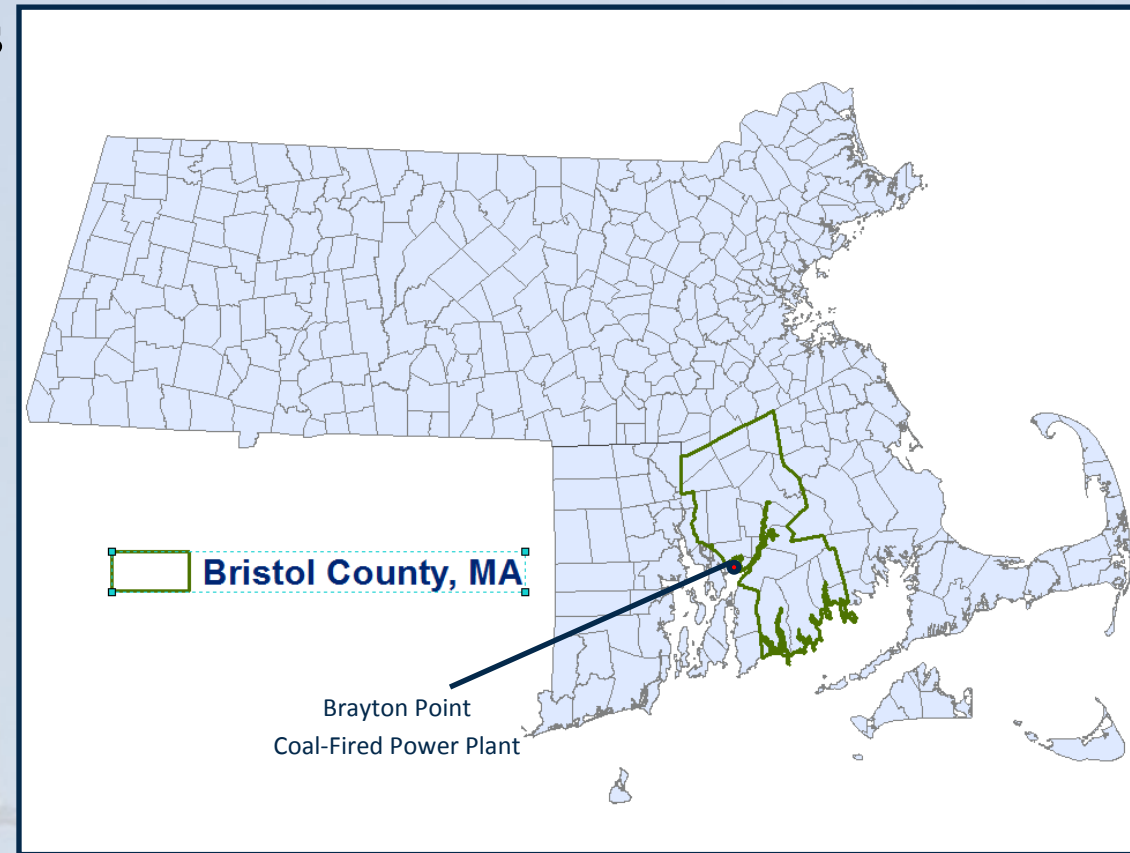


A Just Transition:

