

# **State of the Nation's Marine Managed Areas: With Particular Emphasis on the Caribbean, South Atlantic and Gulf of Mexico Regions**

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## **ABSTRACT**

Currently, there are more than 1,800 MMAs in U.S. marine waters and the Great Lakes, managed by hundreds of distinct federal, state, and territorial authorities. The South Atlantic (339) and Gulf of Mexico (318) regions have the greatest number of MMAs, while the Caribbean region has 42 individual MMAs. Spatial management covers a considerable portion of the regional waters (0 - 200 nm) of the South Atlantic (68%) and Gulf of Mexico (41%), though less than 1% of Caribbean waters are designated in MMAs. Much of the MMA area in each region consists of large MMAs focused on promoting sustainable fisheries. Although a few, large federally managed natural heritage MMAs also occur in each region. The overwhelming majority of MMAs in these regions are "multiple-use" sites, in which a variety of human activities, including fishing and other forms of harvest, are allowed. In contrast, the total no-take area is small in each region. Only 10% of the area within MMAs in the Caribbean region is no-take, whereas less than 0.01% of the area within MMAs in the Gulf of Mexico and South Atlantic prohibit all forms of harvest. Spatial analysis of the location, type, conservation purpose, and protection level within MMAs in the U.S. Caribbean, Gulf of Mexico and South Atlantic regions is presented. Patterns and trends in management approaches and distribution of MMAs are compared and contrasted across regions.

KEY WORDS: Marine protected area, spatial analysis, MMA

## **El Estado del Marina de la Nación Manejó Areas (MMAs): Con el Énfasis en el Caribe, Atlántico y el Golfo de Regiones de México**

Actualmente, hay más de 1.500 MMAs en EE.UU. aguas marinas y los Grandes Lagos, manejado por centenares de claro federal, indica, y las autoridades territoriales. El Atlántico Sur (320) y el Golfo de México (295) las regiones tienen el número más grande de MMAs, mientras la región caribe tiene cincuenta y cinco MMAs individual. Mucha de esta área consiste en las zonas de la administración de pesquería que son enfocadas a promover pesquerías sostenibles. La herencia natural, federalmente manejada y grande MMAs ocurre también en cada región. La mayoría arrolladuro de MMAs en estas regiones es los sitios del múltiples-uso, en que una variedad de actividades humanas, inclusive la pesca y otras formas de cosecha, es permitida. Por contraste, el área de no-toma es pequeña; el diez por ciento del área dentro de MMAs en la región caribe es no-toma, mientras que menos de 0,01 % del área dentro de MMAs en el Golfo de México y Atlántico Sur prohíbe todas formas de cosecha. El análisis espacial de la ubicación, del tipo, de propósito de conservación, y del nivel de la protección dentro de MMAs en los EE.UU. Caribe, el Golfo de México y regiones de Atlántico Sur es presentado. Las pautas y las tendencias en enfoques de administración y distribución de MMAs serán comparadas y serán contrastadas a través de regiones.

PALABRAS CLAVES: Marina protegió área, El Atlántico, Golfo de Mexico

## **INTRODUCTION**

Faced with widespread declines in ocean health and a growing interest in place-based ecosystem management, many nations, including the United States (U.S.) are establishing marine protected areas (MPAs) to address declines in recreational and commercial fisheries, habitat degradation, loss of biodiversity, and threatened species and populations (Agardy 1994, Allison *et al.* 1998, NRC 2001). Many types of areas have been established for various purposes, ranging from restoring and protecting biodiversity to promoting sustainable fisheries (Agardy 1994). The national marine sanctuaries, national parks and wildlife refuges, state parks, and fishery management areas are common examples of the wide array of spatial management in U.S. waters. These sites are representative of the diverse legal authorities and programs, which occur at all levels of government (i.e. federal, state, and territorial) within U.S. waters from 0 - 200 nm offshore. U.S. MMAs are as diverse as they are numerous; differing in terminol-

