landed at Pillar Point Harbor: 2000-2006

Year	Species
2000	Chinook Salmon, Dungeness Crab, Halibut, Sanddab, Sablefish
2001	Dungeness Crab, Chinook Salmon, Sanddab, Halibut, Petrale Sole
2002	Dungeness Crab, Chinook Salmon, Halibut, Market Squid, Sanddab
2003	Dungeness Crab, Market Squid, Chinook Salmon, Halibut, Sanddab
2004	Chinook Salmon, Dungeness Crab, Halibut, Sanddab, Petrale Sole
2005	Dungeness Crab, Chinook Salmon, Halibut, Dover Sole, Sablefish
2006	Dungeness Crab, Chinook Salmon, Halibut, Dover Sole, Sablefish

Source: CDFG 2007

Top Five Species Landed at Santa Cruz Harbor: 2000-2006

Year	Species
2000	Chinook Salmon, Sablefish, Dungeness Crab, Halibut, Albacore
2001	Chinook Salmon, Albacore, Halibut, Dungeness Crab, Seabass
2002	Chinook Salmon, Dungeness Crab, Albacore, Halibut, Butterfish
2003	Chinook Salmon, Dungeness Crab, Albacore, Halibut, Sablefish
2004	Chinook Salmon, Dungeness Crab, Halibut, Albacore, Sablefish
2005	Chinook Salmon, Dungeness Crab, Halibut, Sablefish, Swordfish
2006	Chinook Salmon, Dungeness Crab, Halibut, Albacore, Sablefish

Source: CDFG 2007

Top Five Species Landed at Monterey Harbor: 2000-2006

Year	Species
2000	Market Squid, Chinook Salmon, Spot Prawn, Anchovy, Dover Sole
2001	Market Squid, Spot Prawn, Chinook Salmon, Dover Sole, Seabass
2002	Market Squid, Spot Prawn, Chinook Salmon, Thornyhead, Dover Sole
2003	Market Squid, Spot Prawn, Chinook Salmon, Sablefish, Dover Sole
2004	Market Squid, Chinook Salmon, Spot Prawn, Petrale Sole, Halibut
2005	Chinook Salmon, Spot Prawn, Market Squid, Petrale Sole, Sanddab
2006	Spot Prawn, Petrale Sole, Chinook Salmon, Sablefish, Cabezon

Source: CDFG 2007

Top Five Species Landed at Moss Landing Harbor: 2000-2006

Year	Species
2000	Chinook Salmon, Market Squid, Pacific Sardine, Sablefish, Albacore
2001	Sardine, Market Squid, Albacore, Sablefish, Anchovy
2002	Market Squid, Pacific Sardine, Chinook Salmon, Sablefish, Albacore
2003	Market Squid, Sablefish, Pacific Sardine, Chinook Salmon, Thornyhead
2004	Market Squid, Pacific Sardine, Chinook Salmon, Sablefish, Anchovy
2005	Yellowfin, Rockfishes, Dover Sole, Shark, Flounder
2006	Sardine, Sablefish, Anchovy, Spot Prawn, Market Squid

Source: CDFG 2007

Top Five Species Landed at Morro Bay Harbor: 2000-2006

Year	Species
2000	Spot Prawn, Albacore, Swordfish, Chinook Salmon, Cabezon
2001	Albacore, Spot Prawn, Swordfish, Cabezon, Rockfishes
2002	Spot Prawn, Pink Shrimp, Albacore, Cabezon, Chinook Salmon
2003	Albacore, Market Squid, Cabezon, Rockfish, Pink Shrimp
2004	Market Squid, Petrale Sole, Pink Shrimp, Chinook Salmon, Cabezon
2005	Dover Sole, Rockfishes, Thornyheads, Albacore, Sablefish
2006	Dungeness Crab, Spot Prawn, Sablefish, Swordfish, Rockfish

