

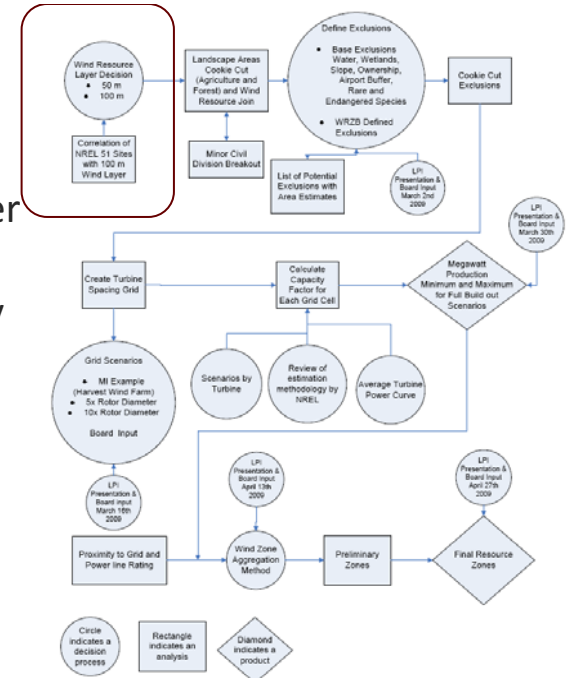


Wind Resource Zone Board March 16th

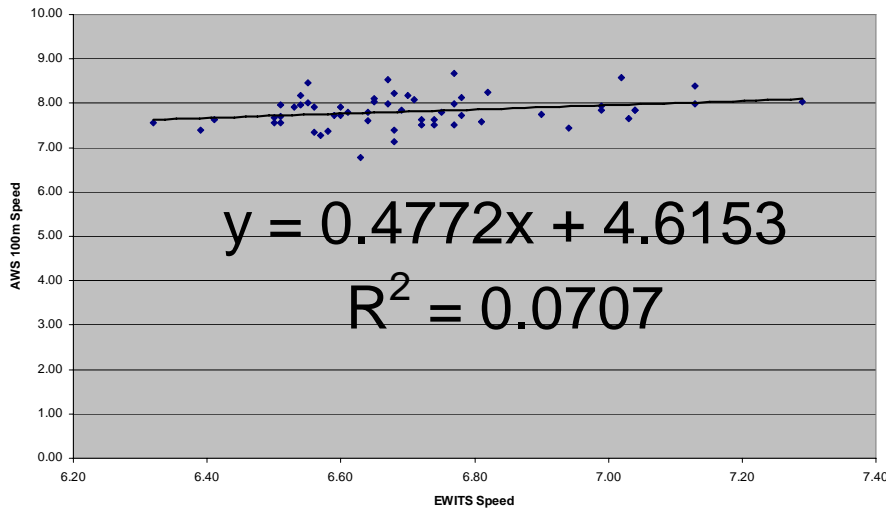


Flow Chart And Timeline

- The First step in this analysis is to determine the resource Layer to be used.
- We Consulted with the National Renewable Energy Laboratory EWIT work group to look at their process and use their data to validate the Michigan 100m data.
- The results were not encouraging, less than 27% correlation.
- We at this point recommend using the 50m data layer.
 - Correlation matrix between 50m and 100m indicates.
- The Question is what is the low average wind speed cutoff?
 - Class three defined by NREL as beginning at 6.4 m/s



EWITS Speed vs. AWS 100m Speed



STATISTICS OF INDIVIDUAL LAYERS

Layer	MIN	MAX	MEAN	STD
1	3.8129	9.5443	6.3865	1.0591
2	5.2447	10.3152	7.6256	0.8770