ogy, purpose, jurisdiction, allowable uses, and level of protection. MMAs range in overall management approach from relatively rare "no-take" areas that prohibit all extractive uses, to the more common "multiple use" areas in which a variety of consumptive and non-consumptive uses are allowed and often encouraged. Adding to the confusion in managing MMAs is the lack of a clear terminology, a scientific consensus on their benefits and a unified approach to managing their design and management (NRC 2001, Agardy *et al.* 2003). The growing use and challenges of place-based management in the ocean led to Presidential Executive Order 13158, which was signed in May 2000. The Executive Order seeks to enhance the management, protection, and conservation of U.S. marine resources through more effective and participatory uses of MPAs as an ecosystem management tool. It directs the National Oceanic and Atmospheric Administration (NOAA) and the Department of the Interior to work with

other federal agencies and states, territories, tribes, and the public to develop a scientifically-based, comprehensive national system of MPAs. MPAs, a subset of the broader MMAs, are defined by the Executive Order 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 and cultural resources therein.” To ensure a more comprehensive understanding of the various types of spatial management in the oceans, the MPA Center developed an inventory of all MMAs, which includes all areas established for purposes of conservation. The definition of MMA is purposefully broad in order to identify the full range and diversity of marine areas that potentially contribute to the protection of marine resources.

What is a Marine Managed Area? The MPA Center has defined an MMA as a site which has meets the following criteria:

- i) *Area* — Must have legally defined boundaries,
- ii) *Marine* — An area of ocean or coastal waters or the Great Lakes,
- iii) *Reserved* — Established by or currently subject to law or regulation,
- iv) *Lasting* — Provide year-to-year protection for a minimum of two consecutive years, and
- v) *Protection* — Have existing regulations that afford increased protection specifically to natural and/or cultural resources and qualities within the site.

Analysis of the MMA inventory provides a powerful analytical tool for understanding spatial approaches to conserving marine resources throughout the U.S. The Caribbean, South Atlantic, and Gulf of Mexico regions each have long histories managing MMAs to achieve various national, regional, and local objectives. By examining patterns in the distribution and management of MMAs in each region, we can begin to understand how this important place-based management tool is used in the U.S.

The purpose of this manuscript is to provide a broad overview of the distribution and purpose of MMAs in the Gulf of Mexico, South Atlantic, and Caribbean regions. Our intent here is to present regional information on:

- i) The number, areal coverage (in km<sup>2</sup>) and types of MMAs,
- ii) Discuss how various governmental levels contribute to management of MMAs,
- iii) Examine the major programs that manage MMAs, and
- iv) Evaluate the level of protection afforded to species, populations and habitats within MMAs.

We intentionally examine MMAs at the broad spatial scale, providing an overview of the MMA landscape in each region.

## METHODS

The National Marine Protected Areas Center in collaboration with local, territorial, state, and federal partners initiated the development of an unprecedented inventory of the location, purpose, goals, habitats, species protected, and restrictions within each MMA in the U.S. For each MMA, the following information was collected on:

- i) Name, type, government level, establishment date,
- ii) Geographical location and size,
- iii) Legal authority, regulation citations, legal dates of interest, brief description of restrictions, and protections afforded to marine resources, and
- iv) Site management, (i.e., management plan).

In addition, shape files of the spatial distribution of each MMA were either acquired from the management entity or created by the MPA Center. The MMA inventory represents the best and most comprehensive database of U.S. MMAs available to date. Presently, more than 1,800 MMAs are contained in the national inventory of MMAs.

In response to the complex assortment of different MPA types and purposes, the MPA Center developed a classification system that provides agencies and stakeholders with a straightforward means to describe MPAs in purely functional terms using five objective characteristics common to most MPAs. These are:

- i) Conservation focus,
- ii) Level of protection,
- iii) Permanence of protection,
- iv) Constancy of protection, and
- v) Ecological scale of protection.

This classification is easily applied and available at [www.MPA.gov](http://www.MPA.gov). Non-spatial data were queried in ACCESS 2003.

Spatial analysis of the MMA inventory was conducted in ArcGIS 9.2 using spatial analyst. GIS shape files were not available for all sites; 84% of all sites in Gulf of Mexico, 87% of all sites in the South Atlantic, and 93% of all sites in the Caribbean were included in the analysis. However, most of the missing sites are small (often these areas are shipwrecks and other cultural heritage sites). Analyses are restricted to the waters contained within the U.S. jurisdiction, which includes waters from the shoreline to 200 nautical miles (nm) offshore. Spatial analysis was conducted only on the marine portions (defined as the mean high water mark and below) and excluded all terrestrial areas.

