

**UNITED
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Environment
Program**

EP

Original: ENGLISH

Proposed areas for inclusion in the SPAW list
ANNOTATED FORMAT FOR PRESENTATION REPORT FOR:

**Flower Garden Banks National
Marine Sanctuary**

United States of America

Date when making the proposal : 29/8/12

CRITERIA SATISFIED :

Ecological criteria

Representativeness

Conservation value

Rarity

Naturalness

Critical habitats

Diversity

Connectivity/coherence Resilience

Cultural and socio-economic criteria

Productivity

Cultural and traditional use

Socio-economic benefits

The following information to list the Flower Garden Banks National Marine Sanctuary is reported in the format according to the Guidelines and Criteria for the Evaluation of Protected Areas to be listed under the SPAW Protocol.

(* = required information)

I. IDENTIFICATION

**a - Country:*

USA

**b - Name of the area:*

Flower Garden Banks National Marine Sanctuary

**c - Administrative region:*

Southeast United States, Gulf of Mexico Federal Waters

**d - Date of establishment:*

December 5, 1991 (Federal Register Notice [56 FR 63634](#))

**e - If different, date of legal declaration:*

January 17, 1992 (Signed Designation). Stetson Bank added to sanctuary in 1996.

**f - Geographic location (include a separate annex with a geographical map as stated in the legal declaration of the area), and geographical coordinates (X,Y for the central point, WGS84, UTM projection system):*

Three topographic features at continental shelf margin 115 miles south of the Texas and Louisiana border in federally administered waters. Includes East and West Flower Garden Banks and Stetson Bank.

For map see:

http://flowergarden.noaa.gov/image_library/maps/fgnmsatlasmap.jpg

For coordinates see:

http://flowergarden.noaa.gov/document_library/aboutdocs/boundary_buoy_coord.pdf

**g - Size (sq. km):*

145 sq km

**h - Contact address (with the website address if existing):*

4700 Ave U, Building 216, Galveston TX 77551 USA <http://flowergarden.noaa.gov>

**i- Marine ecoregion (according to the Marine Ecoregions of the World classification):*
Northern Gulf of Mexico -- 43

The banks that are part of the sanctuary are circled in red.

Stetson Bank. Black and red box is existing boundary. Red line is potential new boundary that is being proposed.

East Flower Garden Bank. Black and red outline is existing boundary. Red outline is potential new boundary that is being proposed. Red lines to southwest propose to link East Flower Garden Bank to West Flower Garden Bank and incorporate additional seafloor features into the sanctuary.

West Flower Garden Bank. Black and red outline is existing boundary. Red outline is potential new boundary that is being proposed. Red lines to east propose to link West Flower Garden Bank to East Flower Garden Bank and incorporate additional seafloor features into the sanctuary.

II. EXECUTIVE SUMMARY

Present briefly the proposed area and its principal characteristics, and specify the objectives that motivated its creation:

The Flower Garden Banks National Marine Sanctuary provides natural resource protection to some of the most intact coral reef ecosystems and most healthy coral communities in the Western Atlantic. These reefs are the northern most coral reefs in the continental US. Surrounded by seafloor of 150 m water depths, the reefs grow on salt-dome features that rise to within 16 m of the sea surface at the margin of the continental shelf in the northern Gulf of Mexico. The sanctuary also protects mesophotic reef communities in its deepwater areas. The sanctuary was created by public interest to protect these coral reef communities from expanding oil and gas development, anchoring and fishing impacts in the NW Gulf of Mexico. The coral reefs are popular dive sites. Recreational and commercial fishing is allowed in the sanctuary with some gear restrictions and oil and gas production infrastructure is also present within sanctuary boundaries. As a result, the Flower Garden Banks is an example of how marine resource use and conservation protections can compatibly coexist with the US National Marine Sanctuary System.

**Explain why the proposed area should be proposed for inclusion in the SPAW list, and according to you, the Criteria to which Criteria it conforms (Guidelines and Criteria B Paragraph 2):*

The Flower Garden Banks addresses all of the ecological and social/economic criteria for inclusion on the List (described in more detail in Section IV). The Flower Garden Banks are one of a chain of reefs and banks that ring the Gulf of Mexico. These banks are ecologically and physically connected by the currents and species migrations through the Gulf. They form part of a network of key habitats that sustain the diversity and abundance of marine life within the Gulf of Mexico and are linked to the east coast of the US by the Loop and Florida Currents. The Flower Garden Banks are the most important examples of tropical reef communities on the banks of the NW Gulf of Mexico and also protect deepwater hardground benthic communities in the region. The sanctuary protects healthy diverse coral populations and other benthic invertebrates that are key components of the Gulf of Mexico ecosystem and are essential habitat for many commercial and other fish species. The coral reefs are considered some of the healthiest in the Caribbean region and their protection is important to the condition of the wider Gulf ecosystem. Coral cover has been consistently high (>50%) over 30 years of monitoring. *Acropora palmata* colonies exist, which are the deepest records of this species. Deepwater habitats include algal nodule reefs, brine seeps and chemosynthetic communities and mud volcanoes. The robust nature of the coral reef populations, including high coral cover and colony sizes, demonstrate the resilient and resistance of the sanctuary ecosystem to disturbances that have disrupted other coral reefs in the Caribbean.

III. SITE DESCRIPTION

**a) General features of the site*

Three discrete topographic features 112 -185 km off the coasts of Texas and Louisiana that rise to within 17 m of the sea surface and surrounded by water depths of 150 m where seafloor hardgrounds and brine seeps support deepwater coral and chemosynthetic communities.

