policy brief

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Marine Protection in the Gulf of Mexico

Current Policy, Future Options, and Ecosystem Outcomes

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To better protect ocean ecosystems, policymakers now turn increasingly to the use of marine protected areas and other policies that manage and regulate activities within specific areas of the sea. Well-designed marine protection and spatial planning could contribute to the improved management of the Gulf of Mexico, but only if designed to adequately account for the human, geological, and biological features of the Gulf. The region is characterized by heavy industrial use, deep-sea habitats, economically important yet often depleted fisheries, and human communities that depend on a broad spectrum of ocean uses, including oil and gas extraction, commercial and recreational fishing, and tourism. All of these factors combine to create an integrated, complex Gulf ecosystem that includes nature, humans, and political institutions.

In this brief paper, faculty, staff, and junior researchers from Duke University's Nicholas Institute for Environmental Policy Solutions and Nicholas School of the Environment share their thoughts about the ways in which marine protection in the Gulf of Mexico could be designed to account for the region's unique ecosystem, what types of spatial management and protection could be implemented under existing policies and law, and how these spatial management options might influence future ecosystem health, even in the face of potential human and natural disasters.

Marine Protected Areas in the Gulf of Mexico

The science of marine protected areas

Marine Protected Areas (MPAs) provide place-based protection for marine species, habitats, and ecosystems. Marine protection can include the exclusion of fishing, specific types of fishing or fishing gear, anchoring, boating, and industrial development, to name just a few of the activities that can damage marine ecosystems. The federal definition of an MPA, as given in Executive Order 13158, is: "any area of the marine environment that has been reserved by federal, state, tribal, territorial, or local laws or regulations to provide lasting protection for the part or all of the natural or cultural resources therein." In practical terms, MPAs are delineated areas in oceans, estuaries, and coasts with a higher level of protection than in surrounding waters. There are 1,500 MPAs in the U.S., classified by various programmatic types. The vast majority of MPAs in the U.S. are not strict reserves; few MPAs in the U.S. protect against all extraction (i.e., no-take areas). More often, MPAs are areas in which diverse resources are allocated for multiple uses. In some cases, marine protected areas have had measured success in maintaining ecosystem health and conserving biodiversity, but because MPAs protect so little of U.S. waters, their contribution to management and conservation goals on a larger scale is still unclear.

In the Gulf of Mexico, marine protected areas would likely be most beneficial if designed to both protect and improve the resilience of regional ecosystems. "Resilience" is the ability of an ecosystem to resist and recover from disturbances including both low-level, chronic disturbances (e.g., pollution, fishing, ship travel) and major, intermittent disturbances (e.g., hurricanes, oil spills). Marine protection also reduces cumulative impacts on the ocean and thus maintains diversity that in turn can promote resilience by retaining redundancy in important ecological processes.

Increasingly, researchers are calling for the creation of *networks* of MPAs. Unlike individual, isolated MPAs, a network of MPAs can operate synergistically at various spatial scales and with a range of protection levels. A deliberately created network of MPAs should contain complementary and ecologically linked areas that

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are sited with network-wide goals in mind (e.g., species ranges, genetic connectivity, and harmonized management).

The network approach to MPA design distributes and thus reduces ecologic risk. Though not all catastrophic disturbances are predictable, in the Gulf of Mexico, two are likely: hurricanes and oil spills. As a tool for risk mitigation, a network of representative MPAs could be established at larger scales than the areas likely to be affected by hurricanes and oil spills. Additional factors to consider in designing networks of MPAs are spacing, shape, and the total area protected. Ecological connectivity among the MPAs should be a particular focus in the creation of MPA networks. Marine species, many of economic importance, often occupy more than one ecological role throughout their life spans. Protecting larval and adult dispersal and migratory pathways and protecting enough populations to maintain genetic diversity are critically important.

