

IMPROVING CALIFORNIA'S OCEAN MANAGEMENT STRUCTURE: POTENTIAL FOR  
A COMPREHENSIVE MARINE SPATIAL PLANNING PROGRAM

by

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## Abstract

California's history with ocean resources is riddled with overuse and degradation. It wasn't until a new chapter in California's ocean governance started that the state began to address these problems. An examination of existing legislation, policy and management highlights that significant gaps in California's ocean management still exist. The major gaps are lack of coordination between ocean management institutions and lack of attention to the spatial aspects of human use of the ocean.

One way to fill in these gaps is to create a comprehensive marine spatial planning (MSP) program for California's waters. A set of criteria was applied to examples of MSP initiatives both abroad and in the US in order to determine the "success" of each program, and what could possibly work for California if it were to adopt an effective MSP program.

California has three options for establishing a statewide marine spatial planning program for its ocean spaces. These options are establishing MSP 1) under the current legislative regime, 2) by amending an existing law or adding a new statute, or 3) through a comprehensive revamp of ocean legislation. Each option was arrayed against select criteria—resources needed; political feasibility; amount of change to current structure; effectiveness towards achieving goals; and durability and robustness of approach to determine which would be the best avenue for the implementation of marine spatial planning in California's state waters.

Option 1 cannot achieve successful MSP and it is unlikely that MSP will develop under Option 3 because of a lack of political will to revamp California's ocean legislation. It appears as though Option 2 is the most practical for California to implement MSP at this time.

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## **I) Ocean Management in California: An Overview**

### **A) History of Overuse and Degradation**

The importance of marine and coastal environments to the state of California cannot be emphasized enough. Like a number of coastal states, California is highly dependent on the ocean and all it provides. The state recognizes this and has taken a number of measures to better manage its ocean spaces. But California's history, with its marine and coastal resources, has not always been good—much of it has been riddled with overuse and degradation.

Human use of California's marine and coastal resources has occurred for thousands of years. The original inhabitants of coastal California made use of the resources available to them, through activities such as collecting shellfish and hunting salmon. When Europeans came to California beginning in the mid-1700s, they disrupted the native's system of harvesting—which generally relied on concepts associated with sustainable management— as competition for resources arose. During the 1800s, newcomers to California (coming to the area primarily during the gold rush) put further pressure on the resources of state, such as salmon, whose numbers began to decline as a result of overharvesting and habitat degradation (McEvoy 1986).

Fishing emerged as a new industry when hopefuls from the gold rush realized they needed a more “reliable occupation” (McEvoy 1986). By the 1880s, the state was considered one of the country's leading fishery states, but California gained this title at a price as many “valuable fisheries faced outright extermination [...] after the gold discovery” (McEvoy 1986). Fish species weren't the only ones to suffer—furbearing sea otters and seals were so depleted during this time that they faced extinction. Whales, sea lions, and elephant seals were also systemically hunted for their oil (McEvoy 1986).

Overexploitation and degradation of California's marine and coastal resources continued into the 1900s. During the past century, California saw drastic declines in several of their fisheries. After WWII ended, the sardine fishery collapsed—a fate foreseen by number of scientists who had called for protective measures (Radovich 1982, McEvoy 1986). The west coast fishery operated at unsustainable levels, going from landings of around 64,000 metric tons during the 1920s to over 600,000 metric tons during the 1940s (Norton et al. 2013) Pacific salmon continued to suffer from fishing pressure in the first half of the century as well due to both new markets and better technology (Ludwig et al. 1993).

Previously extensive kelp forests in the southern part of the state saw great losses by the 1950s. Evidence shows that extensive fishing of sheepshead (a species of wrasse) and spiny lobster around this time contributed to the decline, as they are sea urchin predators (Tegner and Dayton 2000). When freed from the pressure of predation, sea urchins can overgraze kelp forests. It was not until sea urchins fisheries started to emerge in the 1970s that the kelp forests were able to begin to recover (Dayton et al. 1998, Tegner and Dayton 2000).

Abalone experienced a steady decrease in numbers over the past several decades, which resulted in the closure commercial and recreational take of the species in 1997 for areas south of San Francisco (Karpov et al. 2000). Originally, all abalone species (red, pink, green, black and white abalone) were managed as one “entity”, so the fishery's landings appeared stable for quite some time (Leet et al. 2001). The stable appearance of the fishery did not correspond with what was actually happening to abalone populations. In 1957, the abalone fishery reached its peak, with a landing of almost five and a half million pounds. But, in the decades after this, fisheries for each species ended in collapse as populations dwindled (Leet et al. 2001). Karpov et al. (2000)

“found no evidence” of sustainable harvest of abalone throughout the history of this commercial fishery.

Today, concerns for California’s coastal and marine environments are not just isolated to problems within the realm of fisheries. A number of invasive species are now a now present in California’s waters including the Asian clam, the European green crab, and the Chinese mitten crab. San Francisco Bay has suffered from the presence of invasives that take over ecological niches normally held by native species. Studies show that over 230 invasive species can now be found in San Francisco Bay, and that one new species is being introduced into this habitat every 14 weeks. Many of the state’s agencies have recognized the threats that invasive species pose to California’s waters in general, and more specifically to threatened or endangered species (Leet et al. 2001).

Pollution—both from point sources such as sewage discharge and non-point sources such as agricultural and storm water runoff—affects various stretches of California’s coastline and pose significant problems in maintaining healthy ocean ecosystems. Numerous sections of California’s waters have been listed as impaired due to pollution. Coastal pollution can cause a number of issues for a variety of species, such as “reproductive problems, birth defects, behavioral changes, and increased susceptibility to disease” (Leet et al. 2001). This is not only an issue for marine life, but for California residents and tourists who depend on clean ocean environments (Leet et al. 2001).

Over 90% of the state’s coastal wetlands were lost in the 150 year period “following statehood and settlement by European Americans”, and those that remain have been either altered or degraded (Van Dyke & Wasson 2005, Leet et al. 2001). Zedler (1996) reported that development in recent years has caused an 85% decline in tidal wetlands in the San Diego region

alone. Coastal development has become quite intensive in California—a significant portion of the state’s population lives on the coast and development has increased in recent decades to accommodate this. The diking, filling, and draining of wetlands that occur as a result of residential, commercial, and agricultural development continues to threaten the small amount of wetlands that are still intact in California (Leet et al. 2001).

## **B) The Emergence of Ocean Governance in California**

The state has not stood by idly as its marine and coastal environments has experienced such problems—California has been involved in “issue specific ocean management activities for over 100 years” (Cal. Res. Agency 1997). But it has really been in the past 40 years that California has worked to set up a better governance structure that attempts to remedy issues that are plaguing its ocean space (Cal Res. Agency 1997). This section will examine several important pieces of legislation that contribute to the framework of California’s ocean management regime.

### *i. California’s Coastal Act*

California is known for its community involvement in coastal and marine management. The state’s Coastal Act resulted from a voter initiative started in 1972. The act was finally passed in 1976 (Gleason et al. 2006). The statute is meant to govern California’s state waters or its coastal zone (defined as the area “extending seaward to the state’s outer limit of jurisdiction, including all offshore islands, and extending inland generally 1,000 yards from the mean high tide line of the sea”); therefore, it influences the management of the public trust resources found in the state’s coastal environments (Cal. Pub. Res. Code §30103, Sivas & Caldwell 2008). Within the act, the California legislature recognizes the importance of maintaining a healthy coastal zone for both economic and social interests (Cal. Pub. Res. Code §30001). The policies

of the Coastal Act focus on six areas that cover a wide number of considerations relating to coastal resource planning and management (Cal. Pub. Res. Code §30210-30265.5):

- 1) public access: considers things such as development interfering with access and distribution of public facilities
- 2) recreation: considers things such as protection of water-oriented activities and recreational boating use and facilities
- 3) marine environment: considers things such as marine resources, oil spills, and construction altering the state's shoreline
- 4) land resources: considers things such as environmentally sensitive habitat areas (ESHAS) and land suitable for agricultural use
- 5) development: considers things such as conditions for sewage treatment plant development and priorities for coastal-dependent development
- 6) industrial development: considers things such as oil and gas development, tanker facilities, and activities revolving around offshore oil transport and refinement

The Coastal Act is also known for establishing the Coastal Commission whose mission is to “protect, conserve, restore, and enhance environmental and human-based resources of the California coast and ocean for environmentally sustainable and prudent use by current and future generations” (California Coastal Comm. a). Under the Coastal Act, the Coastal Commission has the “primary responsibility for implementation of the provisions” listed in the statute and is “designated as the state coastal zone planning and management agency” (Cal. Pub. Res. Code §30330). The work performed by the commission is both legislative (for example, it makes sure “resource conservation and use [...] conforms to a statewide set of policies”) and quasi-judicial

(for example, it reviews development proposals for new projects) (Sivas & Caldwell 2008, Cal. Pub. Res. Code §30320).

An important aspect of the Coastal Commission's work involves local coastal programs (LCPs). Each coastal county and a number of coastal cities in California must prepare an LCP, the primary purpose of which is to guide coastal development and protection. The Coastal Commission will review an LCP and if they find that the program adheres to the policies outlined in the Coastal Act, then it will be approved. The Commission must review each approved LCP every five years to make sure changes in development and new information will be incorporated into the programs (California Coastal Comm. a, California Coastal Comm. b)

Currently, the Coastal Act is just one of the many state and federal laws that influence management of California's coastal zone, further contributing to the complicated "matrix of agencies that oversee human uses and activities in state waters" (Sivas & Caldwell 2008).

*ii. The National Marine Sanctuaries Act*

Though the Marine Protection, Research, and Sanctuaries Act (MSPRA) of 1972 is a federal law, it exerts some influence over California's ocean governance. The statute created three different programs with the intent of protecting and restoring the United States' ocean ecosystems. Title III of this act, which came to be known as the National Marine Sanctuaries Act, established the Marine Sanctuaries Program (Chandler & Gillelan 2004).

The purpose of the Marine Sanctuaries Program is to establish a system of areas "of the marine environment which have special conservation, recreational, ecological, historical, cultural, archaeological, scientific, educational or esthetic qualities as national marine sanctuaries" (MPRSA 1972). These national marine sanctuaries are meant to better manage marine resources,

increase awareness of the importance of the ocean, and to maintain marine environments for generations to come (MPRSA 1972).

a. California's Role in Sanctuary Legislation

California played a significant role in developing the National Marine Sanctuaries Act. In the late 1960s, members of California's Congressional delegation wanted to set aside areas on the state's outer continental shelf where oil drilling would be banned. Bills to ban oil drilling in waters off of Santa Barbara were introduced in the House and US Senate in 1968. The following year, a massive oil spill occurred in the Santa Barbara Channel as a result of a ruptured well (Chandler & Gillelan 2004).

After the Santa Barbara oil spill, Senator Alan Cranston of California became a vocal advocate for banning oil and gas development in several sections of the state's coastal waters, but the call to prohibit drilling activities was unheeded. The spill prompted the senator to introduce the California Marine Sanctuaries Act which "declared it the policy of Congress to preserve, protect, and restore portions of the California shoreline and coastal waters" (Chandler & Gillelan 2004). Several bills also were introduced to study waters along California's coast for potential sanctuary designation (Chandler & Gillelan 2004).

The MSRPA, which originally started out as an ocean dumping bill, was finally signed by Nixon in 1972, and the marine sanctuary title (Title III) was included. If not for the multiple attempts of California's delegation to get some sort of marine sanctuaries provision in federal legislation, the creation of the Marine Sanctuaries program may never have occurred (Chandler & Gillelan 2004).

After the act passed, California pushed for sanctuary designations in their waters and the state is currently is home to four national marine sanctuaries: Channel Islands, Cordell Bank, the

Gulf of Farallones, and Monterey Bay (Chandler & Gillelan 2004, NOAA NMSa). When Congress passed the Oceans Act of 1992, the Monterey Bay National Marine Sanctuary was granted a new protective measure—oil and gas development was prohibited (NOAA NMSb).

It is important to note that in California, Monterey Bay is a special exception as the act did not explicitly prohibit development uses, such as drilling for oil or pollution discharge, in areas designated as national marine sanctuaries (Chandler & Gillelan 2004). So, one of the main drivers for California becoming involved in marine sanctuaries legislation—banning oil and gas development in certain areas— is not actually covered under the National Marine Sanctuaries Act. Some are critical of the act, saying that these sanctuaries do not afford any clear type of protection to the habitats they encompass (Gleason et al. 2006).

