Summary Report

BOEM Cooperative Agreement M14AC00001 to New York State Department of State and Stony Brook University: Assessment of sand needs and resources offshore New York

05/31/2016

NY Lead Agency:

New York State Department of State, Office of Planning and Development, in conjunction with SUNY Stony Brook University, School of Marine and Atmospheric Sciences

Principal Investigators:

Michael Snyder & Wilhelmina Innes
Ocean and Great Lakes Program
New York State Department of State
Office of Planning and Development
99 Washington Avenue
Albany, NY 12231
(518) 486-7736
Wilhelmina.Innes@dos.ny.gov

Co-Principal Investigators from Stony Brook University, School of Marine and Atmospheric Sciences (SOMAS):

Henry Bokuniewicz
Roger Flood
Robert Wilson

Additional Contributors from Stony Brook University, SOMAS:

Justin Lashley
Amin Ilia
Claudia Hinrichs
Hanlu Huang

Overview

The technical reports described below and developed pursuant to Cooperative Agreement M14AC00001: *Sand Needs and Resources Offshore New York* are important steps in improving understanding of and linkages between federal and State sand resources offshore New York. These reports are New York State's first attempt to compile and synthesize existing information on sand resources and transport processes, in furtherance of the State's long-standing interest in sand resources. In order to achieve the objectives of the current Cooperative Agreement with the Bureau of Ocean Energy Management (BOEM), the New York State Department of State (DOS) entered into a Cooperative Agreement with BOEM, and a Memorandum of Agreement with the State University of New York (SUNY) at Stony Brook, School of Marine and

Atmospheric Sciences. The coordination of effort between these entities, and the data and information that resulted, already have measurably increased New York State's scientific knowledge base and decision-making capacity.

Superstorm Sandy provided clear evidence of the potential suddenness and severity of coastal flooding and erosion, and increased attention to sand management strategies and prioritization of coastal needs. Because the emphasis of this current Cooperative Agreement is on assembling existing data, the below products do not address the desirability of using state or federal sand resources for projects that were previously proposed or that may be under future consideration. Nor do the reports reflect a State-sponsored evaluation or prioritization of existing or potential coastal projects that may require sand resources.

The ultimate goal of the State's Cooperative Agreement efforts is to develop management strategies for offshore sand resources that will preserve the ecological function of offshore systems while helping to achieve resilience for coastal communities. To that end, the State's continued research and coordination activities with the federal government will focus on understanding: sediment transport patterns and the potential effects of removals and placement; the role of sand in natural and ecological system function; the relationships between offshore sand resources and coastal needs; and other related management priorities. This information will be critical to the development of sustainable approaches to existing and future activities seeking the use of sand in federal waters offshore New York.

BOEM-NY Cooperative Agreement M14AC00001 Project Deliverables

Technical Reports

Bokuniewicz, H.J. and Huang, H., 2016. Preliminary assessment of New York's sand needs. School of Marine and Atmospheric Sciences, Stony Brook University, Unpublished Report.

The average demand for sand is about 1.5 million cubic yards per year but approximately 2/3 of that comes from routine maintenance dredging of inlets. With new and pending commitments to long-term maintenance of large projects, the routine demand will increase. Extraordinary demands could push that up, perhaps to as much as 6 million cubic yards per year. A preliminary screening indicated that approximately 30% of offshore sand cover is suitable for beach nourishment.

Bokuniewicz, H., and Huang, H., 2016. Inventory of New York's sand borrow sites along New York's ocean shoreline & their sustainable management. School of Marine and Atmospheric Sciences. Stony Brook University. Unpublished Report.

The offshore area of sand resources in both State and Federal waters covers about 1080 square miles. The historical and existing borrow areas are all in State waters. Combined, they contain approximately 50 to 75 million cubic yards of sand which could fulfill demand for approximately 8 -150 years depending on level of demand and future conditions. Borrow areas seem to refill

with sand on the order of decades of time. However, we don't know enough about rates and routes of sand transport on the shelf to predict replenishment rates.

Flood, R., Bokuniewicz, H., and Lashley, J. 2016. Synthesis of existing geological and geophysical surveys with suggestions for areas for future research, School of Marine and Atmospheric Sciences, Stony Brook University, Unpublished Report.

Geophysical and geological data is compiled and reassessed to support identification, characterization, and delineation of sand resources for potential use in future coastal restoration, beach nourishment, and/or wetland restoration efforts. The South Shore of Long Island includes, in part, the Fire Island National Seashore. Holocene sand ridges extend at an oblique angle to the cross shore in the seaward direction. Borrow areas among the sand ridges that have been excavated were apparent in the most recent surveys and it appears that natural replenishment of offshore borrow areas has been occurring although the rates need to be determined in order to assess their sustainability. Extension of this assessment will include data analysis from a recent survey sponsored by the Bureau of Ocean Energy Management that resulted in approximately 700 km of geophysical survey lines located between 3 and 9 nautical miles offshore, and 46 geotechnical samples, comprised of a combination of grab samples and vibracores.

Wilson, R. and Hinrichs, C. 2016. Technical report on physical wave modeling. School of Marine and Atmospheric Sciences, Stony Brook University. Unpublished Report.

