Executive Summary

The Monterey Bay National Marine Sanctuary (MBNMS) is the largest marine protected area in the United States, spanning nearly 400 miles of the California coastline and encompassing over 5,300 square miles (Fig. 1). The MBNMS is famous for its scenic coastline, beautiful beaches, and diverse array of intertidal and subtidal plant and animal life. These characteristics make the Sanctuary a popular location for both local inhabitants and tourists to engage in a variety of commercial and recreational activities, such as boating, fishing, tidepooling, kayaking, snorkeling and SCUBA diving. The MBNMS is also a nationally recognized center for marine biological and oceanographic research, with over twenty research institutions located within a few miles of the coastline. Such a high intensity of human activity within the Sanctuary can have negative impacts on its sensitive physical and biological resources. Over the past century local, State, and Federal agencies have attempted to protect these resources by designating areas (e.g., Marine Life Refuges, Dredge Material Disposal sites) in which human activities are controlled. The purpose of this report is to identify and review these legislated areas and preliminarily evaluate their effectiveness in protecting resources within the MBNMS.

The MBNMS contains 72 sites in which specific human activities, both commercial and recreational, are either restricted or promoted (Fig. 1). For the purpose of this report, these sites are grouped into 13 categories (Table 1) - hereafter referred to as marine zones - which can be described as follows:

1) National Marine Sanctuary Zone. National Marine Sanctuaries are areas of special national significance due to their resource and human-use values. Their designation is intended to facilitate the coordinated and comprehensive conservation and management of the area. Zone regulations serve to protect the conservation, recreational, ecological, historical, research, educational, and esthetic resources in the area. Regulations restrict exploring for oil, gas, and minerals, modifying the seafloor, attracting white sharks, altering the natural water quality, and operating certain motorized vessels. The Sanctuary does not regulate commercial or recreational fishing.

2) Jade Collection Zones. Jade collection zones are areas in which traditional small-scale collection of loose jade is allowed in the MBNMS. Previous to the formation of jade collection zones, all such collection was prohibited within the Sanctuary. Zone regulations allow small-scale collection to support the local artisan industry while protecting the mineral resources of the Sanctuary from degradation.

3) Dredge Material Disposal Zones. Dredge material disposal zones are areas specifically designated as disposal sites for dredged material. Dredged material is sediment that has been removed from the sea floor, by means of suction or scooping. Dredging is often conducted to widen harbors and channels - therefore, the sediments can be contaminated with pollutants, such as industrial chemicals, oil, and gasoline. Dredge material disposal zones allow the disposal of certain types of dredge material while minimizing the possible negative impacts to the marine environment.

4) Restricted Overflight Zones. Restricted overflight zones are intertidal and subtidal areas over which motorized aircraft are restricted from flying below 1000 feet (305 meters). These zones often encompass areas with high densities of marine mammals or seabirds, such as pupping grounds and nesting sites. Restricted overflight zones do allow overflight below 1000 feet in cases of emergency, for law enforcement, and by the Department of Defense.

5) Motorized Personal Watercraft Zones. Motorized personal watercraft zones are areas specifically designated for the recreational use of motorized personal watercraft (MPWC). MPWC (e.g., jet skis) are motorized vessels that are less than 15 ft long, capable of exceeding 15 knots, and can carry only two or fewer people. The purpose of MPWC zones is to allow this form of recreation while protecting nearshore marine life from disturbance or injury and minimizing conflicts with other recreational users, such as SCUBA divers and kayakers.

6) Shark Attraction Prohibited Zones. Shark attraction prohibited zones are areas in which the attraction of white sharks is prohibited. Attraction is defined as the conduct of any activity that lures or may lure white sharks by using food, bait, chum, dyes, acoustics, or any other means, except the mere presence of human beings (e.g., swimmers, divers, surfers, kayakers, boaters). The purpose of zone regulations is to prevent the possible negative impacts of shark baiting or attraction events, such as conflicts among various user groups and behavioral changes in the attracted species (e.g., feeding and migration).

7) Military Zones. Military zones are areas of the Sanctuary in which military training operations are routinely conducted by the Department of Defense. Information about military zones, including the location of the zone and advisories to civilian users, are included on nautical and aeronautical charts. The purpose of military zones is to allow military training while avoiding interference from and harm to civilian vessels and aircraft.

8) Vessel Traffic Zones. Vessel traffic zones serve to manage large vessel traffic in such a way as to maximize protection of the physical and biological resources of the surrounding waters while allowing safe and efficient vessel operation. Vessel traffic zones apply primarily to the following vessel types: tankers, hazmat ships, barges, and large commercial vessels (LCVs).

