Place-Based Ocean Management: Emerging U.S. Law and Practice

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ABSTRACT

Marine protected areas and marine reserves are being established in United States ocean waters under several federal and state laws. Relevant laws include the National Marine Sanctuaries Act, the Magnuson-Stevens Fisheries Conservation and Management, the National Monument Act, the federal Submerged Lands Act, and the California Marine Life Protection Act. This article evaluates U.S. place-based ocean management from the perspectives of relevant international law principles and programs and foreign nation experiences relevant to the U.S. It then focuses on the challenges presented in managing multiple uses of U.S. ocean waters in the face of federal and state jurisdictional complexity. Integrating place-based management with fisheries management is given special attention.

KEYWORDS: area-based ocean management; marine protected area; marine reserve; marine sanctuary; marine spatial planning; multiple-use management; ocean zoning; no-take zone

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INTRODUCTION

Placed-based management specifies appropriate human uses for a particular geographic area to reduce user conflicts [1] and protect the area temporarily or permanently from some or all preventable harm [2]. Thus, within a particular area, due to place-based management there are more regulations than outside the area. Place-based management is applied to ocean areas through marine protected areas (MPAs) and marine reserves. A marine protected area is defined in President Clinton's 2000 MPA executive order [3] as "any area of the marine environment that has been reserved by Federal, State, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural resources therein;" the order also refers to "ecological reserves" and areas "where consumptive uses would be prohibited." A marine reserve is a sub-category of marine protected area defined as, "an area of the sea which is completely protected from all extractive activities. Within a reserve, biological resources are generally protected through prohibitions on fishing and the removal or disturbance of living and non-living marine resources, except as necessary for monitoring or research to evaluate reserve effectiveness" [4]. Navigation through marine reserves generally is allowed.

The United States 12 nautical mile (nm) wide territorial sea [5] and adjacent 188 nm exclusive economic zone (EEZ) [6] claimed pursuant to customary international law are the world's largest, totaling over 2.2 million square nautical miles, and rich in living and non-living resources. Under the U.S. 1953 Submerged Lands Act (SLA) (43 U.S.C. §§ 1301-15), the first 3 miles are managed by the adjacent coastal state, and the remaining 197 miles are managed by the federal government [7]. An important function of national ocean legal regimes is designating "particular ocean areas…for particular ocean uses" [8, 9]. Placed-based management is one means by which nations can carry out that function. Yet, historically, less than 1% of U.S. ocean

waters have been subject to either federal or state placed-based management, which is similar to the global percentage [10].

Now, marine protected areas including marine reserves are being established and managed in state and federal ocean waters under several different types of legislative, regulatory, planning, and programmatic frameworks, including the world's largest MPA, the 140,000 square mile Northwest Hawaiian Islands Marine National Monument which is nearly as big as California and has over 7,000 marine species. For example, there are 37 MPAs in Florida state waters including 13 refuges for manatees (67 Fed. Reg. 68,450 (Nov. 8, 2002)), plus 3 National Estuarine Research Reserves and the Florida Keys National Marine Sanctuary which includes state and federal waters. Coordination and expansion of MPAs is supported by Executive Order 13158 [3] quoted above, the 2003 report of the Pew Oceans Commission [11], the 2004 report of the United States Commission on Ocean Policy (USCOP) [12], President Bush's 2004 Action Plan [13] implementing the USCOP report and his accompanying Executive Order 13366 [14], and the Joint Ocean Initiative formed to follow up on both commission reports.

Under current law there are a variety of pathways for designating and managing MPAs in United States waters. For federal waters, relevant laws include the National Marine Sanctuaries Act (NMSA) (16 U.S.C. §§ 1431-45a), the Magnuson-Stevens Fisheries Conservation and Management Act (MSA) (16 U.S.C. §§ 1801-82), and the National Monument Act (NMA) (16 U.S.C. § 431). Within estuaries [15], bays, and the first three miles of ocean waters controlled by the states [16] and some U.S. territories [17] pursuant to the SLA and related legislation, states have enacted specific MPA legislation (RCW 79.68,060, WAC 332-30-151) and utilized existing submerged lands [18-20] and fisheries laws [21-23] to create and enforce MPA rules [24-36].

The relevant federal and state laws involve different governmental decision makers and different decision making time tables for designating MPAs. MPAs management agencies also vary depending on which law is used to designate the MPA. At the federal level they include the sanctuaries program office of the National Oceanic and Atmospheric Administration (NOAA), regional fisheries management councils established by the MSA, and the Interior Department under the NMA. The NMSA [37-41] and the NMA [42, 43] offer the broadest multiple-use management and enforcement capability as compared to MPAs established under the MSA [44, 45] where MPA management and enforcement emphasize fishery closures and protection of habitat from damaging fishing activities (50 C.F.R. 600, Subpart J). Under 2006 amendments to the MSA, decisions to completely close certain areas to fishing must be based on scientific assessments of the resource benefits and impacts on user groups (16 U.S.C. § 1853 (b)(2)(C)). Under all three federal laws, MPAs can be sized large enough to provide support for ecosystem-based management. MPAs at that scale have been established in the Florida Keys [46], the Northwest Hawaiian Islands [47], the Washington State Olympic Coast, and off the central and northern California coasts. Bans on bottom trawling developed by the Pacific [48, 49] and North Pacific [50] Fishery Management Councils are very extensive and include 140,000 square miles (43%) of west coast federal waters and large portions of the west coast national marine sanctuaries, including two-thirds of the Monterey Bay NMS. Sanctuary regulations also restrict bottom trawling in many sanctuary waters and California and Washington laws prohibit trawling in state waters. Subject to NMFS approval, in June 2007 the North Pacific council proposed closing an additional 180,000 square miles of Bering Sea bottom to trawling, and in February 2006 the Pacific Council proposed closing extensive areas including west coast sanctuary waters to krill fishing to support ecosystem-based west coast fisheries management [51].

New federal leases for offshore oil and gas drilling have been banned by Congress and the Commerce Secretary in all sanctuaries upon their designation; President Clinton also banned such activity in the first twelve sanctuaries pursuant to section 12 of the Outer Continental Shelf Lands Act (OCSLA) (43 U.S.C. § 1341) [52]. More recently, Congress, in authorizing renewable energy and other activities to be located on the outer continental shelf (OCS) beyond state waters, prohibited the Interior Department from approving such activities in national marine sanctuaries, monuments, parks, and refuges (43 U.S.C. § 1337(p) (10)).

Other features of the NMSA that make it an attractive vehicle for establishing MPAs in United States waters include its prohibitions on the destruction or injury of sanctuary resources (16 U.S.C. § 1436) which have received strong judicial support when enforcement actions [53-55] have been brought [56, 54, 57-62]; and its provisions for NOAA review of any federal agency action that might impact a sanctuary resource (16 U.S.C. § 1434(d)); for coordination of fisheries management within sanctuaries with the relevant fisheries management councils established under the MSA (16 U.S.C. § 1433(b)(2)); for inclusion of state waters within a sanctuary with the governor's approval (16 U.S.C. § 1434(b)); and for review of sanctuary management plans every five years (16 U.S.C. § 1434 (e)).

Increasingly sanctuary management plans deal with direct and indirect, as well as primary and secondary, effects on sanctuary resources. For example, the management plan for the Monterey Bay sanctuary includes a Water Quality Protection Program. That program includes an Agriculture and Rural Lands Plan to help farmers in the Bay's inland watershed minimize the run-off into the Bay's waters of polluting sediments and nutrients from fields and rural roads. The Florida Keys sanctuary has a similar Water Quality Protection Program [63].

International, as well state, federal, and local cooperative programs are encouraged and advisory councils have become part of the management plan development process. For example,

in 2000, the International Maritime Organization (IMO) approved three no-anchoring areas in the Flower Garden Banks sanctuary in the Gulf of Mexico and a Monterey Bay Vessel Traffic Plan designed to facilitate safe, efficient travel by large vessels through the Monterey Bay, Gulf of the Farallones, and Channel Islands sanctuaries off California. In 2002, the IMO designated 3,000 square nautical miles of the Florida Keys Sanctuary as a "Particularly Sensitive Sea Area" in which navigation and anchoring by vessels longer than 164 feet are restricted [64, 65]. In May 2007, President Bush proposed PSSA status for the Northwest Hawaiian Islands Marine National Monument (NWHIMNM) [66].

Thus, the NMSA is the one existing federal statutory tool for multiple-use management in the United States ocean waters. Currently, less than one percent of those waters are included in the thirteen designated national marine sanctuaries. Including the NWHIMNM, the figure rises to about 4%. Furthermore, Congress has placed a statutory moratorium on the designation by the Secretary of Commerce of additional sanctuaries unless sufficient financial resources are available to "effectively implement sanctuary management plans for each sanctuary in the System" and to "complete site characterization studies and inventory known sanctuary resources . . . within ten years." (16 U.S.C. § 1434(f)). While this moratorium on secretarial designations is in place, additional sanctuaries will have to be designated by Congress, as were 7 of the first 13.

In 2005, Oregon's governor wrote President Bush and the members of the Oregon congressional delegation seeking their support for designation of a national marine sanctuary off Oregon [67]. The governor's proposal is under review by the state's statutorily created Ocean Policy Advisory Council (ORS 196.438-.555) with current projections being that the earliest a sanctuary could be designated is 2011. No other proposals for additional national marine sanctuaries appear to be active at this time.

Besides the 13 national marine sanctuaries and the NWHIMNM, an on-going MPA inventory suggests that there are over 1500 MPAs in U.S. waters involving more than 150 federal, state, territory, local, and tribal management authorities and programs [68]. These MPAs include fishery management zones, national seashores, national parks [69], national monuments, critical habitats, national wildlife refuges, national estuarine research reserves, and state conservation areas and reserves. Federal MPAs number over 250.

The National Marine Fisheries Service portion consists of 86 sites established under four federal statutes, primarily the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (48), and the Marine Mammal Protection Act (24). A smaller number (14) of the sites were established under the MSA in combination with the Endangered Species Act (11) or the Atlantic Tuna Convention Act (3). Each site within the inventory is characterized by approximately 50 attributes encompassing biological, physical, and legal characteristics of each site. Analysis of the data indicates that 67% of the MMAs provide year-round protection for their targeted resource. While each MMA was established for a specific purpose (habitat protection, fish stock protection, protected species conservation), only 16% of the sites have multiple, complimentary management objectives. However, review of spatial data indicates that 90% of the sites were designed and are managed as part of a larger network. Currently, 64% of these MMAs have associated data that permits an evaluation of how well a site is meeting management objectives.

Within NOAA, a Marine Protected Areas Center headquartered in Santa Cruz, California has been created to further develop the U.S. MPA system and to work with agencies and stakeholders to develop regional systems of MPAs that can achieve system-wide goals and objectives. In addition, a thirty-member MPA Federal Advisory Committee has been appointed

to provide recommendations on accomplishing the complex task of creating the national MPA system [70].