- Terrestrial surface under sovereignty, excluding wetlands (sq. km):

N/A

- Wetland surface (ha):

N/A

- Marine surface (sq.km):

145 sq km

b) Physical features

East Flower Garden Bank is a pear-shaped topographic high that rises 150 m above the surrounding seafloor at the margin of the continental shelf. It is 8.7 by 5.1 km in size, capped by 1.43 square km of coral reef that is within 17 meters of the sea surface. West Flower Garden Bank is a similar oblong-shaped topographic feature, 11 by 8 km in size and includes 0.42 square km of coral reef area 18 meters below the surface. Stetson Bank is located 113 km south of Galveston, Texas, and 48 km to the northwest of West Flower Garden Bank on the continental shelf. Stetson Bank is 800 m long, 300 m wide, and rises abruptly from the 53 m depth of the local seafloor to its highest point of 17 m below the sea surface. The bank is ringed by a 2,500 m diameter outcropping of hardground on the seafloor with a maximum of 2.5 m of relief.

**c) Biological features (attach in annex existing inventories of species of flora and fauna with Latin names)*

Brain and star corals dominate the coral caps of the Flower Garden Banks, with some coral colonies exceeding 6 meters in diameter. There are at least 21 species of coral, covering over 50% of the bottom to depths of 30 meters. Deepwater habitat of the Flower Garden Banks makes up over 98% of the area within the sanctuary boundaries. These deep habitats include algal-sponge communities, “honeycomb” reefs (highly eroded outcroppings), mud flats, mounds, mud volcanoes and brine seep systems. Assemblages in these deeper habitats include extensive coralline algae pavements and nodules, sea fans, sea whips and black corals, deep reef fish, batfish, sea robins, basket stars and feather stars.

For detailed species lists see:

http://flowergarden.noaa.gov/document_library/aboutdocuments.html

*- Habitats: *brief description of dominant and particular habitats (marine and terrestrial):*

Coral reefs, mesophotic coral communities, deepwater hardgrounds, brine seeps

If possible detail for each habitat/ecosystem the area it covers or, if it is not known with accuracy, provide a rough estimate of the area (using an interval min<surface<max for example)

Coral Reef: 2.68 sq. km, 1.84% of the area within the sanctuary.

Coral Community (i.e., non-reef-building): 0.05 sq. km, 0.03% of the area within the sanctuary.

Coralline Algae Zone:

Algal nodules: 28.27 sq. km, 19.45% of the area within the sanctuary.
Coralline Algal reef: 4.98 sq. km, 3.43% of the area within the sanctuary.

Deep Coral: 12.37 sq. km, 8.51% of the area within the sanctuary.

Soft Bottom Community: 96.95 sq. km, 66.69% of the area within the sanctuary.

*- Flora: *brief description in a few sentences of the main plant assemblages significant or particular in the area:*

All plant species at the Flower Garden Banks are marine. More than 100 species of green, brown and red algae have been identified at the Flower Garden Banks.
http://flowergarden.noaa.gov/document_library/aboutdocs/fgbnmscoralcapspecies.pdf

These include many of the typical tropical marine species found on coral reefs in the Caribbean that form a complex of erect and turf growth forms. Algae growth and species distribution is ecologically linked to the amount of nonliving-coral hard substrate, nutrient inputs (low at the Flower Garden Banks) and grazing intensity. In addition, corals themselves are a consortium of plant and animal life. Coral growth and nutrition is closely dependent on their internal symbiotic algae. In deeper areas of the sanctuary (45 - 85 m), coralline algae is important in benthic habitat formation and builds nodules up to 25 cm in diameter, pavements and crusts.

Where possible, provide an estimate of the population sizes for each species within the lists above.

*- Fauna: *brief description in a few sentences of the main fauna populations and/or those of particular importance present (resident or migratory) in the area:*

The habitats of the Flower Garden Banks have been classified into depth related zones that contain distinctive communities of fauna and associated flora.

Coral Reef Zone

The coral reef zone is the shallowest zone at the Flower Garden Banks, occurring at depths of between approximately 17 to 44 meters. Large, closely spaced star and brain coral heads, many greater than 3 meters in diameter and height dominate the zone. Reef topography is relatively rough, with many vertical and inclined surfaces and crevices. Between groups of coral heads, there are numerous sand patches and channels. This zone is characterized by a high diversity coral assemblage dominated by *Montastraea spp.*, *Diploria strigosa*, *Colpophyllia natans* and *Porites astreoides*. Coralline algae, and filamentous and leafy algae also occur on reef substrates, but are not dominant members of the benthic assemblage. *Madracis mirabilis* forms large monotypic stands in deeper portions of the coral reef community. Sponges and *Agaricia spp.* are common in crevices and cavities of the reef.

Coral Community Zone

The coral community zone is comprised of areas that, while not considered to be “true” coral reefs, do contain hermatypic (reef-building) coral species at low densities, or are characterized by other coral reef associated organisms, such as the hydrozoan *Millepora spp.* (fire coral), sponges and macroalgae. Coral communities are found in depth ranges similar to those that contain coral reefs (17 to 50 meters), where other environmental factors do not allow full development of coral reefs. This community type is predominant at Stetson Bank.

The coral community at the Flower Garden Banks is characterized by the blushing star coral, (*Stephanocoenia intersepta*), the great star coral, (*Montastraea cavernosa*), and the large grooved brain coral, (*Colpophyllia natans*), and occurs between depths of 40 to 55 meters. Lettuce corals (*Agaricia spp.*) and brain coral (*Diploria strigosa*) are also an important part of the community. Crustose coralline algae are found on dead coral rock, along with leafy algae and numerous sponges. The dominance of hard corals declines with depth, and few coral colonies occur between 45 to 50 meters at East and West Flower Garden Banks. Coral communities at Stetson Bank are dominated by a *Millepora*-sponge assemblage, along with areas of *Madracis decactis* and individual colonies of *Diploria strigosa* and several other coral species.