## RESULTS AND DISCUSSION

The South Atlantic region has more MMAs (339) than the Gulf of Mexico (318) and the Caribbean (42) regions and these cover considerable portions of the regional waters (0 - 200 nm) (Table 2, Figure 1 & 2). In the Gulf of Mexico and South Atlantic, 41% and 68% of the U.S.

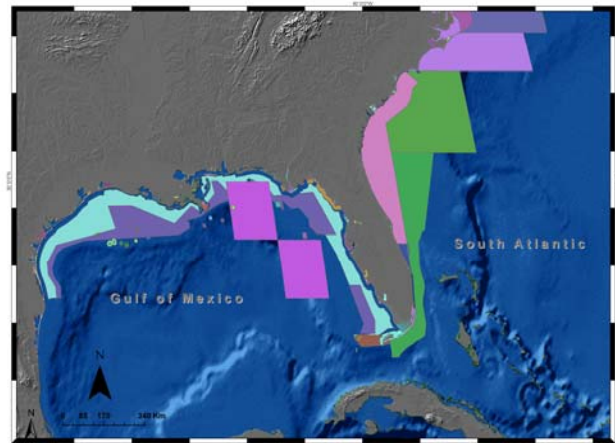
waters (0–200 nm), respectively occur in some type of MMA (Table 2). To many, this creates the perception that large portions of the marine environment in these regions are conserving biodiversity and ecosystem function. However, most of the MMA area in the Gulf of Mexico and South Atlantic regions was established by the National Marine Fisheries Service (NMFS) to promote sustainable fisheries or to allow for continued harvest of important fisheries stocks, while protecting non-target stocks or endangered species. In the Caribbean region, less than 1% of the U.S. waters are contained within MMAs (Table 2), most of which was established by the Caribbean Fishery Management Council and NMFS in response to declining reef fish populations and to conserve reef fish spawning aggregations.

### Conservation Focus

MMAs generally address one or more of three different conservation goals. Natural heritage MMAs are created to conserve natural heritage values, such as biodiversity, ecosystems or protected species. Sustainable production sites are established to support healthy and sustainable fisheries, which might include restoring overfished stocks, and protecting spawning grounds or other key habitats. Lastly, cultural heritage MMAs focus on conserving our nation's maritime history and traditional cultural connections to the sea, such as shipwrecks, submerged cultural artifacts, and areas important to specific cultures. An MMA's conservation focus influences its design, location, size, management strategies, and potential contribution to surrounding ecosystems.

The majority of the MMA area in the three regions was established for sustainable production in response to declining stocks of important fisheries. For example, in the Gulf of Mexico, 91% of the MMA area is focused on sustainable production. The Reef fish stressed area and reef fish longline gear and buoy closure areas are by far the largest two MMAs in the Gulf of Mexico (Figure 1). In the South Atlantic, a combination of natural heritage (57% of MMA area) and sustainable production (43% of MMA area) MMAs exist. The largest sustainable production MMAs includes Charleston Bump, East Coast Florida Closed Area, and the Flynet Closure located off the coast of North Carolina (Figure 1). Large natural heritage MMAs consist of the Southeast U.S. Monitoring and Restricted areas, which span the entire coast of the U.S. The Caribbean region contains natural heritage (92% of MMA area) and sustainable production (8% of MMA area) MMAs. The largest MMA in the region is the Mona Island Natural Reserve, focused on natural heritage conservation, and supports a large coral reef trap fishery. Other natural heritage MMAs include the Department of Interior sites such as Virgin Islands National Park, Buck Island Marine Garden, and Salt River Canyon, which protect coral reef ecosystems and their associated fisheries. Six sustainable production MMAs are located in the Caribbean, four of