9) No Harvest Zones. No harvest zones are intertidal and subtidal areas in which it is unlawful to take or possess any plants or animals. These areas are intended to provide habitat for the permanent residence of local marine life and possibly to replenish surrounding areas. Scientific research is allowed, and often encouraged, in no harvest zones because these areas represent a more "natural" state that can be compared to adjacent exploited habitats. With the appropriate permits, collection of plants or animals is allowed for the purpose of scientific research. Often access to the site or activities within the site are limited to decrease the potential negative impacts of ecotourism.

FIGURE 1. Summary of zoning in the Monterey Bay National Marine Sanctuary.

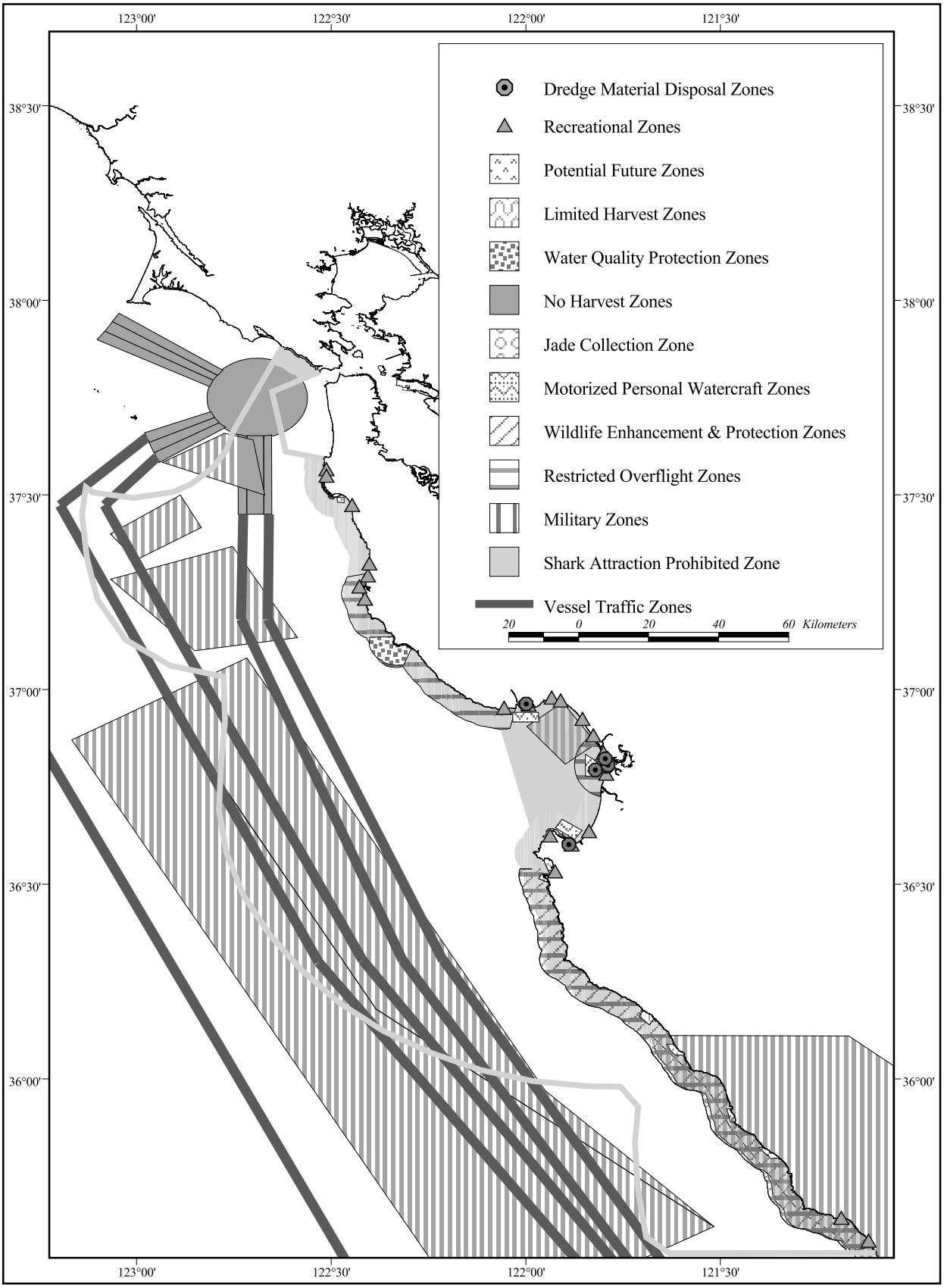

Table 1. Total area and percent of MBNMS encompassed by each marine zones type (bold) and by each site (italics). Sites are listed in order from north to south. N/A = not applicable; these are designated points, not areas.