COVARIANCE MATRIX

Layer	1	2
1	0.46520	0.37860
2	0.37860	0.31942

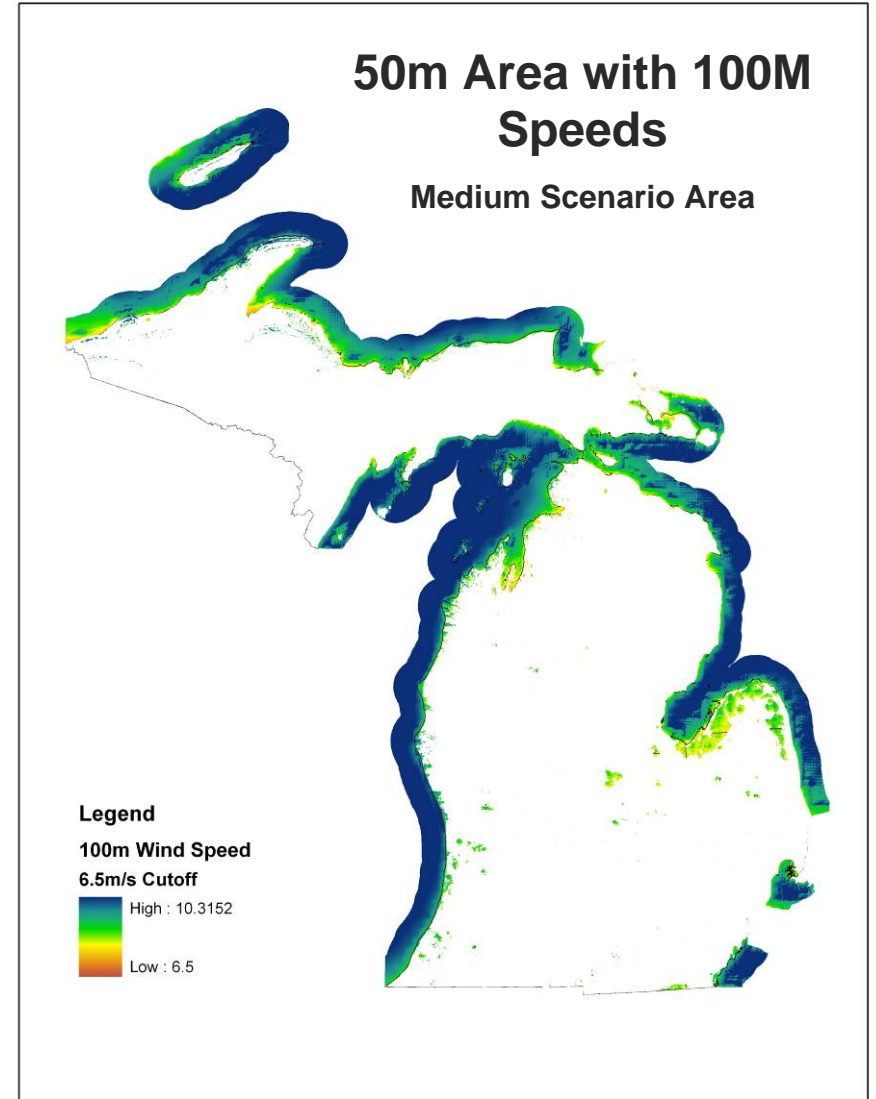
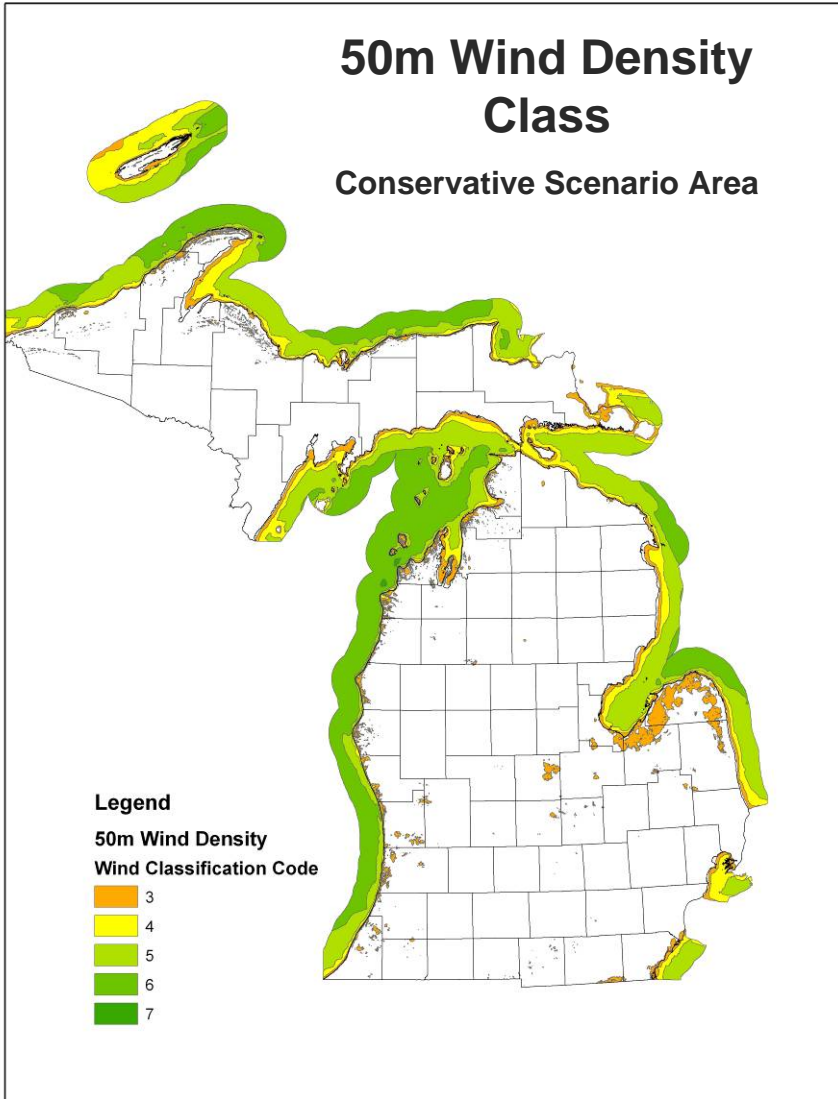
CORRELATION MATRIX