Coralline Algae Zone

Found in depths between 45 to 90 m, the coralline algae zone is made up of algal nodule fields, pavements and coralline algal reefs. Coralline algae occurs within the photic zone above approximately 85 meters. This zone is rich in sponges, algae, gorgonians, and black coral, and harbors healthy populations of deep reef fish including rough tongue bass (*Pronotoqrammus martinicensis*), scamp (*Mycteroperca phenax*), and marbled grouper (*Dermatolepis inermis*). Crustose coralline algae forms large beds of algal nodules (also called “rhodoliths”), or massive reef structures composed of large plates and ridges. A variety of sponge species are abundant in this zone, along with numerous antipatharians (black corals) and octocorals (sea whips). Few reef-building corals occur at these depths, and are primarily limited to small isolated colonies.

Deep Coral Zone

Found in depths typically below 90 meters, the deep coral zone is dominated by eroded reef outcroppings, azooxanthellate (non-reef building) solitary hard corals, antipatharian and gorgonian corals, deep reef fish, sponges, bryozoans, and crinoids (feather stars). Rock surfaces are often highly eroded, and lack coralline algal growth. The deep coral zone is sometimes characterized by turbid water conditions, and reef outcrops may often be covered with a thin layer of silt (particularly at Stetson Bank).

Soft Bottom Community Zone

Large expanses of mud, sand, and silt substrates, which typify the soft bottom community zone, are found in the deepest parts of the banks and surrounding the banks. Features of the soft bottom community include pits, burrows, *Cirripathes* (*Stichopathes*) fields, stalked anemones, and echinoderms. Squat lobster (*Munida* sp.) are often observed in this zone. Deeper areas of the sanctuary are characterized by a soft, level bottom composed of both terrigenous sediments originating from coastal rivers and carbonate sediments resulting from calcareous planktonic remains and erosion of adjacent rocky outcrops and coral reefs. Soft bottom communities are often characterized by sand waves, burrows and mounds. Transitional zones between soft bottom communities and hard bottom features are characterized by exposed rubble, isolated patch reefs or exposed hard bottom. Areas with buried or exposed carbonate rubble are often colonized by antipatharians, octocorals, or solitary hard corals. These soft bottom communities are important feeding areas for fishes.

Fish

At least 280 species of fish have been documented within the sanctuary, including parrotfish, wrasse, angelfish, boxfish, smooth trunkfish and squirrelfish. Large schools of barracuda (*Sphyraena barracuda*) and pelagic jacks (*Caranx* spp.) also occur. Winter brings enormous schools of mackerel (*Scomberomorus* sp.). The conspicuous deeper water fish in the sanctuary include rough tongue bass, threadnose bass, vermilion snapper, red snapper, scamp, and marbled grouper. Commercially targeted species include snapper, grouper, jacks, and mackerel. Smooth trunkfish (*Lactophrys triqueter*) are common throughout the Caribbean, but the golden morph of the species is very rare and was first described at the Flower Garden Banks, and has since been rumored to occur in just one other place in the Caribbean.

Sea Turtles

Loggerhead and hawksbill sea turtles reside at all three banks of the sanctuary throughout the year. Loggerheads (*Caretta caretta*) are most often seen at night or in the late afternoon resting underneath ledges or coral heads. In the early morning they often leave the reef to feed in deeper areas of the sanctuary. The most frequently observed loggerheads are juveniles approaching maturity, perhaps suggesting that the sanctuary reefs serve as a temporary residence for these animals while they prepare to move on to adult feeding areas. Adult female loggerheads have also been sighted on several occasions. Because hawksbill sea turtles (*Eretmochelys imbricata*) are primarily sponge-eaters, Stetson Bank offers an abundant food source and is likely an excellent habitat for these turtles. A young hawksbill sea turtle has been a resident of Stetson Bank since 1999. A small number of transient hawksbills have also been reported at both the Flower Garden Banks and Stetson Bank.

Sharks & Rays

Approximately 20 species of sharks and rays have been documented at the Flower Garden and Stetson Banks, some seasonal, others year-round. During the winter months, schooling scalloped hammerhead sharks (*Sphyrna lewini*) and spotted eagle rays (*Aetobatus narinari*) are visitors to all three banks. The reason for the seasonality of their visits is unclear, but the occurrence is quite predictable. Other winter visitors include occasional sandbar (*Carcharhinus plumbeus*) and tiger sharks (*Galeocerdo cuvier*), as well as spinner sharks (*Carcharhinus brevipinna*), which are often seen leaping out of the water. Summer months usually bring whale sharks (*Rhincodon typus*) to the area. Nurse sharks are sometimes seen resting under ledges or in crevices in the coral, while large schools of silky sharks (*Carcharhinus falciformis*) are known to aggregate around oil and gas platforms in the vicinity of the sanctuary during the winter months. Silky sharks have recently been observed in large schools, exhibiting mating behavior at Stetson Bank. Manta rays (*Manta birostris*) and the very similar-looking mobula rays (*Mobula spp.*) are regular visitors to the sanctuary (Figure 11). At least 58 different individuals have been documented and identified by distinctive markings on their undersides. Acoustic tracking of the manta rays has revealed that the mantas are moving between at least the three banks of the sanctuary.

**Provide also the list of animal species within the site that are:*

- In SPAW Annex II & III

FAUNA

Class: HYDROZOA

Order: MILLEPORINA

Family: MILLEPORIDAE

branching fire coral *Millepora alcicornis*

Class: ANTHOZOA

Order: ANTIPATHARIA

Acanthopathes thyoides

Antipathes atlantica

Antipathes furcata

Antipathes sp.

Aphanipathes pedata

Elatopathes abietina

Phanopathes expansa

Plumapathes pennacea

Stichopathes sp.