Wind Farm Suitability to Replace the Brayton Point Coal Power Plant

Introduction

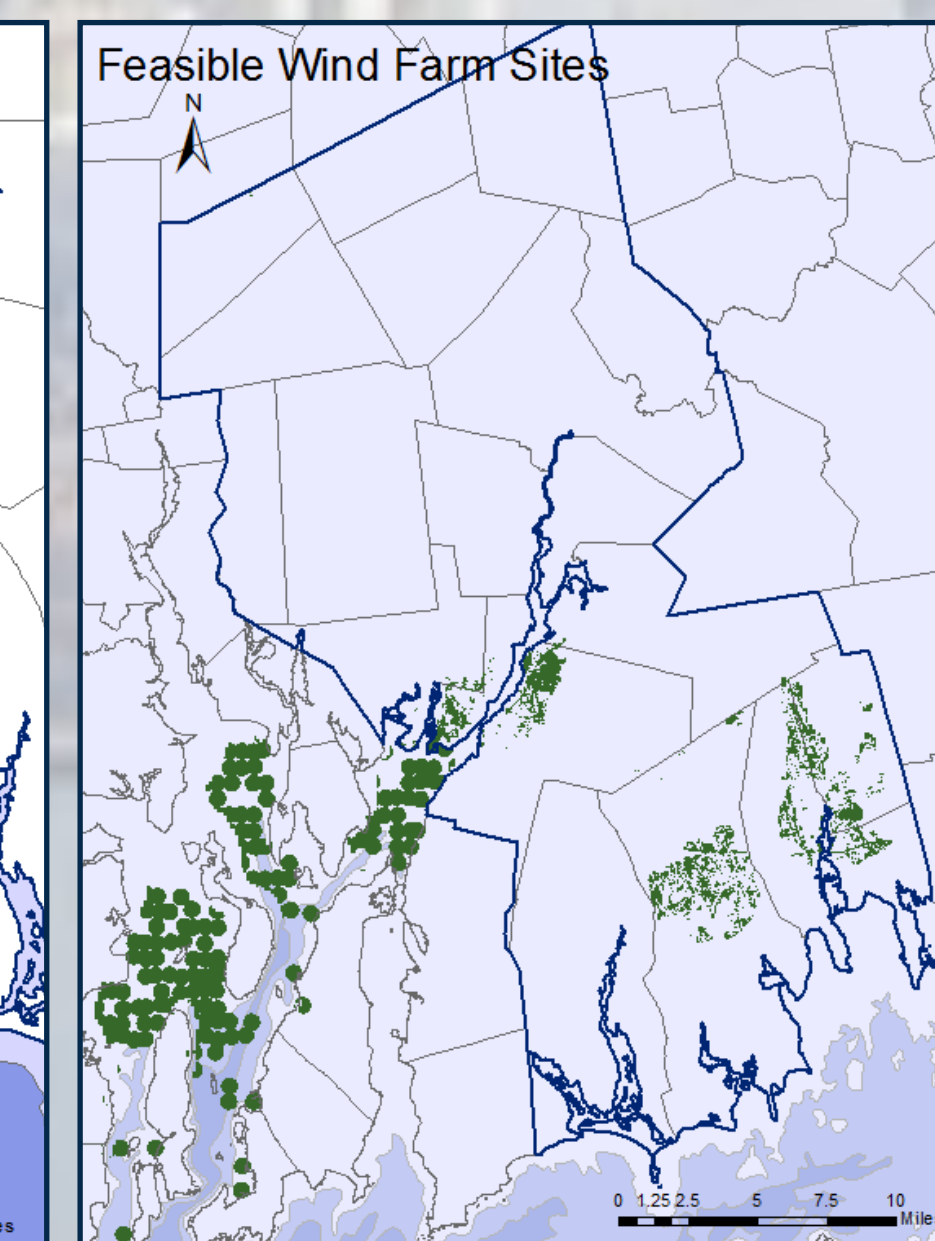
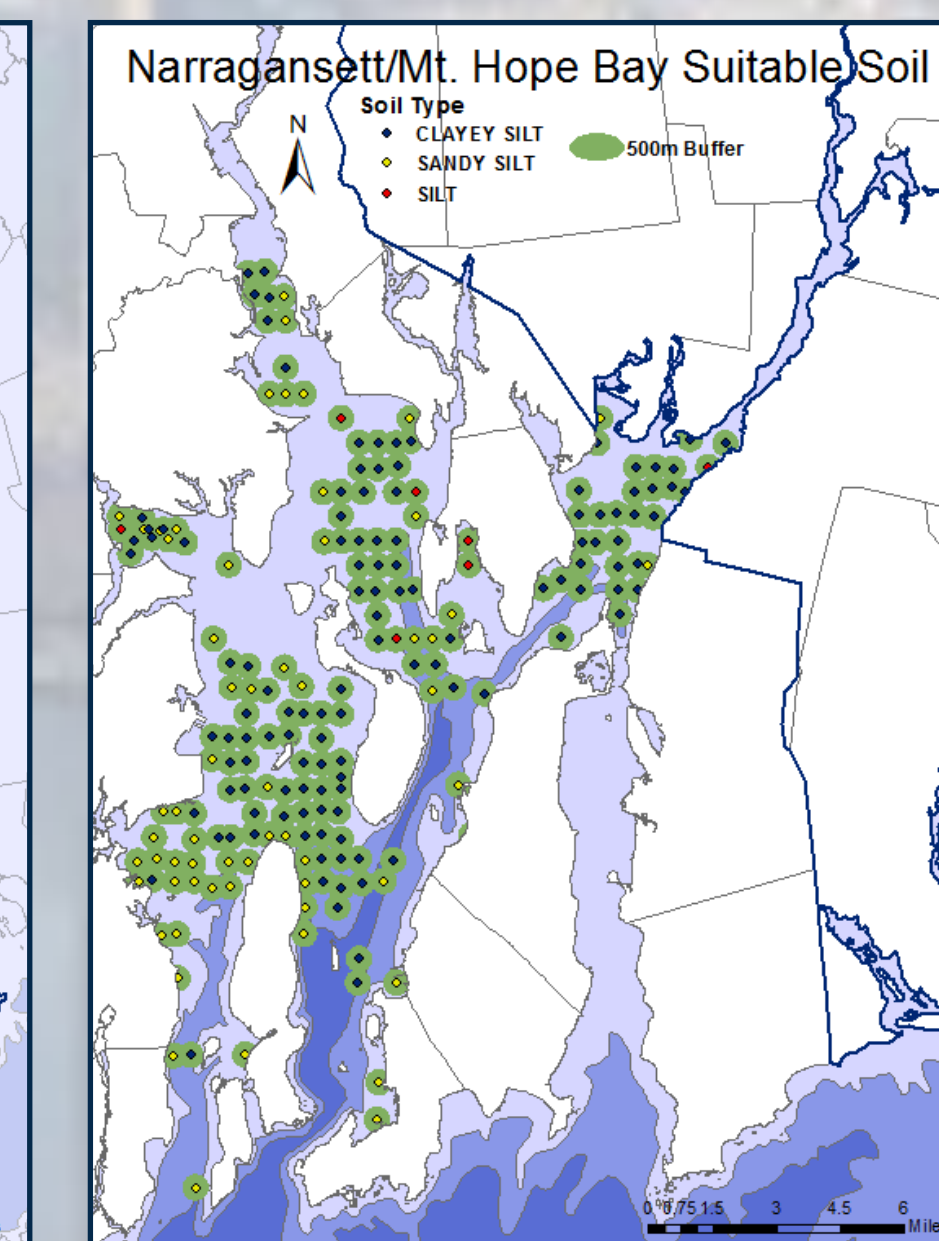
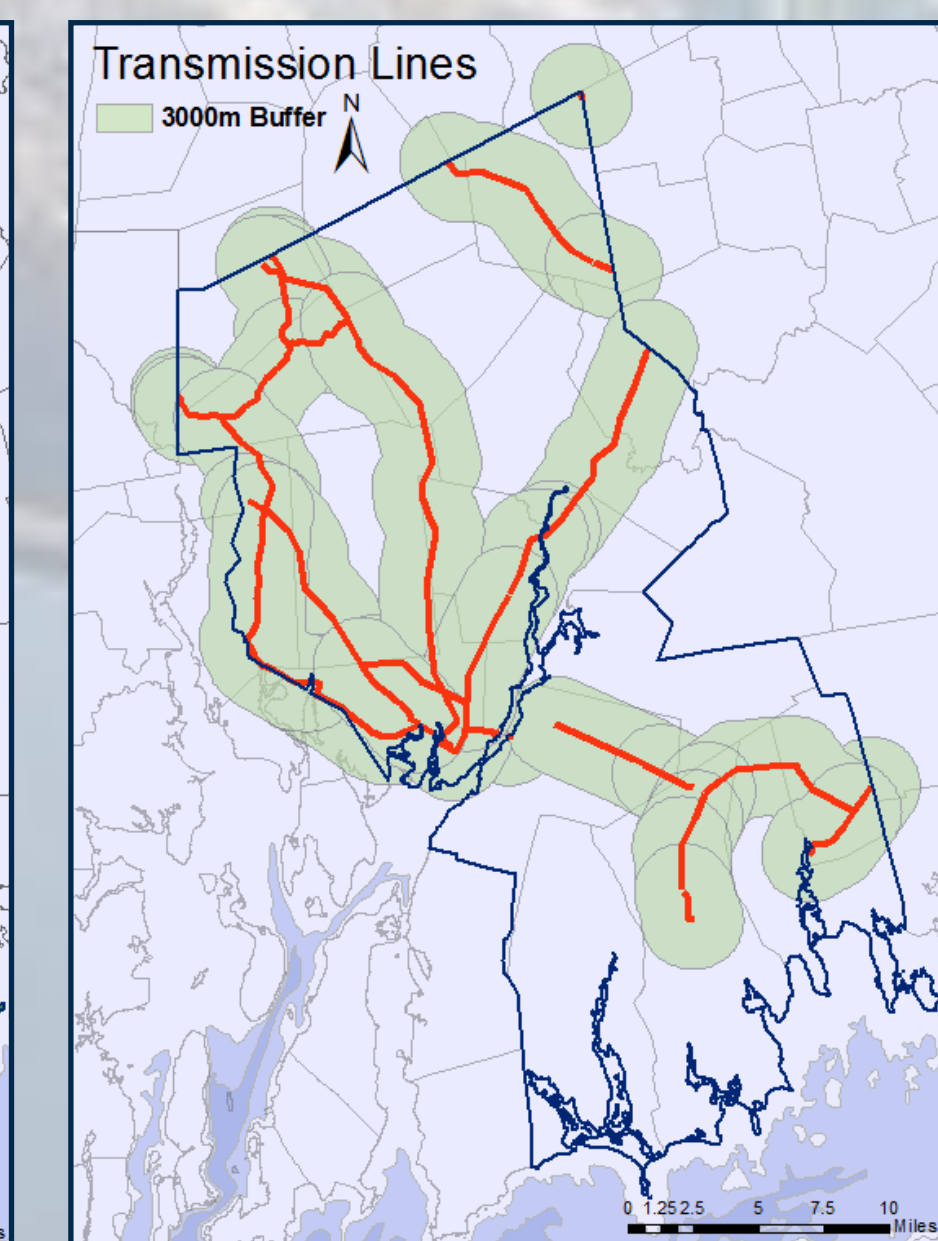
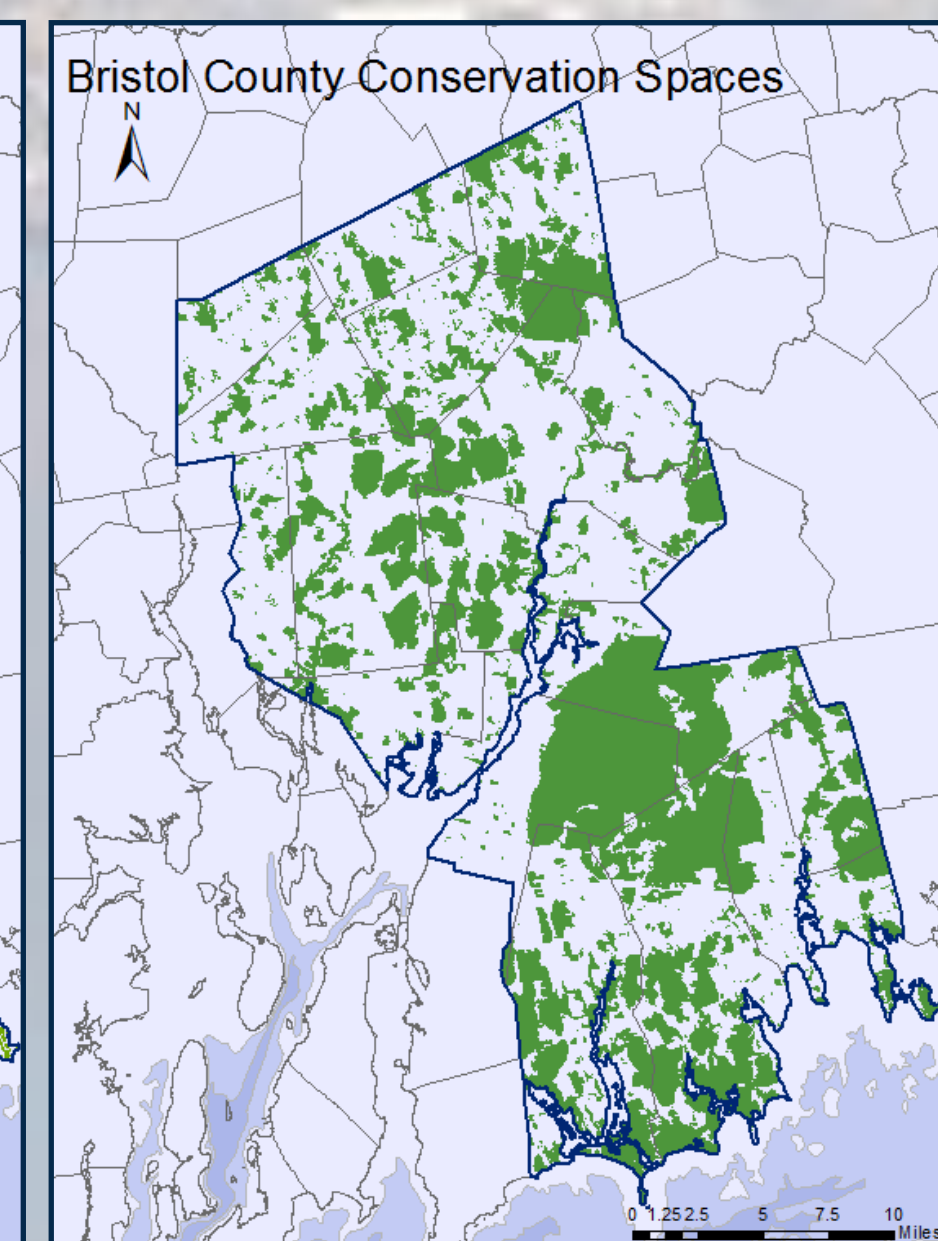