Layer	1	2
1	1.00000	0.98215
2	0.98215	1.00000



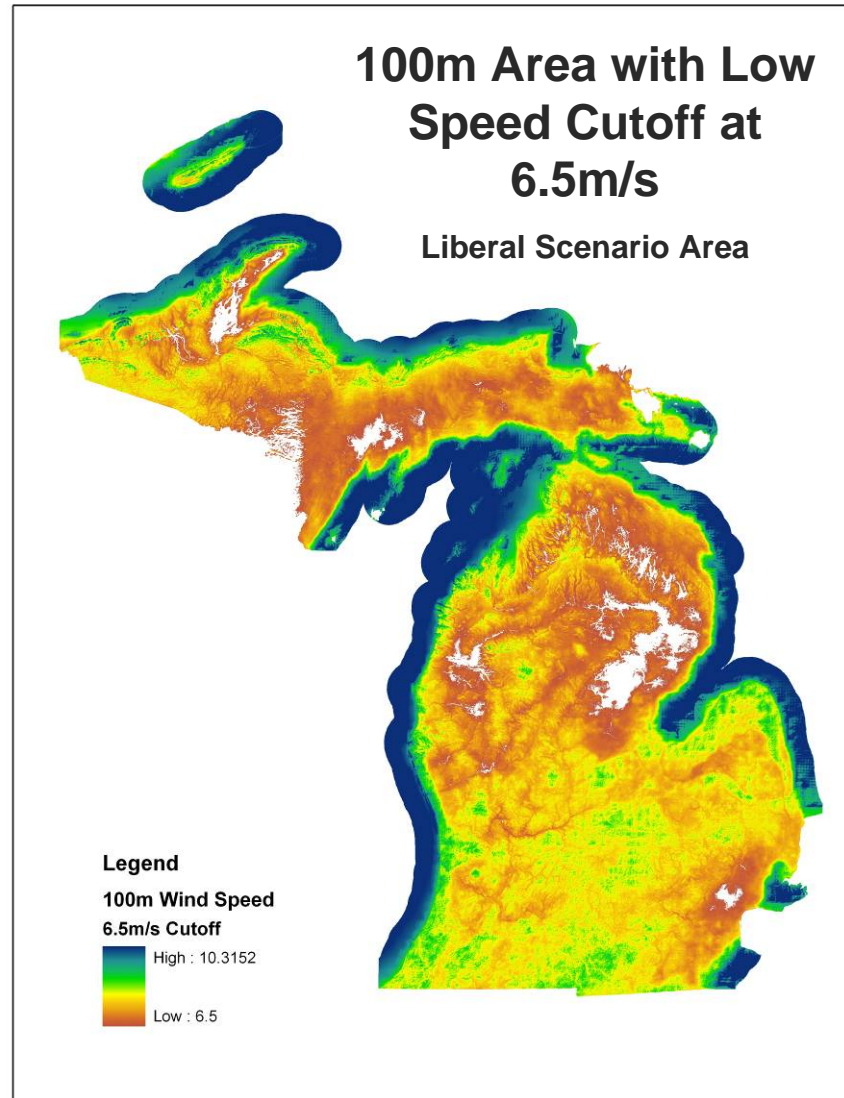


Wind Resource Maps



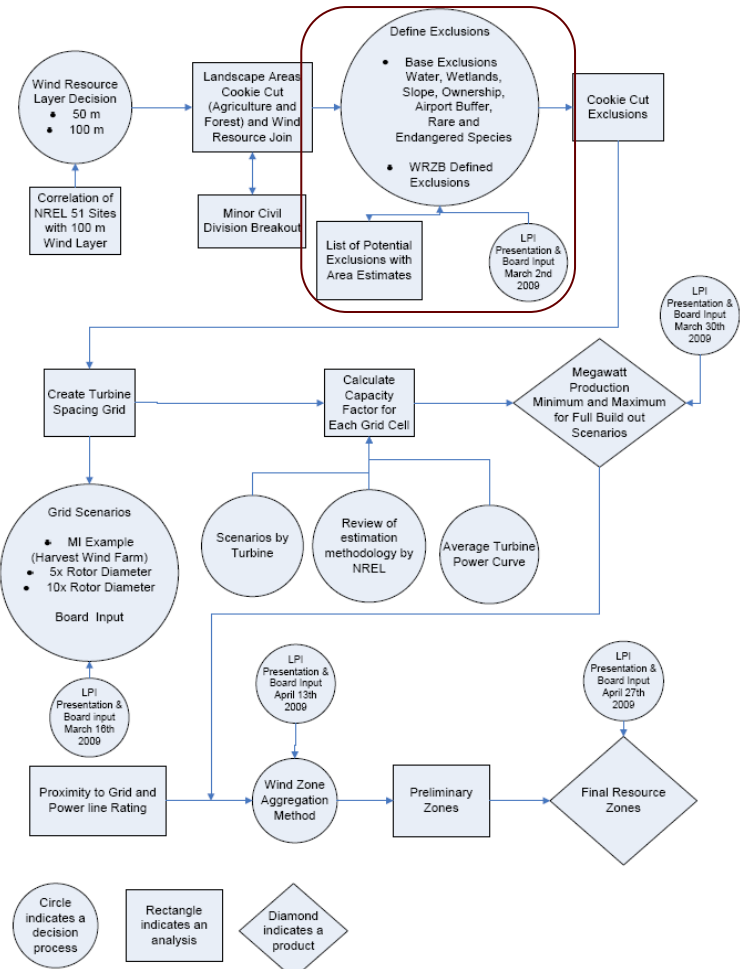


Wind Resource Maps



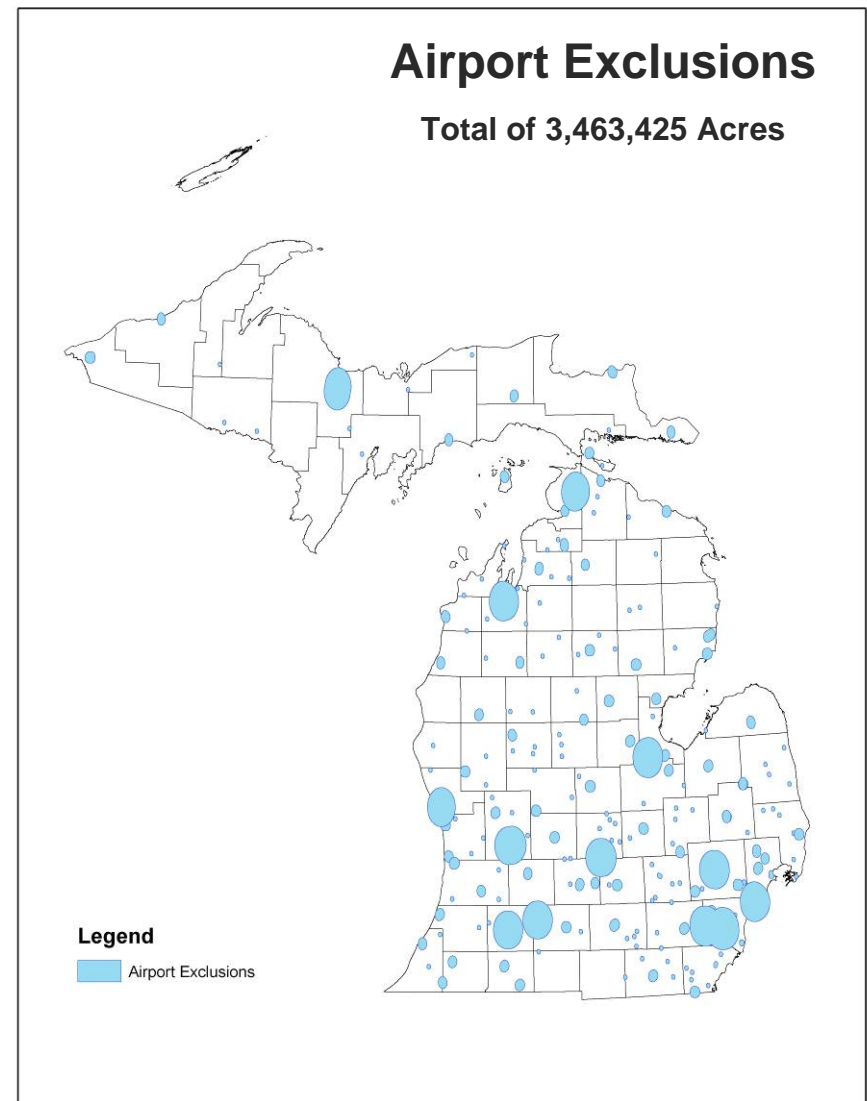
Exclusions Decided On

- Airports
 - Michigan has 1,500 separate airports. The Board discussed how to determine setbacks for airports. Radar setbacks are done on a case by case basis by a board. The Board concluded that using Metro Airport's radar setback would likely cause too much land to be excluded.
- Wetlands
 - The Board decided to exclude regulated wetlands (> 5 acres) and later on in the analysis, look at our identified regions to consider excluding smaller wetlands.
- Ownership
 - The Board agreed to a three-tiered state land analysis.
 - No state lands.
 - State forest land included.
 - State forest land, state recreation/game areas and state parks included.
- Road Buffers
 - The Board agreed to 1.5 * the rotor hub height as a road setback and agreed to do a sensitivity analysis using 80 meters since it might be hard to install 100 meter towers in the Thumb due to all of the roads. A 100 meter hub height is the default hub height.
- Buffers from Great Lakes Shoreline
 - The Board agreed on a 1 mile buffer from Great Lakes Shorelines.
- Buffer from Lakes and Rivers
 - 1.5 * ultimate height (hub height plus the height to the tip of the blade in its vertical position).
- Rare and Endangered Species
 - MNFI (Michigan Natural Features Inventory) index. An index number of 26 and up is flagged.