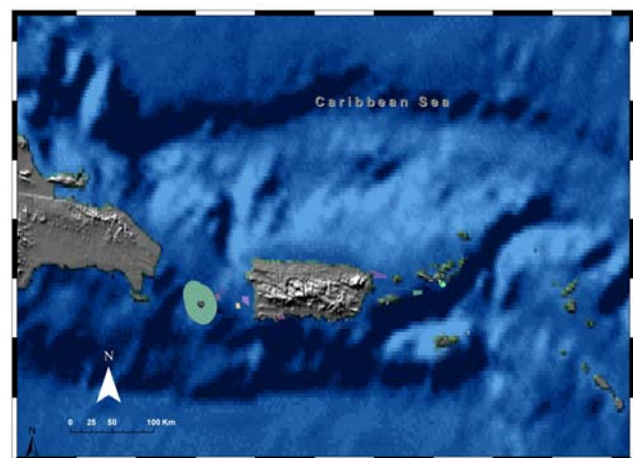
which were designated to conserve spawning aggregations for groupers and snappers.



**Figure 1.** The areal coverage (km<sup>2</sup>) of MMAs in the South Atlantic and Gulf of Mexico regions. Individual MMAs are uniquely colored.

**Table 2.** Summary statistics of MMAs in the Gulf of Mexico, South Atlantic and Caribbean regions.

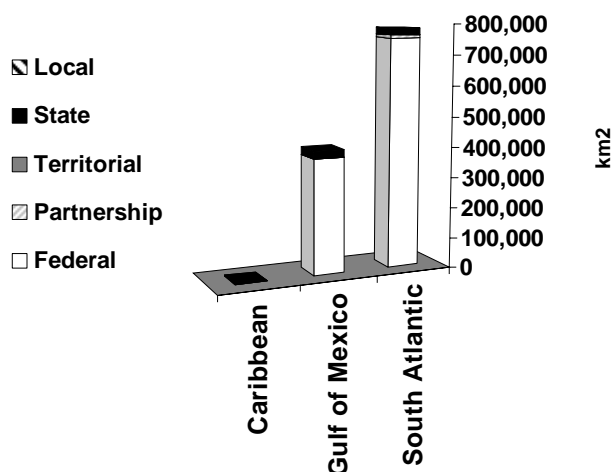
	Gulf of Mexico	South Atlantic	Caribbean
# of MMAs	318	339	42
Area (km <sup>2</sup> ) of MMAs	292, 289	358,441	2,446
Percentage of overlap	30 %	55 %	4 %
Percentage of regional waters (0-200nm)	41 %	68 %	<1 %
Total no-take (year round) MMA area (km <sup>2</sup> )	25	~1300	269



**Figure 2.** The areal coverage (km<sup>2</sup>) of MMAs in the Caribbean region. Individual MMAs are uniquely colored.

### Level of Government

The vast majority of the MMA area in the South Atlantic (98%) and Gulf of Mexico (99%) regions is managed by the federal government (Figure 3). In the Caribbean region, most of the MMA area (94%) in Puerto Rico is managed by the territorial government, whereas in the U.S. Virgin Islands, the federal government manages most of the MMA area (96%) in a system of national parks.



**Figure 3.** Total MMA area (km<sup>2</sup>) by level of government for MMAs in the South Atlantic, Gulf of Mexico and Caribbean region.

### Major MMA Programs in Each Region

In each region, a few major resource management programs manage the majority of the area within MMAs, and these programs vary from region to region (Table 3). Some programs are focused more on terrestrial habitats (some State Parks, Wildlife Management Areas and National Wildlife Refuges), though they may have areas within their boundaries that occur at the marine and terrestrial interface. For instance, the state parks, game lands and dedicated nature preserves of North Carolina do not actively manage open ocean or marine areas. Other programs specifically target marine ecosystems by focusing on specific species (such as the endangered manatee), water quality (SWIM areas and Florida Outstanding Waters) or unique marine habitats and features (Aquatic Preserves program in Florida).

The dominant programs in each region reflect the historical legislative mandates and objectives of individual territorial, state and federal resource management agencies. For example, in the Gulf of Mexico and South Atlantic the Florida Outstanding Waters (OFW) program of the Department of Environmental Program (DEP) manages close to 200 individual MMAs, more than any other program in these regions (Table 3). This special designation is applied to certain Florida waters, and is intended to protect existing high-level water quality (DEP 2007). In general, DEP cannot issue permits for direct pollutant discharges to OFWs which would lower ambient (existing)

**Table 3.** Major MMA management programs for each region (excluding NMFS sites), with number of individual MMAs per region indicated.