Existing MPAs in the Gulf of Mexico

There are currently at least 300 designated areas in the Gulf of Mexico that provide a mosaic of marine protection and encompass just under 6% of the total Gulf of Mexico within U.S. waters. However, there is no indication that these 300 areas were established as a network (in other words, they were not designed with connectivity or risk mitigation in mind). The Gulf hosts a diversity of ecosystems (e.g., wetlands, barrier islands, deep and shallow coral reefs, wetlands, rocky bottoms), economically important fish and shellfish populations (e.g., red snapper, grouper, oysters), and important species habitats (e.g., Bluefin tuna spawning habitat, Kemp's Ridley sea turtle migratory pathways). The extensive range of this ecosystem diversity is not captured in the cumulative area currently under protection in the Gulf.

Most MPAs in the Gulf of Mexico are managed for multiple uses. These MPAs include three National Marine Sanctuaries, many National Wildlife Refuges, fisheries closure areas (e.g., Habitats of Particular Concern), and state parks, conservation areas, and reserves. Probably the best-known MPAs in the Gulf are the National Marine Sanctuaries (NMS): the Florida Keys NMS and the Flower Garden Banks NMS. National Marine Sanctuaries enjoy national recognition and dedicated funding. These sanctuaries allow multiple uses, including fishing. Overall, only 35 of the federal and state-level MPAs in the Gulf prohibit commercial fishing, and of these only six prohibit recreational fishing. Of the 35 MPAs that do not allow commercial fishing, 11 are smaller than one square kilometer.

Another type of MPA is the "no activity zone" in areas leased for oil and gas development. These zones are designated by the Bureau of Ocean Energy Management, Regulation, and Enforcement (formerly, the Minerals Management Agency) in ecologically sensitive areas, such as hard-bottom habitats or chemosynthetic ecosystems (e.g., hydrothermal vents or petroleum seeps).

Additionally there are many areas in the Gulf of Mexico where fishing is restricted indirectly (e.g., the exclusion zone around oil rigs during dangerous activities). The Gulf of Mexico has the most area of any other region in U.S. waters in de facto MPAs (DFMPA).[1] The majority of these de facto MPAs occur in oil transfer areas, shipping lanes, and areas used by the military; most are managed by the U.S. Coast Guard. DFMPAs rarely prohibit commercial and recreational uses directly, but restrictions on navigation tend to make fishing difficult if not impossible. While numerous, only 1% of the Gulf is permanently closed to the public by DFMPAs.

Plans for new MPAs in the Gulf of Mexico

In 2008, the National Ocean Service and the National Marine Sanctuary Program wrote a concept paper outlining a network of priority conservation areas in the northern Gulf of Mexico. The paper proposed that the President declare nine areas of hard-bottom habitat in the northern Gulf a network of MPAs (a concept dubbed "Islands in the Stream"). These areas are home to soft corals and more than 90 fish species, including snappers, groupers, tunas, sharks, and subtropical and tropical invertebrates. The proposed MPAs in this network are linked by the Gulf Loop current, which would enable the dispersal of organisms among the MPAs. The proposal stalled, however, when immediate concerns were expressed by the recreational fishing sector. Ultimately it was concluded that any network of MPAs in the Gulf would have to undergo a full stakeholder participation process.

Domestically, there are other initiatives to investigate expanded marine protection in the Gulf. Dr. Sylvia Earle's SEAlliance identified 200 deepwater reefs and banks along the northwestern Gulf of Mexico as targets for conservation. Most of these reefs lie in unprotected waters. At the state level, the Gulf Ecological Management Sites Program is a joint initiative between the EPA's Gulf of Mexico Program and the five Gulf states "to provide a regional framework for the recognition of habitats or habitats ecologically significant for the production of

1 De facto MPAS are areas "where activities are restricted by law for reasons other than conservation" (e.g., safety, security, and danger zones; traffic separation schemes) (http://mpa.gov/dataanalysis/defacto/).

fish, wildlife, and other natural resources in the Gulf of Mexico."