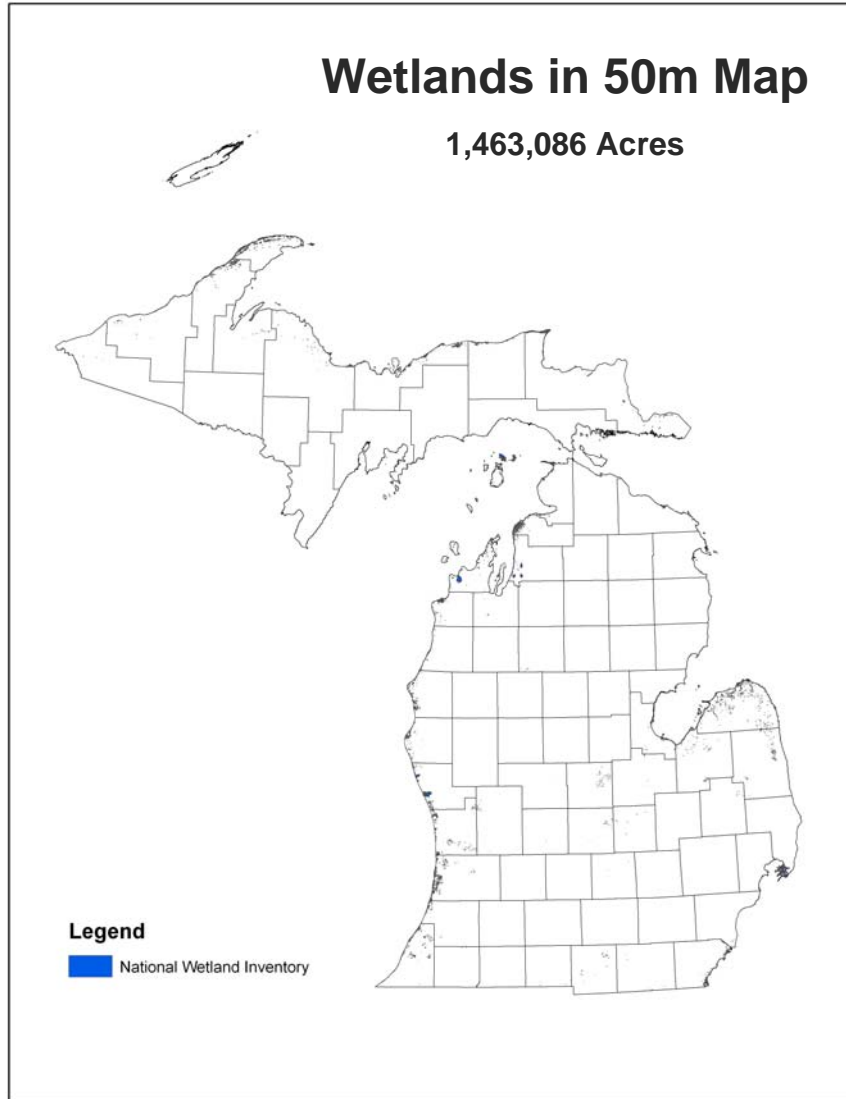
Airport Exclusion Estimates

- Airport Exclusions are based on input and help from Michael Serafin, Specialist, Renewable Energy, DTE and Joe DeVito, VP of Development North Central and Northeast, US Renewable Energy Systems
- In Summary runway buffers are:
 - Commercial Airports are buffered 10 miles
 - Local Airports are buffered 6.32 miles.
 - And small Strips are buffered 1.25 miles