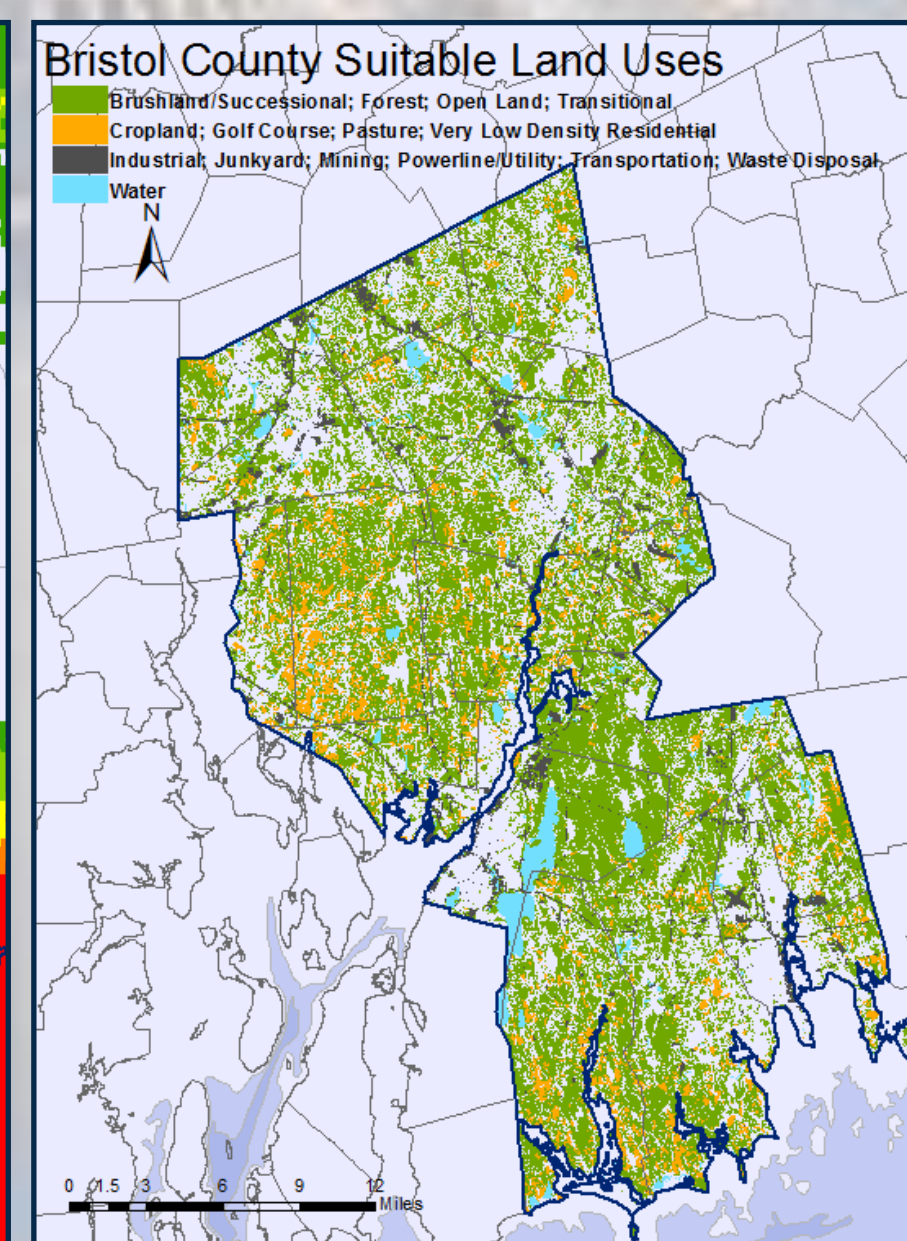
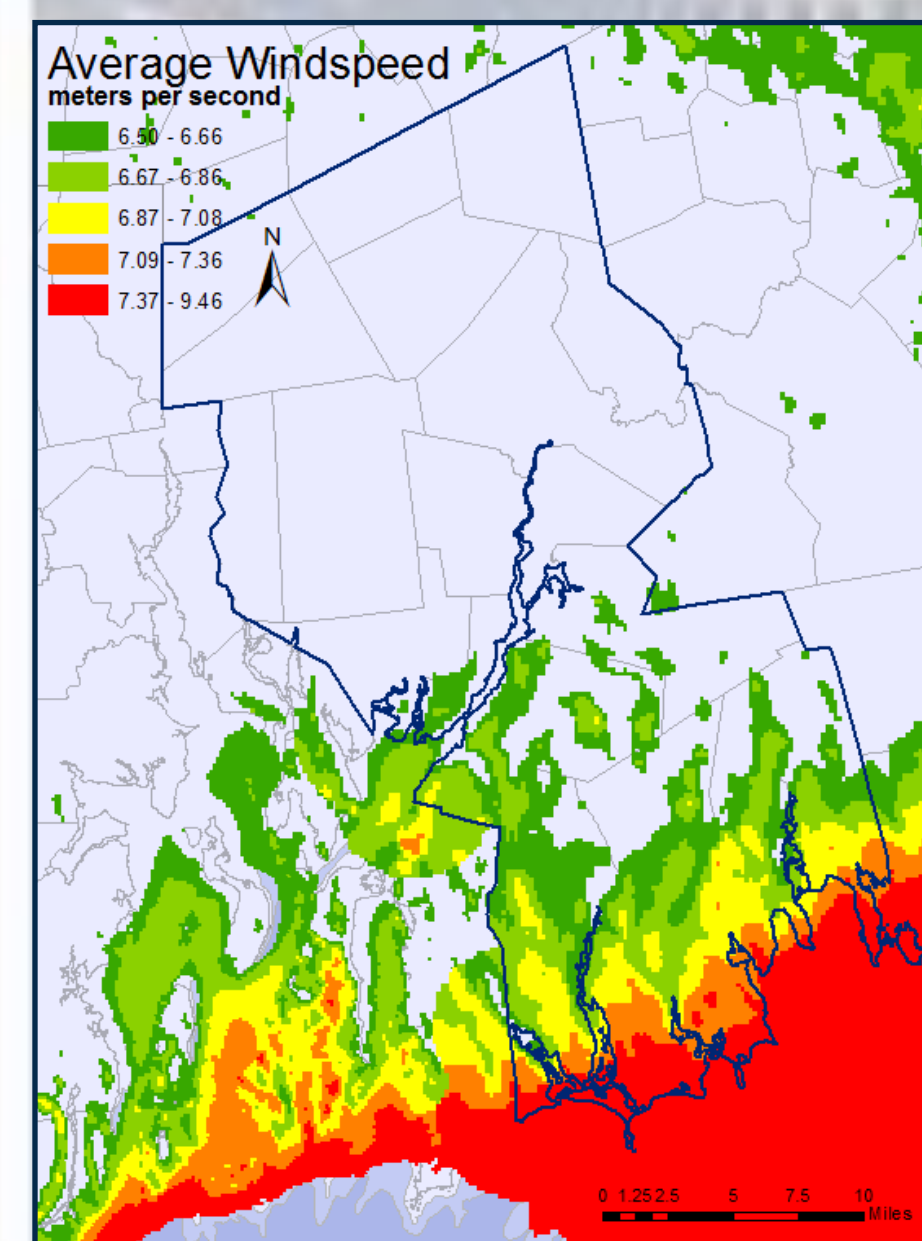
After frequent protest and decreasing profitability, the Brayton Point coal power plant in Somerset, MA is scheduled to shut down in June of 2017. Calls for the shutdown, based on pollution levels and outdated coal-fired energy technologies, were paired with demands for a just transition for workers and their families in the area. In an effort to make this demand more than just empty rhetoric, I research the physical feasibility of wind energy production in Bristol County and the Narragansett Bay. I also analyze county census data for demographic features that signify a need for green jobs, or that make portions of the local population suited to particular renewable energy jobs.