Coordinated management of adjacent MPAs in state and federal waters is expressly provided for in the NMSA and the MSA. Ad hoc inter-governmental agreements also have been used to achieve coordinated state and federal management of adjacent waters. Seven of the 13 national marine sanctuaries include state waters within their boundaries. In some locations, such as state and federal waters in the Channel Islands off Central California, MPAs and "no-take" marine reserves have been designated in parallel state and federal processes [71-73]. The 21 MPAs and reserves are located within the boundaries of the Channel Islands National Marine Sanctuary and include a system of 12 reserves designated in the sanctuary's shallower state waters in 2003. Twenty-nine additional reserves in Central California state waters were designated in 2007, pursuant to California's 1999 Marine Life Protection Act (Cal. Fish & Game Code §§ 2850-63) [74-76] and related legislation (Cal. Fish & Game Code § 1591). President Bush's proclamation establishing the 140,000 square mile NWHIMNM [77, 78] was coordinated with the state of Hawaii's previous designation of the islands and their surrounding three nautical miles of state seabed and state ocean waters as the 1200 square mile Northwest Hawaiian Islands State Marine Refuge in which fishing is banned and public access is limited [79, 80]. Extensive state-federal coordination takes place in the Florida Keys and Hawaii Humpback sanctuaries as well.

In March 2000, the U.S. Coral Reef Task Force announced a plan to set aside at least 20 percent of U.S. coral reefs [81] as "no take" reserves by 2010. In addition, the President's December 2004 Ocean Action Plan [13] states that the U.S. will seek to host the International Coral Reef Initiative's (ICRI) Secretariat during 2007-09. The ICRI is an informal mechanism that allows developing country representatives to partner with major donor countries and

development banks, scientific associations, the private sector and NGOs, and international environmental and development agencies regarding the best strategies to preserve the world's coral reef resources. Coal reefs are eligible for protection under the Ramsar Convention on Wetlands (996 U.N.T.S. 245) to which the U.S. is a party. Six of the 13 U.S. national marine sanctuaries already include coral reefs, some of them in no-take zones in the Florida Keys NMS. 4,500 square nautical miles (sq. nm) of coral reefs are included in no-take areas within the Northwest Hawaiian Islands Marine National Monument [82] and similarly large areas are included in the proposed coral reef ecosystem fishery management plan for the Western Pacific Region [83, 84]. For U.S. states and territories containing coral reefs [85], assistance in the development of management strategies may be available under the Coral Reef Conservation Act (Title II, Pub. L. No. 106-562, 2000). Finally, in the administration of Clean Water Act section 404 (13 U.S.C. § 1344) which requires permits for discharges of dredge and fill material in U.S. waters, coral reefs, sanctuaries and refuges are among the types of "special aquatic sites" entitled to a presumption that alternative sites are available for non-water dependent activities proposed in them. At the state level, Florida has established a Coral Reef Conservation Program.

Coral reefs in federal waters adjacent to U.S. coastal states are protected by a regulation which states that "No person shall engage in any operation which directly causes damage or injury to a viable coral community that is located on the OCS without having obtained a permit for said operations" and provides for fines and imprisonment of violators as a misdemeanor offense (43 C.F.R. 9266.4). Also, through federal OCS oil and gas lease stipulations, the coral reefs on Flower Garden Banks in the Gulf of Mexico 100 nm southwest of Galveston, Texas are protected by a No Activity Zone and a four-mile "shunt" zone in which all effluents from drilling processes must be shunted to the sea floor [86-89], as well as the IMO-approved no-anchoring areas mentioned above.

Place-based management of areas surrounding two coral species recently designated as threatened under the federal Endangered Species Act (ESA) [84, 90] will take place once their critical habitat has been designated under that act.

In addition to threatened coral reef species, place-based management under the ESA and the Marine Mammal Protection Act (MMPA) is protecting the three endangered species of large whales found in Atlantic Ocean waters off the New England states, and endangered killer whales found in Pacific Ocean waters off Washington (71 Fed. Reg. 69,504 (Nov. 29, 2006)). The Atlantic Large Whale Take Reduction Plan [91] includes seasonal restrictions on the use of fixed fishing gear in the designated critical habitat of the North Atlantic right whale and changes to vessel routes in the area which are projected to reduce ship strikes of whales by 50 percent.

President Clinton's MPA executive order instructs the federal Environmental Protection Agency to use its existing authority under the Clean Water Act to identify and protect areas that warrant additional pollution protection. Following up on the executive order, in January 2001, EPA proposed the designation of four "Special Ocean Sites" which would have been covered by more stringent Clean Water Act standards than other coastal waters [92]. The four sites included portions of the Gorda Ridge off Oregon and California, the Flower Garden Banks off Texas and northern Right whale habitat off New England. EPA designation would have strengthened the existing place-based management at all four sites mentioned above: under the ESA for the right whale; under the NMSA for the Flower Garden Banks; and through the bottom trawling banks of the Pacific Fishery Management Council covering deep ocean waters off California, Oregon, and Washington. However, the proposal was withdrawn. Even if designated by EPA, the sites would not have qualified as marine reserves unless the strengthened Clean Water Act standards had the practical effect of precluding all resource extractive activities in the area. The conclusion is similar for California's ban on waste water discharges into state ocean waters designated as

Areas of Biological Significance in the Water Quality Control Plan for Ocean Waters of California approved by the federal Environmental Protection Agency under Clean Water Act section 303(a) (33 U.S.C. § 1313((a)) [93].

The focus of the remainder of this article is on federal MPA programs and their coordinated operation. Insights relevant to improved U.S. place-based ocean management derived from the international MPA experience are discussed first.

INTERNATIONAL LAW ASPECTS OF U.S. MPA MANAGEMENT

NMSA sections 305 and 307(k) (16 U.S.C. §§ 1435, 1437(k)) encourage the use of international law as part of the framework for sanctuary management. The U.S. is party to several relevant vessel navigation treaties as well as the World Heritage Convention, and has signed but not yet ratified the Convention on Biological Diversity (CBD) and the United Nations Convention on the Law of the Sea (UNCLOS).

In a May 15, 2007 statement, President Bush again urged the Senate to ratify UNCLOS [66]. Pending Senate action, since 1983, the U.S. successfully claimed an EEZ extending 200 nm seaward consistent with UNCLOS. NMSA section 307(k) (16 U.S.C. § 1437(k)) specifically authorizes the designation of sanctuaries anywhere in the U.S. EEZ as well as the 12 nm wide territorial sea claimed in 1988 consistent with UNCLOS [94].

In 1988 the 17th General Assembly of the International Union for the Conservation of Nature adopted Resolution 17.38 calling for the creation of a globally representative system of MPAs. The 1992 CBD provides that the parties shall "establish a system of protected areas . . . to conserve biological diversity" (Article 8). Under Article 22, paragraph 2 of the CBD, "Contracting Parties shall implement this Convention with respect to the marine environment consistently with the rights and obligations of States under the law of the sea." The 5th World

Parks Congress (Durban, September 11-17, 2003) called on the international community "to establish by 2012 a global system of effectively managed representative networks of marine and coastal protected areas" (Recommendation 22). The 7th Conference of Parties (COP-7) of the Convention on Biological Diversity endorsed this recommendation in February 2004. While the prospects for Senate ratification of the CBD are uncertain, U.S. federal MPA network staff are actively involved in the international MPA network implementation effort [95]. Larger U.S. MPAs such as the NWHIMNM are a very significant contribution to the international MPA network effort.

The UNESCO World Heritage Convention supports the national identification, protection, and preservation of cultural and natural heritage, including marine areas. Ten MPAs have been nominated by their national governments for their natural values, including the Great Barrier Reef Marine Park, Shark Bay off Western Australia, the Belize Reef Reserve, the Galapagos National Park and Marine Reserve, the Cocas and Coiba Islands, and the Malpelo Sanctuary of Colombia. A World Heritage Marine Strategy has been developed to expand UNESCO's marine portfolio and provide synergies with other international instruments. Among U.S. MPAs, there is support for U.S. nomination of the NWHIMNM as a World Heritage Site [96]. However, enforceable rules protecting World Heritage listed sites are found primarily in the domestic law of the listing nation rather than in the World Heritage Convention or other international law sources [97]. Furthermore, meaningful protection under the convention of world heritage quality sites that are not listed is unlikely [98].

Regarding pollution and other impacts on U.S. MPAs from vessel navigation, the legal framework for U.S. place-based ocean management includes several treaties administered by the International Maritime Organization (IMO). The International Convention for the Prevention of Pollution from Ships (MARPOL), provides for "special areas" where strict standards are applied

to discharges from ships [99]. Special areas provisions are contained in MARPOL Annexes I (Regulations for the Prevention of Pollution by Oil), II (Regulations for the Control of Pollution by Noxious Substances in Bulk), and V (Regulations for the Prevention of Pollution by Garbage from Ships). Under these rules, a fifty-mile prohibited discharge zone has been created around the Great Barrier Reef. For example, under Regulation I, para. 10 of Annex I, "Special area means a sea area where for recognized technical reasons in relation to its oceanographical and ecological condition and to the particular character of its traffic, the adoption of special mandatory methods for the prevention of sea pollution by oil is required." In addition, guidelines for the Identification of Particularly Sensitive Sea Areas (PSSAs) have been adopted, and revised several times, most recently in 2005. A PSSA is defined as "an area that needs special protection through action by IMO because of its significance for recognized ecological or socio-economic or scientific reasons and which may be vulnerable to damage by international shipping activities" [64]. So far 10 PSSAs have been designated by the IMO's Marine Environment Protection Committee based on proposals by one or more member nations.

The specific national measures applying to PSSAs such as ships' routing measures, discharge restrictions and operational criteria must fall within the competence of IMO, prevention of pollution from ships. Under paragraph 9.3 of the IMO's PSSA resolution:

> Member Governments should take all appropriate steps to ensure that ships flying their flag comply with the Associated Protective Measures adopted to protect the area identified as a PSSA. Those Member Governments which have received information of an alleged violation of an Associated Protective Measure by a ship flying their flag should provide the Government which as report the offence with the details of any appropriate action taken.

As previously noted, all waters of the Florida Keys NMS have been designated as a PSSA [100, 101], and the IMO has approved three no-anchoring areas in the Flower Garden Banks NMS [94], and a large vessel traffic management plan for the Monterey Bay NMS [102-104]. Within the Florida Keys PSSA, ships greater than 164 feet in length must avoid certain

areas while in transit and when anchoring. In a May 15, 2007 statement, President Bush proposed PSSA status for the NWHI [66]. However, the U.S. and Singapore have protested IMO approval of Australia's extension of its Great Barrier Reef National Park MPA mandatory vessel pilot requirement further north and west into the Torres Strait [105, 106]. With the PSSA's expanded use in place-based ocean management have come concerns about possible inappropriate uses of the concept [107]. President Bush's May 2007 request for PSSA status for the NWHIMNM provides an opportunity to fine tune the IMO's PSSA process as applied to large MPAs located in one nation's EEZ.

FOREIGN MPA EXPERIENCES RELEVANT TO U.S. MPA MANAGEMENT

Globally, estimates are that less than 1% of ocean waters are subject to place-based management [91], and that the global annual rate of increase of MPAs over the last century has been 3 to 5 percent. At those rates, the Convention on Biological Diversity global target of 10% MPA coverage by 2012 would in fact not be met until around 2069. And some experts have recommended 20% global coverage, with 1% to 26% of the open ocean placed in no-take reserves [108].