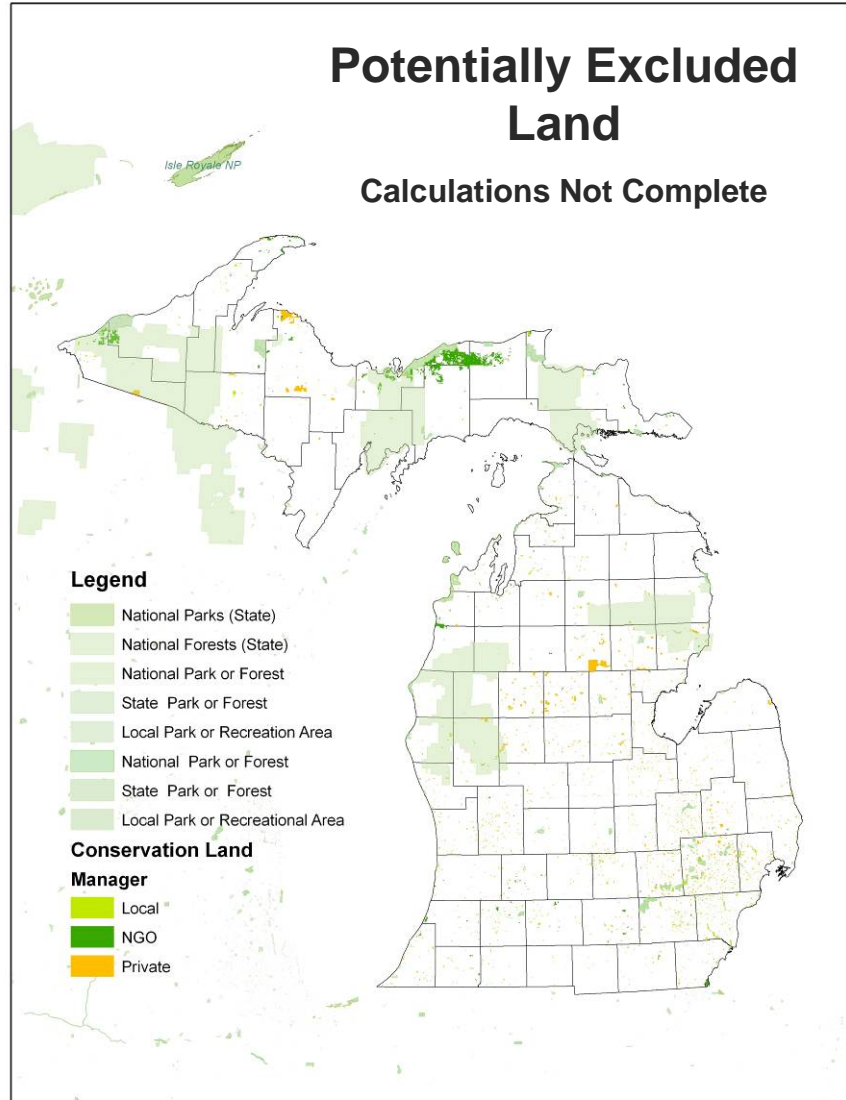


Wetlands

