Municipal Vulnerability Preparedness Program Action Grant Case Study

Municipality: Towns of Scituate and Cohasset
Project Title: Mapping Storm Tidal Pathways in Scituate and Cohasset: Assessing Coastal Vulnerability to Storms and Sea Level Rise
Grant Award: $ 112,668
Match: $ 40,031

Community Overview:
Provide a general description of your community as a brief introduction to the project.

Scituate is a seacoast Town in Plymouth Country with a population of 18,133 at the 2010 Census. Scituate is heavily impacted by storm events being the most impacted by nor'easters of probably any community in New England.

Cohasset is a smaller town abutting Scituate with a population of 7,542 at the 2010 Census.

Description of Climate Impact:

Address the community's current and potential future vulnerability to climate change impacts. What are the specific threats to the project area/site and reasons for applying to the grant program?

Scituate is the hardest hit if not close to hardest hit coastal community in all of New England. The flood insurance claims in Scituate are higher than any other community within Massachusetts by far. For the most part, the entire coast is extremely vulnerable.

Project Goals:
What were the specific goals of the project?

The primary goal of this project was to supplement the LIDAR base map with more accurate GPS survey data to map the routes through which 'storm tides' (discussed in more detail below) will pass, threatening vulnerable areas with inundation of varying depths. For purposes of this project, these locations have been termed 'storm tide pathways'.

Approach and Result:
How did the project team implement the project? Describe the methodology or your approach to achieve the project goals. Describe, and quantify (where possible) project results (e.g. square footage of habitat restored or created). Provide web links, if available, to your project deliverables.

Field work necessary to verify and locate pathways accurately was conducted from November 2019 through March 2020 throughout the two towns. A total of 443 pathways were identified in the initial desktop analysis. After field surveys, 28 pathways were added and 6 were removed for a total of 465 storm tide pathways in the study area. The Town of Cohasset has 166 pathways, the Town of Scituate has 299. In addition to the 28 pathways added in the field, the location of 202 pathways (43.4%) were moved more than 1 m horizontally during field surveys. Presently, the towns of Scituate and Cohasset flood regularly during high water storm events, but to illustrate the nature of the future threat faced by low-lying communities this study has identified 54 pathways between 14.8 ft - 15.8 ft (MLLW) that have not flooded in recorded history, yet lay less than 12 inches above the storm of record for the area.

The storm tide pathways data and maps are digital but can be used in a number of ways. Hardcopy maps can be generated for training purposes, field use or in the event of a power loss, online apps can be produced for use by town staff and the public and offline apps can be created for use by first responders and other staff to use during internet loss, to train, or plan future mitigation efforts and/or assess vulnerabilities. Working with the SNEWFO-NWS, Center for Coastal Studies (CCS) staff reformatted data generated from this project within Cohasset and Scituate to conform to standards needed to be hosted on the NWS Coastal Flood Threat and Inundation Mapping website. This website now combines NWS storm surge forecasts with accurate elevation data and storm tide pathway locations to provide municipalities with reliable information of the severity of coastal inundation events. These improved and easily accessible data will help communities to avoid, mitigate and prepare for these increasingly severe flooding events.

Lessons Learned:

What lessons were learned as a result of the project? Focus on both technical matter of the project and process-oriented lessons learned.

The low-lying areas throughout Cohasset and Scituate, though numerous were not always contiguous. Many of the mapped storm tide pathways inundated small but critical areas that may have been missed if mapping were done at a coarser scale. This is due in part to the uneven shoreline and topography resulting from the rocky coast and glacial and erosional features, such as drumlins, barrier spits and tombolos that stretch along much of the shoreline.

Further, the rapid loss of area due to inundation with a relatively small increase in sea level rise was also somewhat surprising. It was shown that for every 6 inches of sea level rise approximately 100 acres of coastal land were lost. The storm tide pathways mapped with elevations 1-12 inches above the storm of record (the January 2018 storm) should be a major focus for local managers. These pathways have never been inundated and thus institutional knowledge and past experience has not prepared local public works departments and first-responders to anticipate and respond to inundation at these levels, which could lead to catastrophic impacts during a new storm of record.

Partners and Other Support:

Include a list of all project partners and describe their role in supporting/assisting in the project.

The National Weather Service:

Working with staff at SNEWFO-NWS, these shapefiles are imported into the Coastal Flood Threat and Inundation Mapping website and color coded to correspond to NWS Minor and Moderate and Major flooding categories. The updated webpage using these project data, when internal NWS review is completed, can be viewed at https://www.weather.gov/box/coastal.