*iii. The California Ocean Resources Management Act*

The California Ocean Resources Management Act (CORMA) was passed in 1989 and includes an important declaration revolving around the need to “develop and maintain an ocean resources planning and management program to promote and ensure coordinated management” of the state’s marine and coastal resources (Cal. Pub. Res. Code §36002). The act also outlined the importance of scientific research to increase the understanding of ocean ecosystems and how development in marine habitats affects ocean resources (Cal. Pub. Res. Code §36002).

In order to do this, California’s Secretary of Environmental Affairs was called to prepare a report on the state’s ocean management activities and impacts, but a lack of financial resources prevented the report from being written (Sivas & Caldwell 2008, Cal. Pub. Res. Code §36002). Two years later, CORMA was amended so that the responsibility for all “non-statutory marine and coastal management programs” was shifted to the Secretary for Resources and required not

only a report but a plan as well (Sivas & Caldwell 2008). The report that resulted was released in 1997 and was called the Ocean Agenda (Cal. Res. Agency 1997).

The report recognizes that a “complicated system of laws, regulations and specific designations have been developed over to protect and manage [...] ocean resources [and] such measures were developed without the assistance of [...] comprehensive planning” (Cal. Res. Agency 1997). It also identified the various departments housed within the Resources Agency alone that play some part in ocean management, including, but certainly not limited to: the Department of Parks and Recreation, the Department of the Conservation, the Department of Fish and Game, the State Coastal Conservancy, and the Office of Oil Spill Prevention and Response. The Ocean Agenda highlighted how the different responsibilities of not only the Resources Agency, but all involved in ocean management in California, make it hard to address problems in an efficient manner (Cal. Res. Agency 1997)

*iv. Marine Life Management Act*

California passed the Marine Life Management Act of 1998 during a time when changes in marine management were occurring at federal levels and in other states (Harty et al. 2010). For California, it is considered to have “opened a new era in the management and conservation of [the state’s] living marine resources” (CA Dept. of Fish & Wildlife.a). The MLMA’s main goal is to “ensure the conservation, sustainable use, and restoration of California’s living marine resources, including the conservation of healthy and diverse marine ecosystems and living resources” (Weber & Heneman 2000, Leet et al. 2001).

California’s Fish and Game Commission, which only was responsible for regulations concerning recreational fisheries, kelp harvesting, and ecological reserve creation, was charged with important new management roles under the MLMA (Weber & Heneman 2000). The statute

put the responsibility for managing a number of commercial fisheries into the hands of the Commission. The responsibility for managing most commercial fisheries had originally belonged to the state's Legislature (Sivas & Caldwell 2008). There are exceptions for some high value fisheries however; the Legislature still retains authority for managing a few of these (Harty et al. 2010).

Several new features were incorporated into California's ocean management of marine resources with the passing of the MLMA (CA Dept. of Fish & Wildlife, Weber & Heneman 2000):

- The statute applies to all living marine resources, not just those that are harvested by commercial and recreational fishing industries.
- The statute attempts to curb high levels of continued overexploitation and degradation by having entities prove their actions are sustainable.
- The statute highly encourages the use of science-based management and the inclusion of all stakeholders involved in ocean management.
- The statute recognizes the need to act based on long-term benefits (including commercial, recreational, cultural, social, and economic benefits), rather than short-term benefits.

An aspect of the MLMA that differs from previous ocean management legislation is its recognition for the need of shifting away from management schemes that focus on single species to a more comprehensive management regime—one based on looking at marine ecosystems as a whole. Considering the health of entire marine ecosystems better ensures that fisheries will remain to be productive and non-consumptive uses of resources found in these environments can continue (Weber & Heneman 2000).

The MLMA mandated the creation of fishery management plans (FMPs) for the white sea bass and near shore fisheries, status reports on marine resources, and a master plan prioritizing fisheries which can be improved via management plans (Harty et al. 2010, Weber & Heneman 2000). The guiding principle of the FMPs is sustainability which means the plans must work to prevent overfishing, help to rebuild decreased stocks, promote conservation, and foster habitat protection and restoration. The MLMA has been likened to the Magnuson-Stevens Fishery Conservation and Management Act because of its mandate for fishery management plans (Weber & Heneman 2000).

As some point out, the Magnuson-Stevens Act has not been very “successful in achieving either sustainable commercial fisheries or ecosystem protection” so the same could be said of the MLMA (Sivas & Caldwell 2008). Also, after explicit requirements of the act were implemented, the momentum for additional action quickly dwindled. No new FMPs have been implemented under the MLMA despite the fact that a master plan was developed in order to determine which fisheries needed management plans (Harty et al. 2010).

v. *Marine Life Protection Act*

In 1999, a year after the MLMA was passed, another important statute was enacted: The Marine Life Protection Act (MLPA). The MLPA was heralded as the first law of its kind; it was a piece of legislation that mandated the implementation of a redesigned MPA network in order to “increase its coherence and its effectiveness at protecting the state’s marine life, habitat, and ecosystems” (Cal. Fish & Game Code §2853).

California has had a relatively long history with MPAs—the first one was established in 1957 in La Jolla. After that initial MPA was created, over 100 additional areas were implemented throughout California waters, but many of them unfortunately followed a case-by-

case model that paid little mind to regional conservation goals (Avasthi 2005, Gleason et al. 2006). They generally lacked “clearly defined purposes, effective management measures and enforcement (Cal. Fish & Game Code §2851). These fundamental issues were responsible for creating an “illusion of protection” in California’s waters—the MPAs were not reaching their full potential in conserving both marine life and habitats (Cal. Fish & Game Code §2851). The MLPA was meant to remedy this problem through the requirement of clearly defined objectives and management measures for the newly designed MPA network (CDFG 2005).

The first attempt to implement the MLPA began soon after the statute was passed. A team of scientists was called upon to recommend possible MPA areas for the statewide network. Stakeholder involvement was minimal and when the initial MPA plans were revealed, they garnered very limited support from the public. In 2002, a new process started with the introduction of regional stakeholder groups and the lofty goal of planning a complete statewide network all at one time. This attempt ultimately halted in 2003 as there were no more financial resources available to continue on with the planning (Weible 2008, Gleason et al. 2010).

In 2004, a public-private partnership was formed through a Memorandum of Understanding (MOU) that allowed MLPA implementation to continue because charitable foundations agreed to contribute funding to planning efforts. Under the MOU, California’s waters were divided into several study regions (the North Coast, the North-Central Coast, the Central Coast, the South Coast, and the San Francisco Bay study regions) to facilitate MPA planning via a phased approach (Gleason et al. 2013). The MOU outlined the roles of California public agencies and identified bodies such as the Blue Ribbon Task Force, the Science Advisory Team and a Regional Stakeholder Groups for each region (Kirlin et al. 2013). All of these bodies

participated in developing MPA plans for their respective regions and were integral in the implementation of the MLPA over the past several years.

The California Fish and Game Commission had the ultimate say in approving final MPA plans that were presented as they are the decision-making body under the MLPA (Cal. Fish & Game Code §2859). The Commission has approved plans for four of the five study regions and these plans have been implemented successfully; San Francisco Bay is the final region where the MLPA must be implemented. Almost \$40 million has been spent on MPA network planning for the four study regions, highlighting the large amount of funds that are needed to complete such a comprehensive project (Kirlin et al. 2013). Less than 3% of the state's waters were protected a decade ago, but now under the MLPA, that number has jumped to 16% (Gleason et al. 2013, Kirlin et al. 2013). Though the MLPA was definitely a step in the right direction for increased protection of California's ocean places, there are some issues that it is unable to address.

The MPAs redesigned and created through the MLPA implementation process only consider extractive activities for which the California Fish and Game Commission has authority over, including commercial/sport fishing and kelp harvesting. They cannot address other activities such as oil and gas exploration—the authority for this lies with the State Lands Commission. The MLPA also lacks requirements for integrated management as there are no mandates requiring agencies involved in ocean management to work together or consider the MPA network in their decisions (Sivas & Caldwell 2008).

vi. *California's Ocean Protection Act*

The most recent piece of legislation added to California's repertoire of ocean management legislation is the California's Ocean Protection Act (COPA) of 2004. COPA

recognizes the importance of several principles in making California's ocean management strategy more effective (OPC 2006):

- Consideration of the land-sea interface to ensure sustainability of coastal uses and health of coastal ecosystems
- The need for scientific understanding to better protect, conserve, and manage marine ecosystems
- The precautionary principle
- Public funds must be used effectively and efficiently in order to improve ocean management
- Coastal uses (including those that fall under aesthetic, educational, and recreational opportunities) must be made a priority
- Public involvement in the work of the OPC

The most important tangible results of COPA's passage were the creation of the Ocean Protection Council and the Ocean Protection Trust Fund. The OPC is considered the "cabinet level oversight body responsible for identifying more efficient methods of protecting the ocean" (Cal. Pub. Res. §35515). The council consists of five members: the Secretary of the Natural Resources Agency, the Secretary for Environmental Protection, the Chair of the State Lands Commission, and two members of the public that are appointed by the state governor (Cal. Pub. Res. §35600). The OPC is called upon to foster several key features associated with ocean governance in California. The council is meant to "coordinate activities of state agencies with ocean or coastal management interests or regulatory authority, to improve the effectiveness of state efforts to protect ocean resources and to establish policies to coordinate the collection and

sharing of scientific data related to coastal and ocean resources among agencies” (Cal. Pub. Res. §35621).

The Ocean Protection Trust Fund was established within the State treasury and sets aside millions of dollars for the purpose of improving ocean management in California (Cal. Pub. Res. §35650, Ruckelhaus et al. 2008). The money, which the OPC has the authority to disburse, can be spent on a variety of projects and activities including ones that (Cal. Pub. Res. §35650):

- Eliminate or reduce threats to ocean ecosystems and resources
- Improve fisheries management
- Foster sustainability in commercial and recreational fisheries
- Focus on adaptive management

Though it appears as though COPA answers the Ocean Agenda’s call to increase coordination among agencies, it ultimately falls short of actually achieving this goal. The act grants OPC no “regulatory authority or management jurisdiction” (Sivas & Caldwell 2008). It mainly acts in an advisory role, only able to guide “voluntary coordination among state agencies” and recommend “legislative changes” (Sivas & Caldwell 2008).

## **II) Total Ecology of Ocean Management in California**

In order to gain better insight into California’s ocean management regime, having an understanding of its total ecology is integral. Total ecology considers three different elements: 1) the biophysical ecology, 2) the human ecology, and 3) the institutional ecology. When considering ocean management, the biophysical ecology can simply be defined as the ocean ecosystem (Orbach 2009). The human ecology refers to “human behaviors that affect, are affected by, or otherwise concerned with the defined biophysical ecology” (Orbach 2009). The institutional ecology refers to the “governance institutions that govern or affect the behavior of

those in the human ecological system” (Orbach 2009). This section delves into each ecological system as it pertains to California’s management of its ocean environments.

### **A) Biophysical Ecology**

The biophysical ecological system for California’s ocean management is quite broad as it can be defined as all of the coastal and marine environments found in the state’s waters.

California’s has jurisdiction of over 5,700 square miles of water which includes San Francisco Bay (Cal. Dept. of Fish and Wildlife.b).

California’s waters encompass a number of different habitats including those that are located at the land-sea interface, such as coastal wetlands and seagrass meadows. As mentioned previously, California’s wetlands have greatly declined in the past few decades, but those that still remain are important spaces for a variety of fish and invertebrate species. Both wetlands and seagrass meadows can act as “spawning, nursery, and feeding grounds for important fishery species” such as halibut and sea bass and provide habitat for commercially important invertebrate species such as clams and oysters (Cal. Res. Agency 1997). The vegetation found in these environments also plays an important part in coastal and marine food chains (Cal. Res. Agency 1997).

Sandy beaches and rocky shores can be found in California’s near shore ocean zones, along with kelp beds, sandy and muddy bottom habitats (Gleason et al. 2006, Cal. Res. Agency 1997). Marine mammal species such as harbor seals, sea lions, and elephant seals are very common in near shore environments as they rely on these areas for foraging and breeding purposes (though elephant seal and sea lions will travel farther offshore for food as well). Sandy and muddy bottoms are habitat for halibut and other flatfishes. Kelp forests offer refuge and foraging opportunities for many marine and coastal species—common ones found in kelp forests

are lingcod, sea urchins, and sea otters (Cal Res. Agency 1997). Kelp is also harvested and used in the manufacturing of food items and cosmetics (NOAA Nat. Ocean Service).