Source: CDFG 2007

Top Five Species Landed at Avila Harbor: 2000-2006

Year	Species
2000	Dover Sole, Salmon, Rock Crab, Thornyhead, Cabezon
2001	Albacore, Rockfish, Halibut, Rock Crab, Dover Sole
2002	Thornyhead, Dover Sole, Rockfish, Albacore, Sablefish
2003	Dover Sole, Pink Shrimp, Thornyhead, Sablefish, Rockfish
2004	Rockfish, Dover Sole, Sablefish, Thornyhead, Market Squid
2005	Rockfish, Dungeness Crab, Chinook Salmon, Cabezon
2006	Dungeness Crab, Rockfish, Cabezon, Halibut, Surfperch

Source: CDFG 2007

Top Five Species Landed at Santa Barbara Harbor: 2000-2006

Year	Species
2000	Red Sea Urchin, Prawn, Spiny Lobster, Rock Crab, Market Squid
2001	Red Sea Urchin, Spiny Lobster, Rock Crab, Halibut, Prawn
2002	Red Sea Urchin, Spiny Lobster, Rock Crab, Prawn, Halibut
2003	Red Sea Urchin, Spiny Lobster, Rock Crab, Prawn, Market Squid
2004	Red Sea Urchin, Spiny Lobster, Rock Crab, Halibut, Market Squid
2005	Red Sea Urchin, Spiny Lobster, Rock Crab, Halibut, Market Squid
2006	Red Sea Urchin, Spiny Lobster, Rock Crab, Halibut, Sea Bass

Source: CDFG 2007

Appendix K:

California Department of Motor Vehicles, Total Recreational Vessel Registrations by County: 1985-2006

Year	Santa Barbara	San Luis Obispo	Monterey	Santa Cruz	San Mateo	CCC Total
1985	7,624	6,977	6,047	5,370	14,119	40,137
1986	7,916	7,464	6,347	5,801	14,729	42,257
1987	8,212	7,976	6,697	6,158	15,194	44,237
1988	8,356	8,342	6,916	6,408	15,358	45,380
1989	8,433	8,621	6,932	6,606	15,451	46,043
1990	8,636	8,509	7,159	6,802	15,513	46,619
1991	8,788	9,326	7,304	7,002	15,053	47,473
1992	8,699	9,510	7,426	7,072	14,672	47,379
1993	8,928	9,786	7,575	7,136	14,580	48,005
1994	9,021	9,989	7,641	7,213	14,528	48,392
1995	9,271	10,367	7,936	7,371	14,697	49,642
1996	9,399	10,831	8,159	7,561	14,744	50,694
1997	9,619	11,150	8,437	7,639	14,719	51,564
1998	9,650	11,366	8,621	7,655	14,675	51,967
1999	10,278	12,425	9,235	8,168	15,162	55,268
2000	9,822	12,154	8,872	7,804	14,037	52,689
2001	10,520	13,148	9,470	8,237	14,474	55,849
2002	9,904	12,497	8,961	7,772	13,153	52,287
2003	10,595	13,373	9,542	8,287	13,716	55,513
2004	9,762	12,438	8,681	7,559	12,223	50,663
2005	10,330	13,570	9,169	7,964	12,363	53,396
2006	9,614	13,031	8,448	7,345	11,542	49,980

Source: California Department of Motor Vehicles 2007

Appendix L

Recreational Shore Angling: San Mateo County to Monterey County

Beach	County
Año Nuevo State Reserve Beach	San Mateo
Bean Hollow State Beach	San Mateo
Half Moon Bay City Beach	San Mateo
Half Moon Bay State Beach	San Mateo
El Granada Beach	San Mateo
Esplanade Beach	San Mateo
Francis Beach	San Mateo
James V. Fitzgerald Marine Reserve Beach	San Mateo
Montara State Beach	San Mateo
Pebble Beach	San Mateo
Pigeon Point Beach	San Mateo
Pillar Point Harbor Beach	San Mateo
San Gregorio State Beach	San Mateo
Bonny Doon Beach	Santa Cruz
Capitola City Beach	Santa Cruz
Cowell Beach	Santa Cruz
Davenport State Beach	Santa Cruz
Four Mile Beach	Santa Cruz
Greyhound Rock Fishing Access	Santa Cruz
Lighthouse Field State Beach	Santa Cruz
Lincoln Beach	Santa Cruz
Main Beach	Santa Cruz
Natural Bridges State Beach	Santa Cruz
New Brighton State Beach	Santa Cruz
Palm Beach	Santa Cruz
Panther Beach	Santa Cruz
Red, White, and Blue Beach	Santa Cruz
Seabright Beach	Santa Cruz
Seacliff State Beach	Santa Cruz
Sunset State Beach	Santa Cruz
Yellowbank Beach	Santa Cruz
Carmel City Beach	Monterey
Jade Cove Beach	Monterey
Lover's Point	Monterey
Marina State Beach	Monterey
Partington Cove Beach	Monterey
Pfeiffer Beach	Monterey
Sand Dollar Picnic Area and Beach	Monterey
Shoreline Beach	Monterey
Willow Creek Picnic Area Beach	Monterey