There also is interest in developing a more international approach to marine protection in the Gulf of Mexico. In June 2010, the Harte Research Institute for Gulf of Mexico Studies at Texas A&M University–Corpus Christi hosted the "Summer Workshop on Governance for the Gulf of Mexico: Overcoming International Obstacles to Creating Marine Protected Areas in the Gulf of Mexico." Members of Cuban, Mexican, and U.S. natural resources and protected areas agencies discussed the possibility of a whole-Gulf approach to developing a representative MPA network.

Existing and Potential Fisheries Tools for Spatial Management in the Gulf of Mexico

Fisheries managers are able to implement limited forms of marine protection by the closure of certain areas to fishing. The duration and spatial extent of these closures varies and can apply to as few as one and to as many as dozens of stocks of fish. Closures may apply to specific species, certain types of commercial or recreational fishing, and/or designated types of fishing gear. In many cases these closures are seasonal and recur annually. De facto closures also result from management measures intended to regulate harvest or meet other management goals.

In the U.S. portion of the Gulf of Mexico, marine fisheries management is divided between the "states" (three nautical miles from shore for Louisiana, Mississippi, and Alabama, and nine miles for Texas and the west coast of Florida) and the federal government (three to 200 nautical miles). In state waters, each state has jurisdiction over fishery laws, regulations, and policies, with certain provisions for pre-emption by the federal government over state jurisdiction under specific circumstances. In federal waters, under the Magnuson-Stevens Fishery Conservation and Management Act, the U.S. Department of Commerce, through its sub-agencies the National Oceanic and Atmospheric Administration and the National Marine Fisheries Service, approves and implements fishery management plans developed by Regional Fishery Management Councils. In the Gulf of Mexico, the Gulf of Mexico Fishery Management Council manages federal fisheries and thus is able to recommend spatial area closures and restrictions for commercial and recreational fishing.

State and federal waters include different kinds of habitat; closures that affect different habitats may provide different sets of benefits. Some species primarily occupy state or federal waters, while other species utilize both zones. For example, many commercially and recreationally important species grow to maturity in shallow-water nursery habitats and move to deeper water as adults. Regardless of the jurisdiction, fishery closures are generally implemented for four reasons: (1) to support rebuilding of overfished stocks; (2) to protect fragile habitat, or habitat that is critical to vulnerable life history phases (e.g., nursery habitat, spawning aggregation areas); (3) to reduce the catch of nontarget species, particularly protected species; and (4) as a precautionary buffer against the uncertainty inherent in fishery models and management measures.

Management measures and gear restrictions can indirectly result in spatial closures to particular user groups and gear types and for specific species. For example, a total yearly quota for catch of a particular species may result in the cessation of fishing for that species after the quota is reached. Some fisheries, such as the recreational fishery for red snapper in federal waters, utilize seasonal closures as a management tool to control fishing effort. Under these circumstances, fisheries are only open for a limited length of time each year resulting in a de facto (spatial) closure the rest of the year. Gear restrictions also can have a spatial component. For example, state and federal management bodies may adopt restrictions on bottom trawling (the dragging of a net across the bottom to catch bottom-dwelling species) or longlining over certain areas to protect bottom habitat or to reduce bycatch of nontargeted species. Other gear restrictions are designed to separate conflicting uses in space and/or time (such as stone crab traps and shrimp trawls). Closures or gear restrictions intended for a specific purpose, such as reducing interactions with protected sea turtles, may yield other indirect benefits.

The Gulf of Mexico Fishery Management Council approved an Aquaculture Fishery Management Plan in 2009. The plan has not yet been implemented, but the council's preferred alternative would establish restricted access zones around marine aquaculture facilities.

There are many areas in the Gulf of Mexico, in both state and federal waters, where specific fishing activities are either allowed or prohibited. For example:

- Areas inshore of 20 fathoms along the Florida shelf and 50 fathoms throughout the rest of the Gulf of Mexico are closed to buoy and longline fishing gear.
- The Madison-Swanson and Steamboat Lumps Restricted Fishing Areas are closed to all recreational and commercial bottom fishing; surface trolling, which does not interact with the seafloor, is permitted May–October.

- The Tortugas North and South Marine Reserves are no-take reserves closed to all fishing.
- The Flower Garden Banks National Marine Sanctuary allows hook and line fishing only.
- The Florida Keys National Marine Sanctuary permits fishing in most areas. Other areas are closed to all fishing, and some are catch-and-release trolling only.
- The Gulf of Mexico Coral Fishery Management Plan designates Habitat Areas of Particular Concern (including some of the closures above) that prohibit the use of fishing gear that interacts with the bottom.

Other areas may be closed to fishing to protect industrial facilities. All fishing is prohibited within 2.5 miles of the Louisiana Offshore Oil Port (LOOP), an offloading facility for oil tankers. However, there are few restrictions against recreational and commercial fishing in close proximity to oil platforms during normal operation (although access may be restricted during dangerous operations).

There are also new concepts emerging related to the spatial management of fisheries. For example, although the employment of fishery closures has generally been limited to coastal waters over the continental shelf, many fisheries occur in offshore pelagic environments and closures are possible in these areas as well. Some have suggested that the geography of these closures could change over time (dynamic closures), moving as fish stocks move and migrate in offshore areas. Placement of fishery closures in offshore environments is difficult due to (a) the lack of a clear scientific process for determining where to place the fishery closure, and (b) the logistics of managing and enforcing a large, potentially dynamic reserve that may be far offshore. Nevertheless, static or dynamic offshore fishery closures may prove useful in the development of ecosystem-based approaches to fisheries management. These methods are becoming more feasible with the widespread use of vessel monitoring systems (VMS) and the availability of dynamic oceanographic and species observation data.

Protecting Deep-Sea Habitats

Spatial policies in the Gulf that protect deep-sea habitats or ecosystems

As discussed above, area-based and ecosystem-based management tools, such as protected areas, networks of MPAs, sanctuaries, and monuments, can restrict human activities in the Gulf of Mexico. Restrictions on activities that damage the seafloor, such as trawling, mining, or drilling, can serve to protect deep-sea habitats and ecosystems. We focus here on ways that spatial management can protect important deep-sea habitats and ecosystems.

Ecological benefits of deep-sea marine protection

Bottom-dwelling organisms in the deep sea consume and transfer organic material through the food web. Bottom-dwelling organisms support and serve as food for other bottom-dwelling and free-swimming species of fish and other invertebrates. Additionally, bottom-dwelling organisms decompose organic material and regenerate nutrients on and near the seabed—a process that is critical in the supply of nutrients to the upper water column where photosynthetic organisms combine light and nutrients to feed the rest of the food chain. Damage to the seafloor, even in the deep sea, can lead to a decline in the rate of decomposition and nutrient cycling. At the extreme, this can lead to a "dead" seabed, where these natural functions of bottom-dwelling invertebrates and microorganisms are halted.

The deep seabed of the Gulf of Mexico also supports a number of small, patchy environments (typically < 1 hectare) with unusual characteristics, including natural asphalt seeps, hydrocarbon seeps, brine pools, methane hydrate outcrops, carbonate platforms, and cold-water coral reefs that support organisms uniquely adapted to these environments. Our knowledge of most of these communities dates back to 1985, when dense beds of tubeworms and mussels were discovered at the base of the Florida Escarpment, at a depth of 3600 m (Figure 1). The tubeworms were quickly determined to be cold-water cousins of tubeworms living at hot springs in the deep sea. These tubeworms are animals that lack a digestive system and instead rely on bacteria housed inside their bodies to convert inorganic (noncarbon) compounds into the carbon-based materials necessary for life. This microbial process is known as chemosynthesis (in contrast to photosynthesis). These microorganisms are primary producers, providing an ecosystem service that is the deep-sea equivalent of primary production by phytoplankton in the water column: they create new organic material that serves as the base of a complicated food web.