Coastal upwelling occurs in California's near shore zone. This phenomenon occurs when seasonal winds bring up cold, nutrient-rich water from the deep oceans which in turn help to support complex food web systems (Lynn & Simpson 1987). Many species depend on the productivity of the food web systems in near shore environments and several of these are commercially important, including abalone, Dungeness crab, and Pacific mackerel (Cal. Res. Agency 1997).

California's offshore ocean zone starts at a depth of approximately 100 meters and stretches to where the United States Exclusive Economic Zone begins 200 miles offshore (Cal. Res. Agency 1997). California's continental shelf break occurs at a depth of around 200-300 meters and the pelagic waters located here are ecologically important for seabirds and marine mammals that forage there (Yen et al. 2004). Seabirds such as albatrosses and frigate birds support themselves on the abundant food sources found in the offshore zone of California. A variety of large marine mammals can be found offshore of California such as gray and humpback whales as well as a number of dolphin and porpoise species. This zone also serves as an important environment for deeper water species such as tuna, rockfish, sablefish, Pacific hake, and swordfish—all of which are commercially valuable (Cal. Res. Agency 1997).

Human activities occur throughout all of these zones. These activities include, but are not limited to disposal of dredged materials, oil and gas development, wildlife viewing, offshore energy exploration (such as wind energy), commercial and recreational fishing, shipping operations, and military exercises many of which can have negative effects on both the environments and species found there (Cal. Res. Agency 1997, Dvorak et al. 2010).

## **B) Human Ecology**

The biophysical ecology of California's ocean management helps to outline the significant role the state's waters play in the lives of the people that reside there. The value of California's marine and coastal resources to those that live there also highlights the need for effective and comprehensive management of the state's ocean spaces. Though almost 80% of California residents live on the coast, they are not the only ones who reap benefits from a well-managed ocean (Kildow & Colgan 2005). In California, there is a broad spectrum of people who have some at least some small stake in how the ocean is managed—from conservation scientists to surfers, from commercial and recreational fishermen to Native American tribes, from residents of coastal communities to out-of-state tourists (Fox et al. 2013).

Californians and those who visit the state depend on marine and coastal ecosystems for both consumptive and non-consumptive uses. The coastal and marine environments outlined above provide numerous services, especially in the food, energy, mineral, and pharmaceutical sectors. Ocean environments also play various roles in different capacities when it comes to climate regulation, nutrient cycling, and storm protection. California's waters also foster opportunities for trade, tourism, recreation, research, and education. At the same time, the state's ocean environment holds great cultural, aesthetic, and spiritual value for many people (Leslie & McLeod 2007).

The importance of California's ocean economy, which can be defined as "those activities that derive at least some portion of their value from the ocean and its resources", cannot be understated (Sivas & Caldwell 2008). The state has one of the largest ocean economies in the United States and accounted for almost 19% of the national ocean economy in 2000 (Kildow & Colgan 2005). In 2000, the value of California's ocean economy was estimated to be almost \$43

billion and was responsible for the providing close to 700,000 jobs, primarily relating to the transportation and tourism sections (Kildow & Colgan 2005). Though these data are almost 15 years old, Sivas and Caldwell (2008) point out that there is no reason to expect that these numbers have decreased in recent years.

### **C) Institutional Ecology**

Institutions have the ability to play an active “causal role” in affecting human behavior through governance structures outlined by both legislature and administrative agencies (Young 2002). Governance for ocean management in California has already been discussed in terms of important existing legislature. The following section will focus on several administrative entities in the state that have authority and/or responsibility (in at least some degree) relating to ocean management.

#### *i. California Natural Resources Agency*

Many of these agencies fall under the California Natural Resources Agency (CNRA). The CNRA is a cabinet level agency that was created in 1961 after a reorganization of the state government (Cal. Res. Agency 1997). The mission statement of the CNRA is “to restore, protect, and manage the state’s natural, historical, and cultural resources for current and future generations using creative approaches and solutions based on science, collaboration and respect for all communities and interests involved” (Cal. Nat. Res.). The CNRA is also “oversees and coordinates the activities and administration of 15 departments” all of which have some hand in managing the state’s natural and cultural resources, including those found in California’s ocean environments (Cal. Res. Agency 1997).

#### *ii. California Coastal Commission*

The California Coastal Commission is a permanent coastal management agency in the state government. It was created under the Coastal Act and is the implementing agency of the statute. The Commission is able to implement policies that address a variety of coastal issues, including natural resource protection, public access and recreation, and coastal development initiatives (Cal. Res. Agency 1997). It is also one of the three agencies that work to administer the federal Coastal Zone Management Act in California (California Coastal Comm. a).

*iii. Division of Boating and Waterways*

The Division of Boating and Waterways (DBW), while not a regulatory agency within the CNRA, has responsibilities that are directly associated with ocean uses relating to recreational boating (Cal. Nat. Res. 1997, Div. Boat. and Water.) It is considered the state's expert on recreational boating matters including "public access, safety and education, marine law enforcement, and environmental protection" (Div. Boat. and Water.). The DBW is meant to address the needs of California's recreational boating community and has responsibility to do this by, for example, "planning, developing, and improving [boating] facilities on state-owned and state-managed properties" (Cal. Res. Agency 1997, Div. Boat. and Water.).

*iv. California Department of Conservation*

The California Department of Conservation (DOC) has a number of responsibilities—mainly to conserve, protect and ensure informed development of the state's resources. In terms of ocean uses, the DOC can regulate oil and gas development operations both onshore and offshore. Though the Division of Oil, Gas, and Geothermal Resources in the department has regulatory authority over this type of development, they ultimately are not the final decision-makers when it comes to development permits for extraction of oil and gas resources. The decision lies with agencies such as the California Coastal Commission and the State Lands

Commission. The DOC also provides guidance for policy relating to ocean mining (Cal. Res. Agency 1997).

*v. State Lands Commission*

Established in 1938, the State Lands Commission (SLC) acts as a steward for California's lands, waterways, and resources (Cal. State Lands Comm.). The SLC holds authority over California's tidal and submerged lands and has responsibility for managing activities that occur there, as well as activities that occur within three nautical miles of the state's shoreline. These activities include offshore oil and gas development, harbor development, and construction and operation of offshore facilities (Cal. Res. Agency 1997).

*vi. California Department of Fish and Wildlife and California Fish and Game Commission*

The California Department of Fish and Wildlife (previously the Department of Fish and Game) is considered a lead trustee for state natural resources with the authority over California's living marine resources (Gleason et al. 2010, Baird & Mace 2005). It is important to reiterate the institutional change which occurred under the MLMA and affected the California Department of Fish and Wildlife (CDFW). Up until the MLMA was enacted, the regulatory authority of commercial fisheries was entirely in the hands of the state Legislature, but after its passage, much of this authority shifted over the CDFW (Sivas & Caldwell 2008). As mentioned previously, the California Department of Fish and Wildlife also plays an important role within the MLPA—it is the implementing agency for the statute (Fox et al. 2013). Other state agencies are required to consult with the CDFW in concern to projects that may affect fish resources and their habitats. The department is also responsible for reviewing environmental impact assessments for both offshore and near shore projects, investigating pollution and spill impacts

for marine waters, and conducting research on fish found in the state's waters (Cal Res. Agency 1997).

Often confused with the CDFW, the California Fish and Game Commission (FGC) is a completely separate entity. The FGC is actually responsible for setting regulations that the CDFW must implement (Cal. Fish and Game Comm., Cal Res. Agency 1997). The FGC is also responsible for a wide variety of things relating to ocean management such as (Cal. Fish and Game Comm.):

- Seasons, bag limits, and methods for take in sports fisheries and some commercial fisheries
- Controlling invasive species (including those found in marine and coastal environments)
- Leasing areas for shellfish cultivation
- Regulating uses of protected areas
- Leasing kelp beds for harvesting
- Developing terms and conditions for aquaculture registration

*vii. Department of Parks and Recreation*

The Department of Parks and Recreation (DPR) was created in 1928 with the mission to “provide for the health, inspiration, and education of the people of California by helping to preserve the state’s extraordinary biological diversity, protecting its most values natural and cultural resources, and creating opportunities for high-quality outdoor recreation”(Cal. Dept. of Parks and Rec.). The department creates opportunities for marine recreation along various stretches of California’s coastline through ocean front parks. The DPR is responsible for managing a number of natural areas, such as state reserves and beaches, as well as 11 marine

underwater parks. The DPR also has the ability to designate important coastal areas as either preserves or reserves. With assistance of programs such as the California Sea Grant, the DPR conducts marine research in the coastal and underwater areas they manage (Cal. Res Agency 1997)

*viii. State Coastal Conservancy*

The State Coastal Conservancy (SCC) was created to “protect, restore, and enhance coastal resources and to provide access to the shore” (Cal. Coast. Conserv.) The conservancy works with a number of stakeholders on a number of projects including those that work to restore wetlands and waterfronts (Cal. Res. Agency 1997). The conservancy has a unique role in that is meant to act as an intermediary for issues that arise between coastal resources users (Cal. Coast. Conserv). When issues arise between users, the SCC can use “non-regulatory means to resolve conflicts” (Cal Res. Agency 1997). The conservancy has been called upon to use its skills of mediation, facilitation, and partnership building to help alleviate problems that arise over conflicting demands of the “government, citizens, and the private sector” (Cal. Res. Agency 1997, Cal. Coast. Conserv.).

*ix. California Department of Water Resources and State Water Resources Control Board*

The primary goal of the Department of Water Resources (DWR) is to protect and manage California’s water supply. Water supply management has implications for the water quality and quantity in a number of environments, such as estuaries and the near shore ocean. The DWR retains responsibility over ocean water desalting proposals, determining sea level changes, and monitoring the quality and quantity of reclaimed water released into the ocean (Cal. Res. Agency 1997).

The State Water Resources Control Board, which is housed in California's Environmental Protection Agency, is primarily "responsible for ensuring the highest reasonable waters of the State, while allocating those waters to achieve the optimum balance of beneficial uses" (State Water Res. Control Board a). To fulfill these responsibilities, the board created a series of control plans, one of which is the California Ocean Plan, developed by the ocean unit of the board. The plan outlines the benefits of California's ocean, and how those benefits can be maintained via water quality control measures. The plan outlines provision for marine protected areas and vessel discharge. It is currently developing amendments to the plan concerning desalinization facilities (State Water Res. Control Board b, Cal Res. Agency 1997).

This is not an exhaustive discussion of the administrative entities that are involved in California's ocean management structure. The subset of agencies concentrates on some of the more important actors that play a role in California's ocean governance. When looking at the multitude of entities that have authority and responsibility over certain aspects of the ocean environment, it is no wonder that the California's Ocean Agenda called attention to the fact that addressing ocean issues in an effective, comprehensive manner is hard—it is easy to see why coordination among these agencies may be difficult to achieve.

### **III) The Issue: California's Ocean Governance Structure**

The issue with California's ocean management regime has been alluded to in previous sections. The state's governance structure is not able to deal with ocean issues in an effective and comprehensive manner. First, it can hardly be as efficient and straightforward as possible when a number of state agencies often have overlapping or even conflicting jurisdiction over various coastal and marine resources and habitats (Sivas & Caldwell 2008). For example, it is imaginable why issues concerning offshore oil and gas development cannot be readily addressed when the

DOC has regulatory authority over this sector, but the permitting power for extraction lies with the California Coastal Commission and the State Lands Commission.

The MLPA, an innovative approach to certain aspects of spatial ocean management in California, only addresses concerns for areas that have been designated as MPAs under the act. National marine sanctuaries, another spatial tool in ocean management, are a part of California's ocean governance structure in that their purpose is to further the conservation of marine resources (Brax 2002). But as mentioned previously, sanctuary designation falls short affording the type of protection that was originally sought for these areas. The second flaw and main flaw in California's ocean governance structure is that there are no state mandates that attempt to apply the spatial concepts employed by Title III of the MSRPA and the MLPA for the *rest* of the state's waters that do not currently fall under MPA or sanctuary designations. Comprehensive management that considers spatial needs of all ocean uses (both consumptive and non-consumptive) for the California's remaining waters must be developed and it must be done sooner rather than later.