	Gulf of Mexico	South Atlantic	Caribbean
Outstanding Waters	108	88	0
Aquatic Preserve	21	15	0
SWIM	12	3	0
State Parks	24	32	0
Manatee speed zones	10	7	0
Nature Reserves	0	0	28
National Wildlife Refuges	10	18	0
National Estuarine Research Reserve	7	5	1
Critical Wildlife Area	11	7	0
National Seashore	3	5	0
National Monument or National Park	1	3	3
Coastal Preserve	16	0	0
Recreation Area	8	7	0
Wildlife Management Area	12	4	0
Game Land	0	12	0
North Carolina Dedicated Nature Preserve	0	16	0
Marine Reserve and Wildlife Sanctuary	0	0	4

water quality or for indirect discharges (DEP 2007). In the Caribbean, the Department of Natural and Environmental Resources of Puerto Rico (DNER) is responsible for the management of 28 areas with marine components including Natural Reserves, a Commonwealth Forest and a Marine Reserve. All of the sites have been designated by the Puerto Rico Planning Board, except Isla Desecheo Marine Reserve and Seven Seas Natural Reserve which was designated by the Puerto Rico Legislature. The three Red Hind (*Epinephelus guttatus*) Spawning Aggregation Sites were designated by a joint effort between DNER and the Caribbean Fisheries Management Council.

### Federal Programs

Several federal agencies are responsible for managing the bulk of the MMA area in the Gulf of Mexico, South Atlantic, and Caribbean regions (Table 3). The U.S. Fish and Wildlife Service manage a large suite of wildlife refuges that have coastal wetlands, nesting bird beaches and sand bars and sensitive intertidal habitats. National wildlife refuges are located in South Carolina, North Carolina, Florida, Louisiana, Mississippi, and Texas and include St. Marks National Wildlife Refuge and Matlacha Pass National Wildlife Refuge. While several wildlife refuges occur in Puerto Rico, these sites do not have jurisdiction of areas below the mean high water mark, consequently these sites do not meet the federal definition for inclusion in the MMA inventory. The National Estuarine Research Reserve System, (NERRS) a network of protected areas established for long-term research, education and stewardship, has 13 MMAs in the Gulf of Mexico, South Atlantic and Caribbean regions. The NEERS program is a partnership between NOAA and the coastal states that protects more than one million acres of estuarine land and water that provide essential habitat for wildlife; offers educational opportunities for students, teachers and the public; and serves as living laboratories for scientists. The Department of Interior's National Park Service system manages several areas in the South Atlantic and Caribbean regions, including Biscayne National Park (NP), Dry Tortugas NP, Virgin Islands NP, and Buck Island NP. Buck Island Reef National Monument, Salt River Bay National Historic Park and Ecological Preserve, and Virgin Islands Coral Reef National Monument are MMAs that are also managed by the Department of Interior. These sites conserve coral reef, seagrass, and mangrove habitats which support recreational and commercial fisheries including conch, lobster and grouper/snapper fisheries.

By far, the overwhelming majority of area within MMAs in the Gulf of Mexico and South Atlantic regions is managed by the National Marine Fisheries Service (NMFS), though there are considerably fewer compared to state MMAs. More than 90% of the MMA area in these regions is managed by NMFS to support sustainable fisheries or to protect vulnerable species or habitats, while

optimizing fishing opportunities. For instance, large portions of the Gulf of Mexico region are designated as part of the Reef Fish Longline and Buoy Gear Restricted Area (Figure 4). The Gulf of Mexico Fishery management Council identified the Longline Gear Exclusion Zone throughout some 180,000 km<sup>2</sup> of waters in the Gulf of Mexico, which prohibits the use of longline gear that specifically targets reef fishes. Given the continued decline of grouper populations in this region, there is concern that other types of fishing methods (commercial and recreational) quickly filled in the void created by designating this particular MMA (Coleman et al. 2004). The Reef fish Stressed Area was also designated by the Gulf of Mexico Fishery Management Council in response to intensive recreational fishing pressure on reef fish populations. This measure implemented gear restrictions aimed at the commercial fishery, by excluding explosive tipped spear guns, fish traps and roller-rig trawls. Another large NMFS MMA called the Desoto Canyon Closed Area encompasses close to 90,000 km<sup>2</sup>, and was implemented to reduce by-catch of non-target and undersized billfish, swordfish and tunas. This single site represents twenty percent of the total MMA area in the Gulf of Mexico. Here, pelagic longline fishing gear may not be used for pelagic fishing, though other types of longline fishing, trolling, and bottom gear contact are still allowed.