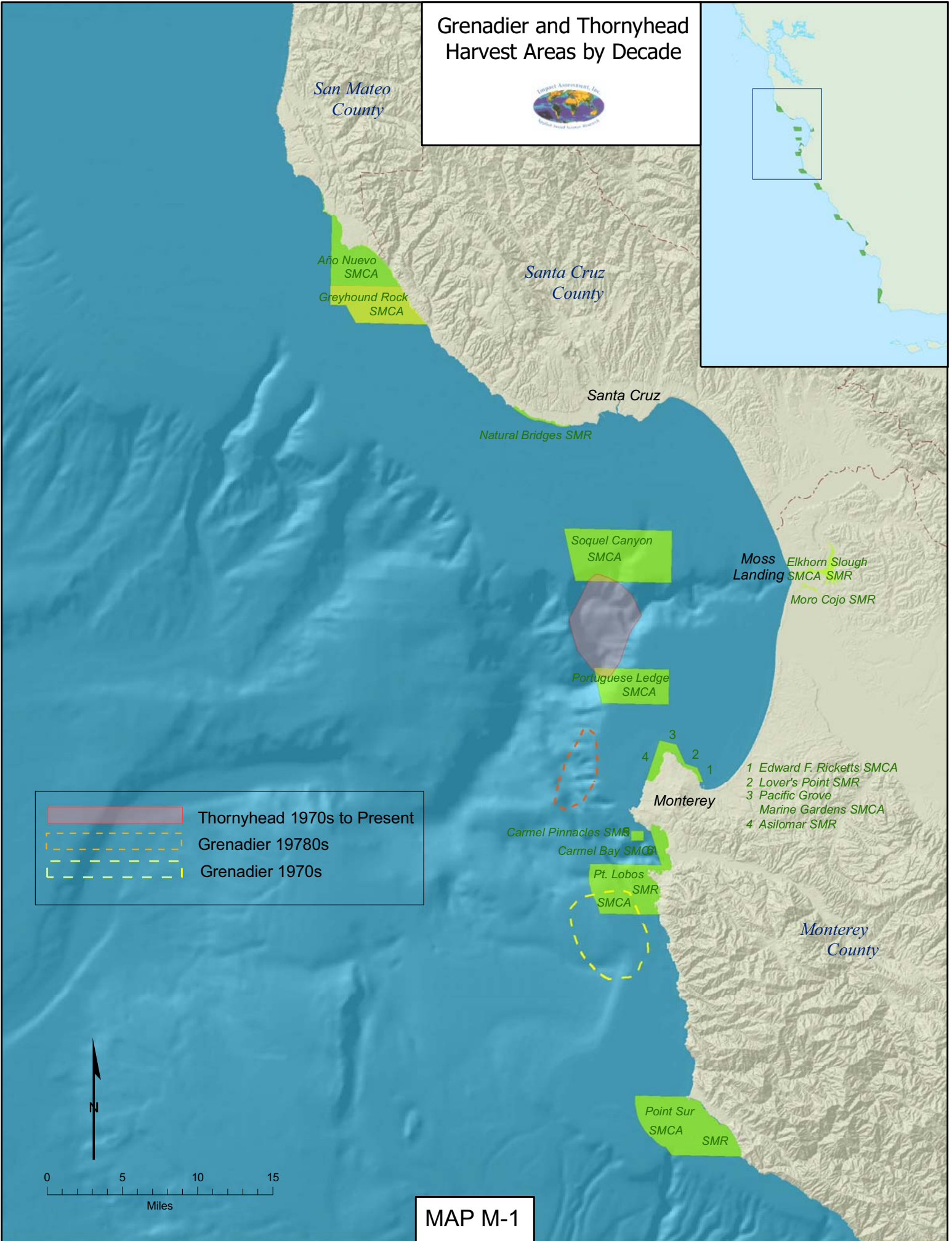
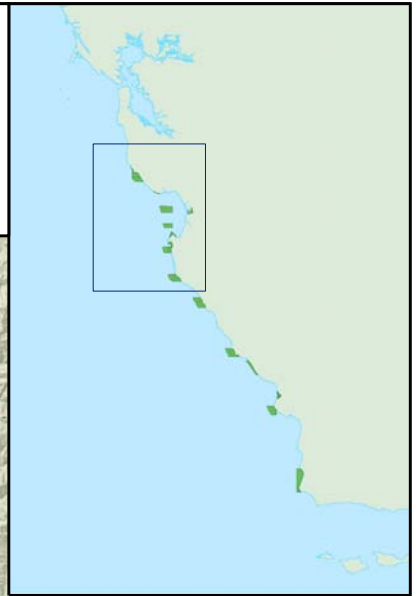
Source: Discover the Outdoors 2004

