

Title: Working towards informed ecosystem-based management of the South Texas Banks

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Focus Areas: Healthy Coastal Ecosystems, Sustainable Fisheries, Resilient Communities

Research Priority: Ecosystem-based management, assessment, health, and valuation; fishing and seafood vulnerability; social vulnerability

Project description:

The continental shelf of the western Gulf of Mexico (GOM) is a wide, muddy shelf punctuated by a few protruding reefs known as the South Texas Banks (STBs). These banks provide essential habitat for abundant and diverse marine communities, including recreationally and commercially important fishes attracted to these mesophotic coral reefs. Very little is known about the ecosystem communities on the STBs, how they may be vulnerable, and how humans are interacting with them. The STBs are expected to play important roles in maintaining connectivity pathways among eastern, southern, and northern mesophotic reefs in the GOM, such as the Flower Garden Banks National Monument (FGBNM). The paucity of data on STB communities, including their importance to other GOM ecosystems and the regional economy, has resulted in minimal conservation and management. Here we propose to work with community members, environmental managers, and other interested stakeholders to generate needed baseline data on the role of the STBs in the larger GOM reef system, as well as the ecosystem services they provide. We envision this effort as an important step in achieving informed ecosystem-based management of this important Texas resource and see this project as the beginning of a long-term effort by UTRGV to support the STBs through community-engaged scientific research.

Support from a Texas Sea Grant will allow us to gather the following baseline information:

Goal 1: Estimates of connectivity between the STB reefs, and all banks in the Gulf of Mexico using ocean modeling (Harrison)

Goal 2: Estimates of coral connectivity between the banks and to/from other mesophotic reefs using genetic markers (Easton, Hicks)

Goal 3: Valuation of ecosystem services the banks provide to regional communities, assessment of priority areas for conservation, and evaluation of potential impacts of limited use on local users (Lavy)

Mesophotic coral reefs provide critical habitat in the STBs, the basis of the ecosystem. Estimating connectivity of the STBs between each other and the larger reef communities (Goals 1-2) allows us to assess which banks are important sources of coral larvae to other regions, and which are sinks, subsidized by larvae from other regions. This helps us to understand the role of each reef in the larger bank system, and informs which banks are the most critical in the network to protect. Using genetic markers allows for validation of the modeling work, in particular the connection of the STBs to FGBNM (Goal 2). Little work has been done in assessing the ecosystem services the STBs provide to the local community, and less in assessing what impact closures would have (Goal 3). We propose to gather needed information on fishing and

shipping in and around the STBs, and how resilient these industries are to potential management activities. We propose to work closely with management agencies, such as the Office of National Marine Sanctuaries and the Gulf Coast Fisheries Management Council, from the beginning through the end of the project to ensure all data products from the connectivity and community work are useful in content and format for informing management efforts. In addition, the role of the STB in the broader GOM system is of scientific interest, and combining genetic and modeling work is at the cutting edge of biophysical connectivity research.

Relationship to Sea grant Focus Areas and Research Priorities:

The proposed research falls within the scope of all three Texas Sea Grant (TSG) focus areas: **healthy coastal ecosystems, sustainable fisheries, and economic resilience**. Primarily, this study is about informing **ecosystem-based management** through **ecosystem assessment** and **valuation**.

The STBs are currently minimally **managed**. Because of their relative isolation in a wide, muddy region, we hypothesize that the STBs and their benthic communities are especially vulnerable to anthropogenic and climate perturbations, while at the same time offering essential habitat for many species in a relatively barren region. Additionally, the STBs may be important larvae source regions for other banks, which also provide essential ecosystem services. **Assessing** the role of the banks in the larger network is the first step in **ecosystem-based management**. The STBs are used by local recreational fisherman, a major component of the tourist economy in the South Texas coast; assigning **value** to the ecosystem services the STBs provide and assessing the **economic resilience** of this industry to potential closures of this resource is a critical step in the management process. Protecting the STBs involves implementing regulations to ensure **sustainable fishery** practices are used. The baseline information of how the STBs are currently fished, as well as which of the banks are the most vulnerable, will help ensure the sustainability of these resources for both ecosystem and human needs.

Programmatic Justification:

This research will improve the **understanding, wise use and stewardship** of the STBs by providing baseline scientific data to inform management of these important **marine resources** for both ecosystem-based management and economic resilience. Under the research priority of **healthy coastal ecosystems** this project will **collaborate with partners to lead and implement restoration and monitoring of habitats and living marine resources in the coastal zone (action 5.1 in the TSG strategic plan)** by **providing technical assistance and tools to resource managers to support science-based decision-making (action 5.2)**, and will **support research and fill information gaps in the current understanding of ecosystem management best practices (action 5.3)**. This project will also **educate coastal residents and decision makers on the services provided by healthy ecosystems that support industries and communities (action 6.1)**. In addition, this project will address the TSG research priority of **STEM Education and Workforce Development** by training undergraduate and graduate students in policy-relevant science applied to the South Texas coast, and by outreach and education activities to students and tourists in the Rio Grande Valley. This project is synergistic with a NOAA RESTORE proposal currently under review to establish a long-term monitoring effort on the STBs.