

INVESTIGATING SEA LEVEL RISE SCENARIOS FOR GLOUCESTER, MASSACHUSETTS

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GIS320

Grinnell Glacier - from Overlook Glacier National Park

Introduction

◦I will be analyzing the impact of projected sea level rise on the city of Gloucester, Massachusetts.

◦This analysis is extremely important because of the growing evidence of global warming and the foreseeable effects on the world.

◦Sea level rise is a direct effect of climate change and we need to be aware of the effects this will have on our coast lines.



Unknown Photographer, courtesy of GNP Archives

circa 1940

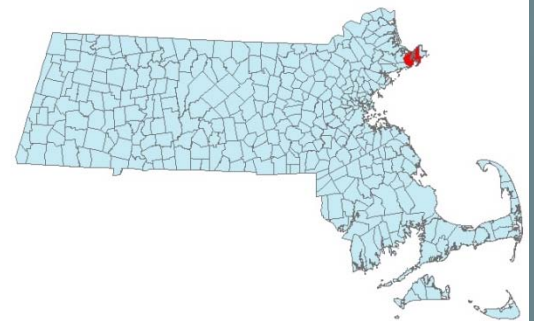


Karen Holzer photo, USGS

2006

www.nrmssc.usgs.gov/repeatphoto

Gloucester, Mass



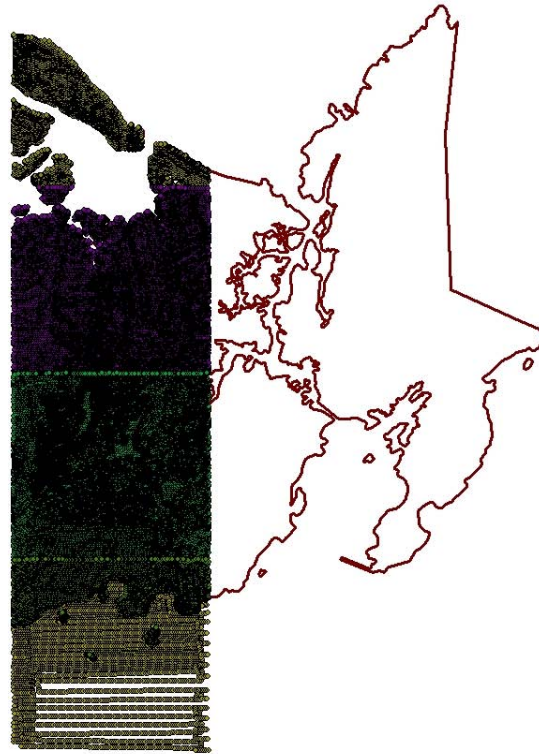
Objectives

- My objective is to produce a series of maps to demonstrate the proportion of Gloucester that would be inundated under 3 different scenarios of sea level rise.
- I will identify and calculate those areas of Gloucester that are .5, 3 and 6 meters above sea level.

Methods and Data

- ▣ The data used for this analysis was obtained from the MassGis website which holds elevation data for the state of Massachusetts. The Digital Terrain Model (DTM) sheets that cover Gloucester consisted of 12 tiles that contain the land surface point elevations for the City.
- ▣ These files were downloaded and then converted into shape files on Arcmap and layers of elevation were created.

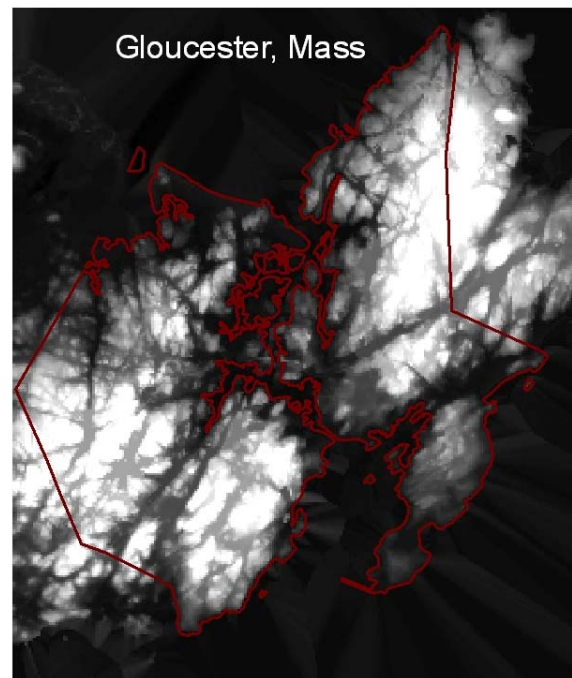
Digital Terrain Model (DTM) sheets



Methods cont.

- ▣ These shape files were then converted to a raster elevation grid thus interpolating the point elevations into a continuous raster elevation surface.

Raster Elevation Grid



Methods cont.

- ▣ I then identified the areas that met my different elevation criteria. I looked at what areas would be inundated if sea level rose by .5, 3, and 6 meters. This was done using the raster calculator with the spatial analyst tool.
- ▣ I produced three maps that show areas that would be inundated under those 3 scenarios in Gloucester.

Results

- ▣ The City of Gloucester consists of 69,143,200 sq. meters or 27.8 sq. miles
- ▣ .5 meters above sea level would inundate .58 sq. miles.
- ▣ 3 meters above sea level would inundate 2.8 sq. miles.
- ▣ 6 meters above sea level would inundate 4.7 sq. miles.

Gloucester, MA
.5 meters above sea level



0 800 1,600 3,200 Meters

NAD 1983

.58 miles of
land would be
inundated.

Gloucester, MA
3 meters above sea level



0 800 1,600 3,200 Meters

NAD 1983

2.8 miles of
land would
be inundated.

Gloucester, MA
6 meters above sea level



0 800 1,600 3,200 Meters

NAD1983

4.7 miles of land
would be
inundated.

Conclusion



Sea-level rise is regarded as one of the more important impacts of climate change on the North Shore. Individuals and governments need to come together to help reverse the negative effects of global warming.

I would like to extend this work by identifying the damage caused by these 3 sea-level rise scenarios.

This could be Ten Pound Island!!!!

**Westport WA
Lighthouse - High
Tide**

[flickr.com/photos/paddrick/1454680409/](https://www.flickr.com/photos/paddrick/1454680409/)

Citations

- ▣ Mass.gov/mgis
- ▣ GRIDA.no (Norway) - the United Nations Environment Programme (UNEP) UNEP.org
- ▣ www.nrmssc.usgs.gov/repeatphoto