Preston Hudlow

GEOG 419

Tom Allen

Lab 8

Q1: Upon visual inspection, how does the shoreline appear to be changing over the course of the time spans included? The 1946-2021 vector shorelines? The apparent changes since the 1852 georeferenced t-sheet to the present?

Between 1946 and 2021, the shoreline on Hatteras Island shifted noticeably toward the land, indicating clear erosion and retreat. The 1946 shoreline remains consistently farther seaward than the 2021 NOAA CUSP data.

Comparing the 1852 T-sheet to the present reveals even greater erosion, highlighting the steady migration of the barrier island.

Q2: Use the measure tool in the viewer to estimate the average shoreline recession (erosion) rate in meters per year between the 1946 and 2021 shorelines: _____ m/yr (Hint: measure the distance approximately orthogonal at a representative location, in meters, and then divide the length by the number of years [2021-1946])

237.47/75= 3.16m/y

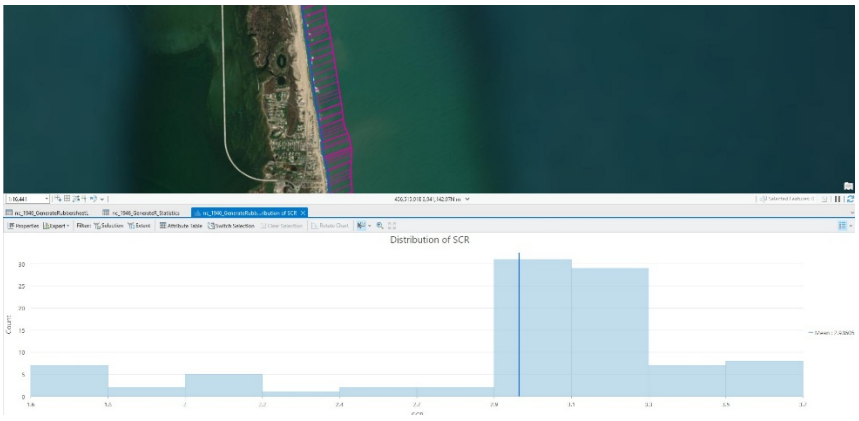
Q3: Find the minimum and maximum distances. Then, Rt-click and choose Statistics. Examine the resulting histogram and interpret the distribution. What is the mean distance of erosion?

Minimum: 1.57

Max: 3.73

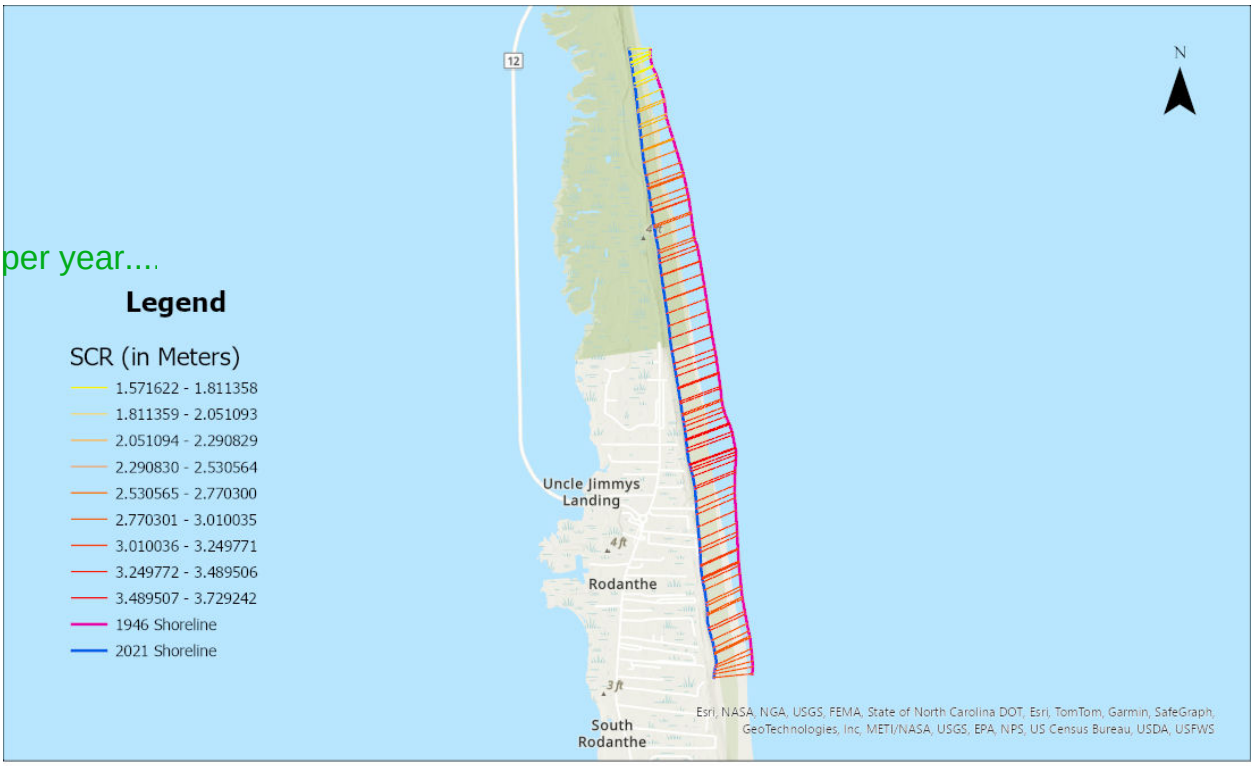
Mean: 2.94 m/y

The histogram shows a distribution skew to the right side which can be seen from the extreme erosion taking place. Other data shows moderate erosion.



Q4: Make a screenshot or quick but professional looking map of your results. Be sure to include the legend for the layer (or at least that from the Table of Contents).

meters per year....



Shoreline Change in Outer Banks from 1946-2021

0 0.25 0.5 1 Miles

Sources: Lab 8
By: Preston Hudlow

might put N arrow near scale bar and use fewer decimal places in legend cla

Q5: Write a paragraph that summarizes your results. Note any concern for potential error in the results (e.g. per lectures and readings) such as the sources of the shorelines or the data quality. You may also want to consider the imagery in the Esri basemaps or even adding imagery or other data you can find on the Esri Living Atlas or from NC Division of Coastal Management.

The results display a consistent trend of shoreline retreat throughout the study area, with an average erosion rate of about 2 meters per year. The highest erosion rates are found near former inlet locations and narrower sections of the island. Possible sources of error include digitizing mistakes, differences in shoreline definitions and georeferencing inaccuracies in historical data. Additionally, natural coastal changes like storms and over wash events can introduce variability into long-term erosion patterns. Overall, the findings are consistent with regional studies that document significant landward migration of the barrier island over the past century.

Bonus (1-2 paragaphs, 2 pts): Let's assume this exercise was a pilot project that was a successful proof of concept or pilot study. You may have been assigned this as an intern for Dare County (NC) or the National Park Service's Cape Hatteras National Seashore. HOW would you expand on this analysis if you were assigned to expand on it for the whole Cape Hatteras National Seashore (from Nags Head south to Ocracoke Island?) What would your response be if your supervisor asked you to use the oldest possible nautical chart/map of the area for the analysis?

To extend this analysis across the entire Cape Hatteras National Seashore, I would gather additional historical shoreline data from NOAA, USGS, and the North Carolina Division of Coastal Management, making sure shoreline definitions remain consistent across datasets. I would also incorporate LiDAR elevation data to assess vertical changes alongside horizontal movement. If required to use the oldest available nautical chart, I would georeference it carefully, using accurate control points to minimize distortions.