Appendix M

Additional Maps for Comparative Purposes

- Grenadier and Thornyhead Harvest Areas by Decade**
- Tuna Harvest Areas 1990s to Present**
- Southern California Wetfish Harvest Areas by Decade**
- Point Buchon Area Marine Protected Areas**
- Vandenberg Area Marine Protected Areas**

Grenadier and Thornyhead Harvest Areas by Decade

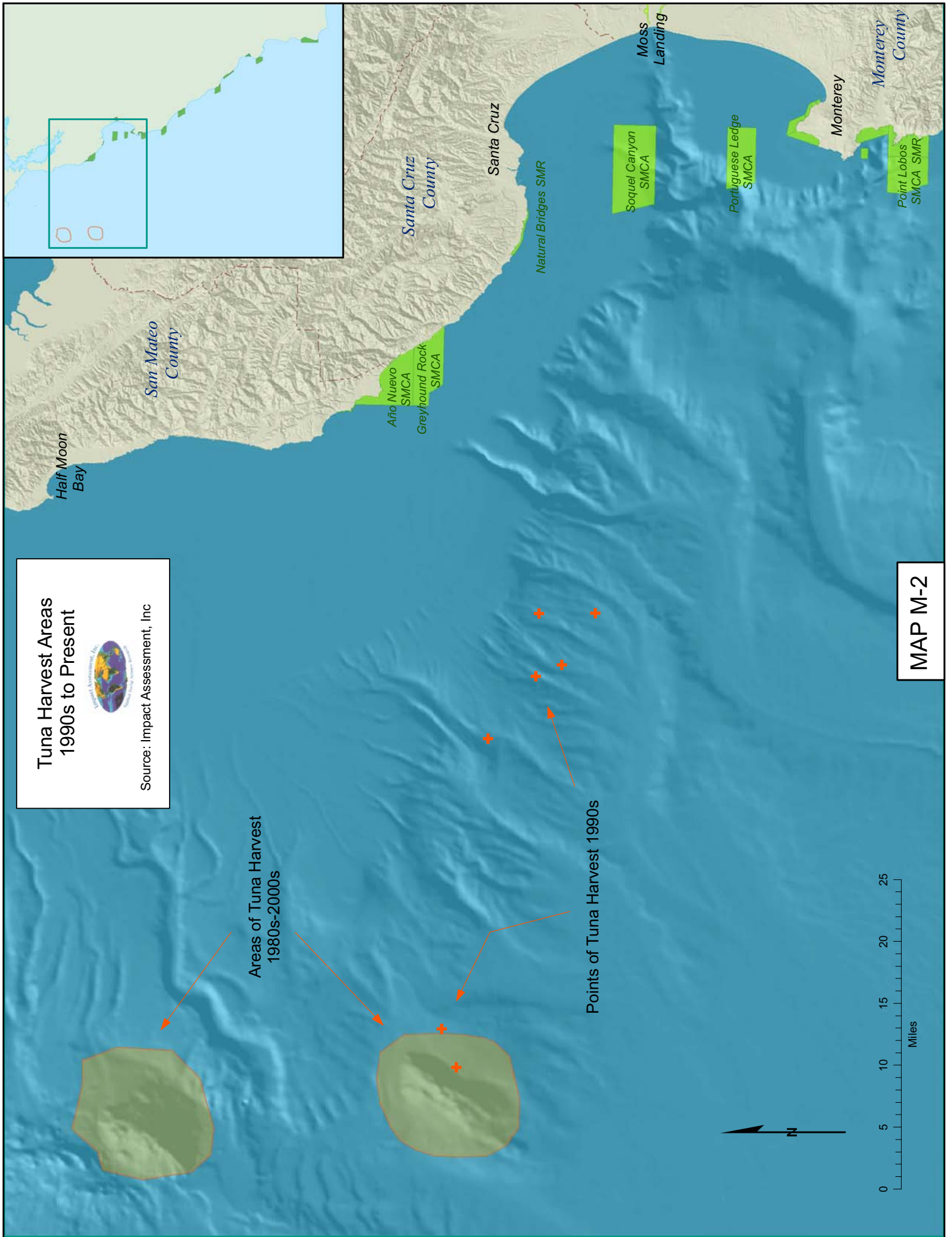


	Thornyhead 1970s to Present
	Grenadier 19780s
	Grenadier 1970s

- 1 Edward F. Ricketts SMCA
- 2 Lover's Point SMR
- 3 Pacific Grove Marine Gardens SMCA
- 4 Asilomar SMR