Thus, for the foreseeable future, national place-based management systems, including MPAs and marine reserves, will need to be integrated with the nation's other laws and programs governing its remaining ocean space [109-116]. Many nations are responding to the challenges of implementing place-based management on an ecosystem basis [117-119] by using MPAs and marine reserves [120] for their own waters, by building MPA networks across national boundaries [121-125]; and by supporting their uses in the high seas beyond [126-134, 99, 135, 136].

A comprehensive review of foreign MPA experiences is beyond the scope of this paper. Instead, insights relevant to further evolution of the U.S. approach are summarized here. They

include Australia's use of "structural adjustment" payments to fishermen adversely affected by new MPAs and marine reserves established in federal and state waters [137-139], including the 2004 expansion of "no take" marine reserves in the Great Barrier Reef Marine Park from 4% to 34% [140]. Due to this expansion, coral trout populations already are recovering [141]. Australia's mixed experience with comprehensive planning for federal and state waters off southeastern Australia [142-144] can be compared with Canada's regional planning effort for its Eastern Scotian Shelf [130, 145, 146]. Both the Australian and Canadian [147] experiences with such large-scale ocean planning suggest the wisdom of building place-based management, not from the top down, but from the bottom up based on emerging spatial, resource, and environmental conflicts among actual and projected users [148].

The 2006 Ocean Health Agreement of the governors of California, Oregon, and Washington establishes a framework for a bottom up approach to regional management of adjacent California Current ecosystem waters [149-151], including expanded MPA and marine reserve networks. The agreement reinforces the three governors' opposition to further offshore oil and gas development in west coast state and federal waters, a position that is supported by state legislative bans covering state waters such as Oregon's Senate Bill 970 (Chapter 521, 2007 Laws).

Like the U.S. in the Channel Islands and Flower Garden Banks, Australia [152, 153] and Canada [154-156] have established MPAs in areas with significant oil and gas resources [157, 158]. Like the U.S. in the Florida Keys and Monterey Bay, Australia has extended protection of the Great Barrier Reef inland [159-162] to control activities such as dams and sugar cane harvesting which reduce freshwater supply and add pollution to MPA waters [163, 164]. Australia's experiences with MPA tourism management [165], MPA enforcement at both the

state [166] and federal [167, 168] levels, and integrating international law into MPA management [169], also are extensive [170-172].

In both national waters and on the high seas, for protection of highly migratory species and their habitat, networks of MPAs and marine reserves with fixed boundaries are necessary [173] but may not be sufficient [174, 175]. In addition, "dynamic" or "mobile" MPAs, which follow the species as they move, may be needed [176]. Examples include mobile whale protection zones [177] established to protect whales from vessels and aircraft approaching too closely [91, 34, 35] and buffer them from underwater noise impacts, including military sonar [178]. Over much larger time and geographic scales, dynamic MPAs may play a role in adjusting place-based ocean management to climate change [179-181].

U.S. MPA MANAGEMENT CHALLENGES

The U.S. National Oceanic and Atmospheric Administration (NOAA) has identified five challenges facing the U.S. MPA system: (1) taking an ecosystem approach, (2) enhancing scientific knowledge, (3) coordinating across complex jurisdictions, (4) managing multiple uses, and (5) selecting new marine protected areas [68]. The balance of this article focuses on the third and fourth challenges. Meeting those two challenges depends on meeting the fifth challenge, selecting new MPAs, which is closely connected to meeting the second challenge of enhancing scientific knowledge. Taking an ecosystem approach, the first challenge, will in turn be supported by meeting the other four.

For example, under the NMSA, multiple uses within national marine sanctuaries are managed pursuant to: rules contained in the legislation (if any) designating the particular sanctuary; regulations issued by the Commerce Secretary governing uses in all sanctuaries and implementing the designation documents and management plans of particular sanctuaries (15 U.S.C. § 1439). For activities not authorized in those sources, special use permits issued

pursuant to NMSA section 310 are required (15 U.S.C. § 1441). However, special use permits are not required for fishing within sanctuaries (15 U.S.C. § 1441(g)), so any constraints on fishing must be contained in the designating legislation (if any) or the secretarial designation documents and regulations. To date, Congress has not restricted fishing in any of the sanctuaries it has designated, so the sanctuary fishing regulations discussed further below have been developed at the secretarial level or are based on other state and federal laws. For activities inside or outside sanctuaries which are carried out or authorized by other federal agencies and which may injure sanctuary resources, consultation with the Commerce Secretary is required (16 U.S.C. § 1431(d)).

The origins of contemporary U.S. area-based ocean management can be traced to the initial multiple-use management challenge that confronted the U.S. national marine sanctuary system, offshore oil and gas development in the Channel Islands [182, 183] and proposed Georges Bank sanctuaries [184]. The management response over time was to prohibit oil and gas leasing and drilling within most sanctuaries through a combination of Congressional, Commerce Secretary, and Presidential decisions, capped off by President Clinton's 1998 decision [52] to indefinitely withdraw all then existing sanctuary federal waters from oil and gas leasing pursuant to OCSLA section 12(a) (43 U.S.C. § 1341(a)). Because the OCSLA currently does not apply to U.S. territories, the tiny Fagatele Bay NMS in American Samoa is not protected by that withdrawal, nor is any new sanctuary added to the program such as the proposed Oregon Coast NMS discussed in the introduction. Also, it is unclear whether succeeding presidents can revoke indefinite withdrawals made by a preceding president under section 12(a) [12, Appendix 6, p. 110]. Activities prohibited within the NWHIMNMS include all oil, gas, and mineral exploration, development, and production (50 C.F.R. 404.6(a)). The breadth of the activities stringently regulated in the NWHIMNM, including commercial and

recreational navigation and fishing, as well as it's size (362,000 square kilometers, just under 140,000 square miles) qualify it as the world's largest marine reserve, MPA, and terrestrial or marine conservation area.

Many of the sanctuary fishing regulations prohibit commercial bottom trawling, a widely-used technique that can be very destructive of seabed habitat [185-187]. And, as discussed further below, under the MSA extensive portions of the five mainland west coast sanctuaries have been designated as essential fish habitat by the Pacific Fishery Management Council, which also has made them off limits to bottom trawling.

The regulations governing fishing activities in marine sanctuaries are written in a permissive manner; that is, all fishing activities (such as fishing, boating, diving, etc.) are allowed unless specifically prohibited or regulated by sanctuary rules, local or federal law:

> All activities (e.g., fishing, boating, diving, research, education) may be conducted unless prohibited or otherwise regulated in Subparts F through R, subject to any emergency regulations promulgated pursuant to " sections 922.44, 922.111(c), 922.165, 922.186, or 922.196, subject to all prohibitions, regulations, restrictions, and conditions validly imposed by any Federal, State, or local authority of competent jurisdiction, including Federal and State fishery management authorities and subject to the provisions of section 312 of the . . . NMSA . . . . The Assistant Administrator may only directly regulate fishing activities pursuant to the procedure set forth in section 304(a)(5) of the NMSA (15 C.F.R. 922.42).

As stated in the quoted regulation, fishing within sanctuaries may only be regulated pursuant to the procedure set forth in section 304(a)(5) of the NMSA (16 U.S.C. § 1434(a)(5)) which provides:

> The Secretary shall provide the appropriate Regional Fishery Management Council with the opportunity to prepare draft regulations for fishing within the Exclusive Economic Zone as the Council may deem necessary to implement the proposed designation. Draft regulations prepared by the Council, or a Council determination that regulations are not necessary pursuant to this paragraph, shall be accepted and issued as proposed regulations by the Secretary unless the Secretary finds that the Council's action fails to fulfill the purposes and policies of this chapter and the goals and objectives of the proposed designation. In preparing the draft regulations, a Regional Fishery Management Council shall use as guidance the national standards of section 301(a) of the Magnuson-Stevens Act to the extent that the standards are consistent and compatible

> with the goals and objectives of the proposed designation. The Secretary shall prepare the fishing regulations, if the Council declines to make a determination with respect to the need for regulations, makes a determination which is rejected by the Secretary, or fails to prepare the draft regulations in a timely manner. Any amendments to the fishing regulations shall be drafted, approved, and issued in the same manner as the original regulations. The Secretary shall also cooperate with other appropriate fishery management authorities with rights or responsibilities within a proposed sanctuary at the earliest practicable state in drafting any sanctuary fishing regulations.

In this role the councils are not limited to sanctuary regulations regarding species covered by existing council fishery management plans.

As mentioned above, presently there is a statutory moratorium on secretarial designations of new sanctuaries (16 U.S.C. § 1434(f)). If and when secretarial designations resume, NMSA section 303(b)(2)(D) (16 U.S.C. § 1433(b)(2)(P)) requires the secretary to consult with affected regional fishery management councils. Although each marine sanctuary has its own unique rules codified at 15 C.F.R. 922, there are a number of regularly recurring provisions shared by multiple sanctuaries. By far the most common fishing provision is an exception to a categorical ban against discharges into sanctuary waters which allows the discharge of fish or fish parts in association with bait, chum, or fishing. Most of the sanctuaries have some version of this rule. There is some variation as to how this exception is worded, but the following passage is typical: "Prohibited or otherwise regulated activities. . . (2) Discharging or depositing any material or other matter except: (i) Fish or fish parts and chumming materials (bait). . ." (15 C.F.R. 922.71).

Most of the sanctuaries also deal with bottom trawling explicitly. Many expressly prohibit bottom trawling, a few expressly allow it. Where bottom trawling is allowed, it is normally expressed as an exception to a categorical ban against altering the seabed, that is, altering the seabed is prohibited except when it results from trawling activity (15 C.F.R. 922.82(a)(3)(iii)).

A number of the sanctuaries prohibit the use or possession of various types of nets or traps, and using or possessing explosive or electrical charges (15 C.F.R. 922.102(a)(1(i)).

Furthermore, leases, permits, licenses, and subsistence use rights existing on a sanctuary's designation date cannot be terminated by the sanctuary's director. Sanctuary regulations do not apply to such previously issued leases, permits, and rights so long as the holder complies with any terms and conditions imposed by the director to achieve the purposes for which the sanctuary was designated (15 C.F.R. 922.47). Valid permits issued by other federal, state, or local agencies will be honored by the sanctuary director so long as the permitee complies with terms and conditions imposed by the director (15 C.F.R. 922.48).

Currently, only two sanctuaries have established marine reserves in which most fishing is prohibited, the Florida Keys NMS for 165 sq. nm (6%) of its state and federal waters and the Channel Islands NMS for 21 sites totaling over 200 sq. nm of state sanctuary waters. These 21 state CINMS MPAs brought the total of California state waters in "no take" marine reserves to 2.58%; in limited take areas to 1.4%; and in recreational-take only zones to .089 %. Nine matching reserves in adjacent federal sanctuary waters, which extend from 3 to 6 nm around each island in the sanctuary, doubled the area of "no take" marine reserves within the CINMS to 210 sq. nm.

The creation of additional MPAs and reserves in California state waters is governed by California's 1999 Marine Life Protection Act (MLPA) (Cal. Fish & Game Code §§ 2851-63). Under that act, in April 2007 the California Fish and Game Commission created 29 MPAs covering 204 sq. nm (18%) of the state's central coast waters from Santa Barbara to Half Moon Bay. 85 sq. nm (46%) of the MPA area constituting 81% of central coast waters area is in 13 "no take" marine reserves; the other 16 sites allow some recreational or commercial fishing. At all sites, harvesting under existing kelp leases is allowed until the leases expire. The commission's goal is to extend the MPA network up and down the California coast by 2011, with the next phase involving the north central coast from Half Moon Bay to Point Arena.