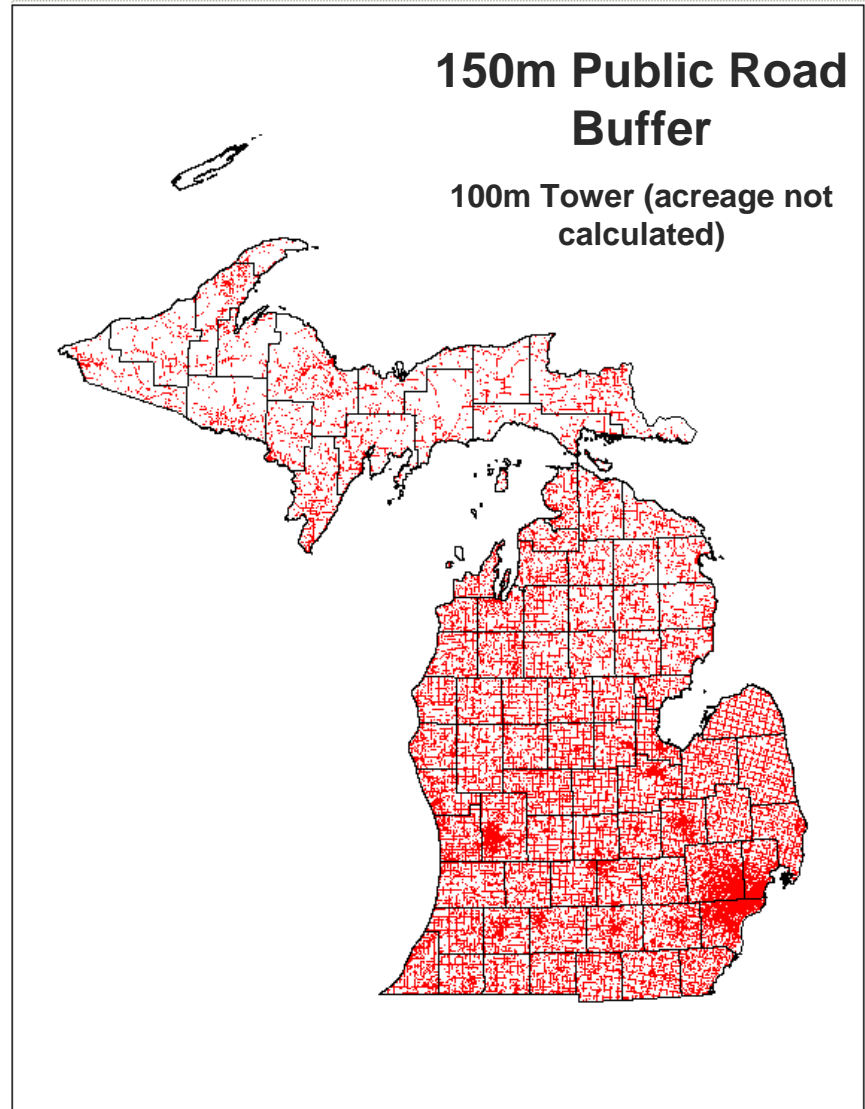
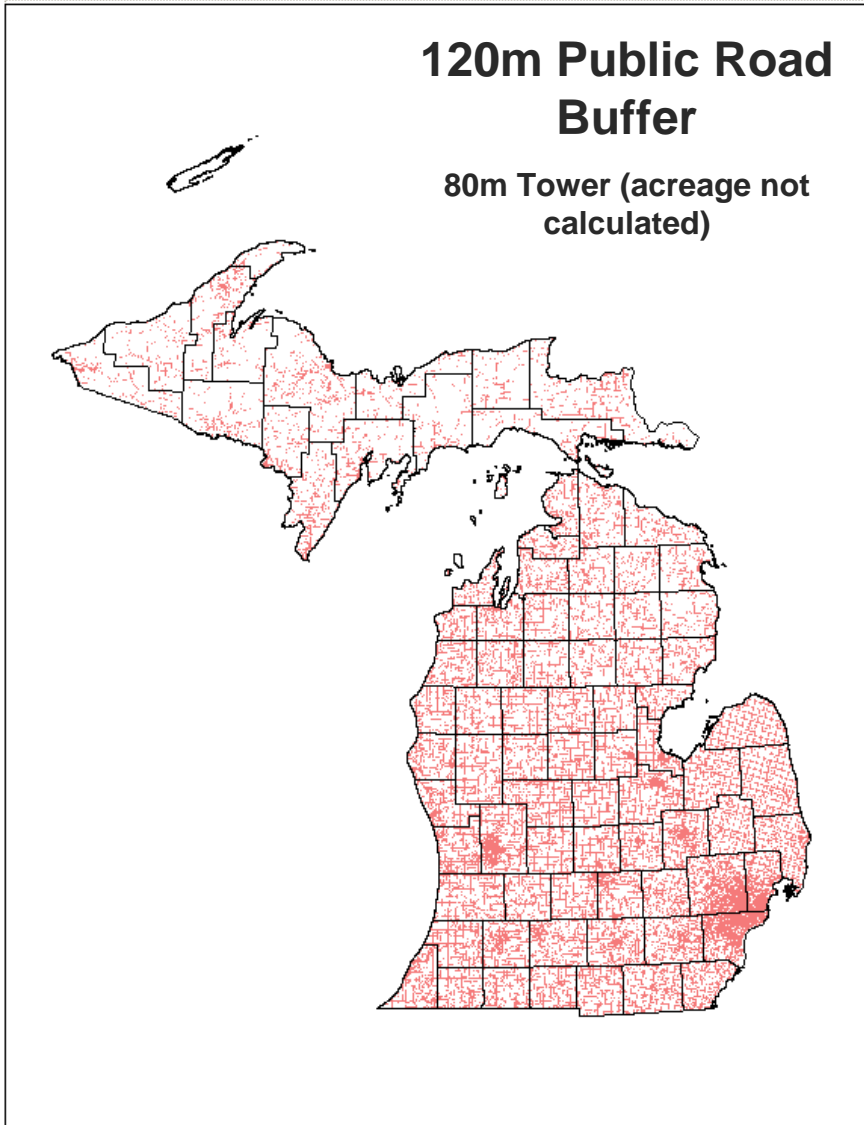




