

GRNMS National Marine Sanctuary

Research Area Efficacy – Fishing Impacts

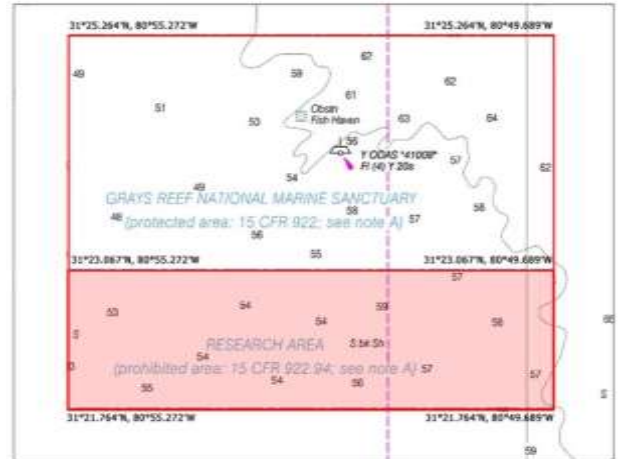
Management Issue

In 2011, approximately one-third of Gray's Reef National Marine Sanctuary (GRNMS) was designated as a Research Area closed to recreational fishing and diving. The Research Area provides a place where scientists can study the impacts of human activities, including bottom fishing, as well as monitor and study impacts of climate change and natural events such as hurricanes and droughts on the sanctuary's marine resources. The sanctuary must also investigate the efficacy of the Research Area itself as a means for conservation of the unique marine resources in the sanctuary.

Description

Gathering information on the status and natural variability of fish communities, habitat, and ecological systems is essential for informed management of GRNMS. Even today, there are many questions we have yet to answer and much information we have yet to gather. The Research Area, comprising eight of the sanctuary's 22 square miles, allows scientists to design and implement studies in which critical variables can be controlled over long periods of time.

It is unknown whether the Research Area will provide adequate protection, reproduction, and spillover to overcome the fishing pressure on exploited reef fishes. Key species of fishes are known to reside within this local area and are widely dispersed, thus seeding areas outside of the Sanctuary. To adequately protect and manage the sanctuary, the effect of the area closure and the contribution of GRNMS to the recovery of depleted fish populations need to be determined.



A map of Grays Reef National Marine Sanctuary, highlighting the RA in pink. Map credit: GRNMS Management Plan

Questions and Information Needs

Research Area Efficacy

- 1) Does the Research Area closure affect the species composition, distribution, size and abundance of fishes and invertebrates on GRNMS?
- 2) What are the regional ecological consequences of recruitment and spillover associated with the Research Area?
- 3) What are the sources of fish and invertebrate recruits to the Research Area?
- 4) What are the contributions of GRNMS fishes and invertebrates to populations outside the sanctuary?

Impacts of Human Activity and Natural Events

- 1) What impacts do extractive activities have on the reef and living marine resources?
- 2) How does marine debris from fishing and other human activities affect GRNMS resources (effects of gear on individual organisms, and the potential for recovery after injury)?
- 3) What would the fish populations and invertebrate communities look like in the absence of fishing impacts?
- 4) What impacts does the removal of targeted species have on the fish community?
- 5) How does one scientifically contrast community structure between “natural” reefs and reefs that have been influenced by human activities?

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- 6) What are the spatial and temporal dynamics of fish communities in a natural population?
- 7) Does fishing affect fish size distribution and movement?
- 8) What variability in the natural system is inherent and what are results of human impact?
- 9) What is the level of fishing mortality from fishing activities in GRNMS, both prior to and after the establishment of the Research Area (this will allow investigators to more accurately interpret the results of studies conducted both areas)?
- 10) How well is NOAA conserving the resources of the sanctuary?



Live bottom habitat including tunicates, sponges, soft corals, sea stars, urchins, and algae. Photo credit: NOAA

Scientific Approach and Actions

- Compare life history (size/age structure; fecundity; mortality; feeding habits) of targeted and non-targeted fish species in fished and unfished areas
- Compare abundance, biomass and length-specific fecundity of fishes in the RA to those in fished area to determine the potential reproductive output of fish populations in a shallow inner shelf live bottom area in the absence of fishing, and what might be exported to fished areas
- Evaluate the status of gag, scamp, king mackerel, black sea bass, red snapper, and other targeted fish species inside and outside the Research Area
- Determine what is landed, caught, released, discarded, or used at sea (i.e., bait). Determine the total amount of catch per person, per hour/per trip, and per gear/method, by location (inside the sanctuary and outside) as well as the level of related lost tackle/"break offs"
- Continue ongoing acoustic fish tagging research to determine the distribution and movement of key snapper and grouper species as well as black sea bass
- Monitor potential long-term changes in seafloor habitats caused by storm impacts, climate variability, and invasive species throughout the sanctuary
- Track the survivorship and recovery rates of animals entangled in fishing gear focusing on Oculina and gorgonian corals
- Characterize and quantify changes in the benthic community structure resulting from shifts in fish foraging pressures after creation of the Research Area
- Assess changes in softbottom seafloor microhabitats (e.g. biogenic structures and geochemical characteristics) resulting from shifts in benthic community structure
- Assess changes in hardbottom topographic complexity resulting from changes in sessile macroinvertebrates
- Conduct a marine debris assessment in the sanctuary, both within and outside the Research Area

Key Partners and Information Sources

NOAA Fisheries, NOAA National Centers for Coastal and Ocean Science, Team Ocean Divers, Georgia Southern University, Skidaway Institute of Oceanography, Georgia Department of Natural Resources, NOAA Office of Law Enforcement, Fishing clubs/associations, USCG Auxiliary; South Carolina Department of Natural Resources, University of Connecticut, Valdosta State University

Sanctuary Resources Available

- Two research vessels, captain and crew
- NOAA ship time
- Support staff for field operations and equipment deployment including science divers
- Habitat maps
- Previous marine debris study conducted in 2004-05
- Monitoring data

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Resource Needs

- Financial support
- Partnerships for: grant application, project design, data collection and analysis, reporting, and monitoring

Management Support Products

- Scientific papers and reports
- Presentations for scientific meetings, workshops, symposia and conferences
- Education and outreach products to inform the general public about Research Area issues and research results

Planned Use of Products and Actions

- This research would aid in a more focused development of outreach and education products and provide the best possible social science to give all stakeholders a voice in the management of sanctuary resources and foster a more cooperative management process
- Appropriate management actions based on findings
- Develop an annual and a five year report on the Research Area and provide to all interested parties
- Develop a five year review of the Research Area to augment management plan review process
- Develop education and outreach products to inform the general public about Research Area issues and research results

Program References

GRNMS Management Plan

- Objective SR: Activity SR3B, Activity SR3D; Objective SR4: Activity SR4A and Activity SR4B

2008 GRNMS Condition Report and 2012 Addendum

- Question 6: What is the condition of biologically structured habitats and how is it changing?
- Question 8: What are the levels of human activities that may influence habitat quality and how are they changing?
- Question 9: What is the status of biodiversity and how is it changing?
- Question 10: What is the status of environmentally sustainable fishing and how is it changing?
- Question 14: What are the levels of human activities that may influence living resource quality and how are they changing?

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