For purposes of initially assessing and coordinating U.S. MPA expansion pursuant to President Clinton's 2000 executive order, NOAA broadly defined "marine managed areas" (MMAs) to include MPAs and marine reserves as well as other U.S. ocean, coastal, and estuarine waters subject to some form of place-based management. With California leading the way, there are now about 275 MMAs in state and federal waters off the U.S. mainland west coast. Including essential fish habitat designated under the MSA as discussed below, about 47% of the U.S. west coast waters is in such MMAs. Thus 53% of west coast waters are not yet subject to any form of place-based management. Furthermore, less than 0.1% of west coast MMAs currently qualify as "no take" reserves, leaving 99.9% of west coast waters subject to some sort of fishing activity.

JURISDICTIONAL COMPLEXITY: MPAS AND FISHERIES MANAGEMENT

Illustrating the jurisdictional complexity involved in efficiently implementing U.S. place-based ocean management, MPAs prohibiting or restricting fishing in large and small ocean areas also are being designated pursuant to the MSA as a response to past overfishing [188]. However, control over non-fishing uses in those MPAs generally is limited to federal agency obligations to consult about actions they fund, carry out, or authorize that may adversely affect the essential fish habitat (EFH) which the regional fishery management councils must identify in every fishery management plan (FMP) they prepare for approval by the National Marine Fisheries Service (NMFS) (16 U.S.C. § 1853(a)(7); 50 C.F.R. part 600, subpart J). One means for protecting EFH is closing particular areas "to all fishing or specific equipment types" (50 C.F.R. 600.815(a)(2)(iv)(B)). Under a 2006 amendment to the MSA, such decisions to completely close areas to fishing must be based on scientific assessments of both the (1) resource benefits, and (2) impacts on user groups (16 U.S.C. § 1853(b)(2)(C)). There appears to be no legislative history explaining this particular amendment, but one commentator [189] has stated that it was endorsed

by recreational fishing groups opposed to marine reserves in connection with their state-level campaigns for the enactment of state "right-to-fish" laws [190-194].

With respect to the MSA closed-area amendment's two requirements, at this time the ocean science for identifying the potential resource benefits of areas closed to fishing seems more mature than the social science for evaluating the socioeconomic impacts, positive and negative, on user groups, commercial, recreational, and non-consumptive [195, 196, 63, 197-203]. With regard to the economics of MPA enforcement, a recent National Research Council report concluded that the enforcement of marine reserves is "relatively efficient" versus other fisheries management techniques once fishermen become familiar with the reserve's boundaries [4]. NOAA analyses of the extensive west coast trawl closures showed that less than 10% of the region's commercial fishing revenue came from the closed areas and projected that affected fishermen would move their operations to open areas. Public and private compensation schemes for fishermen who are adversely affected by new MPAs and marine reserves also have been created [137, 204].

Through the MSA EFH process and prior to the MSA closed-area amendment, bottom trawling was prohibited in extensive east [205] and west coast federal waters, both inside and outside of national marine sanctuaries [206, 50, 48, 207, 208]. Because those "no trawl" zones and many of the relatively few other MPAs included in council FMPs to date [188] are not completely closed to all fishing, they would not seem to be subject to the closed-area amendment's two requirements.

In addition to eliminating overfishing and designating EFH, the MSA requires council FMPs to minimize bycatch of non-target species to the extent practicable (16 U.S.C. §§ 1851(a)(9), 1853(a)(11), (12)). One way to significantly reduce bycatch in sensitive areas is through MPAs and marine reserves in which fishing for the target species is prohibited. A

federal district court recently invalidated an FMP because the council and NMFS irrationally did not consider MPAs and marine reserves as possible techniques for reducing bycatch in the fishery [209].

For all these reasons expanded use of MPAs in FMPs is being considered by several councils. Again, only those in which all fishing is prohibited would be subject to the closed-area amendment's resource benefit and user impact evaluation requirements. However, a rational FMP decision-making process should evaluate all MPAs with respect to those benefits and impacts, and revised EFH regulations could so require. This approach could also be confirmed in the streamlined procedures for council and NMFS compliance with the National Environmental Policy Act's environmental impact statement process (42 U.S.C. § 4332(2)(c)) mandated by the 2006 MSA amendments (16 U.S.C. § 1854(i)).

Thus, as already illustrated regarding MPAs and marine reserves in state and federal waters, the legislative framework for U.S. place-based ocean management is jurisdictionally complex [210, 211]. For fish and their habitat in federal waters, the relationship between the NMSA and MSA is particularly complicated, as exemplified by administration of those two statutes in U.S. Pacific Ocean waters. Under the NMSA, Congress designated the Hawaiian Humpback Whale Sanctuary (Pub. L. No. 102-581) and started the process for designating federal waters surrounding the northwestern Hawaiian Islands as a sanctuary (Pub. L. No. 106-513). President Clinton followed up on the congressional action with two executive orders establishing the Northwest Hawaiian Islands Coral Reef Ecosystem Reserve and mandating that a precautionary approach be used in managing the Reserve [212, 213]. The Reserve was then declared an "Active Candidate" for sanctuary designation (66 Fed. Reg. 5509 (Jan. 17, 2001)). The Reserve included "Reserve Preservation Areas" around various atolls, islands, and banks

where most extractive uses were prohibited but certain fisheries were allowed to continue at their preexisting levels.

In the meantime, the Western Pacific Fishery Management Council issued a Coral Reef Ecosystem Fishery Management Plan and revised regulations under its existing FMP for Precious Corals (67 Fed. Reg. 11,941 (Mar. 18, 2002)). However, provisions of the plan and regulations that conflicted with the Reserve executive orders and the Reserve Operations Plan developed to guide Reserve management pending its designation as a sanctuary were disapproved by the National Marine Fisheries Service because they provided less protection to sanctuary living resources. Then President Bush utilized his authority under the NMA to declare national monuments to impose strong "no take" rules on most of the area, with a five-year phase-out of the five preexisting federal permits to fish for groundfish in the area. To end fishing sooner in the NWHIMNM, NGOs have offered to buy the five permits and then retire them, similar to the process that was used to reduce trawling in the Monterey Bay sanctuary.

For federal waters in the four national marine sanctuaries off California, NOAA personnel are discussing whether Pacific Fishery Management Council (PFMC) FMPs should be supplemented with more sanctuary rules controlling fishing and the habitat impacts of fishing [214-216] beyond the matching marine reserves recently established in Channel Island sanctuary state and in federal waters. More generally, the PFMC is developing an Ecosystem Fishery Management Plan as an overlay on existing FMPs. It would incorporate ecosystem-based principles and establish marine reserves in additional west coast sanctuary waters [215].

CONCLUSION

Integrated operation of the NMSA and MSA as currently structured should be based on the following factors:

(1)(a) The MSA's eight fisheries management regions cover almost the entire U.S. EEZ and territorial sea and FMPs can be extended to state ocean waters in the territorial sea through the MSA section 306(b) (16 U.S.C. § 1856(b)) state preemption process and cooperation with relevant state and interstate fisheries commissions [7]; (b) state waters can be included in a sanctuary with the state governor's consent, but current sanctuaries cover less than 1% of the U.S. EEZ and territorial sea (4% if the NWHIMNM is included) and expansion of the program will require priority attention from Congress, starting with reauthorization of the MSA in the next Congress. Meanwhile, further presidential use of the NMA is a very adequate alternative [43].

(2)(a) The MSA's regional council structure is adaptable to ecosystem-based fisheries management with non-target species and habitat protected principally from the adverse impacts of fishing; (b) all activities including fishing can be managed within sanctuary boundaries, and if the sanctuary is large enough, ecosystem-based approaches would seem to be possible.

The United States Commission on Ocean Policy has stated:

> Ecosystem-based management can provide many benefits over the current structure. The coordination of efforts within a specific geographic area allows agencies to reduce duplication and maximize limited resources. It also provides an opportunity for addressing conflicts among management entities with different mandates. Less obvious, but equally important, ecosystem-based management may engender a greater sense of stewardship among government agencies, private interests, and the public by promoting identification and connection with a specific area [12, p. 64].

Of course implementing ecosystem-based approaches under the MSA, NMSA, or NMA depends very much on relevant scientific capabilities [217, 150, 218-220, 119, 221, 222, 216, 223]. The good news is that the application of U.S. place-based management including MPAs and marine reserves to scientifically significant ecosystem features within U.S. ocean waters has already begun [224] as illustrated throughout this article.

Remaining to be developed at the federal level are principles for resolving ocean use conflicts that remain after the application of any place-based management scheme. A state-level example is an Oregon regulation, Ocean Resources Goal 19 (OAR 660-015-0010(4)), giving higher priority to the protection of renewable marine resources such as fish over non-renewable resources such as offshore oil and gas deposits. As an enforceable policy of Oregon's federally approved coastal zone management program, Goal 19 is applicable to federal agency decisions affecting resources in the state's ocean waters through the federal Coastal Zone Management Act's federal consistency process (16 U.S.C. § 1456(c)). Goal 19 does not as clearly address renewable energy uses such as offshore wind and wave generated electricity. It does require that a precautionary approach be used with regard to the scientific uncertainties involved in determining whether there is a significant use conflict to be resolved. Resolution, including compensation to adversely affected user groups in appropriate circumstances, can then occur either through a new or amended place-based management scheme, or through application of federal and state sector-based ocean resources management laws. Thus, because of the limited geographic coverage of existing U.S. place-based management schemes and because MPA-based programs have to compete with the various ocean use sectors for additional areas to manage [225], federal and state sector-based laws will play a very important role for the indefinite future. As has been amply demonstrated, those laws are adaptable to place-based management pending enactment of the major legislative changes recommended by the USCOP and Pew Oceans Commission for rationalizing U.S. ocean management.

REFERENCES

[1] Briefing paper: regional ocean governance: bridging theory and practice. Paper prepared to

brief participants in the workshop, Regional Ocean Governance: Effective Strategies for Bridging Theory and Practice, held March 18-20, 2007, in Monterey, California, convened by the Joint Ocean Commission Initiative and the Monterey Bay Aquarium's Center for the Future of the Oceans. Available for downloading at http://www.regionaloceans.org/.

[2] Norse EA, Crowder LB, Gjerde K, Hyrenbach D, Roberts CM, Safina C, Soulé ME. Place-based ecosystem management in the open ocean. In: Norse EA, Crowder LB, editors. Marine conservation biology: the science of maintaining the sea's biodiversity. Washington, DC: Island Press; 2005. p. 302-327.

[3] Executive Order No. 13,158, 65 Fed. Reg. 34,909 (May 31, 2000).

[4] National Research Council. Committee on the Evaluation, Design, and Monitoring of Marine Reserves and Protected Areas in the United States. Marine protected areas: tools for sustaining ocean ecosystems. Washington, DC: National Academy Press; 2001.

[5] Presidential Proclamation 5928, Dec. 27, 1988, 43 U.S.C.A. § 1331 note.

[6] Presidential Proclamation 5030, Mar. 10, 1983, 16 U.S.C.A. § 1453 note.

