Flower Garden Banks National Marine Sanctuary

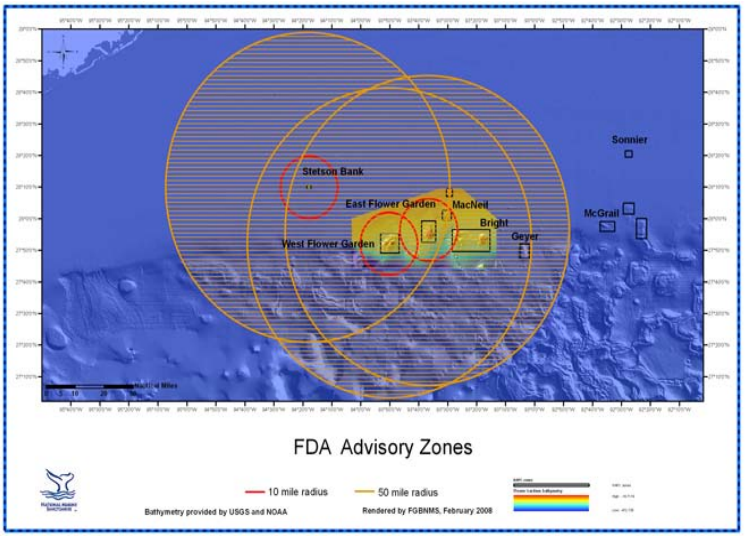
Water Quality - Contaminants

Management Issue

Recent incidents of ciguatoxin (CTX) poisoning causing illness in humans, and measurements of high mercury concentrations in finfish tissue may be a cause for concern to those catching and/or consuming fish caught in and around the Flower Garden Banks (FGBNMS or Sanctuary). Monitoring is currently not adequate to assess the level to which the public should be cautioned against consumption. Sampling for analysis has been limited to the FGB's, but the problem is probably regional.

Description

Ciguatera originates from the dinoflagellate (algae) species *Gambierdiscus toxicus*, which colonizes coral reefs and other hard structures in certain tropical waters. The toxin is eaten by coral-grazing fish and is then passed up the food chain to larger predatory fish (species most commonly with CTX include barracuda, groupers, snappers, jacks, mackerel, and triggerfish). Mercury in fish tissues is also a result of bioaccumulation and has been linked to contamination by discharges produced by hydrocarbon facilities, among other sources. Studies need to be conducted in order to better understand the dynamics of both these threats and to develop and implement appropriate monitoring protocols to track them.



Zones of affected areas reflected in a FDA seafood advisory resulting from detection of unsafe levels of ciguatoxin in fish sampled from the FGBNMS. Image credit: FGBNMS

Questions and Information Needs

1) What finfish species are prone to ciguatera and high mercury concentrations?
2) Over what spatial range are the fish prone to these conditions?
3) What are the frequencies of occurrence and levels of severity?
4) How do the prevalence of ciguatera and mercury concentrations compare to those found elsewhere?
5) What size range of fish are most likely to contain CTX or high mercury levels?
6) What are safe consumption levels for mercury-contaminated fish from the Sanctuary?
7) Are changes in prevalence of ciguatera correlated with declining water quality, changing water temperature, or other likely contributory factors?
8) Do platforms and artificial reefs play a role in proliferation of the dinoflagellate *Gambierdiscus toxicus*?
9) Do platforms play a role in mercury contamination?
10) Is it likely the mariculture facilities and wind farms would further the spread or persisitence of *G. toxicus* and CTX?
11) What monitoring protocols should be in place to track the threats and under what conditions should public advisories be issued?

Scientific Approach and Actions

- Expand study outside FGBNMS
- Tissue samples during outbreaks (for disease characterization and indicators of coral condition)
- Quantitative assessments by random sampling and testing of species caught by fishermen (percent affected by species, size class data)
- Sampling of fish and benthic algae on platforms, artificial reefs, aquaculture facilities, and other structures placed offshore in the region
- Literature search for data from other locations
- Comparison of fish from platforms and natural hard banks
- Concurrent water quality data

Potential Key Partners and Information Sources

University of Texas Marine Science Institute; University of Texas at Austin; Food and Drug Administration (FDA); National Centers for Coastal Ocean Science; commercial and recreational fishermen; National Marine Fisheries Service Sea Grant; State artificial reef programs

Management Support Products

- Maps of CTX and mercury hotspots and ranges of occurrence
- Recommended monitoring protocols
- Recommended consumption thresholds
- Informative outreach materials

Planned Use of Products and Actions

- Implementation of monitoring protocols to allow for early warnings of occurrence
- Public advisories, in cooperation with FDA
- Input regarding requests or planning for placement of artificial reefs, establishing aquaculture facilities, wind farms, or other offshore hard structures that might promote CTX

Program References

FGBNMS Management Plan Review Process

- Public Scoping Reports

FGBNMS Condition Report

- 1 and 3

ONMS Performance Measures

- Number of sites in which water quality, based on long-term monitoring data, is being maintained or improved

Other Documents

- 2004 ONMS Science Needs Assessment
- FDA Seafood Advisory
- Public scientific papers (e.g., Villareal et al., 2007)