Free-living microorganisms associated with natural hydrocarbon seeps in the Gulf of Mexico may seed the water column and digest oil spilled from failed wells. But while this seems possible, we know so little about the nature of these microorganisms that it is difficult to assess their potential in the natural remediation of pollution. Hundreds of new species have been discovered in deep-sea habitat patches; many still are undescribed. Some of them, like the tubeworms and cold-water corals, are exceptionally long-lived (centuries and more), and all of the species in a patch serve as brood stock to seed other habitat patches. Protection of representative and replicated habitat patches would help to ensure

maintenance of habitat heterogeneity and biodiversity, particularly genetic diversity that allows for evolutionary novelty and adaptation to extreme environments.

Figure 1. Deep-sea tubeworms on the Florida Escarpment.

Sufficiently large networks of protected areas that include representative habitat patches on the seafloor and span the full depth range of the Gulf would ensure suitable benthic habitat to allow for gene flow and maintenance of biodiversity and ecosystem services.

Deep sea protection in the Gulf of Mexico

In the Gulf of Mexico, there are a number of spatial management policies that serve to protect deep-sea habitat:

- **The Bureau of Energy Management, Regulation, and Enforcement (BOEMRE, formerly the Minerals Management Service or MMS)** is the steward of sensitive hard-bottom and reef habitats that may be affected by oil and gas exploration and development activities. Offshore energy and mineral development in the Gulf of Mexico is managed by BOEMRE, which also manages protection of seep and cold-water coral communities on the continental slope. BOEMRE may include protective measures directly in the leases it makes for exploration and extraction. These lease restrictions may change as new data emerges on the impact of the activity. Seep and cold-water corals were first protected through these lease restrictions soon after their discovery. The first written regulatory policy, completed in 1988 as Notice to Lessees (NTL) 88-11, required mandatory identification and avoidance of chemosynthetic communities and avoidance of damage to these communities by anchors and platforms. New avoidance criteria were introduced in NTL 2000-20, which specified a minimum separation from chemosynthetic areas (places where chemicals, not sunlight, are the primary source of energy) and "potential" chemosynthetic areas. NTL 2010-G40 decreased the minimum depth requirement for site-specific biological reviews of drilling plans or pipeline installation applications from 400 m to 300 m and increased buffer zones and avoidance distances. NTL 2004-G05 applies similar spatial restriction of activities in Biologically Sensitive Areas (defined as topographic features, live bottoms, pinnacle trend features, and low-relief features).
- **Habitat Areas of Particular Concern (HAPC)** is the name of an area-based concept that offers no protection to the benthos beyond that afforded by the essential fish habitat provisions of the Magnuson-Stevens Act. In the Gulf, prohibitions within HAPCs include gear-based fishing restrictions (e.g., Florida Middle Grounds HAPC's year-round prohibition of bottom longline fishing, bottom trawling, dredging, potting, and trapping) and anchor restrictions (e.g., Tortugas Marine Reserves HAPC).
- **Deep-sea coral reefs in the Gulf of Mexico** could be protected under the Magnuson-Stevens Act, but no current protections are in place.
- **The Gulf of Mexico Security Act** protects the eastern part of the Gulf of Mexico of oil and gas development until 2022. Florida does not allow oil and gas drilling in state waters. Texas and Florida (west coast) state waters extend 9 nautical miles (nm) into the Gulf, compared with the 3 nm standard.

The Role of Marine Spatial Planning in Protecting Gulf of Mexico Ecosystems

Background

Over the last decade, coastal and marine spatial planning (CMSP) has emerged around the world as an important tool for achieving sustainable use of ocean resources while maintaining healthy marine ecosystems. On July 19, 2010, the U.S. Interagency Ocean Policy Task Force issued final recommendations to President Obama, adopted that same day through Executive Order 13547, that created a new national ocean policy to be implemented by the federal government in partnership with state, tribal, and local governments. The Executive Order created a National Ocean Council that is charged with writing an implementation strategy for the new ocean policy, including guidelines for creating coastal and

marine spatial plans in nine regions around the United States.