The ability to effectively manage ocean ecosystems based on the multiple uses that occur there is especially significant when looking towards the future. With over 38 million people residing in the state, California already has the largest state population within the US (US Census Bureau). California's population will only continue to grow; by mid-century, the state's population is expected to be around 50 million people (World Population Statistics). The increase in population will undoubtedly put a greater strain on ocean ecosystems as both human and industry dependence on the oceans (in both recreational and commercial sectors) will continue to grow. This is where user-environment conflicts come into play which occurs when human activities affect ocean environments. Marine and coastal resources are not unlimited (in

terms of space and amount) and as development has increased greatly in the past several decades, competition among users has had detrimental effects on ocean ecosystems (Douvere 2008). In California, this is evidenced by the collapse of multiple fisheries.

The plethora of ocean uses in California is bound to not only conflict with the environment, but also with each other. User-user conflict must be considered in comprehensive ocean management regime as there are a variety of human uses that occur within California’s ocean spaces (Table 1). These uses are not always compatible because they can be “competing for ocean space or have adverse effects on each other” (Douvere 2008). For example, shipping and mineral extraction have the potential to conflict with recreational opportunities that occur within coastal waters. Commercial and recreational fishing can also conflict with nature-based activities such as scuba diving (Agardy 2000).

Table 1. Examples human uses that occur within ocean ecosystems (adapted from Ehler & Douvere 2009)<sup>1</sup>

• Commercial and recreational fishing	• Offshore oil and gas exploration
• Recreational boating and sailing	• Wildlife watching and scuba diving
• Placement of cables, pipelines, and transmission lines	• Dredging and dredged materials disposal
• Ocean desalination plants	• Military operations
• Scientific research	• Port and harbor operations
• Biological, cultural, and historical conservation efforts	• Marine Transportation (for example, cruise ships and cargo vessels)
• Offshore liquefied natural gas facilities	• Offshore renewable energy projects
• Aquaculture facilities (for both marine finfish and shellfish)	• Ocean mining (for example, sand and gravel)

<sup>1</sup> Much of the previous analysis focuses on oil and gas and fisheries for explanatory purposes. But as discussed in the next section, the solution—marine spatial planning— has the ability to better coordinate all human uses of the ocean.

Both user-user and user-environment conflicts can detract from what the ocean environment provides - not just in the biological sense, but in economic and social terms as well. When these conflicts arise, decision-makers often cannot not help but respond in a reactive manner, instead of proactive manner (Ehler and Douvere 2009). This is the case for California as there are no real proactive mechanisms present in the state's ocean management structure that can effectively deal with conflicts when they arise.

There is a tool, however, that can address the main issues outlined with California's ocean governance structure and that is marine spatial planning. California needs to adopt a comprehensive marine spatial planning program to better manage its ocean now and going into the future.

#### **IV) Exploring Marine Spatial Planning Initiatives**

##### **A) Overview of Marine Spatial Planning**

Marine spatial planning (MSP) can be defined as “a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process” (Ehler & Douvere 2009). It important to manage the ocean both spatially and temporally— the distribution of marine and coastal resources is influenced by time and location (Ehler & Douvere 2009). Marine spatial planning can provide guidance to manage in such a way because it “can influence where and when human activities occur in marine spaces” (Douvere 2008).

Traditionally, regulation of ocean spaces been handled through a sector by sector approach which is neither integrated nor comprehensive in nature (Douvere 2008). Through marine spatial planning, ocean management can consider a wide variety of needs, such as protected areas and sustainable development, simultaneously. By providing an integrated framework of ocean use

and conservation needs MSP is able “to address [...] conflict and select appropriate management strategies to maintain and safeguard necessary ecosystem services” (Ehler & Douvère 2009). The ability to do so can lead to more effective and efficient management structures, especially if done on a large scale (Agardy et al. 2011). In the end, the purpose of marine spatial planning initiatives should always be guided by a clear set of principles and encompass all sectors in order to achieve the various benefits that MSP can provide (Gilliland & Laffoley 2008).

There are a multitude of benefits associated with MSP when developed properly, including (Ehler & Douvère 2009):

- Reduction of the negative effects of human activities occurring in marine environments
- Identification of appropriate spaces for biodiversity and nature conservation
- Improved preservation of cultural heritage associated with the ocean
- Identification of compatible ocean uses among and across sectors
- Increased certainty of access to appropriate areas for new investments from the private sector
- Keeping social and spiritual values related to the ocean intact

Marine spatial planning is inherently a future-oriented process because it is meant to consider both existing and future conditions of ocean areas using current information and projections. One of the major steps for an MSP process is to define and analyze future demands of ocean space. Because it works to incorporate future developments that are likely to occur in the ocean, MSP differs from a majority of ocean management strategies that result from decision-makers reacting to problems already happening in ocean ecosystems (Ehler & Douvère 2009).

The main resulting product from a marine spatial planning process is a comprehensive spatial management plan that can be applied to marine ecosystems. This plan can be thought of as a “vision for the future” as it “sets out priorities for [an] area and defines what these priorities mean in time and space” (Ehler & Douvère 2009). This plan is then implemented through zoning or permit systems, or a combination of both. Zoning is an important part of MSP as it helps to designate uses for areas. Along with the spatial plan, zoning can also provide guidance for permit decisions for various sectors (Ehler & Douvère 2009).

According to Ehler and Douvère (2009) that are six important characteristics that MSP should exemplify in order to be effective. These are listed in the table below (Table 2).

Table 2. Characteristics of effective MSP (Definitions in Table 2 were taken from Ehler and Douvère 2009)

1) Ecosystem-based: balancing, ecological, economic, and social goals and objectives towards sustainable development
2) Integrated: across sectors and agencies, and among levels of government
3) Place based or area-based
4) Adaptive: capable of learning from experience
5) Strategic and anticipatory: focused on the long-term
6) Participatory: stakeholders actively involved in the process

It is important to note that MSP is not meant replace single-sector planning, and in fact cannot produce effective conservation and management of ocean uses without it. The purpose of MSP is to provide a comprehensive framework for ocean management; essentially to allocate and coordinate the use of ocean space. Decision-makers for various sectors associated with ocean environments should be able to use MSP to guide their decisions in a way that makes their actions more integrated and complementary (Ehler & Douvère 2009). Ultimately, marine spatial planning can aid in “maximize[ing] compatibilities among human activities and reduc[ing]

conflicts both among human uses and between human uses and nature” (Ehler & Douvere 2009). It does *not*, in and of itself, produce the conservation of specific resources or environments. The ability of MSP to do so makes it a much-needed component in California’s ocean governance structure. Other examples can provide a basis for setting up a comprehensive marine spatial planning program in California’s ocean management regime.

In recent years, marine spatial planning has been recognized around the world as an increasingly important management tool for ocean governance (Diamond et al. 2009). Many countries, a number of which are European, have started implementing marine spatial planning programs for some of their territorial seas in order to alleviate ocean issues (Douvere et al. 2007). In the United States, the Interagency Ocean Policy Task Force has been working on developing frameworks for coastal and marine spatial planning (Diamond et al. 2009). A few states in the United States are currently working to implement marine spatial planning for their waters. The following sections will explore some of the MSP initiatives occurring abroad and those that are currently happening in the United States.

## **B) Exploring Marine Spatial Planning Initiatives Abroad**

### *i) Belgium’s Master Plan*

Belgium was one of the first countries to develop and implement a marine spatial planning program for their territorial sea and exclusive economic zone—known as the Belgian Part of the North Sea (BPNS)—under what is called the Master Plan (UNESCO MSP: Belgium). The North Sea is a highly exploited marine environment and the BPNS, encompassing almost 3,600 km<sup>2</sup> of ocean, is centrally located in a small area where multiple uses occur (Douvere et al. 2007).

Driving forces behind the development of Belgian's MSP program for the BPNS were both environmental and economic. The country recognized that "new activities, expansion of existing activities, as well as nature conservation requirements, will definitely lead to an increased conflict potential that [could not] be dealt with" under their current ocean management structure (Douvere et al. 2007). When concern over new objectives relating to offshore energy projects and European MPA networks arose, Belgium began working on its Master Plan. The objectives of the plan focus on (Douvere & Ehler 2009):

- Offshore wind energy
- Designation of MPAs
- Development of policy plan specifically for sustainable extraction of sand and gravel
- Increasing funds for oil pollution prevention measures
- Mapping projects focused on marine environments
- Protection of ship wrecks (which can be valuable for maintaining biodiversity)
- Management of activities occurring on land that can have an effect on marine environments

It took over three years to develop the Master Plan. Development started with a six-month period that consisted of a number of meetings and multiple interviews with different sectors and interest groups with a vested interest in the BPNS. Doing so allowed for the collection of a vast amount of spatially minded data and information which reflected the "concerns, expectations, and opportunities for each sector" (Ehler & Douvere 2009).

The plan has been implemented in phases since 2004 (UNESCO MSP: Belgium). The first two phases that are currently operational focus on 1) designating boundaries for sand and gravel extraction as well as zoning an area for potential offshore wind projects and 2) setting

boundaries for marine protected areas that are a part of an EU effort (the EU Natura 2000 Network) to establish nature protection areas (Douvere & Ehler 2009).

Prior to the Master Plan implementing its first phase, sand and gravel extraction occurred in two concession zones and the one closest to the Belgium coast was used most heavily due to sand quality and economic costs. It was also discovered that some parts of the two concessions were important areas for fish spawning. The Master Plan attempted to address these concerns through a new zoning system which included sequential rotation procedures that reduces pressure on a single extraction area. Extraction is now prohibited in certain areas during spawning periods. It also suggested an exploitation quota 15 million cubic meters over the course of five years in order to discourage overexpansion of the sand and gravel extraction industry in the marine environment. All of these components of the Master Plan have been approved by law through a Royal Decree (Douvere et al. 2007).

The possibility for offshore wind energy projects was already being explored in the BPNS before the Master Plan became a part of Belgium's ocean management structure. The Master Plan helped determine a specific zone where offshore wind farms could be constructed. The designation of this zone took biodiversity, "visual pollution", and fisheries into account when making the decision of where wind farms can be build (Douvere et al. 2007). Companies can submit their proposals for this specified area and there are at least two projects that were approved as of 2007 (Douvere et al 2007).

The second phase worked to delimit two types of MPAs in the BPNS, one that protects migratory species (i.e. birds) and another that protects certain habitats and species. An analysis of threats and disturbances helped in choosing five areas for MPA designation. Stakeholders

played an important part in the MPA discussion and their voices were heard when outlining commitments to conservation efforts for the chosen areas (Douvere et al. 2007).

In 2005, the GAUFRE project (spearheaded by the University of Ghent) released a report that included the mapping of current activities in the BPNS and the various roles that the BPNS plays in the national and international scene. The report went above and beyond for marine spatial planning when it created six different alternative scenarios focusing on the future of ocean use in the BPNS. These scenarios concentrated on biological, social, and economic needs in relation to the ocean, and in some cases, combined variations of each component (Maes et al 2005). The purpose of developing these scenarios was to “inspire policymakers and end users to envisage alternative ways in which the BPNS might be spatially managed in the future” (Maes et al. 2005).

In 2007, a project that studied the biological valuation of the BPNS using spatial data on marine species (birds and fish) and habitats was completed. The most important products resulting from this study were maps that integrated available biological information to determine what sites were most biologically important. These maps were significant in that they can give decision makers an idea of where the most biologically valuable and act accordingly when spatially managing the BPNS (Deros et al. 2007).

Looking towards the future, Belgium will concentrate their efforts on protecting shipwrecks for cultural and biological interests, integrating marine environment considerations into existing protected areas on land, and setting aside a research zone for the purpose of studying alternative fishing methods (Douvere et al. 2007).

It is important to note that the Master Plan lacks a legal basis, but the plan is still able to provide a spatially-minded framework that accounts for both current and future objectives of various sectors (Douvere & Ehler 2009).

ii) *Germany's Länder and Federal Initiatives*

a. German *Länder*: Mecklenburg-Vorpommern Marine Spatial Planning Program

The coastal *Länder* (or states) of Germany retain authority of marine spatial planning in their territorial waters—waters within a 12 nautical mile zone of the state's coast (Douvere & Ehler 2009, UNESCO MSP: *Länder*). Mecklenburg-Vorpommern, a state on the Baltic coast, has created a spatial development program with a legally binding plan that was completed almost ten years ago. The program “aims to implement principles of sustainable spatial development which can bring social and economic requirements to be met by the territory into harmony with its ecological functions and which leads to a long-term, large-scale and balanced spatial development” (Landesraumentwicklungs-programm). This program applies not only to Mecklenburg-Vorpommern's lands, but to its coastal waters as well.