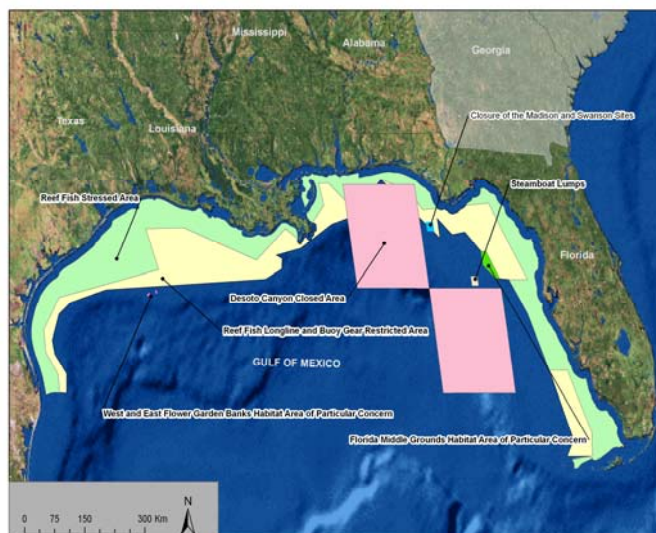
In the South Atlantic, NMFS manages 93% of the total MMA area, much of which occurs in areas designated to protect right whale populations and billfish, swordfish and tunas (Figure 5). The Atlantic large whale take reduction areas (ALWTRP) were intended to reduce the level of serious injury and mortality of three strategic stocks of large whales (North Atlantic right, humpback, and fin) in commercial gillnet and trap/pot fisheries. Part of the ALWTRP consists of time-area closures, which includes the Southeast US Monitoring Area and Southeast U.S. Restricted Area (Figure 5). These were established primarily to protect natural heritage by reducing risks of injury due to specific fishing activities to threatened species, however other less-threatening types of fishing can still occur. The East Florida Coast Closed Area and Charleston Bump MMAs were also designated to reduce by-catch of undersized and non-target billfish, sharks and swordfish. Consequently, such regulations primarily affect the commercial fishery.

In the Caribbean, the Caribbean Fishery Management Council (CFMC) and NMFS also manage considerable portions of the MMA area (~10%), though this is considerably less than the area managed by NMFS in the Gulf of Mexico and South Atlantic regions. The CFMC established spatially and temporally predictable areas that are crucial for reproduction for red hind populations and other groupers and snappers. Several multi-species spawning aggregations are seasonally protected in deep water shelf areas off Puerto Rico and the U.S. Virgin Islands.

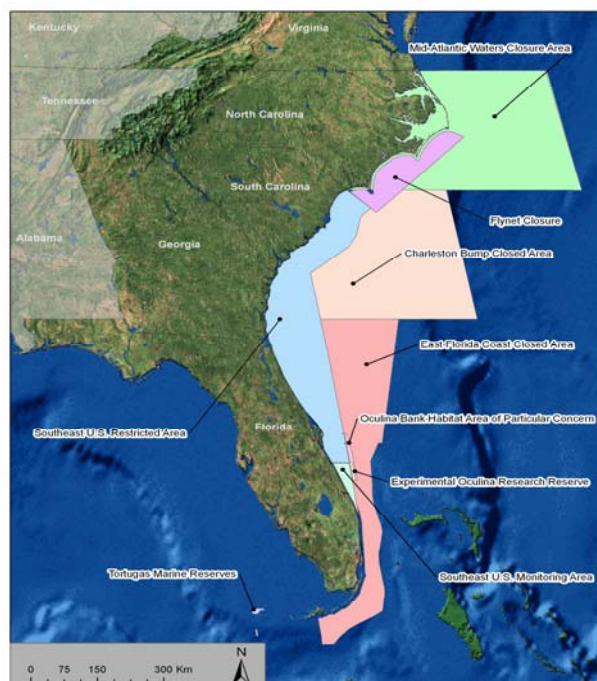


The Department of Interior and NOAA manage smaller portions of the federally mandated MMAs in the regions. The Department of Interior manages multiple MMAs in the Caribbean and South Atlantic regions including the large Virgin Islands Coral Reef National Monument, Buck Island Reef National Monument and Salt River Bay National Historic Park and Ecological Preserve in the Virgin Islands. In the South Atlantic, Dry Tortugas