[7] Hildreth RG. Regional ocean resources management. In: Magoon OT, Converse H, Tippie V, Tobin LT, Clark D, editors. Coastal zone '91: proceedings of the Seventh Symposium on Coastal and Ocean Management. New York: American Society of Civil Engineers; 1991. vol. 3, p. 2583-2606.

[8] Hildreth RG. Managing ocean resources: Canada. International Journal of Estuarine and Coastal Law 1991;6:199-228.

[9] Hildreth RG. Managing ocean resources: New Zealand and Australia. International Journal of Estuarine and Coastal Law 1991;6:89-126.

[10] Hildreth RG, Ivanovici A. Conservation of marine and estuarine areas in a federal system. In: Magoon OT, Converse H, Miner D, Clark D, and Tobin LT, editors. Coastal zone '85: proceedings of the Fourth Symposium on Coastal and Ocean Management. New York: American Society of Civil Engineers; 1985. vol. 2, p. 2014-2025.

[11] Pew Oceans Commission. America's living oceans: charting a course for sea change: a report to the nation: recommendations for a new ocean policy. Arlington, VA; 2003.

[12] U.S. Commission on Ocean Policy. An ocean blueprint for the 21st century: final report. Washington, DC; 2004.

[13] U.S. ocean action plan: the Bush administration's response to the U.S. Commission on Ocean Policy. 2004. Available for downloading at Committee on Ocean Policy, Council of Environmental Quality, http://ocean.ceq.gov/.

[14] Executive Order No. 13,366, 69 Fed. Reg. 76,591 (Dec. 21, 2004).

[15] Johnson DR, Funicelli NA, Bohnsack JA. Effectiveness of an existing estuarine no-take fish sanctuary within the Kennedy Space Center, Florida. North American Journal of Fisheries Management 1999;19:436-453.

[16] Didier AJ, compiler. Marine protected areas of Washington, Oregon, and California. Gladstone, OR: Pacific States Marine Fisheries Commission; 1998. http://www.psmfc.org/files/PSMFC-other-publications/marine_prot_areas.pdf.

[17] Aguilar-Perera A, Schärer M, Valdés-Pizzini M. Marine protected areas in Puerto Rico: historical and current perspectives. Ocean & Coastal Management 2006;49:961-975.

[18] Beck MW, Fletcher KM, Hale LZ, editors. Towards conservation of submerged lands: the law and policy of conservation leasing and ownership. Narragansett, RI: Rhode Island Sea Grant; 2005.

[19] Nature Conservancy. Marine Initiative. Expanding the tools for marine conservation: leasing and ownership of submerged lands. Santa Cruz: Center for Ocean Health, University of California, Santa Cruz; 2004. http://nature.org/initiatives/marine/files/nearshore_marine_fact.pdf.

[20] Nature Conservancy. Global Marine Initiative. Towards conservation of submerged lands: the law and policy of conservation leasing and ownership. Factsheet. Narragansett, RI: Rhode Island Sea Grant; 2005? http://nature.org/initiatives/marine/files/tncrwu_leasing_policy_factsheet.pdf.

[21] McClure R. State acts to protect marine life in several areas of Puget Sound. Seattle Post-Intelligencer, Sept. 26, 2003, B2.

[22] Murray M. The status of marine protected areas in Puget Sound. Puget Sound/Georgia Basin Environmental Report Series, no. 8. 2 vols. Olympia, WA: Puget Sound Action Team; 1998.

[23] Palsson WA. Marine refuges offer haven for Puget Sound fish. Fish & Wildlife Science: An Online Science Magazine, Apr. 2001. http://www.wdfw.wa.gov/science/articles/marine_sanctuary/index.html.

[24] Barber v. Hawai`i, 42 F.3d 1185 (9th Cir. 1994).

[25] California Gillnetters Association v. Department of Fish & Game, 39 Ca. App. 4th 1145 (1995).

[26] Coastal Petroleum Co. v. Department of Environmental Protection, 672 So.2d 574 (Fla. App. 1996).

[27] Coastal Petroleum v. Chiles, 701 So.2d 619 (Fla. App. 1997).

[28] Fanning v. Oregon Division of State Lands, 151 Or. App. 609, 950 P.2d 353 (Or. App. 1997).

[29] James v. Alaska, 950 P.2d 1130 (Alaska 1997).

[30] Kaneohe Bay Cruises, Inc. v. Hirata, 75 Haw. 250, 861 P.2d 1 (1993).

[31] Limon v. California Department of Fish & Game, 2d Civ. No. B171271, 2004 WL 2092223 (Cal. Ct. App. Sept. 20, 2004).

[32] Murphy v. Department of Natural Resources, 837 F. Supp. 1217 (S.D. Fla. 1993).

[33] Stop the Outfall Pipe, Inc. v. Massachusetts Water Resources Authority, 419 Mass. 1, 642 N.E.2d 568 (1994).

[34] UFO Chuting of Hawaii, Inc. v. Young, 327 F. Supp. 2d 1220 (D. Haw. 2004), vacated, 380 F. Supp. 2d 1160 (D. Haw. 2005), appeal pending, 2005 WL 4155371 (9th Cir. Nov. 22, 2005).

[35] UFO Chuting of Hawaii, Inc. v. Young, 380 F. Supp. 2d 1166 (D. Haw. 2005).

[36] Weden v. San Juan County, 135 Wash. 2d 678, 958 P. 2d 273 (1998).

[37] Blumm MC, Blumstein JG. The Marine Sanctuaries Program: a framework for critical areas management in the sea. Environmental Law Reporter News & Analysis 1978;8:50,016-50,034.

[38] Chandler WJ, Gillelan H. The history and evolution of the National Marine Sanctuaries Act. Environmental Law Reporter News & Analysis 2004;34:10,505-10,565.

[39] Chandler WJ, Gillelan H. The makings of the National Marine Sanctuaries Act: a legislative history and analysis. Washington DC: Marine Conservation Biology Institute; 2005. http://www.mcbi.org/publications/pub_pdfs/The%20Makings%20of%20National%20Marine%20Sanctuaries%20Booklet.pdf.

[40] Epting J. National Marine Sanctuary Program: balancing resource protection with multiple use. Houston Law Review 1981;18:1037-1059.

[41] Murley J, Redburn FS. Ready to perform?: planning and management at the National Marine Sanctuary Program. Washington, DC: National Academy of Public Administration; 2006. http://sanctuaries.noaa.gov/news/pdfs/napareport.pdf.

[42] Brax J. Zoning the oceans: using the National Marine Sanctuaries Act and the Antiquities Act to establish marine protection areas and marine reserves in America. Ecology Law Quarterly 2002;29:71-129.

[43] Craig RK. Are marine national monuments better than national marine sanctuaries?: U.S. ocean policy, marine protected areas, and the Northwest Hawaiian Islands. Sustainable Development Law & Policy 2006;7(1):27-31, 81.

[44] Dana DA. Overcoming the political tragedy of the commons: lessons learned from the reauthorization of the Magnuson Act. Ecology Law Quarterly 1997;24:833-846.

[45] Hsu S-L, Wilen JE. Ecosystem management and the 1996 Sustainable Fisheries Act. Ecology Law Quarterly 1997;24:799-811.

[46] Marine zoning in Florida Keys National Marine Sanctuary: balancing resource protection and uses. Coastlines: Information about Estuaries and Near Coastal Waters, 2003;13(1):4-5.

[47] Craig RK. Taking steps toward marine wilderness protection?: fishing and coral reef marine reserves in Florida and Hawaii. McGeorge Law Review 2003;34:155-266.

[48] National Marine Fisheries Service. Magnuson-Stevens Act provisions; fisheries off West Coast states; Pacific Coast groundfish fishery. [Final rule.] 71 Fed. Reg. 27,408 (May 11, 2006).

[49] Woodard C. Saving fish and a fishing industry: 3.8 million acres off California coast protected from trawling. Nature Conservancy, Autumn 2006, 14. Also available online (in html format) at http://www.nature.org/magazine/autumn2006/misc/art18615.html.

[50] National Marine Fisheries Service. Fisheries of the exclusive economic zone off Alaska; groundfish, crab, salmon, and scallop fisheries of the Bering Sea and Aleutian Islands management area and Gulf of Alaska. [Final rule.] 71 Fed. Reg. 36,694 (June 28, 2006).

[51] Pacific Fishery Management Council. Measures to prohibit fishing for krill in the economic exclusive zone off the West Coast: amendment 12 to the coastal pelagic species fishery management plan: environmental assessment, regulatory impact review & regulatory flexibility analysis. Portland, OR; 2006. http://www.pcouncil.org/cps/cpsfmp/a12/Amendment_12_EA.pdf.

[52] Clinton WJ. Memorandum on withdrawal of certain areas of the United States outer continental shelf from leasing disposition, June 12, 1998. Weekly Compilation of Presidential Documents 1998;34:1111.

[53] Davis BC, Moretti GS. Enforcing U.S. marine protected areas: synthesis report. Silver Spring, MD: National Oceanic and Atmospheric Administration, National Marine Protected Areas Center; 2005. http://www.mpa.gov/pdf/publications/enforcement.pdf.

[54] Gardner SE. Damages recoverable under Park System Resources Protection Act. Water Log 2002;22(1):1, 6-7, 9.

[55] National Sea Grant Law Center, compiler. Summary of MPA enforcement actions available on Lexis 1985-present. No date. On file with author.

[56] Craft v. National Park Service, 34 F.3d 918 (9th Cir. 1994).

[57] Tug Allie-B, Inc. v. United States, 273 F.3d 936 (11th Cir. 2001).

[58] United States v. Fisher, 22 F.3d 262 (11th Cir. 1994).

[59] United States v. Fisher, 977 F. Supp. 1193 (S.D. Fla. 1997).

[60] United States v. Great Lakes Dredge & Dock Co., 259 F.3d 1300 (11th Cir. 2001).

[61] United States v. M/V Jacquelyn L., 100 F.3d 1520 (11th Cir. 1996).

[62] United States v. M/V Miss Beholden, 856 F. Supp. 668 (S.D. Fla. 1994).

[63] Keller BD, Causey BD. Linkages between the Florida Keys National Marine Sanctuary and the South Florida Ecosystem Restoration Initiative. Ocean & Coastal Management 2005;48:869-900.

[64] International Maritime Organization. Particularly sensitive sea areas. http://www.imo.org/Environment/mainframe.asp?topic_id=1357. Last accessed on Nov. 1, 2007.

[65] Revised guidelines for the identification and designation of particularly sensitive sea areas. In: Chircop A, Coffen-Smout S, McConnell M, editors. Ocean yearbook 21. Leiden: Martinus Nijhoff Publishers; 2007. p. 785-799.

[66] Bush GW. Statement on the advancement of United States maritime interests, May 15, 2007. Weekly Compilation of Presidential Documents 2007;43:635.

[67] Kulongoski TR, Governor, State of Oregon. Letter to Senator Ron Wyden. Dec. 13, 2005. On file with author.

[68] National Oceanic and Atmospheric Administration and United States Department of the Interior. Marine protected areas of the United States. http://www.mpa.gov/. Last accessed on Nov. 1, 2007.

[69] National Park Service. Dry Tortugas National Park – special regulations. [Proposed rule.] 71 Fed. Reg. 17,777 (Apr. 7, 2006).