Key Questions

- What is the spatial variation of wind resources in Bristol County and the Narragansett Bay?
- Which areas would be restricted from renewable energy development due to commercial or residential land use and conservation status?
- Which areas already contain power and transmission line infrastructure?
- Which areas of the Narragansett and Mt. Hope Bays have soil that is well-suited to offshore wind turbines?
- Which census tracts have a high level of employment in industrial and energy related fields (eg Construction, Manufacturing, Transportation, Utilities)?
- Which census tracts exhibit the highest levels of unemployment?

Physical Site Factors



Methodology

Physical Site Factors

Select By Attribute:

- MA and RI Average Windspeed: All areas with windspeed $\geq 6.5\text{m/s}$
- Bristol County Land Use: All areas listed as Brushland/Successional, Forest, Open Land, Transitional, Golf Course, Pasture, Cropland, Very Low Density Residential, Junkyard, Mining, Waste Disposal, Power/Utility, Transportation and Water

- Narragansett Bay Soil: All soft soils, including Silt, Sandy Silt, and Clayey Silt

Buffer:

- Transmission Lines: 3000m buffer zone
- Narragansett Bay Soil: 500m buffer zone around selected features

Crop:

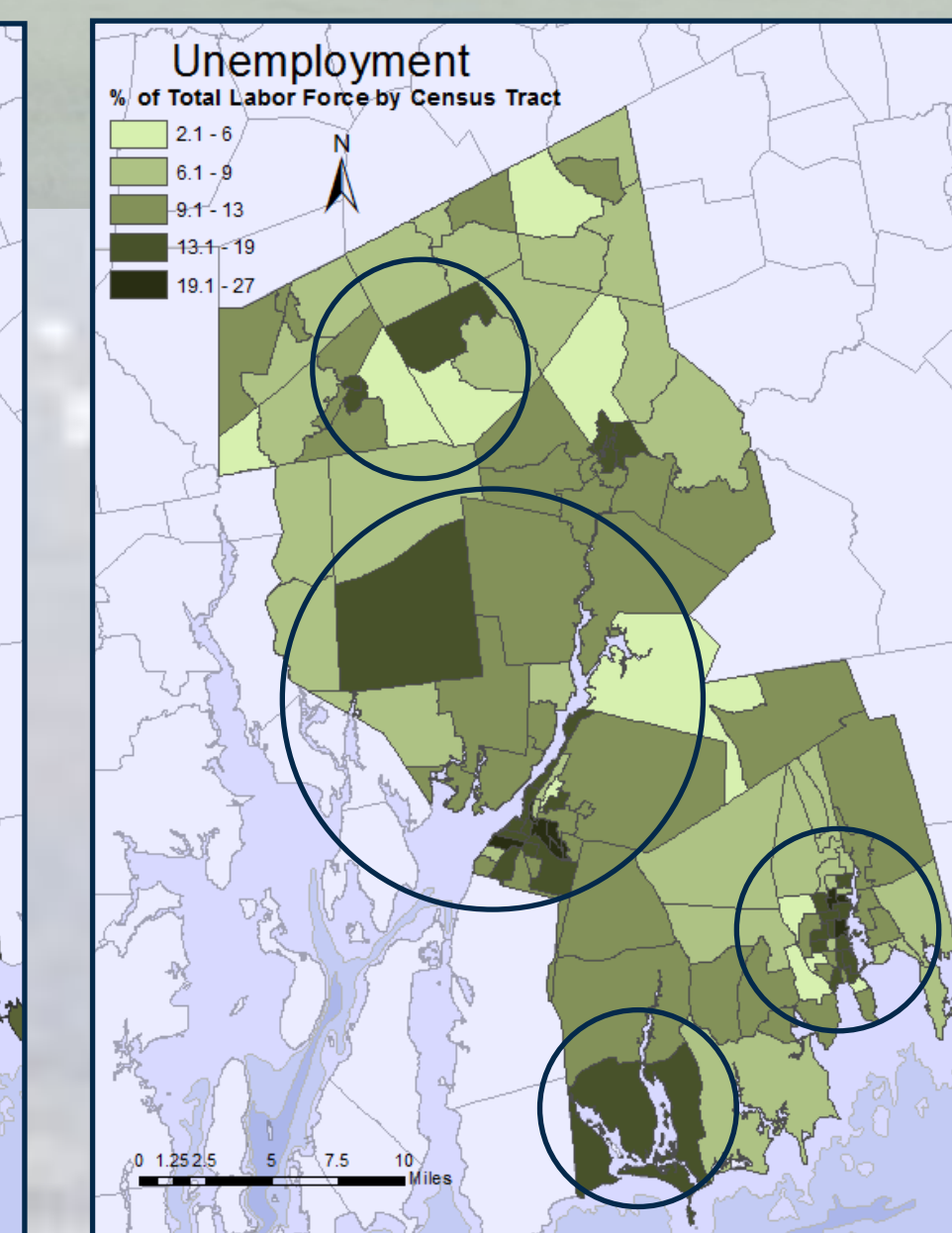
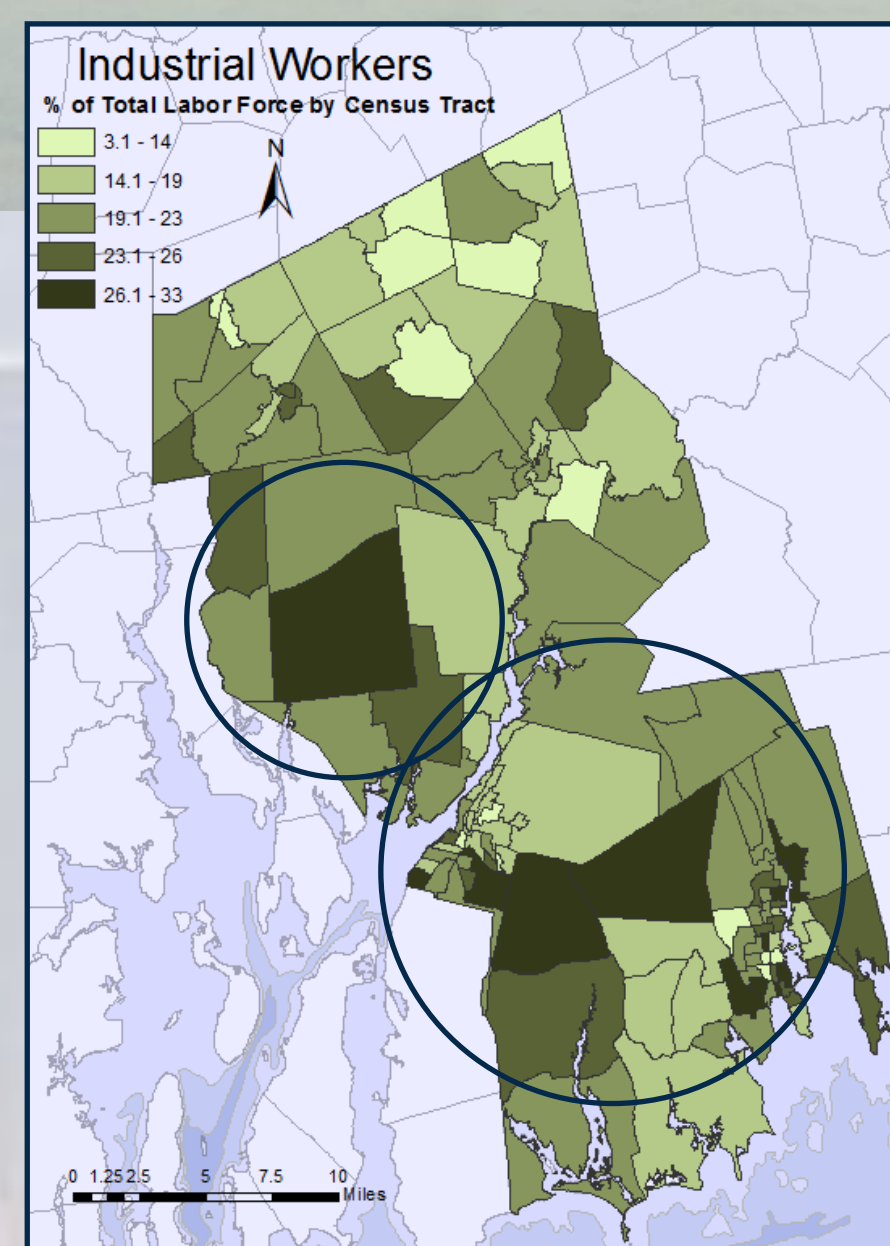
- Suitable windspeeds ($\geq 6.5\text{m/s}$) cropped to suitable land use areas and Transmission Line buffer zones.

Erase:

- Conservation zones erased from cropped-suitable Windspeeds.