How CMSP works

The traditional approach to managing ocean resources in U.S. waters has been fragmented and sometimes ineffective. Laws, agencies, and programs have accumulated over the years, each addressing a different resource or problem. In U.S. waters, including the Gulf of Mexico, separate programs manage fishing, oil and gas extraction, shipping and navigation, renewable energy, water quality, protection of sensitive species and ecosystems, coastal development, dredging, natural hazards, and more. As a result, state and federal policies have generally not addressed the overlaps, synergies, and conflicts between these issues. The negative consequences for the marine environment are well documented, but this regulatory fragmentation has also led to lost economic opportunities.

For the U.S., CMSP has been defined as "a comprehensive, adaptive, integrated, ecosystem based, and transparent spatial planning process, based on sound science, for analyzing current and anticipated uses of ocean, coastal, and Great Lakes areas. CMSP identifies areas most suitable for various types or classes of activities in order to reduce conflicts among uses, reduce environmental impacts, facilitate compatible uses, and preserve critical ecosystem services to meet economic, environmental, security, and social objectives."

In the Gulf of Mexico, a CMSP process would include decision makers and stakeholders from all the surrounding states and the many sectors with interests in Gulf waters. A range of potential spatial plans would be drafted and analyzed to illustrate different tradeoffs. For example, one scenario could aim to maximize economic gains from oil extraction, acknowledging impacts on fishing or ecosystem protection, while another scenario might stress water quality, biodiversity, and tourism, accepting that this might restrict some extractive uses.

The outcomes of CMSP

Because CMSP is still in the early stages of adoption and implementation, it is difficult to document its effects as measured by specific performance benchmarks. Nevertheless, a number of experienced scientists, managers, and policy experts have analyzed applications of CMSP around the world, both in theory and in practice, compared it to existing management approaches, and identified its potential benefits. These include, but are not limited to:

- bringing diverse stakeholders together to forge a common vision for a particular region of the ocean;
- improving the ability of federal, state, tribal, and local authorities to coordinate their objectives and activities;
- forcing previously unspoken, implicit tradeoffs between ocean uses, including conservation, to become more deliberate and transparent;
- promoting diverse, sustainable ocean activities to create stable income and employment in coastal communities;
- maintaining the value of ecosystem services, such as shoreline protection, human health, clean water, and global climate control; and
- minimizing conflicts between different uses and between ocean uses and conservation.

It is important to note that CMSP requires broader cross-sectoral, cross-agency coordination than is normally the case in designing and siting traditional MPAs—a process that historically has pursued a single-sector approach. Although MPAs have been shown to be effective in protecting sensitive ecosystems in many settings, their creation has generally not been linked to broader planning objectives or to the management of activities outside the MPA boundary. Like MPA approaches, CMSP as articulated by the U.S. Interagency Ocean Policy Task Force includes ecosystem health as one of its goals and can assign areas for protection, but CMSP brings additional authorities and tools to the table to maintain ecosystem properties in areas *not* under direct protection.

CMSP in the Gulf of Mexico

The Gulf of Mexico demonstrates many of the ocean management challenges discussed above. A proliferation of activities, each managed under a distinct regulatory regime, has allowed cumulative impacts to build up in the Gulf ecosystem, including impacts on the economy, livelihoods, and lifestyles of Gulf residents and visitors.

The existence of a CMSP would not prevent oil spills from occurring, but it would mean that a diverse group of citizens, business interests, and government representatives has already given serious thought to the potential interactions between and among all the activities and inhabitants (human and nonhuman) found in the Gulf. While current outer-continental-shelf law requires some stakeholder input, the level and geographical scale of stakeholder participation would likely be much greater under CMSP. Under CMSP, the "spatial footprints" of each activity, including oil drilling, would be mapped and studied, both under business-as-usual and disaster

conditions, and deliberate choices made about tolerable levels of risk.

