



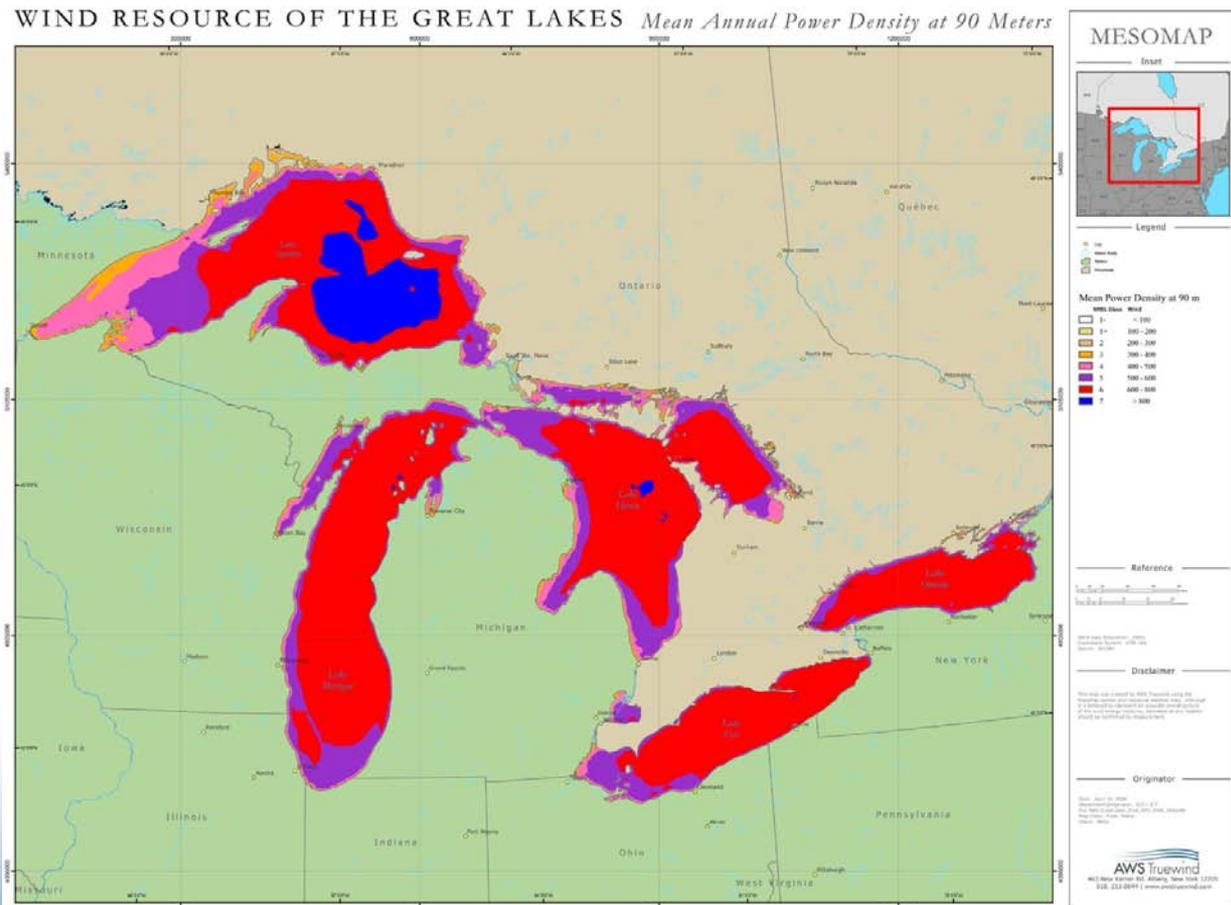
Offshore Wind Energy in Michigan

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IEEE Power and Energy Society General Meeting

Great Lakes Wind Resources

Wind resources classified as “excellent” to “superb” by the U.S. Department of Energy



The Need

- Michigan:
 - Borders 4 of 5 Great Lakes
 - Has more coastline than any state other than Alaska
 - Has ~ 38,000 square miles of bottomlands
- Present process inadequate for permitting offshore wind