Demographics

Unemployment and Industrial Worker population were analyzed through ACS 2012 5-year estimates and mapped as percentage of total population by census tract. High unemployment and industrial employment rates are found circled in the maps below:

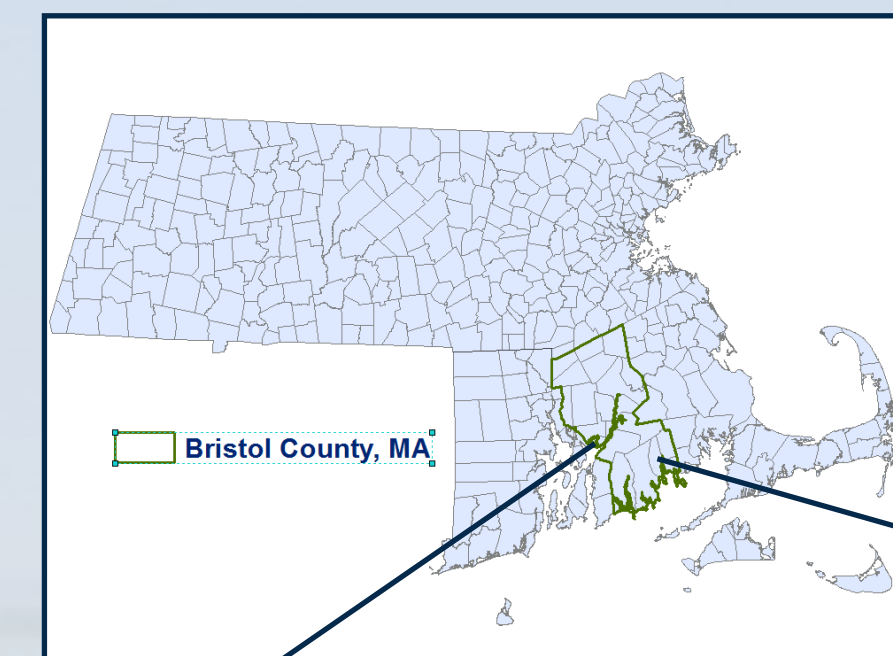


Results and Conclusions

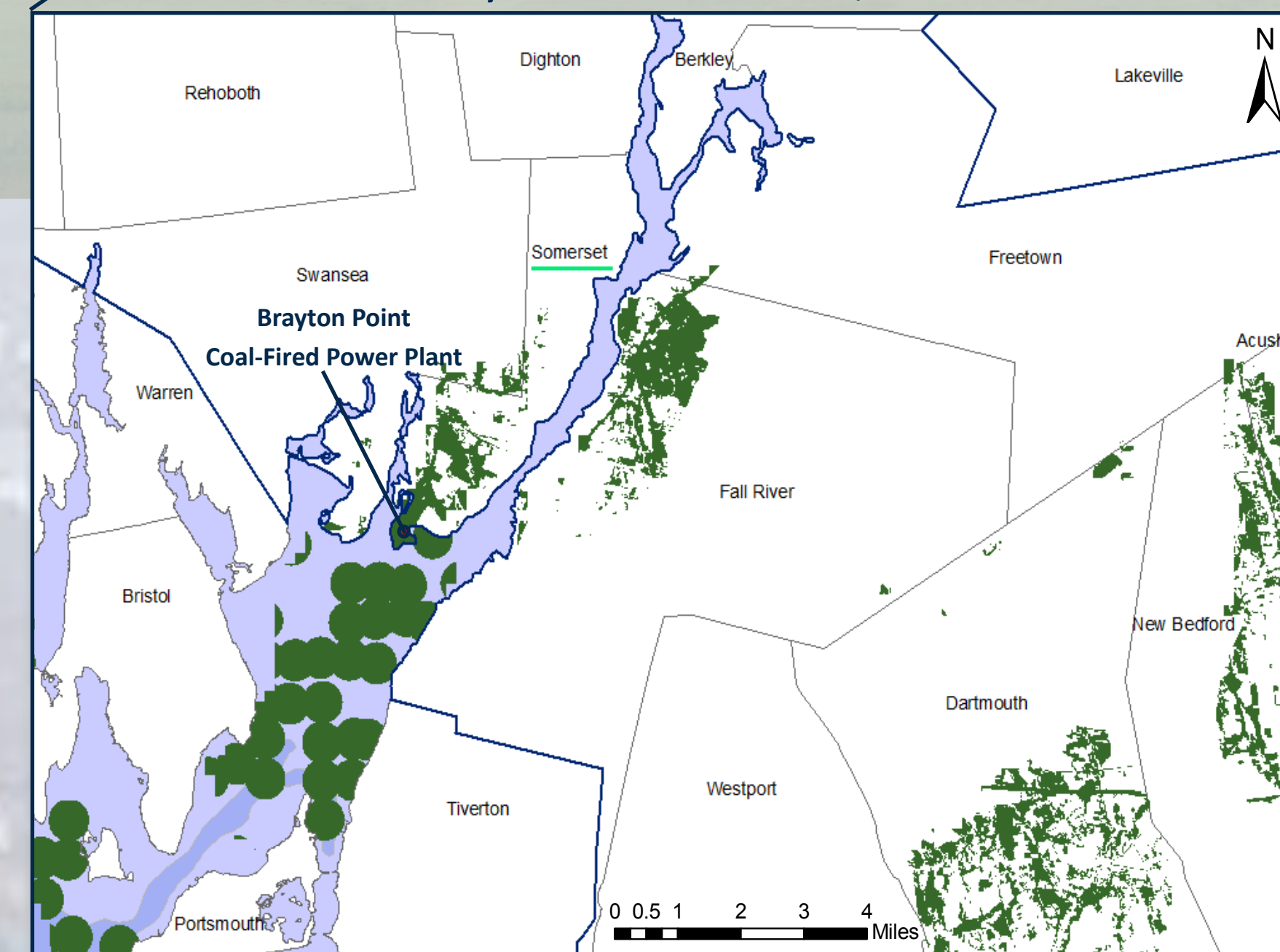
Physical Site Factors

The wind patterns in Bristol County and surrounding areas show feasible velocities toward the coast, but Narragansett Bay and Mt. Hope Bay reach far enough into the mainland that 158.5sq mi, or 22.3% of the county could be utilized based on windspeed alone. Clipping suitable land uses leaves 93.7sq mi for wind turbine development. After accounting for proximity to power lines, 69.9sq mi of land is available. Finally, after subtracting land set aside for conservation, there are **33.6sq mi of land, 4.9% of Bristol County, suitable for development of a windfarm.**

