Title	New York Bight (NYB) Fish, Fisheries, and Sand Features: In the Field
Administered by	Marine Minerals Program
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Procurement Type(s)	T.B.D.
Performance Period	FY 2020–2023
Date Revised	March 5, 2019
PICOC Summary	Write one or two sentences for each of the following elements, as appropriate.
Problem	The benthic environment in the NYB, both physical and biological features, will be affected by potential dredging activities (expected in the near future); this in turn will affect fishermen if landings are impacted.
Intervention	Characterize the potential impacts to the natural environment and fisheries from habitat alteration that may result from dredging activity.
Comparison	This study includes a before-after-control-impact (BACI) design to compare changes to the environment due to dredging with natural environmental changes.
Outcome	We expect to improve the understanding of the NYB ecosystem, including sand features, benthic infauna, fish composition, and fisheries dependence across seasons and years to improve our National Environmental Policy Act (NEPA) analyses of impacts, as well as consultations that recommend mitigations.
Context	The study area would include potential sand resource areas under the Bureau of Ocean Energy Management's (BOEM's) jurisdiction (*i.e.*, >3 nautical miles [nm] from shore) but no more than 50 m deep off of New York and New Jersey in the NYB.

BOEM Information Need(s): Better understanding of demersal and benthic organisms' occurrence in and use of sand habitats in the mid-Atlantic is important for BOEM's Marine Minerals Program (MMP) to inform and evaluate the use of potential sand borrow areas in Federal waters. This information would also support the Office of Renewable Energy Programs (OREP), because they are interested in understanding impacts and recovery of the benthic environment due to cable laying. BOEM anticipates that dredging may occur at multiple sites in Federal waters of the NYB (waters off of New Jersey and New York), in part to address the U.S. Army Corps of Engineers' (USACE's) projected sand deficiency for completing vital federally authorized shore protection projects in the next 5 years. Because dredging on the NYB Outer Continental Shelf (OCS) has been infrequent relative to other regions, research on biological activity, biophysical coupling, and geomorphology will complement the geophysical and geotechnical data, and strengthen NEPA analyses that consider the potential effects of dredging as well as inform consultations that recommend dredging mitigations.

Background: Limited information exists on the ecological function and biological significance of sand waves, ridges, swales, shoals, and other OCS features in the NYB, especially as it relates to dredge-related disruptions. Dredging activities under BOEM's

jurisdiction generally occurs from 3 to 9 nm from shore. The NYB is inhabited by a diverse community of fishes and invertebrates, with both resident and transient species. Many of these species are economically important to commercial, recreational, and charter fishing industries. Additionally, strong seasonal fluctuations in abiotic factors are often linked to changes in biological diversity. Therefore the potential effects and recovery of sand dredging on ecosystem health and the abundance of fish and invertebrate communities may vary spatially and temporally. BOEM's current Cooperative Agreements with New York and New Jersey have gathered data on sand resources and resulted in delineations of potential borrow areas offshore in the NYB, and a current BOEM-funded study will identify existing data, as well as gaps. This research also aligns with state and regional research priorities that aim to identify and assess offshore sand resources, and improve sediment resource management strategies, especially as identified by USACE.

Objectives: Goals include obtaining baseline field data on the seafloor morphology, seabed and substrate sedimentary texture, and the diversity and abundance of demersal and benthic organisms which rely on sand habitats, specifically around potential sand resources off the NYB, from 3–9 nm offshore. The study should monitor conditions before, during, and after dredging, and should document biological activity and succession in these areas. A plan to gather local stakeholder and industry knowledge (*e.g.*, fisheries industry, sport fishing, diving), as well as state, Federal, and academic partners through appropriate and methodical outreach activities (*e.g.*, meetings, online forums, and fishing activity surveys) should be developed and implemented. The results of this effort should then be leveraged prior to activities to highlight issues and further inform study methodology. The MMP would also leverage OREP's experience and network within the region, and include them in outreach as appropriate.

Specific objectives include conducting studies focused on invertebrates, especially ecologically and economically significant shellfish, both demersal and pelagic fish species, and the presence of basal autotrophs. Data should be collected on species abundance, size composition, and distribution across the spatial continuum from the air-sea interface to the sea-sediment interface, in order to understand mesoscale and microscale habitat use, species assemblages, biodiversity, and habitat associations. If feasible and appropriate, BOEM would consider a BACI or Before-After-Control-Impact Paired-Series (BACIPS) design to compare dredged areas with non-dredged areas within the same region over time, so that temporal changes are observed. The overarching hypotheses are that:

- stakeholder and partner involvement strengthens BOEM's understanding of NYB, as well as the approach to gather additional information;

- areas with sand features and relief have greater habitat value for benthic invertebrate and fish species than flat areas with limited or no sand features, as determined by species' abundance, distribution, diversity, and assemblages;

- dredging results in changes to the aforementioned factors in the short-term, with faster ecological succession and recovery times with closer proximity to undredged areas; and

- increased habitat variability and surface area has the potential to increase long-term diversity.

Methods: Details of methodology will be informed by results of the NYB data and literature review currently funded in Fiscal Year 2019 (MM-19-02), as well as any new MMP research findings (*e.g.*, dredge pit evolution). Methods will be further refined by input provided from stakeholders (including academic, Federal, and industry sectors). Additional state partnerships will inform methods and scope, and identify any potential funding leverage.

General parameters are expected to be similar to methods outlined here. Surveys should be performed four to six times, both before, during (if practical), and after dredging, covering a timespan of two or three years. A control site should be monitored proximal to the dredge site, but outside of the expected zone of disruption (*e.g.*, a neighboring ridge-swale complex). Monitoring approaches could include, at varying frequencies:

- multibeam or side scan backscatter geophysical surveys to monitor seafloor morphology and characterize benthic substrate;

- biological sampling via grab samples, clam dredges, and trawl surveys;

- vibracore sampling of substrate;

- water column profiles to measure current flow and direction and water chemistry (*e.g.*, temperature, salinity, pH, dissolved oxygen, turbidity, chlorophyll);

- direct observation using video cameras or remotely operated vehicles; acoustic surveys; and

- tagging.

Organism distribution will be modeled with physical and chemical variables to identify any strong correlations.

Optimally, any monitoring approaches will employ a BACI design to obtain baseline data, and either verify the continued presence of pre-existing benthic and demersal organisms or identify changes. Opportunities may exist for expanding upon current BOEM funding through the Environmental Studies Program submittals from the New York Department of State for the National Oceanic and Atmospheric Administration's National Center for Coastal Ocean Science's substrate mapping which may include using an acoustic echosounder during shipboard surveys to quantify fish biomass, and from the New York State Department of Environmental Conservation for Atlantic sturgeon

which could involve expanded species tagging and systematic receiver gate deployment for broader detection throughout BOEM's area of interest.

Specific Research Question(s):

1. What can the BOEM learn about OCS resources from NYB stakeholders and experts?

2. How do benthic and demersal organisms occur and use NYB sand resources? How does this distribution, composition, and biomass change temporally? What factors influence this distribution?

3. What are the effects (either theoretical or actual) of sand dredging on sand resources and associated resources? What are the recovery times?

4. What strategies might minimize impacts to fish resources associated with sand resources in NYB?

References: