Gray's Reef National Marine Sanctuary

Climate Historical Ecology

Management Issue

When Gray's Reef National Marine Sanctuary (GRNMS) was established in 1981, little was known about the ecological integrity of the site. Current efforts focus on characterizing the present conditions of the ecosystems in the sanctuary, however studying their early state remains to be done. In order to accomplish their stewardship mission, GRNMS's managers need to fully understand the past conditions of biomass and biodiversity of the sanctuary. Estimating baselines informs managers as to the suite of factors, anthropogenic and/or natural, that may have caused changes to the current conditions of the ecosystems and, in some cases, to lose their resiliency. Baselines can thus measure how successful the sanctuary is in protecting the ecological integrity of the site. Baselines are also an indication of the potential productivity of the sanctuary allowing managers to set realistic management goals and restoration targets.

Description

There is a growing recognition in the scientific community that human activities have impacted ocean ecosystems over time at such a large scale that what we see today in American waters is quite different from what early native inhabitants and explorers witnessed. Unfortunately, most changes went unnoticed as they occurred underwater when no one was monitoring these areas. The generational memory loss that is the "Shifting Baseline Syndrome" masked the reality of what a healthy thriving ecosystem used to look like. Archeologists, historians, biologists, statisticians are now applying modern scientific methods on historical data to estimate the nature and scale of the ocean changes.

Marine historical ecology efforts involve gathering and analyzing historical sources (such as letters, maps, logbooks, explorer's narrative, illustrations, traditional knowledge, oral histories, archeological artifacts, etc.) to assess ecological changes in the environment. Such analyses expand of the connection between human and natural history, complementing the maritime cultural landscape of the sanctuary

Questions and Information Needs

1) What historical sources of data are available for the resources of GRNMS?

2) What is the historic status of local marine resources and what is the baseline biomass and biodiversity of GRNMS?

3) What are the factors that caused the GRNMS ecosystems to change to what they are today?

4) What were the key characteristics that made GRNMS ecosystems healthy and resilient?

5) What marine life did the native populations, early explorers and subsequent settlers witness in sanctuary waters?

6) What is the historic level of extraction/harvest of early users ranging from early Native Americans to the 21st century?

7) What methods were used for fishing?

8) What species were targeted?

9) When compared to current conditions, can we have a more accurate understanding of the extent of environmental changes?

10) What are the drivers that have led to changes in sanctuary resources; and are these changes reversible when all current socioeconomic and environmental factors are taken into account?

Scientific Approach and Actions

- Partner with universities to undertake extensive research of source surveys of historical documents and records

- Develop a database for historic records
- Determine historic ecology (abundance and exploitation) of the sanctuary
- Use different academic approaches such as zooarcheology, and oral interviews to extend timelines in the past or in places where no written historical records are available
- Work with the Climate research community to study and differentiate changes caused by climate change and human activities

Key Partners and Information Sources

Local, state, national archives and libraries, COML/HMAP, Gulf of Maine Cod Project, Universities, NOAA, Georgia Southern University; National Centers for Coastal Ocean Science; 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; NMFS Beaufort Lab, Smithsonian, Georgia Museum of Natural History

Sanctuary Resources Available

- Monitoring data
- Historical knowledge

Resource Needs

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

Management Support Products

- Source surveys, data, graphics, reports, historical documents, and maps of GRNMS
- Estimates of historical abundance, biomass, and diversity
- Report on the human history of the GRNMS and how changes in human populations and activities affected the ecosystem
- Education and outreach products to share the history of Gray's Reef with the public

Planned Use of Products and Actions

- Shed new light as what are the key characteristics that make an ecosystem healthy and resilient to human activities.
- Compare historical to current conditions, and derive a more accurate understanding of the extent environmental changes.
- Identify the drivers that have led to these changes, as well as whether these changes are reversible when all current socio-economic and environmental factors are taken into account.
- Reveal a broader suite of possibilities in terms of ecosystem productivity, configuration and resilience than considering only the current conditions.
- Inform management targets and goals
- Use in evaluating current status and trends
- Integrate knowledge in the GRNMS condition report
- Education and outreach products to share the history of Gray's Reef with the public

Program References

GRNMS Management Plan
Objective SR2: Activity SR2A; Objective SR3: Activity SR3B; Objective SR4: Activity SR4A, Activity SR4C; Objective SR5: Activity SR5B

2008 GRNMS Condition Report and 2012 Addendum

- Question 6: What is the condition of biologically-structured habitats and how is it changing?
- Question 12: What is the status of key species and how is it changing?
- Question 13: What is the condition or health of key species and how is it changing?