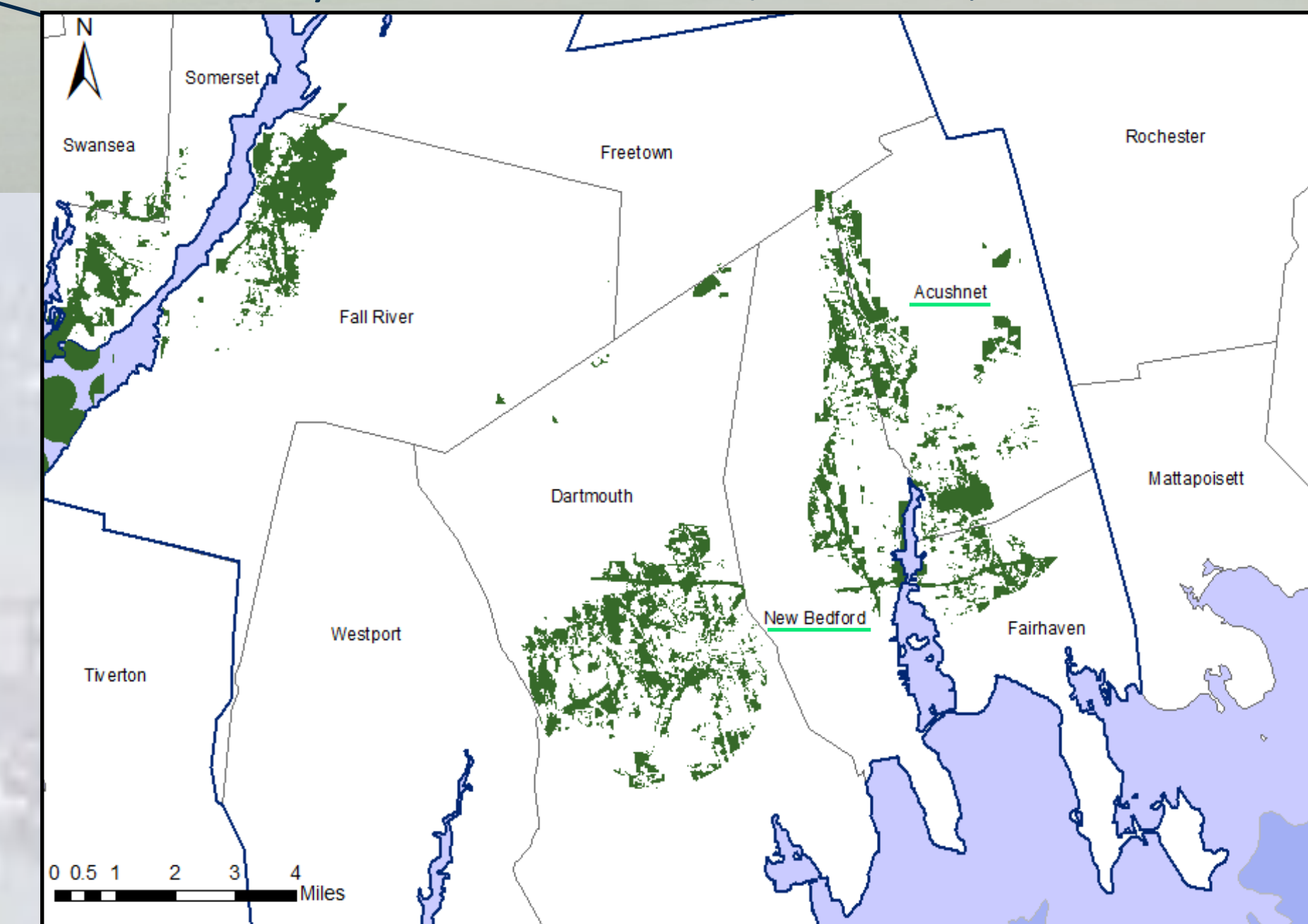
Soil analysis of Narragansett and Mt. Hope Bay from the US Geological Survey show 189 sites with suitable soil, sufficiently soft for wind turbine development. Extending a 500m buffer region around each site gives an area of 48.4sq mi of area with suitable soil for offshore wind turbines. Clipping suitable soil sites to areas with suitable windspeeds leaves approximately **40.2sq mi of offshore wind farm priority areas.**



Priority Area: Somerset, MA



Priority Area: New Bedford/Acushnet, MA



Demographic Factors

Pockets of high unemployment and employment in relevant industries are dispersed throughout the county, tending toward more urbanized areas (Fall River, New Bedford). These areas were prioritized in deciding ideal locations for windfarm development.

Conclusion

Prioritized areas for windfarm development are laid out in the two maps below.

- The towns of **New Bedford and Acushnet** were chosen for their large area of suitable land and their census-based degree of need for employment.
- **Somerset** was especially suitable for windfarm development. due to its large available land area and adjacent offshore areas. Brayton Point, and the coal-fired power plant that was the inspiration for this study, are located in an area of great suitability for windfarm development.

It is hoped that this study will lead to consideration of wind power to replace the Brayton Point coal-fired power plant.



Ben Baldwin | December 12, 2014
 Urban + Environmental Policy + Planning
 Tufts University
 Projection: NAD1983 State Plane Massachusetts Mainland
 Data: MassGIS, RIGIS, US Census Bureau,
 ACS 2012 5-year Estimates,
 US Geological Survey,
 Photos: Conservation Law Foundation,
 Wikimedia (June, 2006. Arunas Sakalauskas)