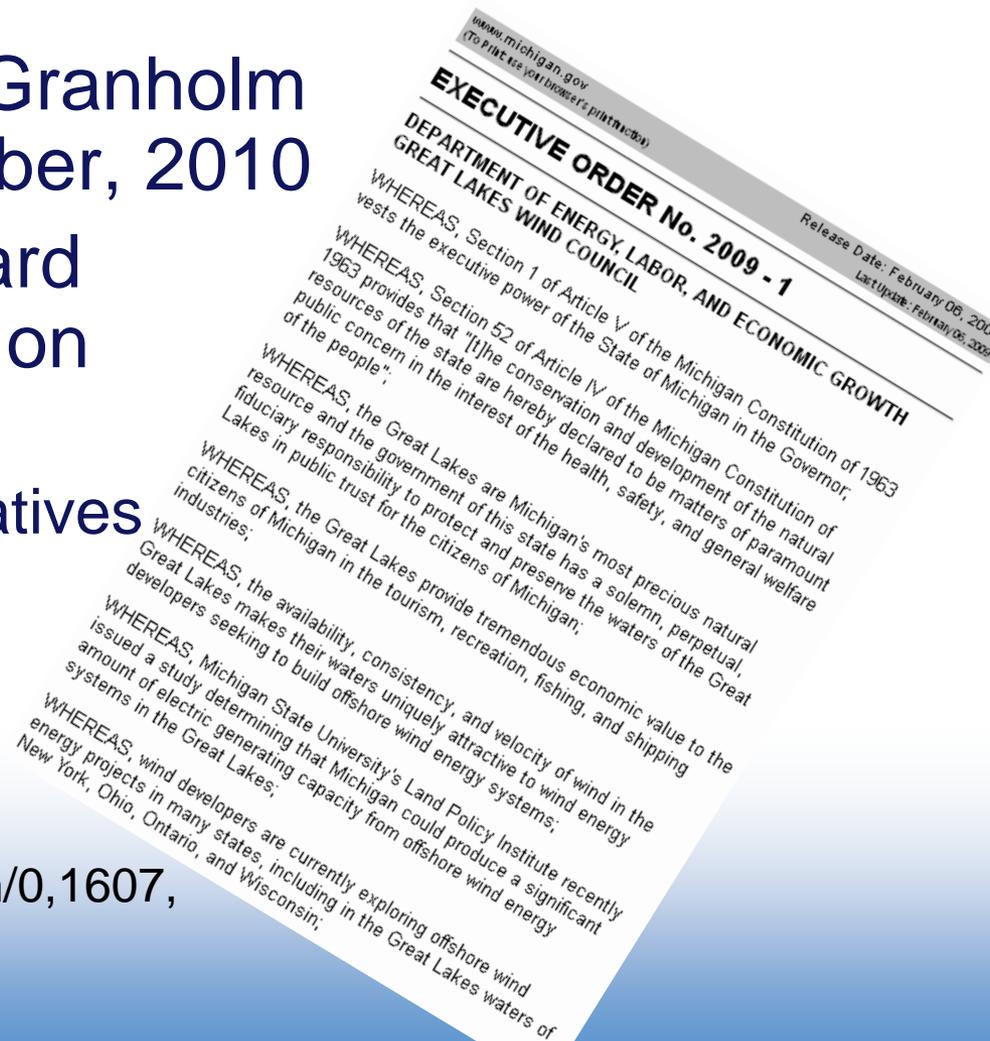
MSU Map Library, 2005

<http://www2.lib.msu.edu/exhibits/map/miboundaries.jsp>

Great Lakes Wind Council

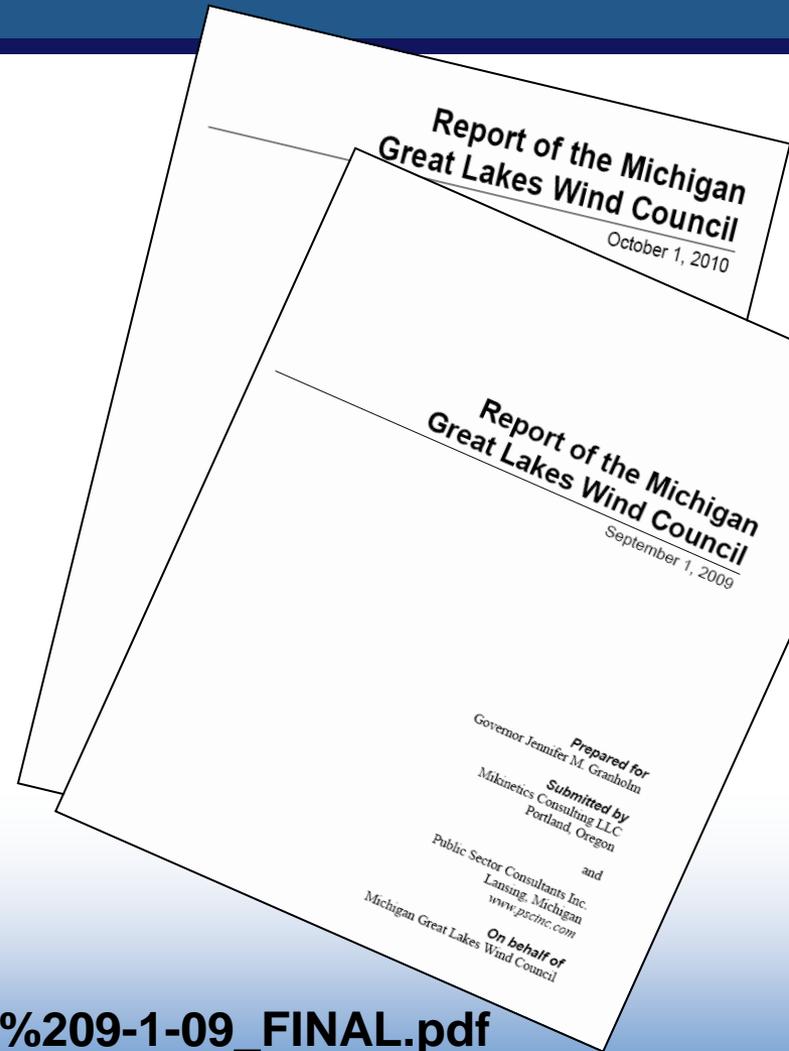
- Appointed by Governor Granholm February 2009 – December, 2010
- 29-member advisory board make recommendations on offshore wind
 - 8 state agency representatives
 - 4 utility executives
 - 2 wind developers
 - 15 other members