MAP M-1



**Tuna Harvest Areas
1990s to Present**



Source: Impact Assessment, Inc

Areas of Tuna Harvest
1980s-2000s

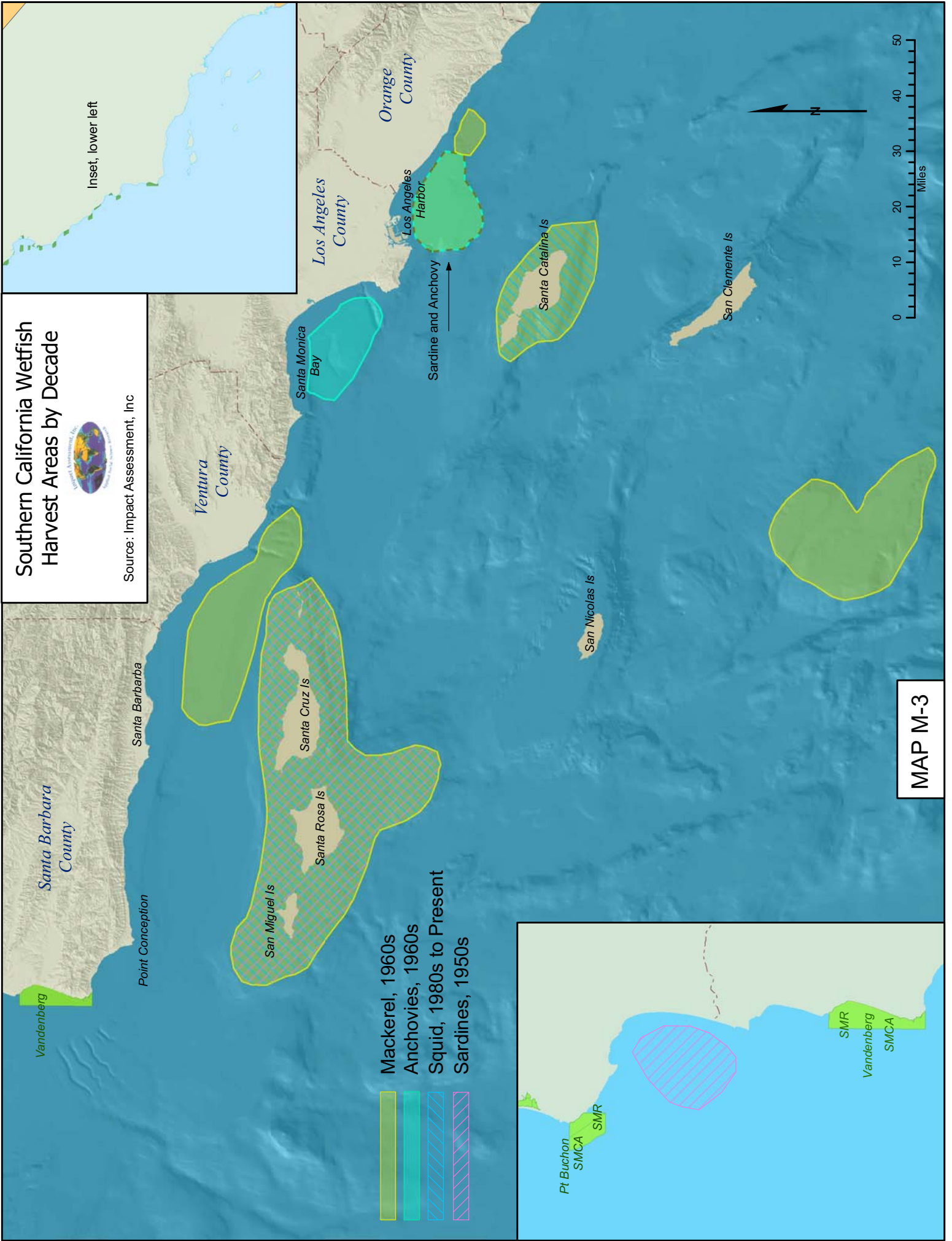
Points of Tuna Harvest 1990s

MAP M-2

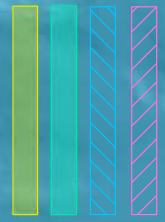
Southern California Wetfish Harvest Areas by Decade



