Flower Garden Banks National Marine Sanctuary
Biomass Removal

Management Issue

Concerns exist that fishing and associated activities may be reducing the integrity of the ecosystem in and around the Flower Garden Banks National Marine Sanctuary (FGBNMS or Sanctuary).

Description

Fishing can diminish ecosystem integrity through reductions in biomass of targeted and by-catch species. This changes species relative abundance, alters species interactions (e.g. predator/prey and symbiotic relationships), possibly reduces the ability to resist introduction of invasive species, and changes community trophic structure. Fishing

Marbled grouper (Dermatolepis inermis). *Photo credit: ONMS*

activities themselves often alter and damage habitats as well, further influencing species interactions. The Sanctuary harbors populations of several species of snapper and grouper that may spawn at specific locations at predictable times. These animals are particularly vulnerable to focused fishing efforts during these periods. The marbled grouper is of particular concern, as it is a rare species throughout the Gulf of Mexico and the Caribbean.

At the Sanctuary, legal commercial fishing is done using hook-and-line, which involve weights and hooks that may damage benthic resources. Fishing that is allowed under current regulations targets primarily snapper, grouper, mackerel and wahoo populations. Bycatch may include several species of sharks, as well as moray eels. Abandoned gear and visual sightings indicate that illegal fishing occurs at the Sanctuary. This illegal activity generally involves longlines or spearfishing. Because of the limited size of the Flower Garden Banks and other banks in the region, some populations may be vulnerable to overfishing even at fairly low levels of effort, and the influence on ecosystems could be profound.

Questions and Information Needs

1) What is the spatial and temporal distribution of fishing effort in the Sanctuary by type and what habitats and species are being targeted?
2) What proportion of biomass of targeted and non-targeted species is removed in any given year?
3) What species are being removed or impacted as bycatch? What is the mortality of non-targeted caught species if released?
4) Does the removal rate exceed the replenishment rate for targeted and non-target species?
5) Does the removal of particular fish affect the ecological influence of those species?
6) How much does targeted fishing affect trophic structure?
7) Is there a disproportionate removal of large adults of targeted species and what is the effect on reproduction?
8) Are there locations that constitute essential habitat for certain species on the basis of requirements for shelter, breeding, feeding, or specific life history stages? (e.g., suspected spawning aggregations of marbled grouper at Geyer Bank, wahoo, grouper, charcharinid sharks and hammerhead aggregations?
9) Do spawning aggregations occur and, if so, where?
10) Why are wahoo aggregating in winter over the region's banks, and does winter fishing make them vulnerable to overfishing?
11) Are symbiotic relationships disrupted by fishing (e.g., cleaning stations, multi-species foraging)?
12) Do large groupers or other predators constitute a protection mechanism against potentially invasive lionfish?
13) Do fishing and diving uses conflict (mooring buoy use, concurrent activities)?
14) How much marine debris is generated by fishing activities and at what rate is it generated?
15) What would be the economic impacts to fishing closures at one or more banks?
16) Is it likely that a closure of locations as small as the Sanctuary would have the desired effect, given much larger scale of regional stock depletions?

Scientific Approach and Actions

- Obtain historic fisheries data and landings information
- Size of fish caught vs. those remaining
- Habitat mapping in deep portions of the banks typically fished
- Diver , ROV and acoustic surveys at potential essential habitat and spawning aggregations
- Vessel tracking and censusing via onboard or remote surveillance systems
- Diver , ROV and acoustic surveys to assess fish abundance and biomass, and document marine debris types, amounts, and locations
- Recruitment and survival rates for focal species
- Time series data on fish cleaning station abundance and use
- Fishing blog tracking
- Economic data on fishing activities and the effects of restricting activities in particular areas
- Experimental fishing closure, with adequate monitoring and longevity.

Potential Key Partners and Information Sources

National Marine Fisheries Service; Reef Environmental Education Foundation; Selected recreational fishermen; selected commercial fishermen; National Centers for Coastal Ocean Science; Texas A&M University; Harte Research Institute, UNCW, HBOI

Management Support Products

- Level of fishing effort
- Estimates of population recovery and other responses with fishing closures
- Models estimating the effect of differing levels of fishing effort
- Fishing effort mapped against habitat types
- Locations of essential habitat for different species
- Video documentation for training and communications about essential habitat and spawning aggregations
- Economic impact scenarios under different types of fishing restrictions

Planned Use of Products and Actions

- Guidance for experimental fishing closures
- Changes to long-term monitoring protocols
- Targeted enforcement efforts
- Recommendations related to fishing to Gulf of Mexico Fisheries Management Council

Crevalle Jack. Photo credit: ONMS

Program References

FGBNMS Management Plan Review Process
- – 2007 Public Scoping Reports

FGBNMS Condition Report
- – 6, 8, 9, 10, 11, 12, 13, 14

ONMS Performance Measures
- – By 2015, 100% of the Sanctuary system is adequately characterized
- – Number of sites in which living marine resources, based on long-term monitoring data, are being maintained or improved

Other Documents
- – 2004 ONMS Science Needs Assessment
- – Research Area Workshop Report