<http://www.michigan.gov/granholm/0,1607,7-168-21975-208366--,00.html>



Charge to Council

- Identify and map most/least favorable areas for offshore wind
- Recommend process for engaging public in permitting decisions
- Recommend legislation for leasing and permitting criteria



www.michiganglowcouncil.org/GLOW%20Report%209-1-09_FINAL.pdf

www.michiganglowcouncil.org/GLOWreportOct2010_with%20appendices.pdf

Council's Process

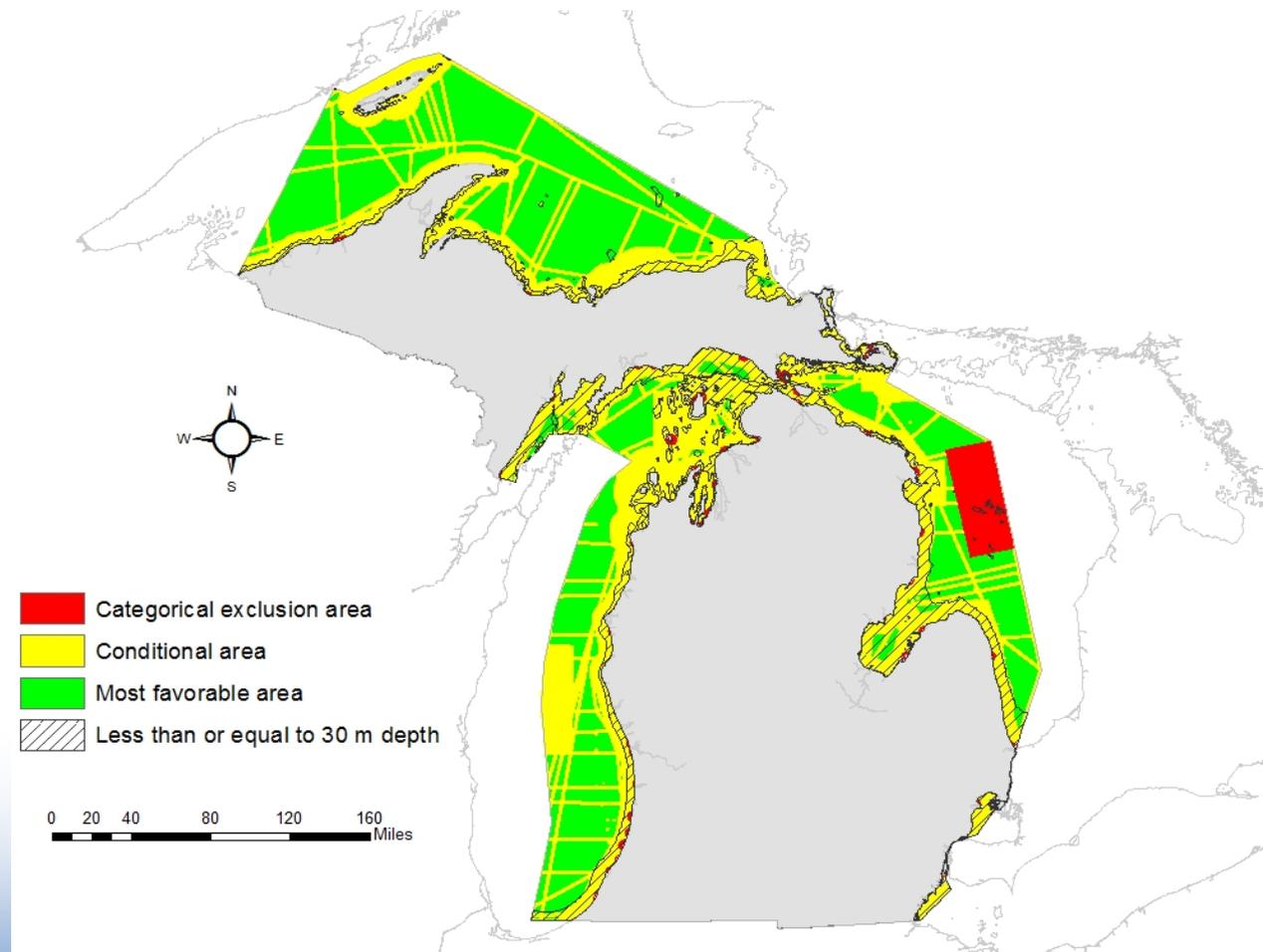
Formed three work groups

1. Mapping work group identified most favorable and least favorable areas to lease
2. Outreach work group created plans to inform, engage, and solicit feedback on those locations
3. Permitting and legislation work group advised on:
 - Proposed legislation and rule making
 - Compensation for leasing of bottomlands

Mapping Workgroup

Need agreed upon criteria among agencies for mapping least/most favorable areas

- Categorical exclusion (red)