Source: Impact Assessment, Inc



- Mackerel, 1960s
- Anchovies, 1960s
- Squid, 1980s to Present
- Sardines, 1950s



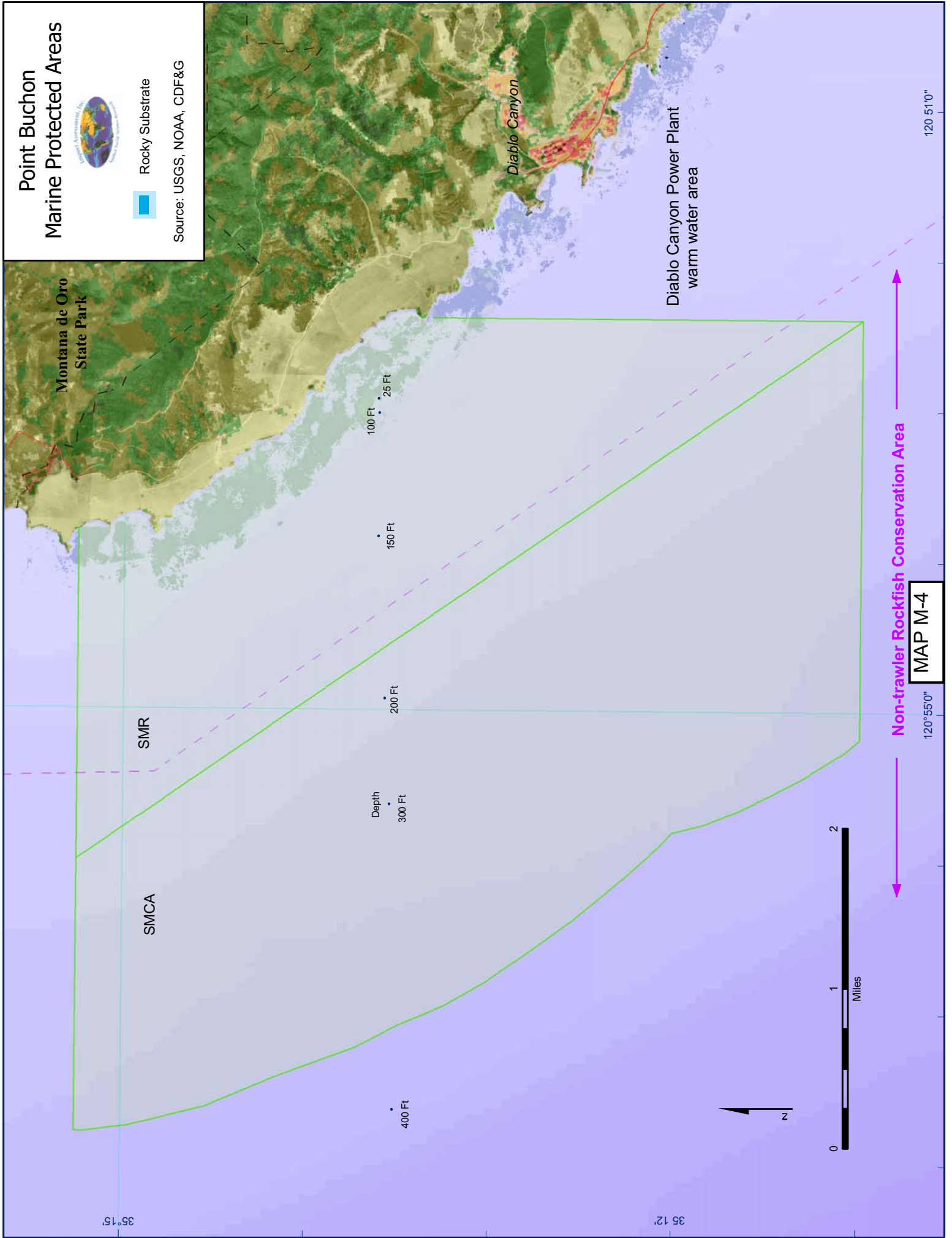
MAP M-3

Point Buchon Marine Protected Areas



Rocky Substrate


Source: USGS, NOAA, CDF&G



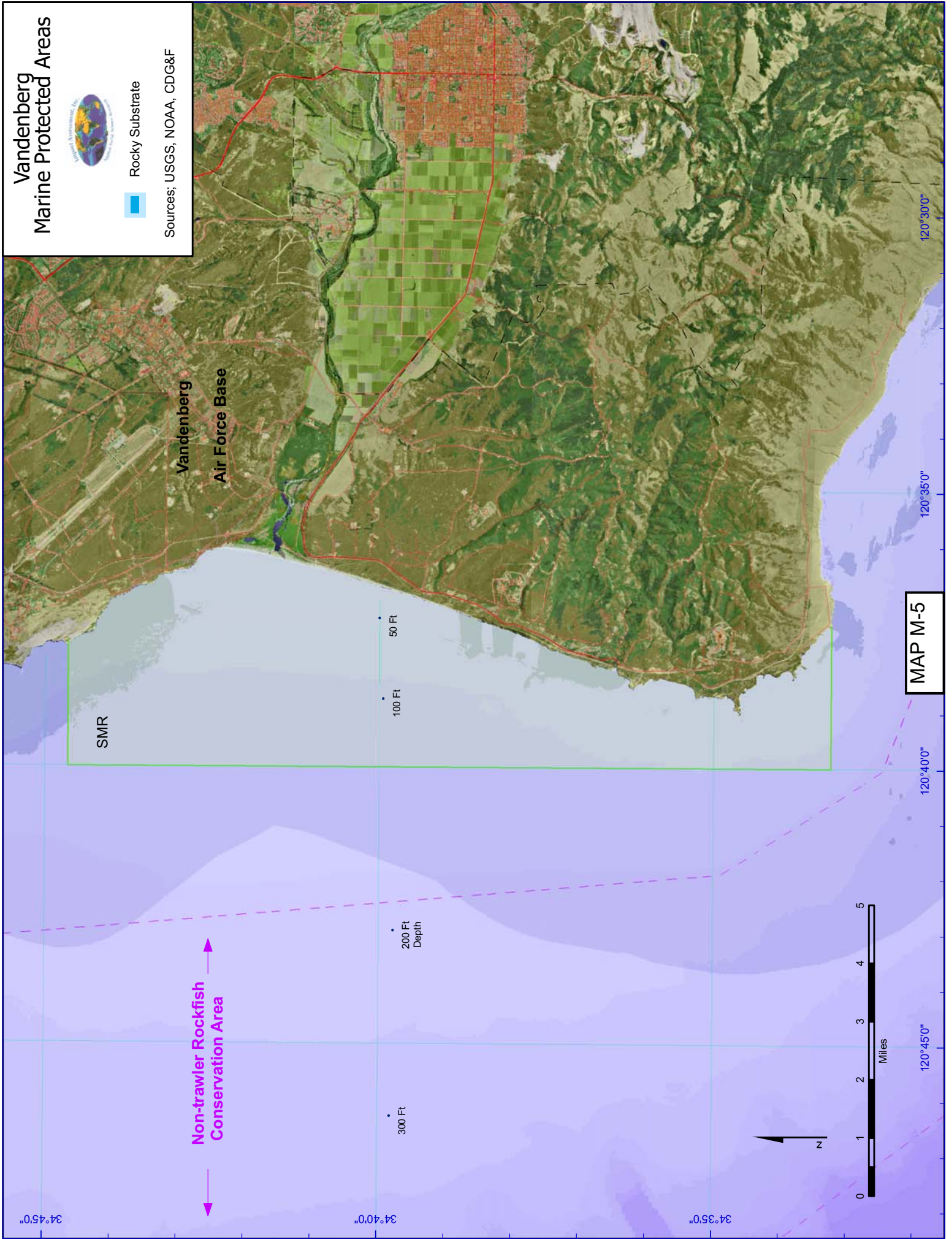
MAP M-4

Vandenberg Marine Protected Areas



 Rocky Substrate

Sources: USGS, NOAA, CDG&F



MAP M-5

Glossary

A - Avila
CCC – Central California Coast
CCKA - Central Coast Kiteboarding Association
CDFG – California Department of Fish and Game
CPFV - Commercial Passenger-carrying Fishing Vessels
CPS – Coastal Pelagic Species
DMV – Department of Motor Vehicles
EEZ – Exclusive Economic Zone
EFH – Essential Fish Habitat
EFP - Experimental Fishing Permit
FMP – Fishery Management Plan
GIS – Geographic Information System
GPS - Global Positioning System
HMB – Half Moon Bay
HMS – Highly Migratory Species