Driving forces behind including coastal environments in spatial planning were offshore wind energy projects, pipeline and cable projects, and coastal erosion and conservation issues. One of the main goals of the MSP initiatives was to create the ability to effectively deal with conflict that are bound to arise between various sectors that are stakeholders in ocean management such as tourism, shipping, and fishing. The state recognizes the significance of preserving the ocean environments and therefore nature reserves and important zones of national parks are considered priority areas in Mecklenburg-Vorpommern's MSP system (UNESCO MSP: *Länder*). Ultimately the state's MSP process is meant to be nested within the wider considerations of integrated coastal zone management (Douvere & Ehler 2009).

## b. Marine Spatial Planning in Germany's Exclusive Economic Zone

In 2004, an amendment was made to Germany's Federal Spatial Planning Act calling for the creation of a spatial planning initiative for the country's Exclusive Economic Zone (EEZ) in the Baltic Sea and North Sea. The German government became especially interested in MSP when maps were released showing where a number of proposed offshore wind energy projects were going to potentially develop. The maps revealed that there were various overlaps between the proposed projects and it was uncertain how exactly the projects would affect the marine environment (Douvere & Ehler 2009). It was recognized that "increasing use demands and potential conflicts between different uses and/or with marine environment[al] protection" made it necessary for an "integrated, comprehensive sustainable management of human activities" (Fed. Mar. & Hydro. Agency).

Under the act, Federal Maritime and Hydrographic Agency was charged with the responsibility to prepare a spatial plan (Douvere & Ehler 2009). The plan's main goal is to "establish sustainable management of space, in which social and economic demands are consistent with ecological function" (Douvere & Ehler 2009). It employed the three designations for managing various ocean uses: 1) Priority Areas: "defined uses have a priority", 2) "Areas: "reserved for a defined use in which other conflicting uses are excluded, and 3) Suitable Areas: "defined uses are allowed inside, but excluded outside the designated area" (Douvere & Ehler 2009)

The agency began developing the plan in 2005 by collecting data concentrating on uses of and interests in Germany's EEZ. That same year, preferred areas were delimited for wind energy project in both the Baltic and North Seas (Douvere & Ehler 2009). Two hearings were held in the summer 2008 to allow for public participating in the MSP procedure (Fed. Mar. &

Hydro. Agency). A draft for the plan was also released in 2008 to allow for public consultation (Douvere & Ehler 2009). The federal plans for MSP for national waters under Germany's jurisdiction went into effect in 2009.

The country made sure to account for the shipping industry throughout the MSP process as it wanted to maintain its competitiveness—navigation priority areas have been established within Germany's EEZ (UNESCO MSP: Germany, Off. Windenergie). The preferred areas for wind energy have also become priority areas and priority areas for pipelines and submarine cables have been created (Off. Windenergie). The German Agency for Nature Conservation created a plan to determine areas of biological importance for conservation purposes (specifically under the EU Natura 2000 program) when MSP plans were authorized. Scientific research focusing on the distribution of species and habitats helped identify important areas and these places were incorporated into Germany's marine spatial planning program. As a result of this research, around 45% of the country's EEZ are now designated as Natura 2000 sites (UNESCO MSP: Germany).

### *iii. The Netherland's Spatial Planning Policy*

Similar to Belgium and Germany, the Netherlands saw the need to incorporate marine spatial planning into their ocean management structure when it became apparent that conflicts between ocean uses (marine protected areas, wind farms, industrial facility development, etc.) in the Dutch part of the North Sea (DPNS) were going to increase. This realization resulted in the addition of a North Sea paragraph to the country's Spatial Planning Policy Document in 2005 (Douvere & Ehler 2009). With this new paragraph, a clear goal for the North Sea was outlined, that being “to enhance the economic importance of the North Sea and maintain and develop the international ecological and landscape features by developing and harmonizing sustainable

spatial-economic activities in the North Sea, taking into account the ecological and landscape features of the North Sea” (IMPNS 2005).

In order to achieve this goal, the Integrated Management Plan for the North Sea (IMPNS) 2015 was created to guide the Dutch government’s management of the Netherland’s ocean space up until 2015. IMPNS is considered a “policy rule and the government is obliged to act in accordance with it” (IMPNS 2005). The plan focuses on sustaining a healthy, safe, and profitable North Sea. The integrated approach to managing the DPNS considers (IMPNS 2005):

- Water quality and biodiversity
- Human safety and safe shipping
- Economic activities such as wind energy, recreation, oil and gas extraction, mineral extraction, shipping and fishing

Under the IMPNS, marine spatial planning in the DPNS occurred mainly through usage zones—shipping routes, military exercise, and ecologically important features—that are defined only where necessary (IMPNS 2005) . The government sees designating usage zones only where necessary as a way to allow the private sector “to develop initiatives within certain constraints” (IMPNS 2005). IMPNS also recognizes that there are various government organizations that have responsibilities tied with the management of the DPNS and that it therefore necessary for these agencies to work together in order to achieve effective management. Through the IMPNS, the North Sea Management Network was established in order to better coordinate management activities (IMPNS 2005).

Though the IMPNS placed emphasis on the use of permits within MSP, it recognizes the importance of additional management tools. Opportunity maps have a place within the IMPNS. These maps can be used to show where activities are permitted to development and where ocean

users see these activities developing further. Spatial monitoring is an instrument that is used to create current pictures of use and how that use may change in the future.

Exploratory spatial studies are a necessity when dealing with activities that may be developing more quickly than anticipated. These studies can guide any changes that must be made to management of activities. One such study to determine current and future economic value of the DPNS is currently underway (as of 2009). The study has been able to predict economic value and spatial needs of important ocean space uses (shipping, wind energy, fishing, etc.) until 2015. The information gained from this will be used to create several alternative scenarios that highlight possible spatial conflicts and the potential for use compatibility. The scenarios coming out of this study can guide the Dutch government in future marine spatial planning initiatives (Douvere & Ehler 2009).

Joint initiatives are an important component within spatial planning for the DPNS (IMPNS 2005). The Dutch government encourages private parties and citizens to propose initiatives that combine activities in order to promote multiple use projects (IMPNS 2005). Multiple use areas already occur within Dutch waters. In certain protected areas, recreation activities are allowed and in military exercise areas, sand extraction may occur as long as the. Additional opportunities for multiple use of space have been identified as well. These potential initiatives such as seaweed and fish cultivation projects being attached to wind turbines (Pol. Doc. on the N. Sea 2009)

In 2009, a North Sea Policy Document was developed under the National Water Plan. This document discusses the changing uses of the North Sea and elaborates upon the decision making framework for activities that occur within the DPNS. The North Sea Policy Document

also outlines policy options available for the management of several ocean uses including conservation, sand extraction, and wind energy (Pol. Doc. on the N. Sea 2009).

### **C) Exploring Marine Spatial Planning Initiatives in the US**

#### *i) Massachusetts' Ocean Act*

The government of Massachusetts saw that there was a need for a new ocean management regime when attempting to balance increasing development and the protection of ocean resources. It saw new uses would put additional pressure on the ocean when proposals for renewable energy, deep water aquaculture, and offshore sand mining started coming in. These new uses would undoubtedly conflict not only with each other, but conflict with the expanding ocean activities already occurring in Massachusetts' waters. The effects of climate change on ocean uses were also identified as a topic that needed consideration (MOMP 2009).

In response to these concerns, Massachusetts passed the Ocean Act in 2008. The act called for the state's Secretary of Energy and Environmental Affairs to develop an integrated ocean management plan that seeks to address biological, social, and economic challenges for Massachusetts' ocean spaces. The Ocean Act gave special consideration to commercial and recreational fishing, identifying it them as allowable uses under the jurisdiction of the state's Division of Marine Fisheries. Another specified allowable use outlined in the act was the development of renewable energy projects. Once developed, the plan was to be revised and reviewed by the public at least every five years. (Mass. S., No. 2699).

An important component of the Ocean Act is the specification that the plan be implemented through existing management strategies (such as licenses, permits, and leases) to "the maximum extent practicable" (Mass. S., No. 2699). This shows the Massachusetts government was not

looking to completely overhaul their ocean management structure, instead attempting to carry out management through existing strategies as much as possible.

The Ocean Act created the ocean advisory committee, which consisted of representatives from a number of different sectors (both public and private), to help with the creation of the management plan. An ocean science advisory council was established under the act as well. The main purpose of this council is to aid the Secretary in creating biological assessments and gathering the scientific data needed to create the integrated ocean management plan (Mass. S., No. 2699).

The final integrated ocean management plan was created as a result of three phases, the first of which was the information gathering phase. Gathering and compiling data was the main focus of development in the beginning. Government agencies made it possible for public participants to review data gathered as well as the quality of the data. The second phase, draft plan development, was characterized by comprehensive spatial analysis. During this phase, expert input and public participating was integral as it helped with determining spatial needs of stakeholders. The plan was released to the public for review in 2009. Formal public review of the draft plan was the final phase, mainly consisting of formal public hearings and a public comment period. Taking the public's view into consideration, the finalized plan was released on December 31<sup>st</sup>, 2009 (MOMP 2009).

The plan has four main goals that were developed in accordance with the Ocean Act: 1) "Balance and protect the natural, social, cultural, historic, and economic interests of the marine ecosystem through integrated management"; 2) "Recognize and protect biodiversity, ecosystem health, and the interdependence of ecosystems"; 3) "Support use wise of marine resources, including renewable energy, sustainable uses, and infrastructure"; and 4) "Incorporate new

knowledge as the basis for management that adapts over time to address changing social, technological, and environmental conditions” (MOMP 2009).

The Ocean Act doesn’t explicitly call for the use of MSP in the integrated ocean management plan, but spatial planning strategies are employed in order to achieve the goals above. Spatial data is an integral aspect of the plan. The plan contains a number of maps based on spatial data that show where ocean activities occur as well as where biologically important areas are located for the entirety of ocean space that is under Massachusetts’ jurisdiction. The data ultimately assisted in determining the compatibility and impact of a variety of human uses. This knowledge in turn helps to guide Massachusetts’ ocean management actions (MOMP 2009). Three types of management areas were established in the plan (MOMP 2009, Figure 1):

- Prohibited Areas: where a number of uses and activities are prohibited. Cape Cod Ocean Sanctuary is designated as a prohibited area
- Renewable Energy Areas: where wind and tidal energy initiatives are allowed to occur. Tidal power projects were under development when the plan was released and two wind energy areas were designated.
- Multi-use Areas: where all uses and activities allowed under the Ocean Sanctuaries Act can occur such as laying cables and pipelines, sand and gravel extraction, and aquaculture development. Management of these areas is based on the effect and compatibility assessments for ocean uses.

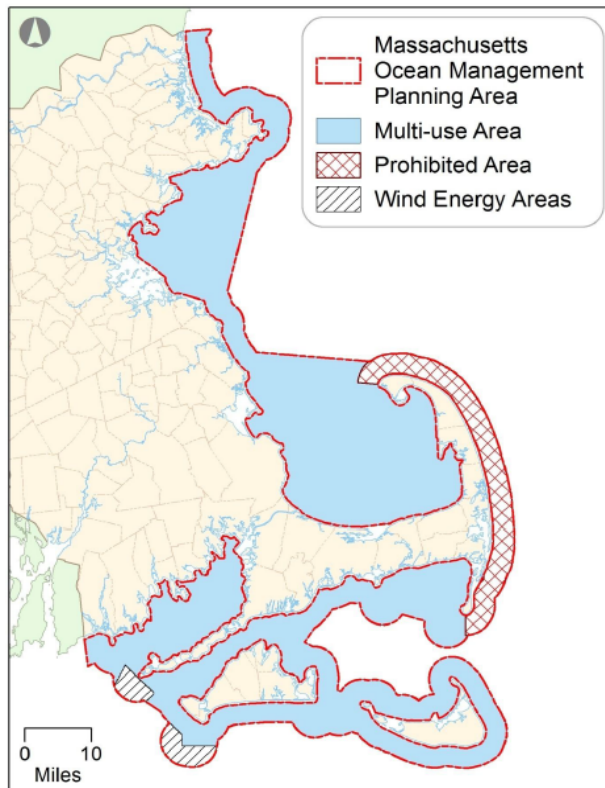


Figure 1. Map displaying Massachusetts ocean planning area and the designated areas outlined by the integrated ocean management plan (taken from the 2014 Review of the Ocean Management Plan).

In accordance with the five year review requirement, a review for the Massachusetts ocean management plan was released in the beginning of 2014. The report recognizes that not all components of the plan have been fully implemented, but it still gives important insights and information on what has been implemented thus far (Rev. of the MOMP 2014).