Tanacetipathes sp.
Plus 11 unidentified species

Order: GORGONIACEA

Many present. List not compiled.

Order: SCLERACTINIA

elkhorn coral	<i>Acropora palmata</i>
lettuce coral	<i>Agaricia agaricites</i>
fragile saucer coral	<i>Agaricia fragilis</i>
ornate cup coral	<i>Coenocyathus sp.</i>
	<i>Colpophyllia amaranthus</i>
boulder brain coral	<i>Colpophyllia natans</i>
knobby brain coral	<i>Diploria clivosa</i>
symmetrical brain coral	<i>Diploria strigosa</i>
	<i>Eusmilia sp.</i>
hat or sunray lettuce coral	<i>Helioseris cucullata</i>
pointed pencil coral	<i>Madracis asperula</i>
ten-ray star coral	<i>Madracis decactis</i>
eight-ray finger coral	<i>Madracis cf. formosa</i>
yellow pencil coral	<i>Madracis auretenra (mirabilis)</i>
	<i>Madrepora carolina</i>
lobed star coral	<i>Montastraea annularis</i>
great star coral	<i>Montastraea cavernosa</i>
boulder star coral	<i>Montastraea franksi</i>
mountainous star coral	<i>Montastraea faveolata</i>
spiny flower coral	<i>Mussa angulosa</i>
diffuse ivory coral	<i>Oculina diffusa</i>
delicate ivory bush coral	<i>Oculina tenella</i>
	<i>Oxysmilia sp.</i>
papillose cup coral	<i>Paracyathus pulchellus</i>
	<i>Polycyathus senegalensis</i>
mustard hill coral	<i>Porites astreoides</i>
finger coral	<i>Porites furcata</i>
finger coral	<i>Porites porites</i>
speckled cup coral	<i>Rhizosmilia maculata</i>
artichoke coral	<i>Scolymia cubensis</i>
	<i>Siderastrea bournoni</i>
massive starlet coral	<i>Siderastrea siderea</i>
	<i>Stephanocoenia michelini</i>
blushing star coral	<i>Stephanocoenia intersepta</i>
orange cup coral (invasive)	<i>Tabastraea coccinea</i>

Class: MOLLUSCA
Order: MESOGASTROPODA
Family: STROMBIDAE

queen conch *Strombus gigas*

Class: CRUSTACEA
Order: DECAPODA
Family: PANULIRIDAE

Caribbean spiny lobster *Panulirus argus*

Class: AVES
Order FALCONIFORMES

merlin *Falco columbarius*

- *In the IUCN Red List*

giant manta ray	<i>Manta birostris</i>
mobula ray	<i>Mobula tarapacana</i>
	<i>Mobula hypostoma</i>
whale shark	<i>Rhincodon typus</i>
beaked whale	<i>Mesoplodon sp.</i>
Atlantic spotted dolphin	<i>Stenella frontalis</i>
bottlenosed dolphin	<i>Tursiops truncatus</i>
loggerhead turtle	<i>Caretta caretta</i>
hawksbill turtle	<i>Eretmochelys imbricata</i>

Where possible, provide an estimate of the population sizes for each species within the lists above.

Detailed abundance data is given in long-term monitoring reports:
<http://www.gomr.boemre.gov/PI/PDFImages/ESPIS/4/5058.pdf>
<http://www.gomr.boemre.gov/PI/PDFImages/ESPIS/4/5073.pdf>

d) Human population and current activities

- Inhabitants inside the area or in the zone of potential direct impact on the protected area (permanent and seasonal number):

No human populations are present near the sanctuary. Workers reside on petroleum production platforms in the region, but only boaters (fishing and diving) come to the sanctuary.

- **Description of population, current human uses and development:*

People only occasionally visit the sanctuary to dive or fish. Estimates are of up to 3000 divers a year visit the sanctuary on commercial dive boats. The number of recreational and commercial fishers is not known. The sanctuary's distance from shore limits the number of people that come to the sanctuary.

e) Other relevant features (such as educational, scientific, research, historical or archaeological features)

The biological habitats have long been of interest to scientists and educators in understanding and telling the story of the Gulf of Mexico ecosystem.

*f) * Impacts and threats affecting the area (both within and around the area)*

Vessel discharges, petroleum exploration and production, anchor impacts (although mooring buoys are present), potential overfishing and bycatch, diver damage and disturbances, regional water quality changes from Mississippi River inputs to the Gulf of Mexico, climate change impacts such as temperature increases and ocean acidification.

The list below is given only as a guide; Parties are free to report on other impacts and threats. Please be precise and, if possible, list which species and/or habitats are more particularly affected by the impacts and threats.

- Exploitation of natural resources (fishing, tourism, agriculture, forest products, others..):

Anecdotal reports from experienced observers, including numerous researchers and recreational divers, suggest a decline in the number of large fish (principally groupers and jacks). Also, lower numbers of large pelagic sharks, primarily the scalloped hammerhead, have been observed during the winter months in recent years.

- Pressure linked with increased population and development and, if relevant, outline historic and on-going conflicts:

The level of private, charter and commercial fishing is not well documented, but appears to be increasing. Discarded fishing gear and injured or dead fish, moray eels and sharks have been documented. A spear gun was recently found at East Flower Garden Bank, and spear tips have been recovered from all three banks, indicating that prohibited activities are taking place. Longline fishing is illegal within the sanctuary, as is bottom trawling, yet longline gear is often encountered during ROV operations in deeper waters, as are discarded trawl nets. Active longline fishing within the sanctuary boundaries has been witnessed by dive charter operators.

- *Threats to habitats and species (including, if necessary, a description of possible or existing invasive and/or alien species):*

The most common and persistent human activities occurring at the Flower Garden Banks are diving and fishing, but other activities, such as anchoring by large vessels and dragging of tow cables, occasionally occur. The levels of recreational diving activities appear stable at present.