[70] Christie DR, Hildreth RG. Coastal and ocean management law in a nutshell. 3rd ed. Nutshell Series. St. Paul, MN: Thomson/West; 2007.

[71] Airamé S, Dugan JE, Lafferty KD, Leslie H, McArdle DA, Warner RR. Applying ecological criteria to marine reserve design: a case study from the California Channel Islands. Ecological Applications 2003;13(1), Suppl.:S170-S184.

[72] National Marine Sanctuary Program. Channel Islands National Marine Sanctuary: draft environmental impact statement for the consideration of marine reserves and marine conservation areas. Silver Spring, MD; 2006. http://channelislands.noaa.gov/marineres/PDF/DEIS.pdf.

[73] National Ocean Service. Marine reserves, CINMS, Channel Islands National Marine Sanctuary. http://channelislands.noaa.gov/marineres/main.html. Last accessed on Nov. 1, 2007.

[74] Airamé S. The role of science in California's Marine Life Protection Act. DVD. Presentation at Oregon State University, December 8, 2006. PISCO, Partnership for Interdisciplinary Studies of Coastal Oceans, 2006.

[75] Mize J. Lessons in state implementation of marine reserves: California's Marine Life Protection Act Initiative. Environmental Law Reporter News & Analysis 2006;36:10,376-10,391.

[76] Update on implementation of California's Marine Life Protection Act. MPA News 2007;8(8):6.

[77] President. Proclamation 8031 of June 15, 2006, Establishment of the Northwestern Hawaiian Islands Marine National Monument. 71 Fed. Reg. 36,443 (June 26, 2006).

[78] United States Department of Commerce. President sets aside largest marine conservation area on earth: Northwestern Hawaiian Islands Marine National Monument encompasses nearly 140,000 square miles. Press release. June 15, 2006. http://www.commerce.gov/opa/press/Secretary_Gutierrez/2006_Releases/June/15_Hawaii_Marine_National_Monument_rls.htm.

[79] Memorandum of agreement among the State of Hawai`i Department of Land and Natural Resources, and the U.S. Department of the Interior, U.S. Fish and Wildlife Service, and the U.S. Department of Commerce, National Oceanic and Atmospheric Administration for promoting coordinated management of the Northwestern Hawaiian Islands Marine National Monument. Dec. 8, 2006. State of Hawai`i Office of the Governor. http://www.hawaii.gov/gov/news/enewsletter/2006/Folder.2006-12-03.5311/Signed%20Agreement%2012.8.06.pdf.

[80] Reichert J. Anatomy of an advocacy campaign. MPA News 2006;8(2):4-5.

[81] Wusinich-Mendez D, Trappe C, editors. Report on the status of marine protected areas in coral reef ecosystems of the United States. Vol. 1, Marine protected areas managed by U.S. states, territories, and commonwealths. NOAA Technical Memorandum CRCP 2. Silver Spring, MD: NOAA Coral Reef Conservation Program; 2007. http://www.coralreef.noaa.gov/Library/Publications/cr_mpa_report_vol_1.pdf.

[82] Maragos J, Gulko D, editors. Coral reef ecosystems of the Northwestern Hawaiian Islands: interim results emphasizing the 2000 surveys. Honolulu, Hawai`i: U.S. Fish and Wildlife Service and Hawai`i Department of Land and Natural Resources; 2002.

[83] National Marine Fisheries Service. Fisheries of West Coast states and in the Western Pacific; coral reef ecosystems fishery management plan for the Western Pacific. [Proposed rule.] 67 Fed. Reg. 59,813 (Sept. 24, 2002).

[84] National Marine Fisheries Service. Environmental impact statement (EIS) for the proposed coral reef ecosystem fishery management plan of the Western Pacific Region. [Notice of intent to prepare an EIS.] 64 Fed. Reg. 32,210 (June 16, 1999).

[85] Birkeland C, Friedlander AM. The importance of refuges to reef fish replenishment in Hawai`i. 2nd ed. Honolulu, Hawai`i: Hawai`i Audubon Society and Pacific Fisheries Coalition; 2002.

[86] Adaptive management: Furthering the MMS mission. MMS Ocean Science 2007;4(2):4-7.

[87] Multipurpose marine cadastre: Charting a physical, social, and political map of the OCS. MMS Ocean Science 2006;3(2):11

[88] Precht WF, Aronson RB, Deslarzes KJP, Robbart ML, Murdoch TJT, Gelber A, Evans DJ, Gearheart B, Zimmer B. Long-term monitoring at the East and West Flower Garden Banks National Marine Sanctuary, 2002-2003: final report. OCS Study. New Orleans, LA: U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region; 2006. http://www.nova.edu/ocean/cpce/mms%5F2006%5F035.pdf.

[89] Stable and thriving communities: monitoring the Flower Garden Banks. MMS Ocean Science 2006;3(6):8.

[90] National Marine Fisheries Service. Endangered and threatened species: final listing determinations for elkhorn coral and staghorn coral. 71 Fed. Reg. 26,852 (May 9, 2006).

[91] Kalo JJ, Hildreth RG, Rieser A, Christie DR. Coastal and ocean law: cases and materials. 3rd ed. American Casebook Series. St. Paul, MN: Thomson/West; 2007.

[92] Craig RK, Miller S. Ocean discharge criteria and marine protected areas: ocean water quality protection under the Clean Water Act. Boston College Environmental Affairs Law Review 2001;29:1-44.

[93] Lormon JJ. California's ban on waste discharges into areas of biological significance. Natural Resources & Environment (ABA Section of Environment, Energy, and Resources) 2005;20(2):28-34.

[94] Johnson LS. Coastal state regulation of international shipping. Dobbs Ferry, NY: Oceana Publications; 2004.

[95] Hillary A, Ehler CN, Laffoley D, Day JC, Smith SE, Llewellyn G, Cid GA, Parks JE. Establishing networks of marine protected areas—a strategic framework for action and capacity building. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 216-217 (paper 016). http://www.impacongress.org/proceedings.htm.

[96] Hawaii Legislature. House. House concurrent resolution encouraging and supporting the nomination and designation of the Northwestern Hawaiian Islands Marine National Monument, Papahanaumokuakea, as a World Heritage Site. H.C.R. 265. 24th Leg., 2007 Reg. Sess. http://www.capitol.hawaii.gov/sessioncurrent/bills/HCR265_.htm.

[97] Thorson EJ. The world heritage convention and climate change: the case for climate-change mitigation strategy beyond the Kyoto protocol. In: Osofsky H, Burns W, editors. Adjudicating climate control: sub-national, national, and supra-national approaches. Cambridge: Cambridge University Press; forthcoming.

[98] Magraw DB. International law and park protection: a global responsibility. In: Simon DJ, editor. Our common lands: defending the national parks. Washington, DC: Island Press; 1988. p. 143-173.

[99] Scovazzi T. Marine protected areas on the high seas: some legal and policy considerations. International Journal of Marine and Coastal Law 2004;19:1-17.

[100] National Oceanic and Atmospheric Administration. Florida Keys coral reefs first in U.S. to receive international protection; one of only five sensitive sea areas in the world. News release. Nov. 13, 2002. http://www.publicaffairs.noaa.gov/releases2002/nov02/noaa02152.html.

[101] U.S. reefs receive international protection. Sanctuary Watch 2003;3(6):6. http://sanctuaries.noaa.gov/news/pdfs/sanctuarywatch/Sanctuarywatchvol3vo6.pdf.

[102] Monterey Bay National Marine Sanctuary vessel traffic management executive summary. Monterey Bay National Marine Sanctuary; 2001. http://montereybay.noaa.gov/vt/vtexec.html.

[103] Unprecedented partnership protects California sanctuaries from catastrophic oil spills. Press release. May 31, 2000. Monterey Bay National Marine Sanctuary. http://montereybay.noaa.gov/intro/press_releases/000531.html.

[104] Vessel traffic lessens in Monterey Bay Marine Sanctuary. Sanctuary Watch 2000;1(5):1. http://sanctuaries.noaa.gov/news/pdfs/sanctuarywatch/sanctuarywatchvol1no5.pdf.

[105] Beckman R. Australia's pilotage system in the Torres Strait: a threat to transit passage? Maritime Studies 2007;no. 153 (Mar.-Apr.):1-2.

[106] Sea Power Centre – Australia. Compulsory pilotage in the Torres Strait. Maritime Studies 2007;no. 153 (Mar.-Apr.):23-26.

[107] Johnson DE, Butt N, Walmsley S. Protecting MPAs from threats posed by international shipping. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 297-298 (paper 051). http://www.impacongress.org/proceedings.htm.

[108] Alpine JE, Hobday AJ. Area requirements and pelagic protected areas: is size an impediment to implementation? Marine and Freshwater Research 2007;58:558-569.

[109] Campbell ML, Hewitt CL. A hierarchical framework to aid biodiversity assessment for coastal zone management and marine protected area selection. Ocean & Coastal Management 2006;49:133-146.

[110] Cho, L. Marine protected areas: a tool for integrated coastal management in Belize. Ocean & Coastal Management 2005;48:932-947.

[111] Christie P. Marine protected areas as biological successes and social failures in Southeast Asia. In: Shipley JB, editor. Aquatic protected areas as fisheries management tools: proceedings of the American Fisheries Society/Sea Grant Symposium, Aquatic Protected Areas as Fisheries Management Tools, held in Quebec City, Quebec, Canada, 11-12 August 2003. American Fisheries Society Symposium 42. Bethesda, MD: American Fisheries Society; 2004. p. 155-164.

[112] Cicin-Sain B, Belfiore S. Linking marine protected areas to integrated coastal and ocean management: a review of theory and practice. Ocean & Coastal Management 2005;48:847-868.

[113] Ehler CN, editor. Integrated MPA management with coastal and ocean governance: principles and practices. Special issue. Ocean & Coastal Management 2005;48(11-12).

[114] Ehler CN. Integrating management of marine protected areas with coastal and ocean governance: principles and practices. Ocean & Coastal Management 2005;48:843-846.

[115] Enemark J. The Wadden Sea protection and management scheme—towards an integrated coastal management approach? Ocean & Coastal Management 2005;48:996-1015.

[116] Hyrenbach KD, Forney KA, Dayton PK. Marine protected areas and ocean basin management. Aquatic Conservation: Marine and Freshwater Ecosystems 2000;10:437-458.

[117] Airamé S, Crowder L, Day JC, Langdon SJ, McLeod KO, Norse EA, Ogden JC, et al. Institutional mismatches constrain the diagnosis and treatment of declining ocean ecosystems. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 484-485 (paper 136). http://www.impacongress.org/proceedings.htm.

[118] Bourque W. Developing principles and guidelines for ecologically sustainable use of Canada's national marine conservation areas. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 654 (paper 385). http://www.impacongress.org/proceedings.htm.

[119] Payet R. Decision processes for large marine ecosystems management and policy. Ocean & Coastal Management 2006;49:110-132.

[120] Hurd AK, Lundin CG, Sherwood K, Samoilys MA, Tamelander J, O'Callaghan BT, Kinh T, Makoloweka S, Machumu M. How MPAs are developed matters—legal options and implications for developing national MPA networks. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 607-609 (paper 293). http://www.impacongress.org/proceedings.htm.