Three ongoing projects occurring within the waters of Massachusetts are currently subject to the plan - all of which are located within a Multi-Use Areas. Two projects focus on cables, while another is concerned with tidal energy. Proposals for wind energy projects have not been submitted as of yet. At the onset of the plan, baseline assessments were completed to gain a better understanding of changes that may occur over time. Work was done to identify priority actions for management. Efforts also concentrated on gathering additional data on the ocean

seafloor and habitat as well as updating knowledge of recreational boating activity through intensive surveys (Rev. of the MOMP 2014).

The review reports that future work should emphasize identifying appropriate locations for priority uses that are expected to expand in the future. The report highlights the need to site areas for transmission lines that will connect offshore projects to land. It recommends that the significant communication with stakeholder groups that occurred during the development of the plan be maintained as public participating is integral to effectively managing the ocean spaces of Massachusetts. Gathering information for the purpose of improving the understanding of Massachusetts' ocean ecosystem is also important. The report called for the description of trends on ocean resources and uses that are apparent based on the baseline assessments so the information can be integrated into the ocean management plan (Rev. of the MOMP 2014).

*ii) Rhode Island's Special Area Management Plan*

The creation of a marine spatial planning initiative in Rhode Island can be attributed to the state's Coastal Resources Management Council (CRMC). In 2004, the Rhode Island General Assembly passed the Renewable Energy Standard that required renewable energy to cover at least 16% of electricity needs by 2019. Three years later, the governor of Rhode Island mandated that offshore wind energy cover 15% of the state's electrical power by 2020 and it was determined that offshore wind farms would be necessary to meet this goal (Ocean SAMP 2010)

The CRMC proposed the creation of an Ocean Special Area Management Plan (SAMP) as it seemed a comprehensive ocean plan would be a helpful tool in meeting these requirements. The council hoped that an Ocean SAMP would be used to engage ocean stakeholders in a proactive manner and provide both guidance and recommendations for suitable offshore renewable energy sites (Ocean SAMP 2010).

The Ocean SAMP has received regulatory status and the CRMC was identified as the lead planning agency. Through the Ocean SAMP, the CRMC is able to uphold its responsibility to “preserve the state’s coastal resources” and manage state waters by “giving full consideration to ecological, cultural, historic, and aesthetic values, as well as needs for compatible economic development” (Ocean SAMP 2010).

The Ocean SAMP outlines specific goals and guiding principles for managing Rhode Island’s ocean spaces (Table 3).

Table 3. The goals and guiding principles of Rhode Island’s Ocean SAMP (Ocean SAMP 2010).

<b>Ocean SAMP Goals:</b>	<b>Ocean SAMP Guiding Principles:</b>
<ul style="list-style-type: none"> <li>• Work to maintain an ecosystem that remains ecologically healthy and economically productive</li> </ul>	<ul style="list-style-type: none"> <li>• Develop the plan in a transparent manner</li> </ul>
<ul style="list-style-type: none"> <li>• Foster and enhance existing ocean uses</li> </ul>	<ul style="list-style-type: none"> <li>• Involve all stakeholders</li> </ul>
<ul style="list-style-type: none"> <li>• Encourage economic development in the state’s ocean waters</li> </ul>	<ul style="list-style-type: none"> <li>• Honor existing activities</li> </ul>
<ul style="list-style-type: none"> <li>• Enhance coordination between state and federal agencies when making ocean management decisions</li> </ul>	<ul style="list-style-type: none"> <li>• Base decision on the best available science</li> </ul>
	<ul style="list-style-type: none"> <li>• Establish monitoring and evaluation measures which can support adaptive management</li> </ul>

The Ocean SAMP included a comprehensive study on the ecology of Rhode Island’s state waters. The purpose of conducting this research was to gain a better understanding of the ecological systems the SAMP is meant to manage and in turn, use this understanding to make better decisions for ocean management. The produced information can help manage proposed activities in such a way as to avoid or minimize/mitigate impacts on valuable ecological systems. The study also helped to establish regulatory standards for Areas Designated for Preservation of important habitats of avian species and Areas of Particular Concern for other important habitats

of marine plants and animals. The plan also looks at how climate change will affect ocean ecosystems and human activities and requires that adaptation be incorporated into planning (Ocean SAMP 2010).

In terms of human use, the Ocean SAMP recognizes the cultural and historic importance of human activity on the ocean. Under the Ocean SAMP, historic shipwrecks and other important archaeological sites are designated as Areas of Particular Concern and adverse impacts on these sites must be avoided as much as possible. Offshore dive sites have also been identified as Areas of Particular Concern because of their importance to recreation and the state's tourism economy. Considerations for commercial and recreational fisheries are included in the Ocean SAMP (Ocean SAMP 2010).

Within the plan, the CRMC highlights the need to maintain the state's recreational and commercial fisheries and vows to work with fishery management agencies to protect fisheries as well as work with these agencies to protect priority habitat areas. The Ocean SAMP also recognizes the importance of designated navigational use areas, such as shipping routes, sailing, recommended vessel routes, and military testing areas some of which have Areas of Particular Concern designation. Finally, in order to achieve what the SAMP was originally intended to do, the plan designated a renewable energy zone that is located south of Block Island (Figure 2) (Ocean SAMP 2010).

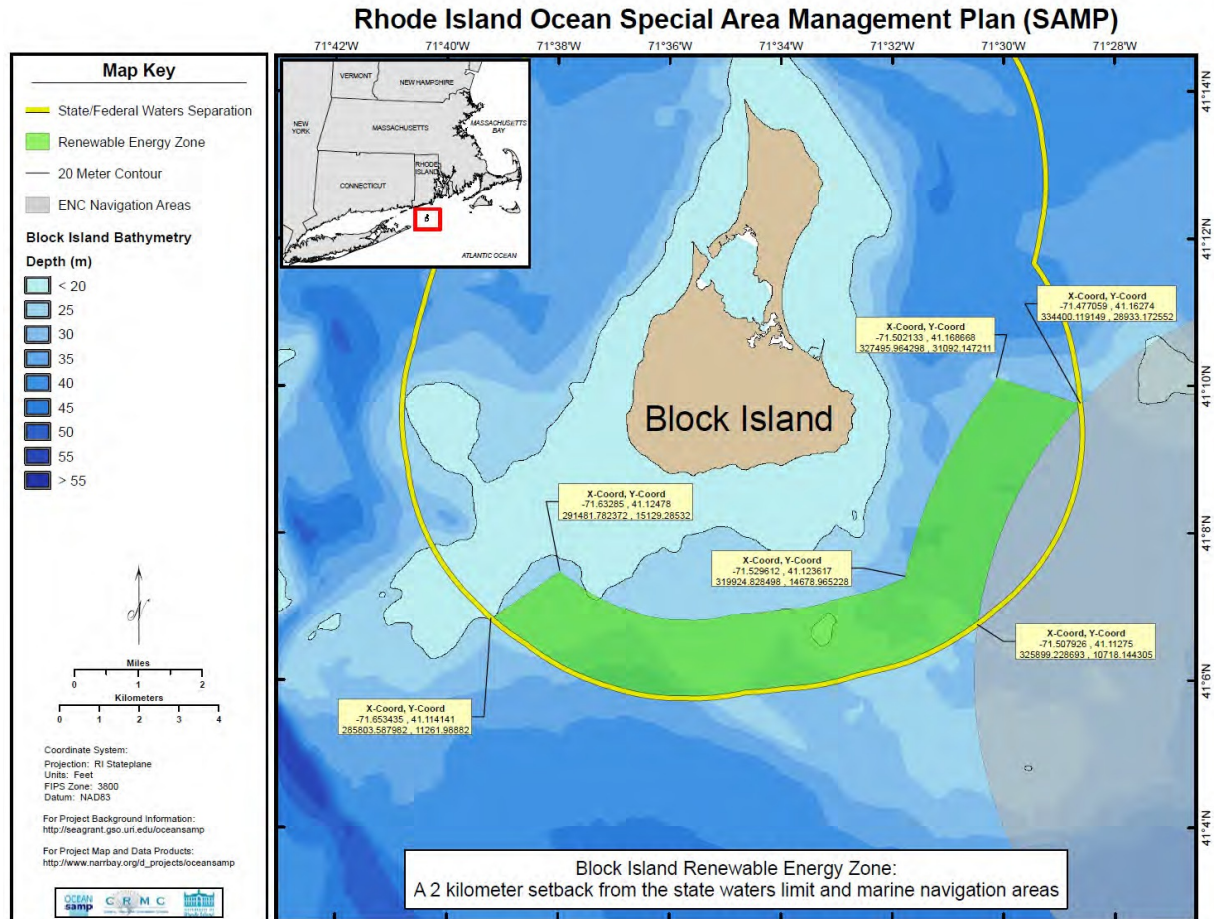


Figure 2. A map depicting the renewable energy zone designated under Rhode Island’s Ocean SAMP (taken from Rhode Island’s Ocean SAMP).

A number of maps were produced for inclusion in the Ocean SAMP. Individually, these maps can give a sense of where considerations of human use of ecologically important areas must be taken into account, essentially showing the spatial needs for conservation and ocean activities. Overlaying these maps over one another serve as an important visualization process—doing so can help to guide ocean management decisions (Figure 3).

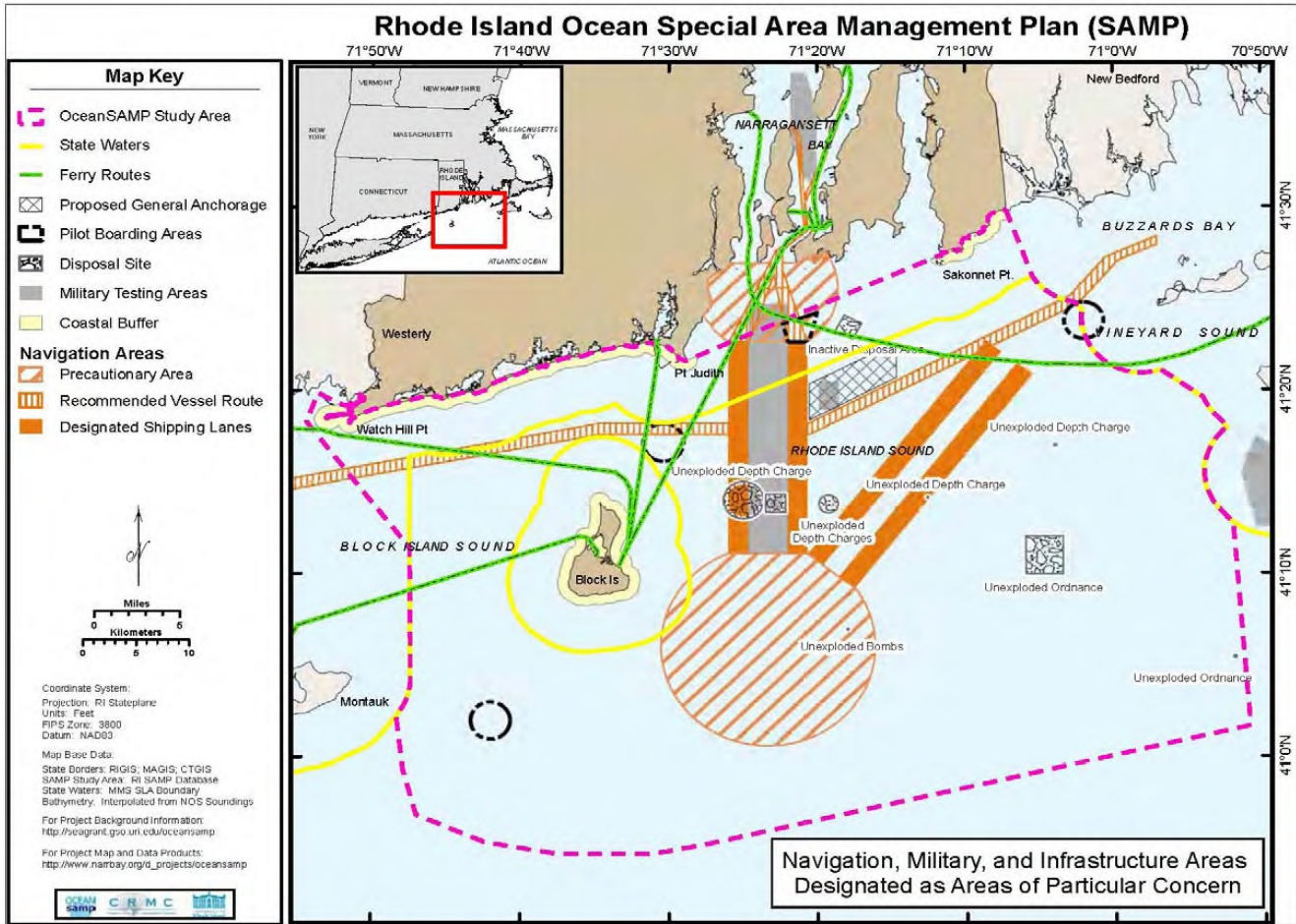


Figure 3. Map depicting an overlay of spatial needs for navigation, military, and infrastructure uses (taken from Rhode Island’s Ocean SAMP).