and Biscayne National Park occur with large marine portions. The National Seashore program of the Department of Interior manages multiple coastal beaches in the Gulf of Mexico and the South Atlantic region. NOAA manages the large, multiple use Florida Keys National Marine Sanctuary, which has several small no-take areas within the boundaries. In the Gulf of Mexico, the Flower Gardens National Marine Sanctuary protects sensitive deep water coral habitat from benthic trawling.



**Figure 4.** Distribution of National Marine Fisheries Service MMAs in the Gulf of Mexico region.



**Figure 5.** Distribution of National Marine Fisheries Service MMAs in the South Atlantic region.

### State Programs

States use a wide variety of site designation authorities to protect and manage natural and cultural coastal and marine resources. Every state and territory has different bureaus, departments, and divisions that regulate the environment, manage lands, and regulate commerce. The distribution of MMAs in each state reflects the mandates of these state programs.

State parks occur in Florida, Texas, Georgia, and North Carolina, many of which emphasize recreational opportunities and facilitate the enjoyment and use of coastal resources. Florida's state park system is one of the largest in the country with 160 parks spanning more than 723,000 acres and 100 miles of sandy white beach, with 55 of these sites that meet the MMA criteria. Texas has five coastal state parks with small estuarine areas, such as Goose Island, Galveston and Sea Rim State Parks. These areas are among the few public places where residents can enjoy outdoor recreation. The Georgia State Parks system manages primarily terrestrial sites, though five areas with wetlands and small marine portions are managed as state parks (i.e. Crooked Rover and Skidaway) or Historic Sites (i.e. Wormsloe Historic Site, Fort King George Historic Site). North Carolina has a system of 32 state parks and four state recreation areas, with five located along the Outer Banks coastal dune system (i.e. Masonboro Island and Hammocks Beach State Park). While South Carolina has five coastal state parks, jurisdiction of these areas does not include sub-tidal habitat, and are therefore not considered MMAs.

Other major state-managed programs occur in each state. Florida has 41 Aquatic Preserves, encompassing almost two million acres, which provide for protection of wildlife habitat, recreational opportunities, and cultural heritage (DEP 2007b). Aquatic Preserves are located along Florida's 8,400 miles of coastline in both the Gulf of Mexico and South Atlantic regions, and typically target the shallow waters of marshes and estuaries. Georgia Natural Areas are properties managed by the Department of Natural Resources for conservation of rare species and natural communities. The primary management objective for natural areas is restoration and maintenance of natural species and habitat diversity, with five of these sites considered MMAs. In Mississippi the Department of Marine Resources (DMR) Coastal Preserves Program manages 20 MMAs. This state program was developed in

1992 by authority of the Wetlands Protection Act to acquire, protect, and manage sensitive coastal wetland habitats along the Mississippi Gulf Coast. This program was established to ensure the ecological health of Mississippi coastal wetland ecosystems (DMR 2007). In Louisiana, eight MMAs are managed by the state, most of which are designated to provide habitat and hunting opportunities for game species in coastal wetlands (i.e. Atchafalaya Delta Wildlife Management Area and Game Preserve). The Wildlife Management Area (WMA) program of Texas was established to represent habitats and wildlife populations typical of each ecological region of Texas, and presently manages five coastal WMAs (i.e. Murphree Wildlife Management Area). South Carolina has the fewest number of state managed MMAs (10), each of which are created by varying legal authorities. Examples include the Bird Key Stono Heritage Preserve, which provides nesting, roosting and foraging habitat for a variety of sea and shore birds, and the Cooper River Dive trail where fossilized Megalodon shark teeth are found. The Dedicated Nature Preserve program of North Carolina is large, with 17 individual MMAs, however these sites are not actively managed, rather such areas are nominated and subsequently designated by a state authority as “outstanding” areas. State programs such as these manage a greater number of individual MMAs, but a smaller total areal extent (km<sup>2</sup>) than federal entities.