The Indo-Pacific lionfish has recently become resident within the sanctuary. It has progressively spread throughout the Caribbean over the last two decades and the western Gulf of Mexico is one of the last areas in the Wider Caribbean to be invaded by this fish. Some other non-indigenous species exist in the sanctuary, but they are sparse enough to preclude substantial or persistent degradation to the ecosystem. Three colonies of an Indo-Pacific species of orange cup coral (*Tubastraea coccinea*) have been found in the sanctuary. This species may be becoming better established in the region. Prior to this finding, the coral had been reported in the Gulf of Mexico, but primarily on artificial structures such as oil and gas platforms. A Pacific species of nudibranch (*Thecacera pacifica*) was recently documented at Stetson Bank. It was photographed during reproduction, so it is likely that this species is becoming established.

- *Pollution (solid waste, point- and non-point pollution):*

Influxes of fresh water originating from land-based or river sources may contribute to the introduction of pollutants of terrestrial origin including pesticides and fertilizers, and cause lower salinity conditions, all of which can contribute to decreased water quality.

Contaminants originate from discharges from oil and gas platform operations. The exact contaminants contained in produced water are highly variable and difficult to track accurately. It is known that heavy metals, such as lead, cadmium, mercury and radioactive compounds, are associated with oil and gas activities in some circumstances. Studies have shown that the sediments surrounding the gas production platform known as High Island A389A, located within the sanctuary boundaries, contain comparatively high levels of mercury, lead, cadmium, zinc and other contaminants, probably due to the stipulations that require drilling lubricants and cuttings be shunted to within 10 meters of the seabed to avoid creating a sediment plume that could envelope the shallow reef areas

- *Other external threats (natural and/or anthropogenic):*

Recent events of coral bleaching (2005 in particular) are the result of higher-than-normal seawater temperature extremes and reflect the threat that climatic induced temperature increases pose to the sanctuary. Coral diseases, although not as much a threat as in other parts of the Caribbean, have occurred within the sanctuary.

g) *Expected or measured trends of the impacts and threats listed above. Please explain,*

to the extent possible, how the impacts and threats presented in f) are expected to evolve in the short-term and the mid-term.

Charts showing and describing the status and trends in water quality, habitat, and living resources at the Flower Garden Banks can be found at:

<http://flowergarden.noaa.gov/science/condreport08.html>

h) Information and knowledge available

Numerous research and monitoring reports have been published over four decades and continue.

Briefly describe what is known of the area and how well it is documented (attach a list of the main publications):

The shallow coral reefs of the sanctuary are well documented physically, biologically and ecologically. The deeper areas of the sanctuary are less well documented, but ROV and submersible observations have provided a good understanding of the biological character of these areas.

An extensive publication list and links can be found at:

http://flowergarden.noaa.gov/document_library/documents.html

IV. ECOLOGICAL CRITERIA

Describe how the nominated site satisfies one or more of the following criteria. (Attach in Annex any relevant supporting documents.)

Representativeness - *The area includes physiographic features, populations of species, habitats and ecosystem types or ecological processes that are representative of the country, region or eco-region.*

The Flower Garden Banks are the most important examples of tropical reef communities on the banks of the NW Gulf of Mexico and also protect deepwater benthic communities that exist on deep soft bottom and hardgrounds in the region.

Conservation value - *The area contributes to the conservation, including management, of the species, subspecies or populations of flora and fauna present in it, either as permanent residents, or during some life cycle stages, with the objective of preserving them as functioning members of their ecological communities, and preventing them from becoming threatened or endangered, both locally and throughout their range.*

The sanctuary protects healthy diverse coral populations and other benthic invertebrates that are key components of the Gulf of Mexico ecosystem and are essential habitat for many commercial and other fish species. The coral reefs are

considered some of the healthiest in the Caribbean region and their protection is important to the condition of the wider Gulf ecosystem.

***Rarity** - The area conserves unique or rare species, habitats, or ecosystems. An area or ecosystem is rare if it is among the few of its kind in the country or Wider Caribbean region or has been seriously depleted across its range. The area may contain habitats that occur in a limited area, or rare, endemic, threatened or endangered species that are geographically restricted in their distribution.*

The Flower Garden Banks are unique for their large, healthy coral populations. Coral cover has been consistently high (>50%) over 30 years of monitoring. *Acropora plamata* colonies exist, which are the deepest records of this species. Deepwater habitats include algal nodule reefs, brine seeps and chemosynthetic communities and mud volcanoes.

***Naturalness (Level of disturbance)** - The area has to a high degree been protected from or has not been subjected to, human-induced change, and the natural environment is thus relatively free from biophysical disturbance caused by human influence.*

Sanctuary regulations have ensured that the coral reefs and deepwater features are some of the most undisturbed habitats in the Gulf of Mexico.

***Critical habitats** - The area contains populations, habitats or ecosystems that are critical to the survival and/or recovery of endangered, threatened or endemic species, or to species listed in Annex I, II or III of the Protocol.*

In addition to protecting coral species, the sanctuary has special regulations protecting whale sharks and manta rays, which are present in sanctuary waters. The Flower Garden Banks are also important spawning aggregation sites for snapper and grouper fish species.

***Diversity** - The area contains the variety or richness of species, communities, ecosystems, landscapes, seascapes and genetic diversity necessary for its long-term viability and integrity. This criterion is especially applicable where the area provides habitat for endangered, threatened, endemic and/or migratory species, and species listed in the Annexes to the Protocol.*

The coral reefs of the Flower Garden Banks are concentrations of tropical marine species in the northern Gulf of Mexico and uniquely diverse compared to other banks in the region.