- Conditional (yellow)
- Most favorable (green)



SOURCE: UM/MDNRE Institute for Fisheries Research. Data for some criteria not reflected.

Council's Criteria

Exclusion

- Aids to navigation
- Buoyed navigation channels
- Coastal airports
- Military operation areas
- Submerged transmission lines

Conditional

- Habitat/biological (5 criteria)
- Disposal sites
- Harbors/marinas
- Large river mouths

Conditional (cont.)

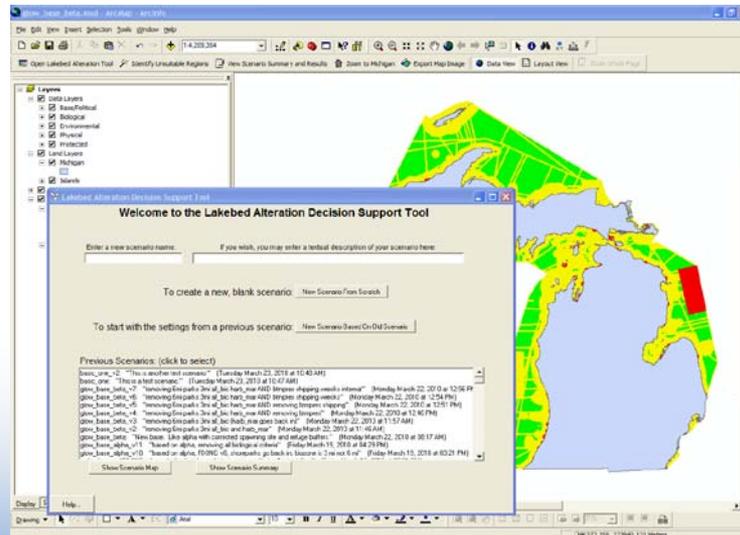
- Shoreline (6-mile nearshore view buffer)
- National park lakeshores
- Shoreline parks and wilderness
- Shipwrecks
- State bottomland preserves
- Underwater archeological sites
- Commercial fishing areas
- International and state boundaries
- Shipping lanes

Criteria are applied to mapping tool, or “decision support tool,” developed by U-M/DNR Institute for Fisheries Research (IFR). Some data still needed.
<http://ifrgis.snre.umich.edu/projects/LADST/ladst.shtml>