	Name of Sites	Area (km^2)	% MBNMS
EXISTING ZONES			
National Marine Sanctuary (MBNMS)		**13705.99**	
Jade Collection Zone		**4.15**	**0.030**
Dredge Material Disposal		**N/A**	**N/A**
	SF-12	*N/A*	*N/A*
	SF-14	*0.97*	*0.007*
	Beach Replenishment	*N/A*	*N/A*
	Subtidal Disposal	*N/A*	*N/A*
	Beach Decant	*N/A*	*N/A*
Restricted Overflight		**1251.91**	**8.971**
	Site 1 - Coastline north of Point Santa Cruz	*332.86*	*2.429*
	Site 2 - Offshore of Moss Landing	*86.14*	*0.628*
	Site 3 - Elkhorn Slough	*2.91*	*0.021*
	Site 4 - Coastline south of Carmel River	*830.00*	*5.893*
Motorized Personal Watercraft		**48.34**	**0.353**
	Site 1 - Offshore of Pillar Point Harbor	*2.15*	*0.016*
	Site 2 - Offshore of Santa Cruz Harbor	*16.55*	*0.121*
	Site 3 - Offshore of Moss Landing Harbor	*13.18*	*0.096*
	Site 4 - Offshore of Monterey Harbor	*16.46*	*0.120*
Shark Attraction Prohibited		**2036.87**	**14.861**
Military		**5220.79**	**38.091**
	"U1" Submerged Submarine Operating Area	*210.29*	*1.534*
	"U2" Submerged Submarine Operating Area	*181.85*	*1.327*
	"U5" Submerged Submarine Operating Area	*704.67*	*5.141*
	Warning Area 285	*3559.33*	*25.969*
	Naval Operating Area	*138.64*	*1.012*
	Hunter Military Operations Area	*426.00*	*3.108*
Vessel Traffic*		**5599.14**	**40.852**

* Area encompassed by lanes and approaches was estimated by calculating the area of the region between the eastern most vessel track (LCV northbound track) and the Sanctuary boundary.

Table 1 (con't). Total area and percent of MBNMS encompassed by each marine zones type (bold) and by each site (italics). Sites are listed in order from north to south. N/A = not applicable; these are designated points, not areas.

	Name of Sites	Area (km^2)	% MBNMS
EXISTING ZONES			
No Harvest[+]		**6.95**	**0.050**
	Hopkins Marine Life Refuge	*0.33*	*0.002*
	Point Lobos Ecological Reserve	*2.79*	*0.020*
	Point Lobos State Reserve	*2.79*	*0.020*
	Big Creek MRPA Ecological Reserve	*3.83*	*0.028*
Limited Harvest[+]		**27.95**	**0.204**
	James V. Fitzgerald Marine Reserve	*1.98*	*0.014*
	Año Nuevo State Reserve	*2.04*	*0.015*
	Elkhorn Slough Ecological Reserve	*5.90*	*0.043*
	Pacific Grove Marine Refuge	*1.96*	*0.014*
	Pacific Grove Marine Gardens Fish Refuge	*4.09*	*0.030*
	Carmel Bay Ecological Reserve	*6.41*	*0.047*
	Julia Pfeiffer Burns Underwater Park	*7.05*	*0.051*
Recreational		**N/A**	**N/A**
	Golden Gate National Recreation Area	*5.35*	*0.039*
	State Beaches	*N/A*	*N/A*
Wildlife Enhancement and Protection		**831.64**	**5.911**
	Moss Landing Wildlife Area	*2.60*	*0.019*
	Elkhorn Slough NERR	*5.90*	*0.043*
	California Sea Otter Game Refuge	*823.14*	*5.849*
Water Quality Protection		**82.98**	**0.605**
	James V. Fitzgerald Marine Reserve ASBS	*4.52*	*0.033*
	Año Nuevo Point and Island ASBS	*54.84*	*0.400*
	PGMG Fish Refuge and Hopkins MLR ASBS	*1.90*	*0.014*
	Carmel Bay ASBS	*6.41*	*0.047*
	Point Lobos Ecological Reserve ASBS	*2.79*	*0.020*
	Julia Pfeiffer Burns Underwater Park ASBS	*7.05*	*0.051*
	Ocean Area Surrounding the Mouth of Salmon Creek ASBS	*5.47*	*0.040*
POTENTIAL FUTURE ZONES			
Limited Harvest	*Ed Ricketts Park*	*0.49*	*0.004*

[+] Cumulative area of the zone type (bold) was calculated by summing the area of all sites (italicized) and subtracting areas of overlap.