***Connectivity/coherence** -The area is adjacent to or ecologically connected to another protected area, or is within an ecological or biological corridor, and thus contributes to maintaining the ecological integrity of the Wider Caribbean region. This can apply for Protected Areas within one country or which transcend political boundaries.*

The Flower Garden Banks are one of a chain of reefs and banks that ring the Gulf of Mexico. These banks are ecologically and physically connected by the currents and species migrations through the Gulf. They form part of a network of key habitats that sustain the diversity and abundance of marine life within the Gulf of Mexico and are linked to the east coast of the US by the Loop and Florida Currents.

Resilience - The area contains biological components (habitats, species, populations) that have demonstrated the ability to recover from disturbances in a reasonable timeframe; or are naturally resistant to threats, such as climate change; and the protection of such areas enhances the recovery of damaged ecosystems elsewhere in the eco-region by providing a source of larvae and juveniles.

The robust nature of the coral reef populations, including high coral cover and colony sizes, demonstrate the resilient and resistance of the ecosystem to disturbances that have disrupted other coral reefs in the Caribbean.

V. CULTURAL AND SOCIO-ECONOMIC CRITERIA

Productivity - The protected area helps conserve, maintain or restore natural processes that contribute to increasing the abundance of natural resources used by humans, and consequently contribute to regional sustainable development.

The mission of the sanctuary is to identify, protect, conserve, and enhance the natural and cultural resources, values and qualities of the Flower Garden Banks National Marine Sanctuary and its regional environment for this and future generations. Its primary goal is to protect, maintain and, where appropriate, restore and enhance the characteristics of the FGBNMS including, but not limited to, the natural living and geological resources, ecological processes, and water quality. The Flower Garden Banks are some of the most intact and productive coral reefs in the Wider Caribbean. Management actions are designed to maintain and enhance the habitats of the sanctuary and the biological communities they support. Regular monitoring and research seeks to understand the environmental factors that influence the biological conditions of the sanctuary, and allow for appropriate and timely responses to changes that may threaten the integrity of the ecosystem.

Cultural and traditional use - The protected area has a special value in a regional context for the conservation, maintenance or restoration of the productivity and biological integrity of natural resources that provide for sustainable traditional or cultural activities, such as those of indigenous communities.

The sanctuary was established to manage and facilitate multiple sustainable uses of sanctuary resources that are compatible with the primary purpose of resource protection.

Socio-economic benefits - The protected area has special value in a regional context for the conservation, maintenance or restoration of the productivity and biological integrity of natural resources that provide for economic or social benefits of user groups such as subsistence fishermen and rural communities, or economic sectors such as tourism.

The sanctuary promotes and leads conservation and management partnerships to protect sanctuary resources and the regional marine environment through ecosystem-based management. These efforts help to preserve important biological resources that are an essential part of the Gulf of Mexico economy and utilized by commercial and recreational fishers as well as the diving operators in the region.

VI. MANAGEMENT

a) **Legal and policy framework (international, national, regional, and local level; attach in Annex a copy of original texts, and indicate, if possible, the IUCN status):*

The Flower Garden Banks National Marine Sanctuary was established using the authority of the National Marine Sanctuaries Act:

<http://sanctuaries.noaa.gov/about/legislation/welcome.html>

http://flowergarden.noaa.gov/document_library/mgmtdocs/nmsa.pdf

b) *Management structure, authority;*

The Flower Garden Banks National Marine Sanctuary is managed within the Southeast Region of Office of National Marine Sanctuaries of the National Oceanic and Atmospheric Administrations within the United States Department of Commerce.

c) **Functional management body (with the authority and means to implement the framework);*

Staff of the Flower Garden Banks National Marine Sanctuary office in Galveston, Texas with management advice of the Sanctuary Advisory Council composed of local and regional stakeholders.

d) **Objectives (clarify whether prioritized or of equal importance);*

Flower Garden Banks National Marine Sanctuary's Mission is to identify, protect, conserve and enhance the natural and cultural resources, values, and qualities of Flower Garden Banks National Marine Sanctuary and its regional environment for this and future generations.

Goal 1: Protect, maintain and, where appropriate, restore and enhance the resources and qualities of Flower Garden Banks National Marine Sanctuary and the ecosystem that supports it.

- 1A: Prioritize resource protection in management decisions.**
- 1B: Develop and integrate best practices, scientific information, and innovative management techniques.**
- 1C: Reduce threats to sanctuary resources.**
- 1D: Enhance compliance with and enforcement of sanctuary regulations.**
- 1E: Improve ability to conduct emergency response and damage assessment.**

Goal 2: Support, promote, and coordinate characterization, research, and monitoring of FGBNMS and the regional environment to inform conservation and protection.

- 2A: Improve characterization of the physical, chemical, biological and human environment of the sanctuary.**
- 2B: Enhance research necessary for effective management and protection of sanctuary resources.**
- 2C: Monitor and assess long-term environmental changes in the sanctuary.**
- 2D: Evaluate environmental impacts that could result from changes in human activities or environmental conditions.**

Goal 3: Enhance and foster public awareness, understanding, appreciation, and stewardship of FGBNMS and the regional marine environment.

- 3A: Broaden public awareness of the sanctuary and the regional marine environment by reaching out to new audiences.**
- 3B: Improve understanding of the sanctuary and its resource protection issues through the interpretation and dissemination of information on sanctuary science and management.**
- 3C: Increase public appreciation, support and stewardship of the sanctuary, including the active participation of volunteers.**

Goal 4: Manage and facilitate multiple sustainable uses of FGBNMS compatible with the primary purpose of resource protection.

- 4A: Minimize potential user conflicts.**
- 4B: Explore innovative management techniques, such as marine zoning, to achieve the mission of protecting sanctuary resources.**
- 4C: Improve understanding of human activities and their potential impacts, direct and cumulative, to sanctuary resources and the regional environment.**

Goal 5: Promote and coordinate partnerships with stakeholders, agencies, and organizations.