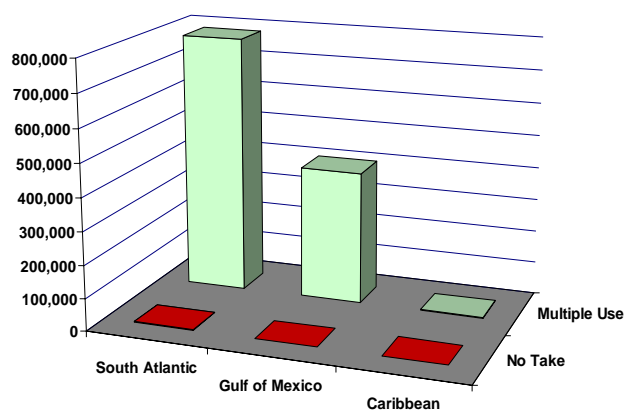
### Territorial Programs

In the Caribbean region, the territorial governments of Puerto Rico and the U.S. Virgin Islands have programs dedicated to the conservation of coastal and marine habitats. In Puerto Rico, the Department of Natural Resources manages a system of territorial natural reserves, many of which incorporate wetlands, mangrove and coral reef habitats. The U.S. Virgin Islands territorial government manages four marine reserve and wildlife sanctuaries including St. James Marine Reserve and Wildlife Sanctuary off St. Thomas.

### Level of Protection

Almost the entire MMA area (99%) of the Gulf of Mexico, South Atlantic and Caribbean regions allows various extractive activities and multiple human uses (Figure 6). Such uses include various forms of commercial and recreational fishing for pelagic species (sharks, tunas), reef fishes (grouper, snapper), benthic organisms (lobster, conch) and other marine resources. Longline fishing, shrimp trawling, fish trapping, and roller rig trawls are examples of the types of activities which can occur within the boundaries of many MMAs. In each region, the vast majority of the area in MMAs is multiple use (Figure 6). In the South Atlantic, approximately 750,000 km<sup>2</sup> and in the Gulf of Mexico approximately 500,000 km<sup>2</sup> of the area designated within MMAs is open to a variety of human uses, including fishing. In contrast, the no-take area in

small, and makes up less than 1% of the MMA area for any given region (Figure 6).



**Figure 6.** Total no-take (in red) and multiple use (green) area within MMAs in the Gulf of Mexico, South Atlantic, and Caribbean regions.

### CONCLUSION

The Gulf of Mexico, South Atlantic and Caribbean regions have many MMAs that span large portions of the U.S. waters (0 - 200 nm). In the South Atlantic, close to 70%, and in the Gulf of Mexico, close to 40% of the U.S. waters are managed spatially by federal, state, partnership and local entities. In the Caribbean region, only 1% of the U.S. waters exist in MMAs, though several large areas are located in critical coral reef habitats. In spite of this vast area set aside, many and in the majority of cases, most forms of extraction and harvest can occur. Rather, in much of this area, a complex regulatory framework exists that targets single species (Atlantic Large Whale Take Reduction Areas) and individual gear types (Pelagic long lines) or fisheries (Reef fishes or sharks). The effectiveness of these MMAs has typically not been evaluated, though continued declines of important marine resources indicates the need to assess the ability of current approaches in meeting regional and national fisheries and conservation objectives.

These analytical results illustrate how MMAs are widely used and cover a significant portion of the Gulf of Mexico, South Atlantic and Caribbean regions. Interesting differences are seen in MMA usage among the three coastal states and between state and federal management programs, with individual legal authorities and regulatory programs and agencies influencing the types and management of MMAs in each region. While more MMAs are managed by state programs, the federal government controls most of the MMA area in the Gulf of Mexico and the South Atlantic, whereas in the Caribbean, more area is managed by the territorial government. Almost the entire area within MMAs in these regions is multiple use, with a small fraction (< 1%) designated in no-take MPAs. These

analyses lay the groundwork for understanding the contribution of MMAs in conserving marine resources, and help identify gaps in protection for future planning efforts.

### ACKNOWLEDGEMENTS

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