M - Monterey
MBARI – Monterey Bay Aquarium Research Institute
MBNMS – Monterey Bay National Marine Sanctuary
MLML – Moss Landing Marine Laboratories
MLPA – Marine Life Protection Act
MPA – Marine Protected Area
NMFS – National Marine Fisheries Service
NOAA – National Oceanic and Atmospheric Administration
ODSVRA - Oceano Dunes State Vehicular Recreation Area
OHV - Off-Highway Vehicle
PacFIN – Pacific Fisheries Information Network
PFMC – Pacific Fisheries Marine Council
PP – Pillar Point Harbor
PSL – Port San Luis
RCA – Rockfish Conservation Area
SB – Santa Barbara County
SC – Santa Cruz County
SLO – San Luis Obispo County
SM – San Mateo County
SMCA – State Marine Conservation Area
SMR – State Marine Reserve
SMRMA - State Marine Reserve Management Area
USCG – United States Coast Guard
VMS – Vessel Monitoring System

**California's Nearshore Fishery Management Plan (NFMP):
List of Species Covered by NFMP**

Black rockfish	<i>Sebastes melanops</i>
Black-and-yellow rockfish	<i>Sebastes chrysomelas</i>
Blue rockfish	<i>Sebastes mystinus</i>
Brown rockfish	<i>Sebastes auriculatus</i>
Cabezon	<i>Scorpaenichthys marmoratus</i>
Calico rockfish	<i>Sebastes dallii</i>
California scorpionfish	<i>Scorpaena guttata</i>
California sheephead	<i>Semicossyphus pulcher</i>
China rockfish	<i>Sebastes nebulosus</i>
Copper rockfish	<i>Sebastes caurinus</i>
Gopher rockfish	<i>Sebastes carnatus</i>
Grass rockfish	<i>Sebastes rastrelliger</i>
Kelp greenling	<i>Hexagrammos decagrammus</i>
Kelp rockfish	<i>Sebastes atrovirens</i>
Monkeyface prickleback	<i>Cebidichthys violaceus</i>
Olive rockfish	<i>Sebastes serranoides</i>
Quillback rockfish	<i>Sebastes maliger</i>
Rock greenling	<i>Hexagrammos lagocephalus</i>
Treefish rockfish	<i>Sebastes serriceps</i>