- 5A: Coordinate the development and implementation of policies, regulations, procedures, and permitting activities.**
- 5B: Enhance opportunities for stakeholder and public involvement in**

sanctuary activities, especially through the sanctuary advisory council process.

5C: Facilitate the exchange of scientific information, technical knowledge, and innovative management strategies.

5D: Improve collaboration and coordination with partners to increase public awareness, understanding and stewardship of the sanctuary.

Goal 6: Promote ecosystem-based management of the FGBNMS regional environment.

6A: Improve understanding of how sanctuary resources are connected to other areas through ecosystem processes.

6B: Improve understanding of other threatened areas in the FGBNMS regional environment that may be nationally significant.

6C: Evaluate and implement management actions that enhance ecosystem-based management.

*e) *Brief description of management plan (attach in Annex a copy of the plan);*

The sanctuary's original management plan is a comprehensive approach to resource protection and management. It includes programs for science, education, outreach, regulation, enforcement, permitting and coordination with other local, state and federal agencies:

http://flowergarden.noaa.gov/document_library/mgmtdocs/fgbnms_eis_mgmtplan_1991.pdf

In April 2012 an updated Management Plan was released based on a comprehensive public review of sanctuary management strategies and activities that is required by the National Marine Sanctuaries Act and modifies and adds certain regulations and programs based on current conservation issues:

http://flowergarden.noaa.gov/document_library/mgmtdocs/fmp2012/fmp2012.pdf

f) Clarify if some species/habitats listed in section III/c are the subject of more management/recovery/protection measures than others;

While some biological components have specific regulations, and certain fish species are managed under the Magnuson-Stevens Fisheries Management Act, the sanctuary is managed as an ecosystem.

g) Describe how the protected area is integrated within the country's larger planning framework (if applicable);

The Flower Garden Banks National Marine Sanctuary is part of the National System of Marine Protected Areas and the Gulf of Mexico Marine Protected Area Network. It is an example of NOAA's commitment to ocean planning and the US

National Ocean Policy.

h) Zoning, if applicable, and the basic regulations applied to the zones (attach in Annex a copy of the zoning map);

Zoning is not used to manage the sanctuary.

*i) * Enforcement measures and policies;*

The sanctuary has published regulations:

http://flowergarden.noaa.gov/document_library/protdocs/fgbnmsregscfr2012.pdf

Enforcement and surveillance is difficult within the FGBNMS due to the distance from shore and inaccessibility of the site. The sanctuary relies greatly on assistance from the U.S. Coast Guard, NOAA Fisheries and state enforcement agencies for an enforcement presence. Although these agencies have been extremely cooperative, there is very little enforcement activity within the sanctuary at this time.

*j) * International status and dates of designation (e.g. Biosphere Reserve, Ramsar Site, Significant Bird Area, etc.);*

Because of the significance of its coral reef, the Flower Garden Banks National Marine Sanctuary was designated as a 'No Anchoring Area' by the International Maritime Organization in 2001. However, vessels of 100 feet or less may tie up to the existing mooring buoys within the sanctuary on a first come, first served basis.

http://flowergarden.noaa.gov/document_library/protdocs/regulationsanchoring.pdf

k) The site's contribution to local sustainable development measures or related plans;

The sanctuary is part of a regional Coastal National Recreation Area that is working to establish sustainable use and development, promote nature recreation opportunities and protections from storm-surge for the upper Texas Coast.

l) Available management resources for the area

- Human resources (total number, with details: staff, volunteers, partners):

Staffing consists of a superintendent, administrator, six research staff, two education and outreach coordinators, a management plan and Advisory Council coordinator, a captain and one crewmember for the sanctuary research vessel and numerous volunteers that periodically assist the sanctuary with special events.

- Physical resources (equipment, infrastructure):

Sanctuary office; extensive administration, education and research equipment; an 80 ft research vessel RV Manta; three vehicles.

- Financial resources and sources of funding (present and additional or expected in the future, and give annual budget)

Annual operating budget is part of the National Marine Sanctuaries allocation within NOAA and authorized by the US Congress. The 2012 allocation for Flower Garden Banks NMS staff and operations was \$1.06 million.

**Conclusion: Describe how the management framework outlined above is adequate to achieve the ecological and socio-economic objectives that were established for the site.*

The Flower Gardens Banks National Marine Sanctuary is managed using an “adaptive” management approach to resource protection, wherein threats are addressed when they are identified and understood. Sanctuary management is a structured, iterative process of decision-making, with the aim of reducing uncertainty over time through system monitoring and management plan updates. Sanctuary management is a learning process rather than a predetermined “solution” to an identified problem. The periodic review of the sanctuary’s management plan, including the development of specific action plans to address priority issues, provide a mechanism to adapt management to address the problems at the Flower Garden Banks.

VII. MONITORING AND EVALUATION

**In general, describe how the nominated site addresses monitoring and evaluation:*

Long-term monitoring of the sanctuary is designed to examine the health of the reef through direct measurements of the percent of coral cover, the occurrence of coral mortality, coral diversity, and growth or retreat of coral tissue. By tracking changes in these parameters from year to year, the monitoring acts as an early warning system for the sanctuary to take immediate steps to prevent any further loss of health on the reef. It also has provided a baseline of information to evaluate change to the ecosystem and aid decisions on how to respond.