Institute for Fisheries Research (IFR) Supported the Council's Mapping Work

Lakebed Alteration Decision Support Tool

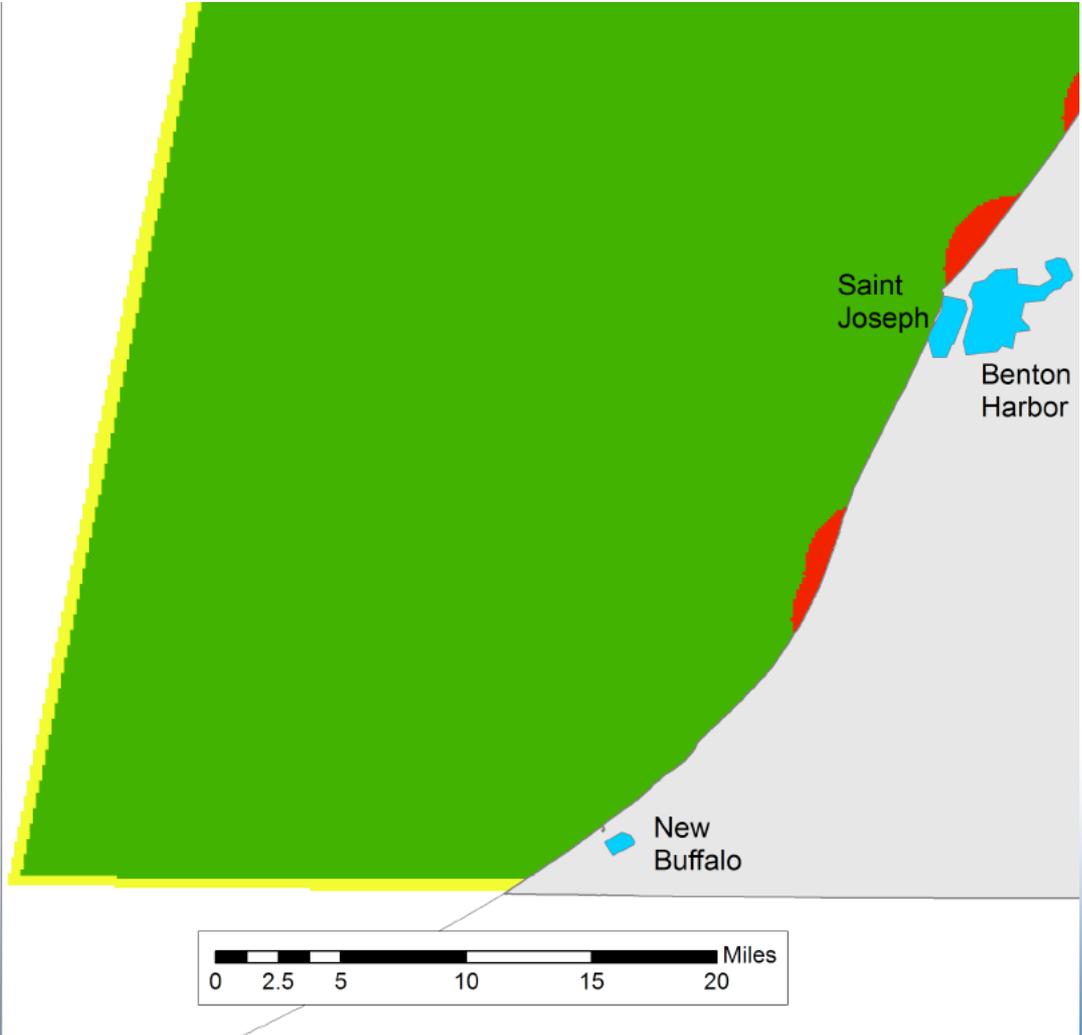
Data layers were applied to see the cumulative effect of multiple factors to be considered during permitting and siting of offshore wind energy systems.



Support tool available at:
<http://ifrgis.snre.umich.edu/projects/LADST/ladst.shtml>
Requires ArcGIS