[121] Agardy T. Melding large scale marine policy with small scale conservation projects through MPA networks. In: Day JC, Senior J, Monk S, Neal W, editors. First International

Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 211-212 (paper 014). http://www.impacongress.org/proceedings.htm.

[122] Craig RK. Protecting international marine biodiversity: international treaties and national systems of marine protected areas. Journal of Land Use & Environmental Law 2005;20:333-369.

[123] Mäkinen A, Saarnio P, Leppänen J, Blankett P. The ecological coherency of the Baltic Sea Protected Area (BSPA's) network. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 567 (paper 215). http://www.impacongress.org/proceedings.htm.

[124] Morgan L, Guinotte J, Tsao F, Maxwell S. The role of non-governmental organizations in developing international networks of marine protected areas: the Baja California to Bering Sea example. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 590 (paper 269). http://www.impacongress.org/proceedings.htm.

[125] Portman ME. Zoning design for cross-border marine protected areas: the Red Sea Marine Peace Park case study. Ocean & Coastal Management 2007;50:499-522.

[126] Allen, CH. Protecting the oceanic gardens of Eden: international law issues in deep-sea vent resource conservation and management. Georgetown International Environmental Law Review 2001;13:563-660.

[127] Allen CH. Protecting the oceanic gardens of Eden: international law issues in deep-sea vent resource conservation and management. In: Thiel H, Koslow JA, editors. Managing risks to biodiversity and the environment on the high sea, including tools such as marine protected areas: scientific requirements and legal aspects: proceedings of the expert workshop held at the International Academy for Nature Conservation, Isle of Vilm, Germany, 27 February - 4 March 2001. BfN-Skripten 43. Bonn: Bundesamt für Naturschutz (German Federal Agency for Nature Conservation); 2001. p. 193-194. http://www.bfn.de/fileadmin/MDB/documents/proceed1.pdf.

[128] Convention on Biological Diversity. The international legal regime of the high seas and the seabed beyond the limits of national jurisdiction and options for cooperation for the establishment of marine protected areas (MPAs) in marine areas beyond the limits of national jurisdiction. Ad Hoc Open-Ended Working Group on Protected Areas, first meeting, Montecatini, Italy, 13-17 June 2005. UNEP/CBD/WG-PA/1/INF/2. http://www.cbd.int/doc/meetings/pa/pawg-01/information/pawg-01-inf-02-en.pdf.

[129] de Fontaubert AC. The status of natural resources on the high-seas: legal and political considerations. In: The status of natural resources on the high-seas. Gland, Switzerland: WWF—World Wide Fund for Nature; 2001. p. 69-93. http://app.iucn.org/dbtw-wpd/edocs/2001-006.pdf.

[130] Foster E, Haward M, Coffen-Smout S. Implementing integrated oceans management: Australia's South East Regional Marine Plan (SERMP) and Canada's Eastern Scotian Shelf Integrated Management (ESSIM) Initiative. Marine Policy 2005;29:391-405.

[131] Gjerde K, Kelleher G. ABCs of HSMPAs: legal options for cooperation for high seas marine protected areas. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 450-451 (paper 119). http://www.impacongress.org/proceedings.htm.

[132] Grant SM. The applicability of international conservation instruments to the establishment of marine protected areas in Antarctica. Ocean & Coastal Management 2005;48:782-812.

[133] Kimball LA. The international legal regime of the high seas and the seabed beyond the limits of national jurisdiction and options for cooperation for the establishment of marine protected areas (MPAs) in marine areas beyond the limits of national jurisdiction. CBD Technical Series, no. 19. Montreal, Quebec: Secretariat of the Convention on Biological Diversity; 2005. http://www.iucn.org/themes/marine/pdf/cbd-ts-19.pdf.

[134] Leary DK. Conservation and management of vulnerable deep-water ecosystems on the high seas: are marine protected areas all that are required? In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 469-470 (paper 128). http://www.impacongress.org/proceedings.htm.

[135] Thiel H, Koslow JA, editors. Managing risks to biodiversity and the environment on the high sea, including tools such as marine protected areas: scientific requirements and legal aspects: proceedings of the expert workshop held at the International Academy for Nature Conservation, Isle of Vilm, Germany, 27 February - 4 March 2001. BfN-Skripten 43. Bonn: Bundesamt für Naturschutz (German Federal Agency for Nature Conservation); 2001. http://www.bfn.de/fileadmin/MDB/documents/proceed1.pdf.

[136] Warner R. Marine protected areas beyond national jurisdiction—existing legal principles and future legal frameworks. In: Thiel H, Koslow JA, editors. Managing risks to biodiversity and the environment on the high sea, including tools such as marine protected areas: scientific requirements and legal aspects: proceedings of the expert workshop held at the International Academy for Nature Conservation, Isle of Vilm, Germany, 27 February - 4 March 2001. BfN-Skripten 43. Bonn: Bundesamt für Naturschutz (German Federal Agency for Nature Conservation); 2001. p. 149-168. http://www.bfn.de/fileadmin/MDB/documents/proceed1.pdf.

[137] Baxter TI. Marine protected areas and structural adjustment schemes: any necessary nexus? In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 503-505 (paper 145). http://www.impacongress.org/proceedings.htm.

[138] Cameron DS, Slegers S, Cadwallader PL, Lewis A, Lowe D, Russell M, Jago B, et al. Use of fisheries data in rezoning the Great Barrier Reef Marine Park. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings,

23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 445-447 (paper 117). http://www.impacongress.org/proceedings.htm.

[139] Whalley A, Bensley NW, Foster EG. Fishing is a way of life: lessons from rezoning the Great Barrier Reef Marine Park. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 440-441 (paper 115). http://www.impacongress.org/proceedings.htm.

[140] Day JC, Tanzer J, Chadwick V, Fernandes L, Jago B. The relative roles of science, public participation and political support in rezoning the Great Barrier Reef. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 559-561 (paper 180). http://www.impacongress.org/proceedings.htm.

[141] Great Barrier Reef bounces back. Maritime Studies 2006;no. 150 (Sept.-Oct.):25.

[142] Edyvane K. Implementing a national, representative system of marine protected areas (NRSMPA) in Australia's EEZ: cross-jurisdictional, science, planning and policy challenges. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 486-488 (paper 137). http://www.impacongress.org/proceedings.htm.

[143] Stump NE, Kriwoken LK. Tasmanian marine protected areas: attitudes and perceptions of wild capture fishers. Ocean & Coastal Management 2006;49:298-307.

[144] Vince J. The South East Regional Marine Plan: implementing Australia's oceans policy. Marine Policy 2006;30:420-430.

[145] Rutherford RJ, Herbert GJ, Coffen-Smout SS. Integrated ocean management and the collaborative planning process: the Eastern Scotian Shelf Integrated Management (ESSIM) Initiative. Marine Policy 2005;29:75-83.

[146] Stark J, Murray R. Implementing marine protected areas policy: lessons from Canada and Australia. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 593-594 (paper 276). http://www.impacongress.org/proceedings.htm.

[147] Guénette S, Alder J. Lessons from marine protected areas and integrated ocean management initiatives in Canada. Coastal Management 2007;35:51-78.

[148] Eagle J. Regional ocean governance: the perils of multiple-use management and the promise of agency diversity. Duke Environmental Law and Policy Forum 2006;16:143-177.

[149] Bottom DL, Jones KK, Rodgers JD, Brown RF. Management in the northern California Current ecosystem. In: Sherman K, Alexander LM, Gold BD, editors. Large marine ecosystems: stress, mitigation, and sustainability. Washington, DC: AAAS Press; 1993. p. 259-271.

[150] Field JC, Francis RC. Considering ecosystem-based fisheries management in the California Current. Marine Policy 2006;30:552-569.

[151] Stark J, Jessen S. Say hello to Big Eddy: a global model for international cooperation for ecosystem-based oceans management and MPA development. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 551-552 (paper 166). http://www.impacongress.org/proceedings.htm.

[152] Hill AK, Jonker LJ, Davidson JA. Marine protected areas and marine industries: two contrasting case studies in Western Australia. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 585 (paper 254). http://www.impacongress.org/proceedings.htm.

[153] Simpson CJ, Jonker LJ, Hill AK, Davidson JA, Stanley F, Sheridan M. Establishing marine protected areas in oil and gas rich areas: lessons learnt in Western Australia. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 301-302 (paper 053). http://www.impacongress.org/proceedings.htm.

[154] Fenton DG, Macnab PA, Rutherford RJ. The Sable Gully Marine Protected Areas Initiative: history and current efforts. In: Bondrup-Nielsen S, Munro NWP, Nelson G, Willison JHM, Herman TB, Eagles P, editors. Managing protected areas in a changing world: proceedings of the Fourth International Conference on Science and Management of Protected Areas, 14-19 May 2000. Wolfville, NS, Canada: Science and Management of Protected Areas Association; 2002. p. 1343-1355.

[155] Government of Canada. Gully Marine Protected Area regulations. Canada Gazette Part II, 2004;138(10):663-694.

[156] Macnab PA, Fenton DG, Hall TJ, Herbert G. Confronting offshore management challenges for the Gully MPA in eastern Canada. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 539-541 (paper 161). http://www.impacongress.org/proceedings.htm.

[157] Mixing oil and water, part I: examining interactions between offshore petroleum and MPAs. MPA News 2004;5(10):4-5.

[158] Mixing oil and water, part II: the offshore oil & gas industry and MPA planning. MPA News 2004;5(11):1-3.

[159] Gray L, Skeat A, Yorkston H, Morris S, Audas DM, Tomkins P, Waterhouse J. Dealing with impacts from outside marine protected areas—a case study on the management of point source and diffuse pollutants entering the waters of the Great Barrier Reef Marine Park/World Heritage Area. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine

Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 299-300 (paper 052). http://www.impacongress.org/proceedings.htm.

[160] Hassall JL, Monkivitch J, Smith AK, Mattocks N, Collie T. Adaptive management and use of ecological thresholds for a major submarine pipeline development in the Great Barrier Reef Marine Park. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 652 (paper 380). http://www.impacongress.org/proceedings.htm.

[161] Haynes D, Brodie J, Waterhouse J. Long-term monitoring of water quality impacts in the Great Barrier Reef Marine Park, Australia. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 568 (paper 217). http://www.impacongress.org/proceedings.htm.

[162] McCook LJ. Scientific rigour, uncertainty and the burden of proof in research for management in MPAs. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 568 (paper 216). http://www.impacongress.org/proceedings.htm.

[163] Conner N, Scandol J, Hartmann J. Using integrated ecological and economic modelling to assess the impacts of catchments on NSW marine parks. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 310-312 (paper 057). http://www.impacongress.org/proceedings.htm.

[164] Ursua F. Outside impacts in Sian Ka'an Biosphere Reserve: shore-line pollution from the marine currents. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 652 (paper 381). http://www.impacongress.org/proceedings.htm.

[165] Mulqueeny L, Myers S. Best practice marine tourism—lessons learned on the Great Barrier Reef. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 545-546 (paper 163). http://www.impacongress.org/proceedings.htm.

[166] Nardi K, Jones GP, Robinson MD. Decreases in abundance of the coral trout (Pisces: Seranidae) in two marine protected areas at the Houtman Abrolhos Islands, Western Australia—a case for effective compliance. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 633 (paper 347). http://www.impacongress.org/proceedings.htm.