In addition, the site is part of a national monitoring framework that uses ecosystem-based monitoring programs to address management information needs. It identifies four primary components common among marine ecosystems: water, habitats, living resources and maritime archaeological resources. By assuming that a common marine ecosystem framework can be applied to the National Marine Sanctuary System a series of questions are posed to every sanctuary and used as evaluation criteria to assess resource condition and trends. The questions provide a tool with which the program can measure its progress toward maintaining and improving natural resource quality throughout the system. Reports summarizing resource status and trends are prepared for each marine sanctuary approximately every five years and updated as new information allows. The information helps set

the stage for the management plan review process and identifies monitoring, characterization and research priorities to address gaps, day-to-day information needs and new threats.

**What indicators are used to evaluate management effectiveness and conservation success. In particular, what indicators are used to evaluate the impact of conservation measures on the status of species populations, habitats and ecological processes, within the protected area and its surroundings:*

The following criteria is used to evaluate management effectiveness:

Water:

**Are specific or multiple stressors, including changing oceanographic and atmospheric conditions, affecting water quality and how are they changing?
What is the eutrophic condition of sanctuary waters and how is it changing?
Do sanctuary waters pose risks to human health and how are they changing?
What are the levels of human activities that may influence water quality and how are they changing?**

Habitat:

**What are the abundance and distribution of major habitat types and how are they changing?
What is the condition of biologically structured habitats and how is it changing?
What are the contaminant concentrations in sanctuary habitats and how are they changing?
What are the levels of human activities that may influence habitat quality and how are they changing?**

Living Resources

**What is the status of biodiversity and how is it changing?
What is the status of environmentally sustainable fishing and how is it changing?
What is the status of non-indigenous species and how is it changing?
What is the status of key species and how is it changing?
What is the condition or health of key species and how is it changing?
What are the levels of human activities that may influence living resource quality and how are they changing?**

What indicators are used to evaluate the impact of the management plan on the local communities:

In addition to the above criteria with regard to the ecosystem, the sanctuary is continually evaluating its relationships with its constituents and stakeholders, and has undertaken periodic surveys of the impact of the sanctuary within the local socio-economic setting. This also takes place at quarterly Sanctuary Advisory Council meetings. The sanctuary is required by law to periodically hold a public review of sanctuary management plans. This review has just been completed (April

2012) and has made a number of changes to better manage the sanctuary's resources and use.

VIII. STAKEHOLDERS

**Describe how the nominated site involves stakeholders and local communities in designation and management, and specify specific coordination measures or mechanisms currently in place.*

The Sanctuary Advisory Council was established to facilitate communication between the sanctuary staff and the diverse groups of people interested in how sanctuary resources are managed. The Council consists of 21 members: 16 non-governmental voting members and 5 governmental non-voting members. The 16 voting Council members represent a variety of regional interests and stakeholders, including: Recreational Diving, Diving Operations, Oil and Gas Industry, Conservation, Education, Research, Commercial Fishing, and Recreational Fishing. The combined expertise and experience of these individuals creates an advisory council that is a valuable and effective resource for the sanctuary manager. It is also a forum for consultation and deliberation among its members on regional issues that affect the Gulf of Mexico. The Sanctuary Advisory Council holds open meetings to ensure continued public input on management issues and to increase public awareness and knowledge of the sanctuary environment. Public participation at these meetings is welcomed and encouraged.

IX. IMPLEMENTATION MECHANISM

**Describe the mechanisms and programmes that are in place in regard to each of the following management tools in the nominated site (fill only the fields that are relevant for your site):*

a) Public awareness, education, and information dissemination programmes:

Education and outreach efforts currently focus on those who have the greatest probability of directly impacting sanctuary resources, both now and in the future. Primary target audiences include recreational divers, the oil and gas industry, and teachers and students. To a lesser extent, efforts are directed toward fishermen, other government agencies and interested members of the public. Education and outreach efforts are implemented through partnerships with other government agencies and the private sector, along with the valuable assistance of trained, dedicated volunteers.

These efforts aim to:

- **Increase awareness about the sanctuary's resources and how they can be**

impacted;

- Educate users about how they can minimize or eliminate impacts to the natural resources; and,
- Develop a sense of personal stewardship for this special place.

The sanctuary conducts numerous local and national programs and utilizes a variety of tools that support better understanding of the sanctuary and its role in society and in ocean conservation.

b) Capacity building of staff and management:

Sanctuary staff are well integrated into a large government organization that provides opportunities for professional development and participation in interagency working groups and collaborative programs.

c) Research, data storage, and analysis:

The sanctuary maintains an active research program with its university partners. A full time research coordinator and staff assemble, maintain and analyze sanctuary data, physical material and information.

d) Surveillance and enforcement:

The sanctuary works closely with the U.S. Coast Guard, NOAA Fisheries Service, and the state enforcement agencies of Texas and Louisiana to ensure that the sanctuary is adequately monitored and its regulations are enforced.

e) Participation of exterior users:

In addition to the Sanctuary Advisory Council described above, the sanctuary works together with educators, researchers, scientists, non-profit organizations, zoos, museums, aquariums, visitor centers, and people like you to get our messages out on the airwaves. Some of our more visible partners include [Audubon Aquarium of the Americas](#), [Texas State Aquarium](#), [Tennessee Aquarium](#) and [The Aquarium at Moody Gardens](#) who all proudly display exhibits and/or information about the habitats and creatures of Flower Garden Banks National Marine Sanctuary. Researchers from universities, [Ocean Exploration](#), government and non-government organizations, and other institutions regularly assist us in evaluating and exploring the reaches of our sanctuary.

f) Alternative and sustainable livelihoods:

N/A

g) Adaptive management:

See above descriptions of Management Plan Review process.

Also: <http://flowergarden.noaa.gov/management/2012mgmtplan.html>

X. OTHER RELEVANT INFORMATION

Extensive information and documents to support this listing can be found at the sanctuary's website: <http://flowergarden.noaa.gov/>

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SIGNATURE (S) AND DATE

On behalf of the State(s) Party/Parties making the proposal.