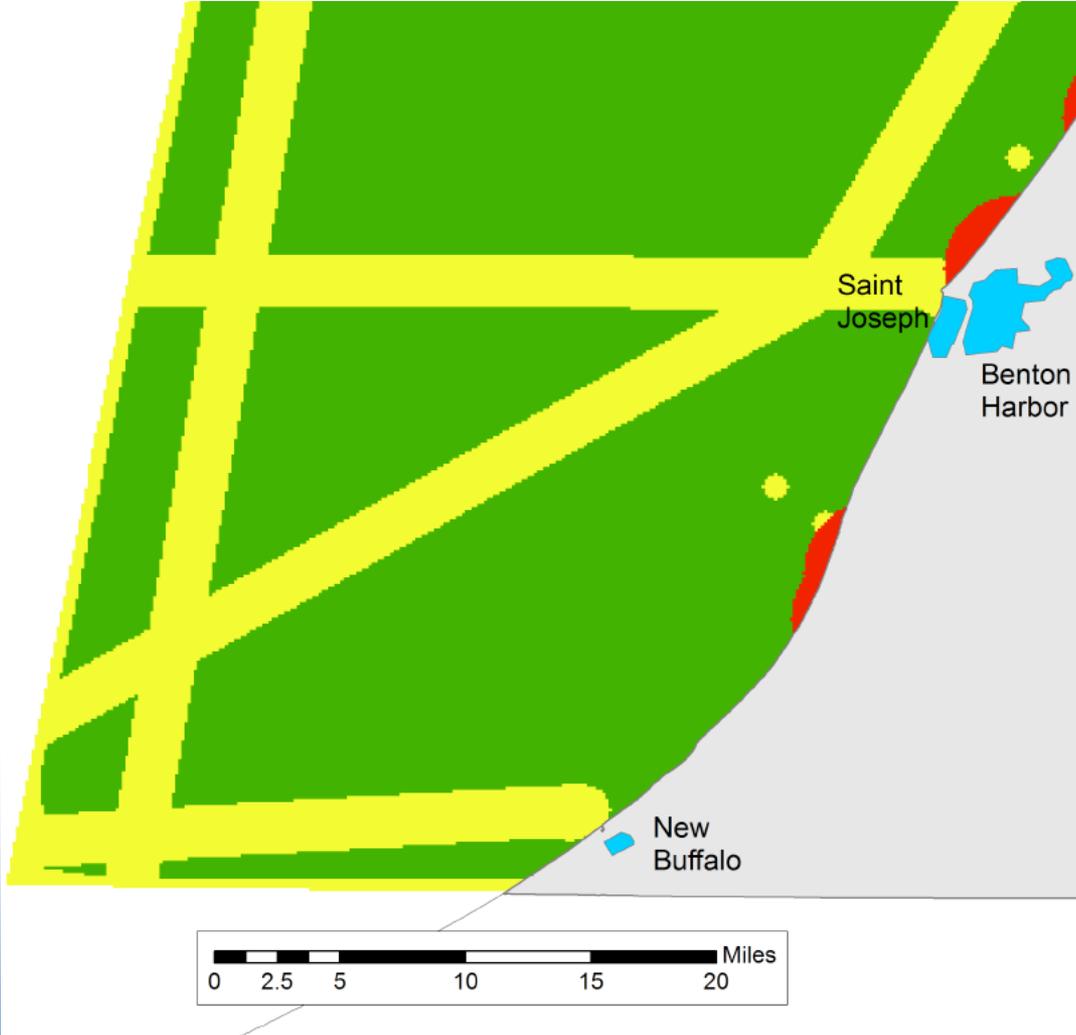
Berrien Wind Resource Area

with State Line & Costal Airport buffers Only



Berrien Wind Resource Area

with Shipwrecks & Shipping Lanes Added



Berrien Wind Resource Area

with Bottomland Preserves Added



Berrien Wind Resource Area

with Harbors and Marinas Added



Berrien Wind Resource Area

with 3-Mile biological Productivity Zone Added

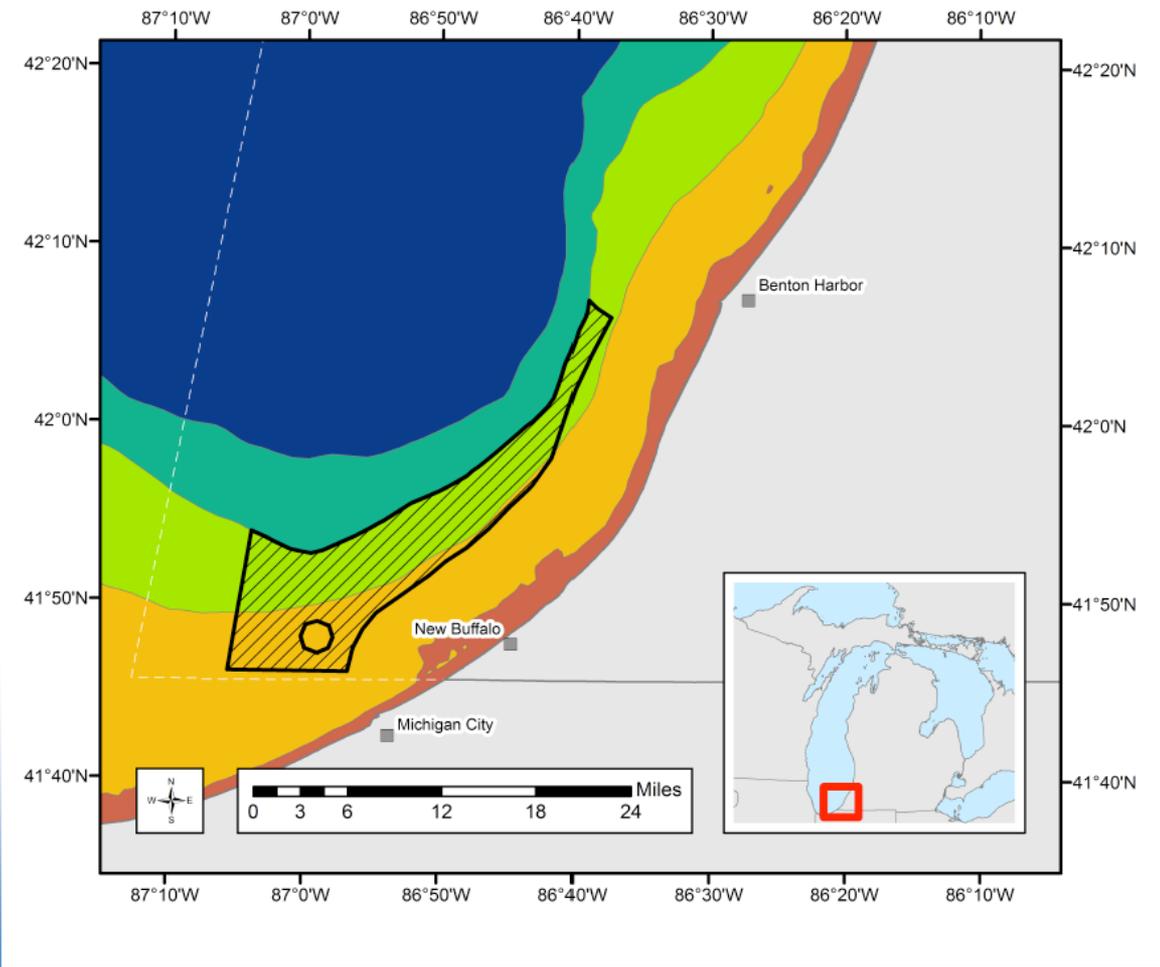


Berrien Wind Resource Area

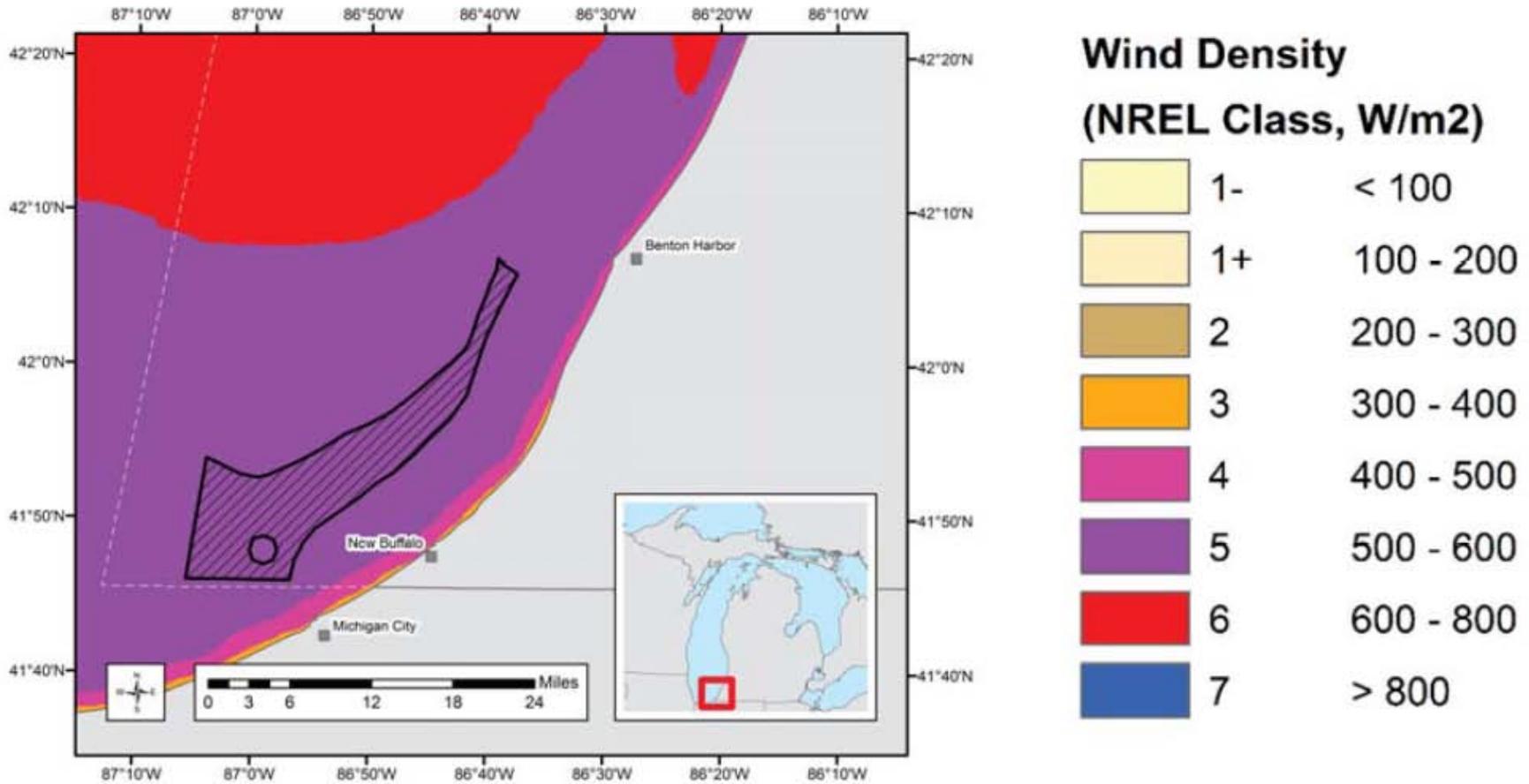
with 6-Mile Viewshed Buffer Added