It is important to note the effort that the CRMC took to make sure stakeholders were included throughout the plan development process. From the beginning, stakeholder groups were a part of “determining the scope and contents of the documents as well as refining the described policies” (Ocean SAMP 2010). Stakeholders meet for a total of 17 times over the entire period it took to create the SAMP. Through these meetings, stakeholders had the opportunity to learn about the work being done on the SAMP and voice their concerns and suggestions for the plan. Each chapter that was developed by the CRMC was released for public review and the review committee made sure to integrate comments into the plan where they could (Payne 2010).

iii) *Washington’s Marine Waters Planning and Management Legislation*

Washington is currently working to establish operational marine spatial planning in their state waters. In 2010, the state enacted a law that focused on marine waters planning and management. It recognizes the importance of the natural resources found in Washington's marine waters and the multiple uses that occur in the ocean which support local communities and the entire state. The law establishes a marine interagency team consisting of a representative from agencies with responsibility for managing marine waters as well as a representative from a federal agency that has responsibility for marine spatial planning. This ensures that MSP in Washington's ocean spaces will be consistent with federal policy (RCW 43.372).

The law authorizes the use of MSP by agencies with marine management responsibilities. The need to work with tribal government, marine resource committees, and stakeholder groups for the purpose of collecting marine spatial information is highlighted. According to the law, this spatial information should be integrated into ongoing marine management plans. The ultimate purpose of the law, though, is mandate to develop a comprehensive marine management plan for implementation and this plan must include MSP. Important allowances for the plan are as follows: the plan may be developed in geographic segments and adoption of the plan can be potentially staggered based on the segments (RCW 43.372).

Under the law, the plan must do a number of things, including (RCW 43.372):

- Recognize and respect current uses and tribal treaty rights
- Promote ecosystem-based management, including linking MSP to near shore and land management plans
- Promote protection and restoration of ecosystems in a way that will maintain ecosystem good and services, even in the long-term
- Address possible impacts of climate change on ocean uses

- Encourage sustainable use of the ocean so as to lessen adverse impacts on ocean ecosystems
- Encourage public participation in decision-making, particularly groups that live on the coast
- Rely on data and resources and work to identify and address data gaps

The law calls for an ecosystem assessment that “analyzes the health and status of Washington marine waters including key social, economic, and ecological characteristics and incorporates the best available scientific information including marine data” (RCW 43.372).

Once this information has been collected, a series of maps must be produced that focus on:

- Ecology of marine environments: environmentally sensitive areas and biological communities that require protective measures
- Human uses: areas that are valuable for fishing, aquaculture, recreation, and marine commerce
- Renewable energy production: appropriate locations with high potential, but have minimal conflict with existing uses or sensitive environments

It is important to note that the plan is currently still in development, but once it is complete the plan will be regulatory and enforceable (UNESCO MSP: Washington). So far, public participation has been a part of the process. While working on the draft, workshops were held to bring government representatives and stakeholder groups together to come up with goals and objectives for the plan (Trosin 2013). Continued engagement of stakeholder groups is expected throughout the duration of plan development (MSP Scoping Document).

## **D) Examining Marine Spatial Planning Criteria in Relation to Cases**

As outlined previously, in order to be truly successful, marine spatial planning needs to meet six important criteria: 1) ecosystem-based, 2) integrated, 3) area-based, 4) adaptive, 5) strategic and anticipatory, and 6) participatory (please refer back to Table 2). These criteria were applied to the six case studies discussed above to theoretically assess how effectively each country or state can manage their ocean spaces using MSP.

### *i) Ecosystem-based*

For an ocean management tool to be ecosystem-based, human activity occurring in the ocean cannot be managed independently from the ocean environment itself (Halpern et al. 2008). Essentially, MSP should work to foster sustainable development, but in a way that also protects important ecological places (Douvere & Ehler 2012). All MSP programs outlined recognize the need to manage ocean uses in a way that lessens their negative impacts on ocean ecosystems and have taken actions that are consistent with this concept. For specific examples, one can look to Belgium and Rhode Island. The Belgian government understands the importance of sand and gravel extraction and therefore set up concession zones for that activity through MSP; at the same time, the country also prohibited extraction in areas during spawning periods (Douvere et al. 2007). For Rhode Island's Ocean SAMP, a comprehensive ecological assessment for their state waters was completed in order to help guide decisions regarding ocean activities, specifically for making sure these activities are managed in such that reduces their negative impacts on the ocean environment (Ocean SAMP 2010).

### *ii) Integrated*

Marine spatial planning should work to integrate all relevant sectors when it comes to the ocean uses because when certain uses are unregulated, it can “undermine the effective

performance of the plan” (Douvere & Ehler 2012). All cases with complete MSP programs work to integrate the various ocean activities into comprehensive management plans. For example, the Netherland’s IMPNS accounted for the uses of different sectors including shipping and military while at the same time delineating ecologically important features—all through specific usage zones. Integration also involves bringing agencies together for the purpose of effectively ocean management and many of the cases work to achieve agency integration. Massachusetts’ Ocean Management Plan was implemented through coordination of jurisdictional entities involved in ocean management (MOMP 2009). The Netherland’s IMPNS also recognized the fact that many government agencies have responsibility for some aspect of ocean management and it is necessary that management is coordinated amongst them (IMPNS 2005).

Many of the cases do fall short of integration when it comes to coordinating across boundaries though. It is important that this be considered because ecosystems do not just stop where country or state boundaries are located—processes that occur in one state or country’s ocean spaces have the potential to affect what goes on in another. Massachusetts and Rhode Island were developing their MSP programs around the same time, but both states made no real effort to consult with one another. Belgium and the Netherlands also created their MSP programs without engaging with adjacent countries. Germany, on the other hand, has worked towards a more integrated MSP approach. As discussed previously, MSP occurs on both the state and federal level. Coastal states have come up with marine spatial plans for their territorial seas, while the federal government has developed MSP in Germany’s EEZ. The federal plans must be consistent with the state plans. Also during development of MSP for the EEZ, Germany consulted with its coastal neighbors, Poland and the Netherlands (Douvere & Ehler 2012).

*iii) Area-based*

Each case study is area-based in nature as they all seek to manage the ocean environment in a manner that takes spatial considerations into account. For example, Germany's MSP program delineates priority, reservation, and suitable areas which set aside specific areas for certain uses. The MSP initiative in Belgium zoned an area for offshore wind energy and also established MPAs for the purpose of protecting marine species and habitats (Douvere et al. 2007). In Massachusetts, three types of management areas—prohibited, renewable energy, and multi-use areas—were created through the state's MSP program (MOMP 2009).

*iv) Adaptive*

Marine spatial planning should be able to adapt, especially in light of changing conditions, in order to achieve better management. MSP is not a tool that can be implemented as a one-time, cure-all solution. New information needs to be incorporated as current conditions are bound to change and new uses are expected to develop and expand. It is also important to monitor and evaluate MSP measures to determine whether or not their intended goals are being achieved. Marine spatial planning in Belgium and Germany are not examples where adaptation is upheld as both countries are working to implement one-time plans that do not explicitly address the need for adaptive strategies in relation to changing circumstances. On the contrary, the Netherlands has already started a “second round” of MSP—the country recognized that changes were occurring and this should be accounted for, mainly by incorporating new information into their plan (Douvere & Ehler 2012).

Massachusetts just recently completed a review of their Ocean Management Plan, which was required under the Massachusetts Ocean Act. The statute recognized that a comprehensive plan could not be static and had to be revised periodically. The review takes a step towards

adaptation as it provides suggestions for enhancing effective management in light of changes as well as recommendation for updates to the original plan (Rev. of MOMP 2014). Rhode Island's Ocean SAMP "may be continually amended through an administrative process" (Ocean SAMP 2010). There is also a requirement for a review of the plan every five years (Ocean SAMP 2010). There is no available evidence that suggest adaptive changes have been made to the plan and a review has not yet occurred since five years has not passed since the plan came into effect in 2010.

v) *Strategic and Anticipatory*

To be strategic and anticipatory, MSP should be future oriented. Since a primary purpose of MSP to help with current and anticipated conflicts between uses, it must focus on the long-term. An important component of considering the future conditions through MSP is the development of alternative spatial scenarios which "help anticipate potential future, opportunities, conflicts, or compatibilities for the area that can guide pro-active decision-making" (Douvere & Ehler 2012). Belgium made it a priority to develop alternative spatial scenarios—a two year research project resulted in the creation of six scenarios which concentrated on different goals and implications for ocean uses in the BPNS. The Dutch government also developed three alternative scenarios that prioritized three different goals: maintaining a healthy, safe, or productive ocean (Douvere & Ehler 2012). Rhode Island's Ocean SAMP can be considered future oriented in terms of climate change because the plan takes into account various scenarios based on climate change predictions (Ocean SAMP 2010). Forecasts for the future do not appear to be included in Massachusetts and Germany's MSP programs based on available information.

*vi) Participatory*

All of the MSP cases discussed have had some form of stakeholder involvement. In Belgium, consultations with various sectors including fisheries, NGOs, transport, and tourism occurred throughout the MSP process. The public was also invited to comment upon the final plan (UNESCO MSP: Belgium). Germany's Federal Maritime and Hydrographic Agency consulted with other agencies involved in ocean management when developing MSP for the country's EEZ and the completed plan was reviewed by the public (UNESCO MSP: Germany). The Netherlands' MSP process was similar in that government agencies and ocean industry sectors were consulted and the public had an opportunity to review the plans (UNESCO MSP: The Netherlands).

Participation of stakeholders in Massachusetts' MSP process was substantial—almost 20 public hearings occurred and extensive stakeholder consultations were a part of the development of the state's Ocean Management Plan (UNESCO MSP: Massachusetts). In the case of Rhode Island, the CRMC made an effort to involve stakeholders in determining contents of the Ocean SAMP and meetings were held so that stakeholders could outline their concerns and suggestions in relation to the state's MSP program as it was being created (Ocean SAMP 2010, Payne 2010). Even Washington, which is currently developing its MSP program, has included stakeholder groups through meetings and workshops (Trosin 2013).

*vii) Quick Conclusion Based on Criteria*

This assessment shows that no cases are completely perfect in meeting criteria for successful marine spatial planning (Table 4). But each state and country discussed should be applauded for their efforts. As opposed to continuing along with business as usual in terms of addressing ocean issues in a piecemeal fashion, they are trying to establish a more

comprehensive means of managing their ocean ecosystems. California can draw upon these cases to develop their own MSP program.

Table 4. Examining each of the six criteria for successful MSP outlined by Ehler and Douvère (2009) in relation to the cases.

Marine Spatial Planning Initiatives	Criteria for Effective Marine Spatial Planning					
	Ecosystem-based	Integrated	Area-based	Adaptive	Strategic and Anticipatory	Participatory
<i>Abroad</i>						
Belgium	Y	Not completely	Y	N	Y	Y
Germany	Y	Y	Y	N	?	Y
The Netherlands	Y	Not completely	Y	Y	Y	Y
<i>United States</i>						
Massachusetts	Y	Not completely	Y	Y	?	Y
Rhode Island	Y	Not completely	Y	?	Y (only in terms of climate change scenarios)	Y
Washington <sup>2</sup>	?	?	?	?	?	Y

**V) Options for Establishing Marine Spatial Planning in California’s Ocean Governance Structure and Measuring How Successful Each Option May Be**

Instead of continuing to rely on ocean management measures that were largely created in a reactive and fragmented manner, California can manage their oceans more comprehensively and effectively through marine spatial planning. The cases above highlight the ways in which

<sup>2</sup> Since Washington has not developed its plan yet, it is unsure whether or not the state would meet many of the requirements.

MSP has developed and its potential to improve ocean management. California can follow in their footsteps so that the state's management regime can better address ocean issues.