If CMSP had been implemented earlier in the Gulf of Mexico, one could imagine a number of ways in which oil and ecosystems might interact differently in the Gulf today. One possibility is that the geographic distribution of oil rigs would be different, perhaps arranged to account for potential interactions with other users. It is also plausible to imagine a plan with the same physical layout of rigs, accompanied by more stringent requirements and contingency plans to guard against the potentially devastating impacts of a spill on other Gulf industries (such as fishing and tourism) and on valuable ecosystems (such as coastal wetlands). These additional safeguards would be possible because of the way CMSP brings all the relevant regulators together to plan for the future of a region, allowing spatial allocations to be accompanied by new approaches to permitting, management, and response.

Recommitting BOEMRE to a broader, more balanced mission will be helpful, but it is unrealistic to expect any one agency, with its particular mission and mandate, to be sensitive to the attributes, requirements, and sensitivities of every player in the surrounding natural and human ecosystem.

In addition to the comprehensive plans generated by CMSP, the process itself would help solidify a network of local, state, tribal, and federal contacts with responsibilities in the Gulf. This, in turn, could make it easier to provide a coordinated response to unforeseen—but inevitable—circumstances, such as natural and man-made disasters.

Legal and Policy Considerations for Marine Protection

A number of federal and state agencies are currently authorized to undertake some form of marine protection in U.S. waters. The principal federal agencies with this authority are the Department of Commerce and the Department of the Interior.

Many other agencies are authorized to undertake spatial management actions that convey a certain amount of marine protection to the areas affected. At the state level, the Coastal Zone Management Act (16 U.S.C. §§ 1451 *et seq.*) authorizes coastal states and territories to establish National Estuarine Research Reserves (NERRs). Though the NERRs are mainly created for research and education, their plans can prohibit activities that are incompatible with these goals.

At the federal level, the National Marine Sanctuaries Act (16 U.S.C. §§ 1431 *et seq.*) authorizes NOAA to establish MPAs called "National Marine Sanctuaries." It requires NOAA to develop and implement management plans and to work with other agencies (state and federal) to ensure that regulations are enforced. The Act has been criticized as not being sufficiently robust in establishing true protections; fishing, shipping, and recreation are restricted in only a few sanctuaries (though most prohibit energy development). National Marine Sanctuaries, however, could provide significantly more marine protection if the political will and appropriations existed.

The essential fish habitat provisions of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. §§ 1801 *et seq.*) authorize the designation of certain areas as "habitat areas of particular concern." Additionally the act authorizes NOAA and the regional fishery management councils to close areas to fishing or to certain types of fishing to allow stocks or habitats to rebound, or to protect spawning sites. These closures are often impermanent, however.

The National Wilderness Preservation System ("Wilderness Act"; 16 U.S.C. § 1131) is used to protect terrestrial lands but, according to the Congressional Research Service (CRS), areas of federal ocean waters "could be eligible for designation as 'wilderness' by Congress, although none have been designated to date."

Under the National Park Service Organic Act (16 U.S.C. §§ 1, 2–4), the National Park Service manages National Parks, many of which include marine waters within their boundaries (often called National Seashores). The National Park Service's dual mandate of conservation and protecting public use is reflected in fishing access to these areas. Many of these parks allow recreational fishing, and some allow commercial fishing.

Under the National Wildlife Refuge Administration Act (16 U.S.C. § 668dd), the U.S. Fish and Wildlife Service manages designated areas for the conservation of fish and wildlife. Many coastal refuges include marine waters, and recreational fishing, hunting, wildlife observation, and education are the main public uses allowed. Oil and gas extraction is permitted in a few refuges.

The President

There is a rich history of the President using Executive Orders to bolster the nation's marine protection. In 2000, President Clinton issued two Executive Orders pertaining to MPAs. The first, EO 13158, created the National Marine Protected Area Center within NOAA and charged it with developing "a framework for a national

system of MPAs, and to provide Federal, State, territorial, tribal, and local governments with the information, technologies, and strategies to support the system." The second, EO 13178, created the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve, within which extractive activities were limited.