10) Limited Harvest Zones. Limited harvest zones are intertidal and subtidal areas in which the take of certain species of plants and animals is limited. For example, zone regulations may protect all species of invertebrates and plants, but allow certain species of finfish to be taken within the designated area. Limited harvest zones also include sites in which the harvesting of plants or animals is limited to certain methods of take or during specific periods of time. For example, zone regulations may allow the taking of finfish by hook and line only. Limited harvest zones are intended to protect the natural resources of an area while allowing limited use.

11) Recreational Zones. Recreational zones are intertidal and subtidal habitats specifically designated to provide areas of open space for recreational uses, such as swimming, boating, fishing, and picnicking. These sites have regulations that limit the degradation of natural resources in order to maintain those resources for future enjoyment. The taking of plants and animals is allowed within recreational zones with some limitations on species, numbers, timing, and(or) method of take.

Table 2. Government agencies responsible for establishment, management, and number of sites in each marine zone type.

	Federal	State	Local	Federal and International	Federal and State	Federal, State and Local	State And Local
EXISTING ZONES							
National Marine Sanctuary	1						
Jade Collection	1						
Dredge Material Disposal						9	
Restricted Overflight	4						
Motorized Personal Watercraft	4						
Shark Attraction Prohibited	1						
Military	6						
Vessel Traffic				1			
No Harvest		2					2
Limited Harvest		6	1				
Recreational		22			1		
Wildlife Enhancement and Protection		2			1		
Water Quality Protection							7
POTENTIAL FUTURE ZONES							
Limited Harvest			1				

12) Wildlife Enhancement and Protection Zones. Wildlife enhancement and protection zones are intertidal and subtidal areas that are established to minimize human disturbance to especially sensitive wildlife populations and their habitats. Regulations governing access to the areas are designed to protect endangered or threatened species or their habitats. The protected sites often include bird nesting areas, marine mammal pupping grounds, and fish spawning and nursery habitats. Restrictions on recreational access may include no-access buffer zones or time periods. Research is often encouraged in wildlife enhancement and protection zones to determine the population dynamics and habitat requirements of the target species.

13) Water Quality Protection Zones. Water quality protection zones are established to protect the specified marine habitats from undesirable changes in water quality. The protected areas serve as habitat for certain species or biological communities that are deemed especially sensitive to changes in water quality.

A variety of federal, state, and local government agencies are responsible for establishing and managing the 72 sites within the MBNMS (Table 2). Federal agencies, including the National Oceanographic and Atmospheric Administration (NOAA), U.S. Coast Guard, and U.S. Environmental Protection Agency, are responsible for managing the zones that were created by the formation of the MBNMS. These agencies appear to be effectively managing the national marine sanctuary, dredge material disposal, jade collection, shark attraction prohibited, and vessel traffic zones. Effective management of the motorized personal watercraft and restricted overflight zones has been hampered by delays in regulation implementation due to lawsuits or interagency disagreements.

Many of the zones managed by state and local agencies fall under the title "marine reserve". Marine reserves have recently received attention due to their potential for: improving the status of exploited species; protecting marine habitats from degradation; protecting biodiversity; facilitating scientific research and fisheries management; and increasing ecotourism. However, reserves must be well designed and managed to achieve this potential. A well designed and managed reserve will have clearly defined goals, scientifically-based design, proper enforcement of regulations, rigorous evaluation, and the potential for adaptive management. Based on these criteria, few of the marine reserves in California are well designed or managed. Many sites suffer from poorly defined goals, confusing regulations, lack of enforcement, and (or) no scientific evaluation. However, a few sites in the MBNMS (e.g., Pt. Lobos State/Ecological Reserve, Hopkins Marine Life Refuge, Big Creek MRPA Ecological Reserve) appear to be fairly effective. Research to date suggests that these sites are achieving their purpose - to protect marine plant and animal populations - at least for certain species. The success of these sites appears to stem from community involvement and on-site enforcement and education.