[167] Bishop MH, Parsons RG, Kingston B, Macdonald F. The strategic approach to compliance in the Great Barrier Reef Marine Park. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 416-417 (paper 103). http://www.impacongress.org/proceedings.htm.

[168] Whitting MA, Domaschenz P. Tackling compliance in Australia's remote northern MPAs. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 420-421 (paper 105). http://www.impacongress.org/proceedings.htm.

[169] Tsamenyi M, Rose G, Castle A. International marine conservation law and its implementation in Australia. In: Hutchings P, Lunney D, editors. Conserving marine environments: out of sight, out of mind. Mosman, NSW: Royal Zoological Society of New South Wales; 2003. p. 1-17.

[170] Gale R, Gullett W. Legislated environmental reporting requirements: compliance issues at the Great Barrier Reef Marine Park Authority. Australasian Journal of Natural Resources Law and Policy 2004;9(1):33-58.

[171] Gullett W. The legal framework and enforcement experience of marine protected areas in Tasmania, New South Wales and Commonwealth waters. In: Beumer JP, Grant A, Smith DC, editors. Aquatic protected areas: what works best and how do we know? World Congress on Protected Areas, Cairns, Australia, August 2002. North Beach, Western Australia: Australian Society for Fish Biology; 2003. p. 388-397.

[172] Gullett W. Up the creek and out at sea: the resurfacing of the public right to fish. Maritime Studies 2006;no. 146 (Jan.-Feb.):1-11.

[173] Dobbs K, Pierce S. Challenges associated with migratory threatened species and marine protected area management. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 563 (paper 203). http://www.impacongress.org/proceedings.htm.

[174] Gubbay S. Marine nature conservation in the pelagic environment: a case for pelagic marine protected areas? N.p.: World Wildlife Fund; 2006. http://www.wwf.org.uk/filelibrary/pdf/marine_pelagic_Sep2006.pdf.

[175] Norse EA. Ending the range wars on the last frontier: zoning the sea. In: Norse EA, Crowder LB, editors. Marine conservation biology: the science of maintaining the sea's biodiversity. Washington, DC: Island Press; 2005. p. 422-443.

[176] Using marine reserves to protect highly migratory species: scientists discuss potential strategies, including mobile MPAs. MPA News 2007;8(8):1-3.

[177] Graham RT, Roberts CM, and Pina Amargos F. Patterns of movement of large migratory fish and the design of marine protected areas networks: whale sharks in the Western Caribbean.

In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 520-521 (paper 152). http://www.impacongress.org/proceedings.htm.

[178] Natural Resources Defense Council v. Evans, 364 F. Supp. 2d 1083 (N.D. Cal. 2003).

[179] In an era of climate change, how can managers ensure that today's MPAs remain relevant over time? MPA News 2006/07;8(6):1-4.

[180] McCook LJ, Marshall PA, Johnson J, Hughes T, Willis B, Diaz-Pulido G, Birrell CL, Schuttenberg H. The ecological basis of coral reef resilience and its consequences for MPA management in the face of climate change. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 209-210 (paper 013). http://www.impacongress.org/proceedings.htm.

[181] Muir MAK. Oceans and climate change: global and Arctic perspectives. Sustainable Development Law & Policy 2006;7(1):50-54.

[182] Western Oil & Gas Association (WOGA) v. Byrne, CV No. 82-5034-AHS (C.D. Cal. Mar. 22, 1985).

[183] National Oceanic and Atmospheric Administration. Coastal zone management; federal consistency appeal by Union Oil Company from California Coastal Commission objection. [Notice of decision by the Secretary of Commerce.] 50 Fed. Reg. 872 (Jan. 7, 1985).

[184] Finn DP. Interagency relationships in marine resource conflicts: some lessons from OCS oil and gas leasing. Harvard Environmental Law Review 1980;4:359-390.

[185] Malakoff D. Papers posit grave impact of trawling. Science 1988;282:2168-2169.

[186] Morgan LE, Chuenpagdee R. Shifting gears: addressing the collateral impacts of fishing methods in U.S. waters. Washington, DC: Island Press; 2003.

[187] National Research Council. Effects of trawling and dredging on sea floor habitat. Washington DC: National Academy Press; 2002.

[188] Hildreth R. Achieving fisheries sustainability in the United States. Environmental Law Reporter News & Analysis 2006;36:10833-10844.

[189] Greenberg P. Ocean blues: America's once-bountiful seafood supply has been decimated. Can the president say kapu? New York Times Magazine, May 13, 2007, 13-14.

[190] Bevis KD. Stopping the silver bullet: how recreational fishermen can use the public trust doctrine to prevent the creation of marine reserves. Southeastern Environmental Law Journal 2005;13:171-202.

[191] Cooke SJ, Danylchuk AJ, Danylchuk SE, Suski CD, Goldberg TL. Is catch-and-release recreational angling compatible with no-take marine protected areas? Ocean & Coastal Management 2006;49:342-354.

[192] Newman P. Letter to the editor: recreational angling and the Skomer Marine Nature Reserve. MPA News 2007;8(8):3.

[193] Obegi D. Is there a constitutional right to fish in a marine protected area? Hastings West-Northwest Journal of Environmental Law and Policy 2005;12:103-123.

[194] Roskilly L. Aligning the interests of anglers and conservation groups on MPAs. MPA News 2007;8(7):5.

[195] Depondt F, Green E. Diving user fees and the financial sustainability of marine protected areas: opportunities and impediments. Ocean & Coastal Management 2006;49:188-202.

[196] Jones PJS. Collective action problems posed by no-take zones. Marine Policy 2006;30:143-156.

[197] Ovetz R. The bottom line: an investigation of the economic, cultural, and social costs of industrial longline fishing in the Pacific and the benefits of sustainable use marine protected areas. Marine Policy 2006;30:809-820.

[198] Ovetz R. The bottom line: an investigation of the economic, cultural and social costs of high seas industrial longline fishing in the Pacific and the benefits of conservation. Marine Policy 2007;31:217-228.

[199] Planners discuss role of science and socioeconomics in California MPA-planning process. MPA News 2007;8(11):2-3.

[200] Sanchirico JN, Cochran KA, Emerson PM. Marine protected areas: economic and social implications. [Prepared] for Restoring America's Fisheries with Marine Reserves. Environmental Defense; 2001. http://www.environmentaldefense.org/documents/1535_MPAs_eco_socio_implic.pdf.

[201] Sanchirico JN, Viatella KC, Emerson PM. Socioeconomic implications of siting marine reserves in United States waters. In: Chircop A, McConnell ML, editors. Ocean yearbook 19. Chicago: University of Chicago Press; 2005. p. 208-231.

[202] Tobey J, Torell E. Coastal poverty and MPA management in mainland Tanzania and Zanzibar. Ocean & Coastal Management 2006;49:834-854.

[203] Wahle C, Lyons S, Barba K, Bunce L, Fricke P, Nicholson E, Orbach M, Pomeroy C, Rechsiek H, Uravitch J. Social science research strategy for marine protected areas. Santa Cruz, CA: National Marine Protected Areas Center, MPA Science Institute; 2003.

[204] No-trawl zones: Using private money to protect seafloor habitat in California. Coastal Services 2006;9(6):4-6, 9.

[205] Link J, Almeida F, Reid B, Packer D, Vitaliano J, Noji T, Murawski S, et al. What we have learned from large scale closed areas: the northeast U.S. example. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 442-444 (paper 116). http://www.impacongress.org/proceedings.htm.

[206] National Marine Fisheries Service. Fisheries of the exclusive economic zone off Alaska; prohibition of groundfish fishing and anchoring in the Sitka Pinnacles Marine Reserve. [Proposed rule.] 65 Fed. Reg. 39,342 (June 26, 2000).

[207] NOAA fisheries service establishes critical marine protected area in Alaska. NOAA Magazine, July 31, 2006. http://www.noaanews.noaa.gov/stories2006/s2673.htm.

[208] Vinton A. Deep sea bottom trawling and the eastern tropical Pacific seascape: a test case for global action. Georgetown International Environmental Law Review 2006;18:355-383.

[209] Pacific Marine Conservation Council v. Daley, No. 01-2506 (N.D. Cal. Apr. 12, 2002).

[210] Crowder LB, Osherenko G, Young OR, Airamé S, Norse EA, Baron N, Day JC, et al. Resolving mismatches in U.S. ocean governance. Science 2006;313:617-618.

[211] Hastings SP, Airame S, Senyk N, Murray M, Ugoretz J. Advancing ecosystem-based management in a complex ocean governance system: the Channel Islands Marine Reserves experience. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 261-262 (paper 035). http://www.impacongress.org/proceedings.htm.

[212] Executive Order No. 13,178, 65 Fed. Reg. 76,903 (Dec. 7, 2000).

[213] Executive Order No. 13,196, 66 Fed. Reg. 7395 (Jan. 23, 2001).

[214] McIsaac D, Executive Director, Pacific Fishery Management Council. RE: Proposed marine reserves in the Channel Islands National Marine Sanctuary. Letter to Chris Mobley, Superintendent, Channel Islands National Marine Sanctuary. Oct. 10, 2006. http://www.pcouncil.org/bb/2006/1106/Sup_Ag_H1a_Att5.pdf.

[215] McIsaac DO, Executive Director, Pacific Fishery Management Council. Re: Pacific Fishery Management Council comments on Oregon's Ocean Policy Advisory Council report about Oregon Governor Kulongoski's proposal to create a national marine sanctuary along the Oregon coast. Letter to Mike Carrier, Natural Resources Policy Director, Oregon Governor's Office. June 26, 2007. On file with author.

[216] Walton A. Developing capacity-building programs to meet the needs of regional MPAs. MPA News 2007;8(9):4.

[217] Examining the role of MPAs in ecosystem-based management, and vice versa: five examples. MPA News 2006;8(4):1-5.

[218] McManus RE. Evolution of large marine management regimes. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 589 (paper 268). http://www.impacongress.org/proceedings.htm.

[219] Smith SE, Newman K, McManus RE, Cerroni R. Learning among conservation NGOs to strengthen MPA network effectiveness. In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 636 (paper 354). http://www.impacongress.org/proceedings.htm.

[220] Pardy B. Changing nature: the myth of the inevitability of ecosystem management. Pace Environmental Law Review 2003;20:675-692.

[221] Results from the MPA news reader poll: the relationship between MPAs and ecosystem-based management. MPA News 2006/07;8(6):6-7.

[222] Salzman J, Thompson BH, Jr, Daily GC. Protecting ecosystem services: science, economics, and law. Stanford Environmental Law Journal 2001;20:309-332.

[223] Worm B, Barbier EB, Beaumont N, Duffy JE, Folke C, Halpern BS, Jackson JBC, et al. Impacts of biodiversity loss on ocean ecosystem services. Science 2006;314:787-790.

[224] Murawski SA. Ten myths concerning ecosystem approaches to marine resource management. Marine Policy 2007;31:681-690.

[225] Kenchington RA. Protecting marine ecosystems: how much can we achieve through MPAs? In: Day JC, Senior J, Monk S, Neal W, editors. First International Marine Protected Areas Congress, conference proceedings, 23-27 October 2005: IMPAC1 2005, Geelong, Victoria, Australia. 2007. p. 218-221 (paper 017). http://www.impacongress.org/proceedings.htm.