There are three options that are available to the state for creating an MSP initiative within California's ocean governance structure. California can attempt to develop a statewide MSP program under current legislation, amend or add new statutes to current ocean legislation structure, or consider a comprehensive revamp of California's ocean legislation.

### **A) Options for Marine Spatial Planning**

#### *i) Option 1: Marine Spatial Planning Initiative in California Under Current Legislative Regime*

Simply put, California's current ocean management regime will not allow for the creation of an effective statewide marine spatial planning program. The fragmented nature of the state's current ocean management structure plays a factor in blocking the state's ability to form a comprehensive MSP program. As discussed previously, a variety of different agencies have authority and responsibility over ocean management in California (Cal. Res. Agency 1997). With no real overarching framework in place to guide the coordination of management decisions, it is very hard to govern the state's marine environment in an efficient manner. Though the Ocean Protection Council was given the responsibility of coordinating ocean management activities, it has no real authority to make agencies work together—this coordination is essentially voluntary (Sivas & Caldwell 2008).

A fundamental component for successful marine spatial planning mentioned earlier is integration and this is especially true when looking to all the agencies that are usually involved in ocean management. Integration is necessary as it ensures for more consistency in management decisions and when there is more consistency issues can be dealt more effectively (Douvere &

Ehler 2012). There is a definitive lack of integration when it comes to California's ocean management agencies and organizations, which is certainly not conducive to consistent management. This ultimately would create a suite of difficulties when trying to develop an effective statewide marine spatial planning initiative that can support straightforward management of the state's ocean spaces.

Most importantly, even though these agencies manage a multitude of ocean uses, they are not required to make decisions based on spatial needs (Sivas & Caldwell 2008). The absence of a mandate that charges agencies with the responsibility of incorporating spatial considerations severely hinders any sort of comprehensive marine spatial planning initiative across ocean use sectors. Without such a requirement to consider spatial information for all aspects of ocean management, it does not seem likely that agencies will begin to work together to do so of their own accord. Therefore it seems impossible that development and implementation of a comprehensive MSP would occur under current conditions.

The one instance of spatial management being employed in current legislation can be found in the MLPA, insofar as the process of developing and managing a network of MPAs is inherently spatial. Is it possible that California can apply this type of spatially-minded framework for the whole of their ocean through amending existing legislation or adding a new piece of legislation that requires marine spatial planning?

ii) *Option 2: Amending Legislation or Adding a New Statute to California's Ocean Management Structure*

Option 2 involves either amending a current piece of legislation or adding a new statute to California's ocean law repertoire—neither of which would involve an intensive reorganizing of

responsibility and authority for ocean management. Instead, it would focus on bringing marine spatial planning onto California's ocean management scene through legislative changes.

In the case of Germany, their Federal Spatial Planning Act was amended to include MSP for the country's EEZ. For Germany, it was probably not as difficult to add a marine component to a law that already made spatial considerations, and the relationship between German state and federal governments is quite different from that in the U.S. This does not seem a likely avenue through which California can begin to develop an MSP program for its state waters because an exact analog would require the participation of the U.S. Congress, which is not inclined to consider marine spatial planning at the moment. It might prove difficult to introduce such a "different" concept as spatial planning into the ocean laws that are already in existence—mainly because it does not appear to easily fit into any of the statutes. Spatial planning was used to some effect MLPA, however, as stated previously, the law mainly focuses on conservation instead of managing ocean activities. But building off the spatially-minded framework outlined in the MLPA appears to be the most appropriate approach for possibly amending legislation in order to mandate the consideration of the spatial needs of human uses for the entirety of California's ocean spaces.

There is potential to introduce a new bill that concentrates on comprehensive MSP for all of California's ocean spaces. A number of the cases outlined above began to develop their MSP programs as a result of a new law calling for spatial management for ocean spaces. There is potential for California to do the same. Sivas and Caldwell (2008) outlined a marine spatial plan for all of California's state waters that at the very least could include establishing the ocean uses that would be managed under the comprehensive plan and designating areas for each of these ocean uses as a number of the MSP cases did (all the while taking into account ecological

considerations as well). This proposed plan also included mechanisms for resolving conflicts between ocean activities as well as establishing monitoring and evaluation procedures that could in turn feed into adaptive management strategies for the MSP initiative.

If California were to pass a law that required marine spatial planning to be incorporated into the state's ocean management structure, it would have to identify agencies to carry out the responsibilities associated with MSP—mainly developing the plan. It is unlikely that a single agency could receive this responsibility as this would result in pushback from the other agencies that have a hand in ocean management. A plan that rests in the hand of one agency would probably not make use of all the expertise that other agencies have gained through the years when managing different ocean sectors (Sivas & Caldwell 2008)

The statute would have to place responsibility for development of a marine spatial plan in the hands of the multiple government agencies and organizations that are involved with ocean management. In order to do so, it might make sense to form an overarching marine spatial planning task force. Going further than the Ocean Protection Council, this task force could include constituents from each government agency and organization that are involved in ocean management as well as a variety of stakeholder groups—possibly by region such as the ones created during the MLPA implementation process. By bringing these constituents and groups together, it is more likely that marine spatial planning process will be more effective in that it will include considerations for multiple ocean uses and sectors.

By law, once the plan is completed, all state agencies and organizations (Department of Fish and Game, State Lands Commission, Department of Parks and Recreation, etc.) should be required to carry out ocean management activities in accordance with the framework outlined by

the plan. Marine spatial planning is not meant to replace management strategies that are already in place, instead it is meant to guide management activities in a more comprehensive consistent manner and Option 2 aligns well with this idea (Ehler & Douver 2009).

*Option 3: Comprehensive Revamp of California's Ocean Legislation*

The possibility of completely revamping California's ocean legislation to allow for statewide marine spatial planning which would include authority and responsibility for all ocean uses, and ideally even be integrated with the coastal management program to address issues that cross the land-sea interface, is a final option. In order to engage in such a broad-scale revamping of ocean legislation, it is imaginable that a large assessment of the current ocean legislative structure would have to occur. Once this is complete, the state can go about making necessary changes to legislation to allow for the development of marine spatial planning. Realistically, this assessment would take a significant amount of time, effort, and resources and, most importantly, political will. It is not clear that these resources would be forthcoming, or—as important as coastal and ocean resources and environments are to California—that this political will exists.

**B) Examining Options Against Select Criteria**

All three options have the potential to introduce marine spatial planning into California's ocean governance structure, but it is important to look at which one would be most practical and achievable for the state. In order to determine what may be the best avenue for California to develop an MSP initiative, each option was measured against certain criteria: resources needed, political feasibility, amount of change to current structure, effectiveness in achieving goals, durability and robustness of approach (Table 5).

*i) Resources Needed*

Holding the actual MSP planning initiative equal across the three options, Option 1 would need the least in terms of resources such as time, effort, and money. This is because it would attempt to use the current ocean management structure to develop marine spatial planning. With little to no change of the structure, this option would be the least “costly” for all resource considerations. The approach outlined in Option 2—amending or adding a new piece of legislation— would require a higher degree of resources. It takes a significant amount of time and effort to either amend legislation or propose and enact a new law. But, Option 3 would require the most resources. It would take a great deal of time, money and effort to completely revamp California’s ocean legislation, especially if the state were to complete the assessment mentioned previously.

*ii) Political Feasibility*

Political feasibility can be defined as the likelihood a policy proposal will be acceptable to decision-makers so that the proposal is actually implemented (Webber 1986). Political feasibility for Option 1 would probably be high since it would require little change and if decision-makers are not required to complete much additional work, they are more likely to accept that approach. Political feasibility for Option 2 could be high (albeit probably lower than Option 1 since it requires additional work). The state has continually added new laws in an attempt to improve its ocean management structure, so it is possible that decision-makers would be open to amending or enacting a piece of legislation to focus on MSP. As discussed earlier, political will for a comprehensive revamp of California’s ocean legislation is unlikely to exist, therefore political feasibility for Option 3 is quite low.

*iii) Amount of Change to Current Structure*

Once again, Option 1 would require very little to no change because MSP would be implemented using the existing structure. For Options 2 and 3, there would be clear changes to California's current ocean governance structure. Option 2 would change ocean legislation in that it would either amend a current piece of legislation or add a new bill to the existing repertoire. Option 3 would go a great deal beyond Option 2 in terms of change to current structure insofar as it advocates for a complete overhaul of California's ocean management structure. Revamping the state legislation to assign authority and responsibility of all ocean uses (possibly even future uses) to ocean management entities would involve great change to the structure.

*iv) Effectiveness Towards Achieving Goals*

To be effective, an option must provide a management framework that is both better coordinated and considers spatial needs of ocean uses. Option 1 falls apart here. As stated previously, under the current management structure there is neither a requirement to make spatial considerations in management decisions nor a requirement for ocean management entities to work together. Without an explicit mandate to do so, it is highly unlikely that Option 1 will work to successfully develop MSP in California's waters. That is why Option 2 and 3 would have greater efficacy for establishing a successful marine spatial planning within the state's ocean governance structure. Explicitly placing responsibility and authority to incorporate marine spatial planning into the ocean management structure and to work in an integrated manner would ensure increased effectiveness when attempting to develop a comprehensive MSP program.

*v) Durability and Robustness of Approach*

If a marine spatial planning program were to be established through Option 1, it would probably not withstand the test of time. A lack of a mandate may cause MSP efforts to diminish—it is likely that an MSP program implemented under Option 1 would fall apart in the

long run with no real requirements put in place. Option 2 would solve this issue because an explicit mandate would *require* coordinated marine spatial planning. Therefore, management strategies would always have to include this component, improving ocean management in the end. Option 3 does best when measured against this criterion. Revamping the ocean legislation to consider all ocean uses and to go even further in an attempt to address land-sea issues would greatly strengthen ocean management now and well into the future.

Table 5. Examination of each option against select criteria to determine which one may be the best avenue for California to develop marine spatial planning in their waters.

	Criteria				
	Resources Needed	Political Feasibility	Amount of Change to Current Structure Required	Effectiveness Towards Achieving Goals	Durability and Robustness of Approach
Options for Development of MSP in California					
<i>Option 1</i>	Low	High	Low	Low	Low
<i>Option 2</i>	Medium	Medium/High	Medium/High	Medium/ High	Medium/High
<i>Option 3</i>	High	Low	High	High	High

## VI) Conclusion

California has gone through great lengths in its attempts to manage coastal and ocean resources and environments, but the structure upon which it relies is fragmented and does not account for the suite of ocean activities in a comprehensive way. This weakens its ocean governance. Establishing a statewide marine spatial planning program could serve as a means to alleviate these issues within California’s ocean management structure.

At the moment, it appears as though the best avenue for the state to achieve better ocean governance is through Option 2. Once again this would involve amending laws or enacting a new piece of legislation to require the development of a statewide MSP framework and mandating management agencies and organizations to make decisions based on the framework—perhaps

based on the model of the U.S. Commission on Ocean Policy (U.S. Comm. On Ocean Policy 2004). It would be very difficult to develop successful MSP under Option 1 because it ultimately would fall short of being effective, durable, and robust. While in theory, Option 3 seems most ideal, but it is an unlikely path for establishing MSP because it would take a large amount of resources when it can be less costly if implemented under Option 2. Under Option 3, an attempt to “reinvent the wheel” of ocean management would be made, which realistically will not happen. Option 2 is more practical. It encourages the use of existing management strategies but under a new integrated and comprehensive framework which employs the concepts of marine spatial planning. Option 2 does not require the excessive amount of resources that Option 3 would , but still has the ability to be effective, durable and robust.

The sooner California can develop law and policy to allow for the implementation of marine spatial planning, the better. If California has the means to improve its ocean management structure starting today, it should take the opportunity to do so.

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Cal. Nat. Res. California Natural Resources Agency

<http://resources.ca.gov/about.html>

Cal. Pub. Res. Code §30000-30900: California's Coastal Act

<http://www.coastal.ca.gov/coactact.pdf>

Cal. Pub. Res. Code §36000-36500: California's Ocean Resources Management Act

<http://resources.ca.gov/ocean/corma.html>

Cal. Pub. Res. Code §35500-35650: California Ocean Protection Act

Cal. State Lands Comm., California State Lands Commission: About the California State Lands Commission

[http://www.slc.ca.gov/About\\_The\\_CSLC/About\\_The\\_CSLC\\_Home\\_Page.html](http://www.slc.ca.gov/About_The_CSLC/About_The_CSLC_Home_Page.html)

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