Physical wave modeling is intended to assess the effects of hypothetical sediment borrow areas on nearshore wave climate and longshore sediment transport rate. This would lead to the identification of those borrow area locations that might have minimal effect, and those locations which might have a more detrimental effect on wave climate and longshore transport. The offshore wave climatology has been defined by analyzing long-term records from NOAA/NDBC wave buoys 44025 and 44017. Wave scenarios expected to most influence coastal wave climate longshore sand transport were identified in terms of significant wave height, wave direction, wave period and wave length. Waves with significant wave heights greater than four meters come from a markedly more easterly more shore parallel direction than smaller waves. The larger waves also have a longer period. Average wave period is much longer for waves over four meters high. Wave climatologies derived from offshore wave buoys are used to define forcing for the wave model SWAN for existing bathymetry and selected bathymetries modified to represent borrow areas.

Bokuniewicz, H., Lashley, J., and Innes, W. 2016. Preliminary annotated bibliography for sand needs and resources offshore New York. School of Marine and Atmospheric Sciences, Stony Brook University. Unpublished Report.

Data Deliverables

Compiled data and synthetic products have been provided to BOEM for deployment on the Marine Minerals Program's MMPGIS Data Portal which is currently under development, and likely will also be deployed on DOS' Office of Planning and Development's Geographic Information Gateway Data Portal.

Complementary State Efforts to Identify Needs Areas

With ninety percent of New York State's population residing in waterfront communities, management of flooding and erosion hazards is a critical concern. During Superstorm Sandy alone, the Governor's Office estimates that 305,000 homes were destroyed primarily by storm surges; over 400,000 people were evacuated; and 53 New Yorkers lost their lives.

DOS Coastal Risk Areas and Community Resilience Planning

While several products exist to help people identify flood risk, such as FEMA floodplains maps, no single product characterizes the cumulative flood risks facing coastal communities. DOS partnered with the National Oceanic and Atmospheric Administration (NOAA) and the Federal Emergency Management Agency (FEMA) to combine different pieces of information (see list below) to identify New York's most vulnerable coastal areas. The result was the "DOS Coastal Risk Areas" which classify areas of extreme, high, and moderate risk for use in future resilience planning.

To identify Coastal Risk Areas, DOS staff gathered information on the following elements of coastal risk:

- elevation
- floodplain
- sea, lake, and overland surges from hurricanes (slosh)
- sea level rise scenario
- shallow coastal flooding
- susceptible natural shoreline features

Maps that used relevant data to classify each of these elements were overlaid on top of one another using GIS. The results of this overlay analysis were used to classify New York's coastal areas into three risk categories: extreme, high, and moderate. The Extreme Risk Areas are the most vulnerable areas, which are currently at risk from frequent flooding. High Risk Areas face less risks from flooding than extreme, but more so than the Moderate Risk Area. All three areas will continue to increase in vulnerability as sea level rises.

The DOS Coastal Risk Areas help identify vulnerable community assets and areas where development is most vulnerable. Risk assessment and resilience planning is a means of evaluating risk in advance of storm events. Through resilience planning, communities have time to identify risks to social, economic, cultural and natural resources that support their quality of life. The risk area maps can be used to compile an inventory of vulnerable assets that support community functions. Once the location of vulnerable functions is known, the risk maps can help assign a general level of risk to each assets to help communities determine which are most vulnerable to prioritize resilience planning efforts and strategies.

As an immediate follow-up to Superstorm Sandy, and in recognition that communities are the most knowledgeable resources on past events and what is most at risk, New York initiated a new community resiliency planning initiative called the "New York Rising Community Reconstruction" program (NYRCR). One goal of the NYRCR Plans was to increase the future

resilience of the places and/or services providing critical social, economic, and natural functions within a community (i.e., assets).

Through the NYRCR planning process, each community identified critical assets and then overlaid those assets with the DOS coastal Risk Areas in order to assign a level of risk in relation to future storm events and sea level rise. This asset risk assessment helped communities strategically plan for and identify future investments that would expedite recovery and improve future resiliency. Examples of assets include public facilities such as schools, medical facilities; emergency and public safety services including fire and police protection; as well as natural, cultural, and recreational resources such as wetlands, beaches, and parks. Assets also include critical infrastructure such as transportation roadways, utility networks, and storm water systems required to support those essential public facilities.

Other Holdings

In addition to community-wide assets, governments at various levels also own or maintain assets that may also be vulnerable. The National Park Service partnered with the Program for the Study of Developed Shorelines (PSDS) at Western Carolina University (WCU) to begin an assessment of the level of exposure that park owned assets will face during a period of rising sea level. The first phase of this collaborative project between WCU and NPS has focused on identifying NPS assets that may be threatened by a future 1 m rise in sea level within 40 coastal units. A 1 m rise in sea level can be expected to occur in the next 100 to 150 years. Many of the assets identified are already vulnerable to existing coastal hazards (erosion and storms). Holdings identified within or adjacent to New York State include:

- Castle Clinton National Monument
- Fire Island National Seashore
- Gateway National Recreation Area
- Governors Island National Monument
- Sagamore Hill National Historic Site
- Statue of Liberty National Monument

Similarly, the New York State Office of Parks, Recreation, and Historic Preservation (OPRHP) is undergoing an effort to determine the impacts of climate change on their facilities. Specifically, OPRHP is using GIS to identify where the potential impact of storms and sea level rise will be in order to develop management plans that improve resilience and expedite recovery after storms. The DOS Coastal Risk Areas have been a key resource in this analysis, helping OPRHP assess the relative vulnerability of valuable coastal park resources, including infrastructure and natural resources.