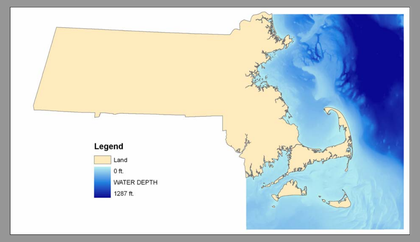
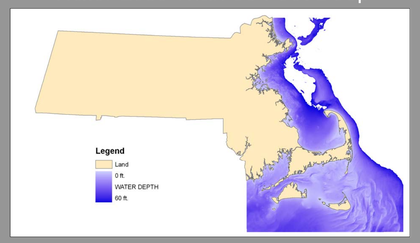
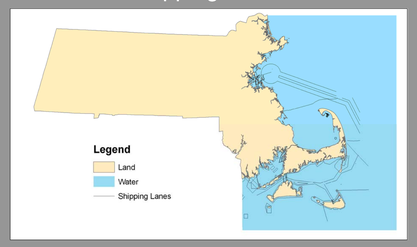
Map 1
Bathymetry of Massachusetts Coast



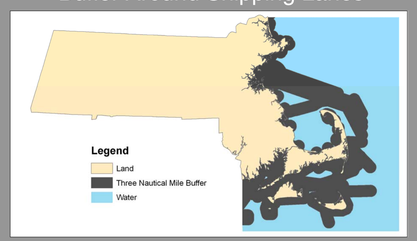
Map 2
Water Less Than 60 Feet Deep



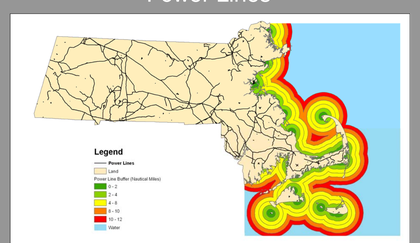
Map 3
Shipping Lanes



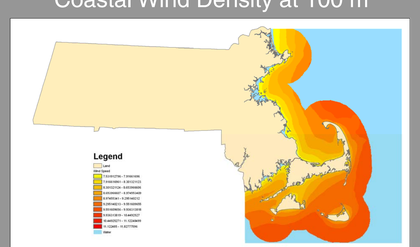
Map 4
Buffer Around Shipping Lanes



Map 5
Power Lines



Map 6
Coastal Wind Density at 100 m



Is Horseshoe Shoal the Right Place for Cape Wind?

Introduction

Developers and engineers are looking to offshore wind turbines for the future of sustainable, renewable energy. Offshore wind turbines have potential for three reasons.

First, winds are generally sustained and stronger in the marine environment. Therefore, the wind turbines can be much larger than if they were on shore.

Second, there is much more available space on the coast on which to develop wind farms.

Finally, wind turbines are out of the public's eye if the turbines are placed offshore. People often say that wind turbines are large, ugly, and loud. When the turbines are placed offshore, the public may not even be aware that there is even a wind farm.

The purpose of this project is to analyze possible wind farm sites off the coast of Massachusetts and then compare these sites to the proposed Cape Wind project on Horseshoe Shoal.

Methods

Map 1 shows the bathymetric data for the coastal waters of Massachusetts. This data was retrieved and then added to the base map of Massachusetts. I then used the reclassify tool to remove data where the water depth is greater than 60 feet deep. The result of this is shown in **Map 2**.

Map 3 shows Shipping lanes and areas to be avoided off the coast of Massachusetts. This data was retrieved in its shown form, but was previously digitized from NOAA marine charts.

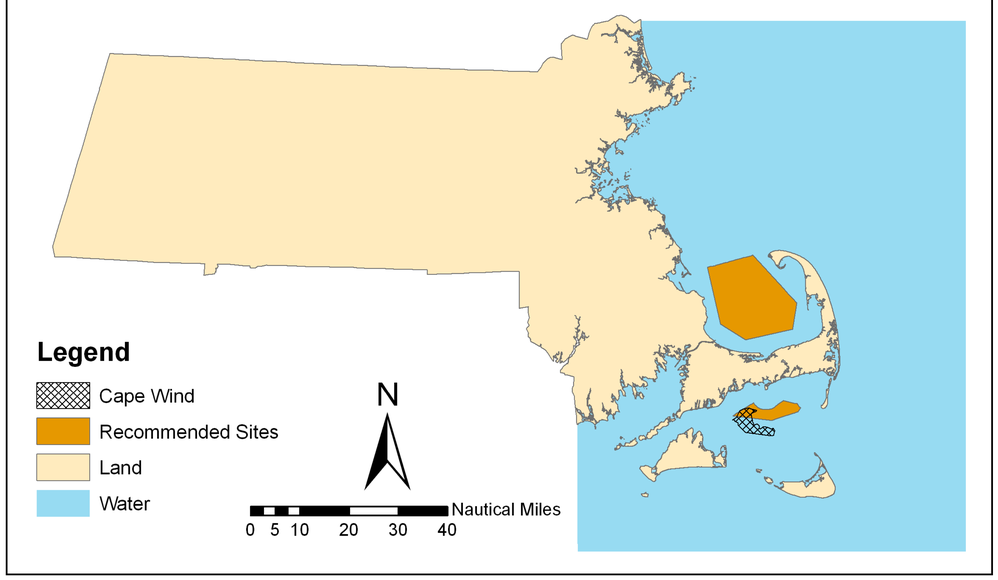
I created a three nautical mile buffer zone around these features. The buffer zone is three nautical miles because that is how wide the shipping lanes are. The buffer zone that I created is shown in **Map 4**.

Map 5 shows where high tension power lines are in Massachusetts. I used these power lines to create a multi-ring buffer. The closer the ring is, the better the site is for a wind farm because there is less distance to transmit the electricity from the wind farm to the electricity grid.

Map 6 shows the wind density along the coast of Massachusetts. This file was imported as a raster file and then colored according to average wind velocity at 100 m above the surface of the water. Red is where the highest average wind velocity is and yellow is here the lowest average wind velocity is.

After I created these maps, I overlaid the wind, power lines, and shipping lane buffer data to see where the best places to site a wind farm is.

Map 7
Recommended Sites and Cape Wind



Conclusions

Map 7 is the final map that I created. This map has the possible sites for wind turbines that I created based on my analysis and the site of Cape Wind on Horseshoe Shoal. My analysis yielded two possible sites for wind farms; one inside Cape Cod Bay, and the other just south of Cape Cod in Nantucket Sound. Both of these sites are good places to put a wind farm. However, the site in Nantucket Sound is better due to the amount of pleasure boating in Cape Cod Bay, which was not included in the analysis, and the stronger winds in Nantucket Sound.

The Nantucket Sound site that my analysis yielded is very similar to the site of Cape Wind on Horseshoe Shoal. I conclude that Horseshoe Shoal is a very suitable place to site a wind farm such as Cape Wind.

Acknowledgements

I would like to thank Professor Jake Benner for his guidance and input on this project.

Sources of Data

The bathymetric data was retrieved from Geospatial One Stop at www.geodata.gov. The rest of the data was retrieved from MassGIS at www.mass.gov/mgis/database.htm.

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