Ownership



Road Buffers



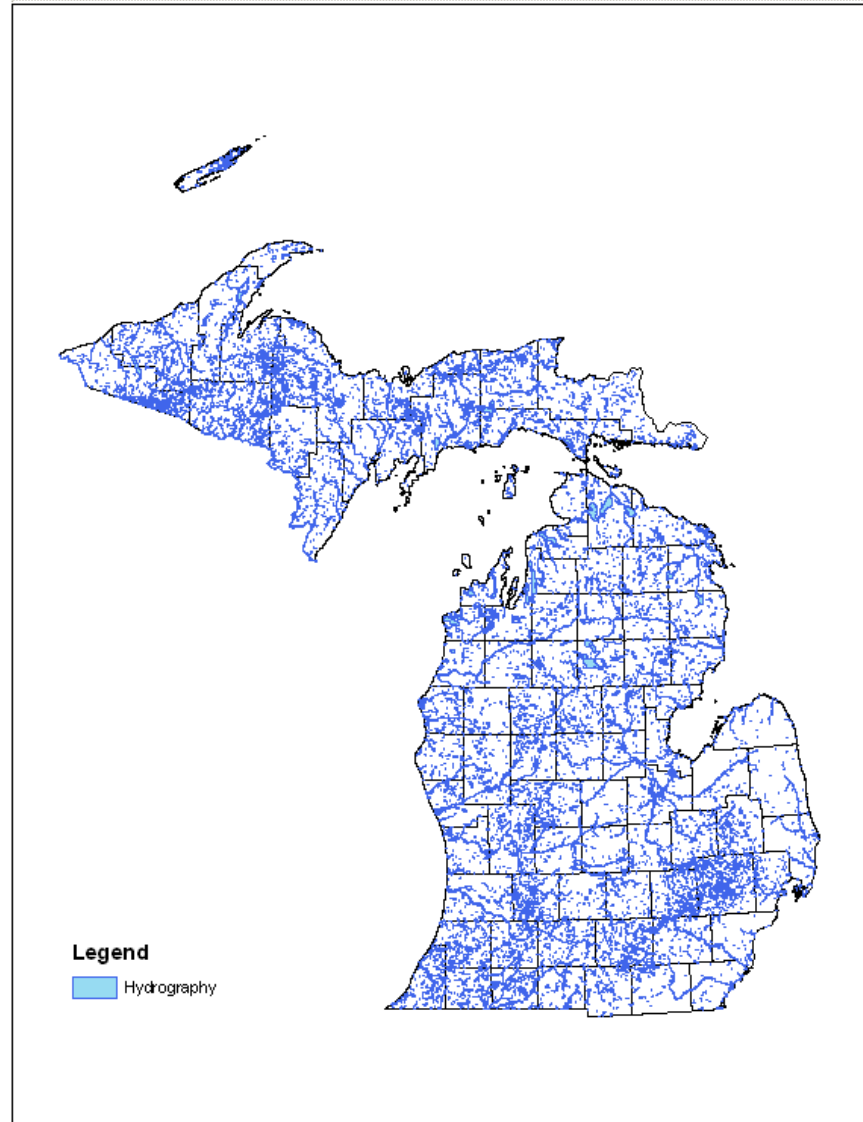


Shoreline Buffer

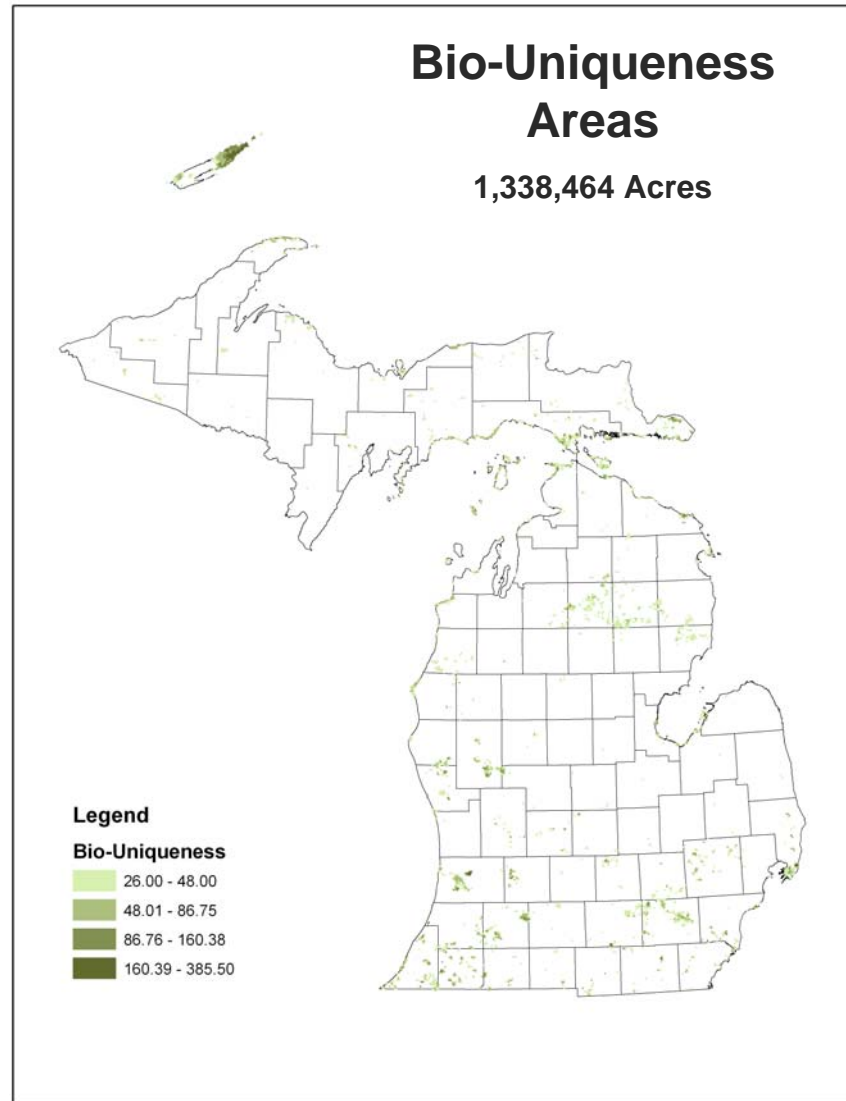




Inland Lake and River Buffers Not Yet Calculated



Rare and Endangered Species





DNR Suggested Exclusions (following meeting on 3/13)

On the following areas of DNR managed lands, commercial wind development will (likely) be prohibited:

- 1. Low suitability sites as defined by Wildlife Division
- 2. Natural River Areas
- 3. Natural Areas
- 4. Environmental Areas (A DEQ DESIGNATION)
- 5. Wilderness Areas
- 6. State Park and Recreation Areas
- 7. State Game and Wildlife Areas
- 8. Land purchased or managed with restricted funding where commercial use would interfere with the intended use based upon funding source
- 9. Areas without existing road access
- 10. Known historic/cultural areas
- 11. Pigeon River Country State Forest-pursuant to the Concept of Management
- 12. Critical Dune Areas/High Risk Erosion Areas
- 13. Biodiversity Stewardship Areas
- 14. Special Conservation Areas
- 15. Ecological Reference Areas



Flow Chart And Timeline

- Next we examine the grid spacing and layout scenarios
- Industry rule of thumb is no less than 5X Rotor diameter, or one turbine roughly every 30 acres.
- In actual deployment in Michigan this has been a larger area.