In accordance with the 1906 Antiquities Act (16 U.S.C. §§ 431–443), President Bush issued Executive Orders to create four large MPAs in U.S. Pacific waters: the Papahânaumokuâkea National Marine Monument (NMM), the Marianas Trench NMM, and the Rose Atoll NMM, and the Pacific Remote Island NMM.

President Obama has similar authority that would allow the creation of new marine protected areas in the Gulf of Mexico by means of an Executive Order.

Political and legal considerations for new MPA creation in the Gulf of Mexico

The controversy that often accompanies MPA designation concerns the uses of marine resources that would be restricted under marine protection. Fishing is an activity that routinely is restricted by MPAs. To quote the Congressional Research Service, "Fishing presents complicated scientific, social, and economic questions, and those complications are amplified by the political strength of the recreational and commercial communities in marine management deliberations." Reflecting the political power of recreational fishing interests, both Presidents Clinton and Bush issued Executive Orders to mandate recreational fishing access to MPAs and other federally managed waters.[2]

Additionally, creating new MPAs could limit the range of offshore energy activities (e.g., oil and gas extraction, shipping lanes, transfer and transportation of oil and gas). Efforts to restrict offshore oil and gas activities could also prove politically difficult because of perceived impacts on jobs and Gulf coastal communities, as it was when the President issued a six-month moratorium on all deepwater exploratory drilling operations in May 2010.

Positive political impacts also may result from the expansion of marine protection through MPAs. In areas heavily dependent on coastal tourism, MPAs can be a tool in protecting the ecosystems at the base of some tourism industries (e.g., scuba diving, charter-boat fishing). Additionally, some areas (e.g., Flower Garden Banks) are highly valued from scientific and cultural perspectives, but do not represent areas of high economic value or use; these areas can often be protected with less political resistance than highly productive fishing grounds or oil-rich areas of the seafloor.

Though the political aspects of expanding ecosystem protection in the Gulf through MPAs are complicated, the legal side of the equation is less so. There are myriad ways to implement MPAs of varying levels of protection in federal and state waters in the Gulf; however, no federal law or program provides a comprehensive route towards protecting marine areas.

Conclusion

Well-designed marine protection could increase the resilience and productivity of the Gulf of Mexico marine ecosystem. Marine protection could:

- reduce the chances of direct damage by human activities,
- protect sources of larvae and other biological stocks that could help damaged areas recover,
- create a portfolio of protected habitat and ecosystem areas so that the overall impact of natural or human-created damages are reduced, and
- improve the resiliency of the Gulf of Mexico ecosystem by providing areas where human stress to the ecosystem is reduced.

Well-designed marine protection requires better integration than currently exists in the Gulf of Mexico. Marine protected areas need to protect critical habitats and need to be arrayed in one or more networks that will maximize their effectiveness. Traditional forms of marine protection need to be integrated into other types of de facto marine protection, including fishery closures and protections (called avoidances) that are stipulated in the creation of minerals, mining, oil, and gas leases. Finally, marine protection will be most effective if part of an overall framework of spatial planning that weighs the benefits and costs of marine protection against other competing uses of the water column and sea floor. The new Coastal and Marine Spatial Planning framework, authorized through the President's July 19, 2010 Executive Order 13547 provides guidance for a process that would provide better integration of marine spatial planning with other economically and socially important activities in the Gulf of Mexico.

Finally, it is important to remember that marine protection is not free. Well-designed marine protection could potentially yield overall economic benefits in the long-term; in the short-term, certain stakeholders could be inconvenienced or economically harmed. Effective marine protection requires that damaging human

2 Bush's EO amended Clinton's to ensure even more access.

activities are restricted. Often, these damaging activities are economically lucrative (e.g., trawling or oil drilling) and the imposition of marine protection in areas of the Gulf of Mexico could keep people and firms from undertaking these activities. Marine protection may also preclude or constrain other activities that have both recreational and commercial components; most notably recreational fishing could be restricted by certain types of marine protection. Restrictions on human activity may have both economic and political consequences that need to be considered in the siting, design, and management of protected areas.