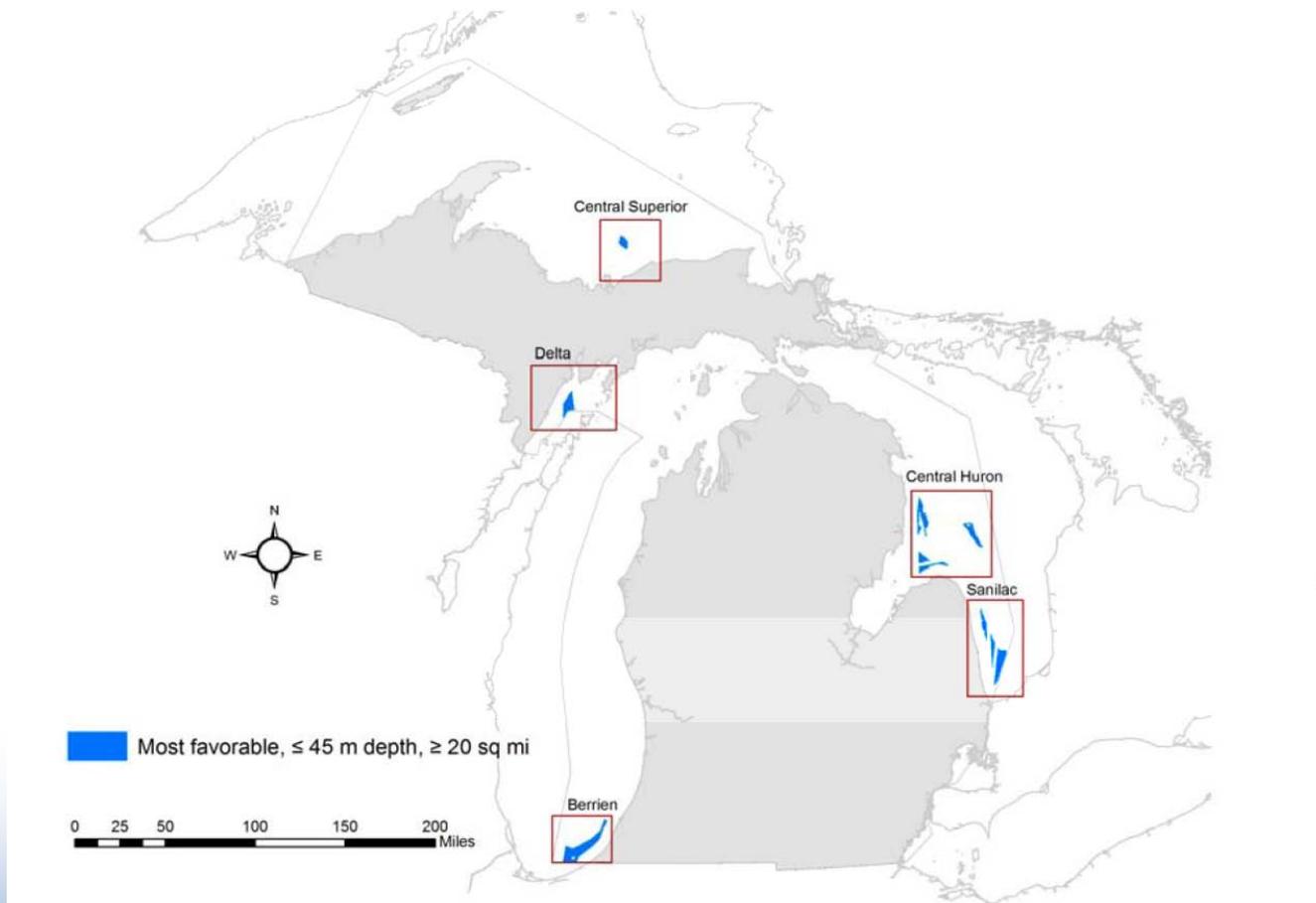
Berrien Wind Resource Area Close-up



Berrien Wind Resource Area Close-up



Most Favorable Areas at Least 20 Square Miles (as of December 2010)



SOURCE: Institute for Fisheries Research, UM/MDNR, 2010.

Square Miles at Water of Different Depths

- Total state-owned bottomlands: 38,448 square miles

Council category	No depth restrictions (sq. mi.)	Depth of area ≤ 45m (sq. mi.)	Depth of area ≤ 30m (sq. mi.)
Categorical exclusion (red)	1,717	528	356
Conditional (yellow)	21,704	9,282	7,195
Most favorable (green)	15,027	838	323
Total area sq. miles	38,448	10,648	7,874

SOURCE: Institute for Fisheries Research, UM/MDNRE, January 2010.

- Offshore wind development of just 2% of “most favorable” and “conditional” areas (no depth restrictions) could supply 30% of total annual electrical energy use in Michigan.

Outreach Work Group

- Recommended processes for public engagement for siting and permitting
- Hosted 5 public meetings to provide information and solicit feedback
- Received and responded to public input



Photo by Leonard G.

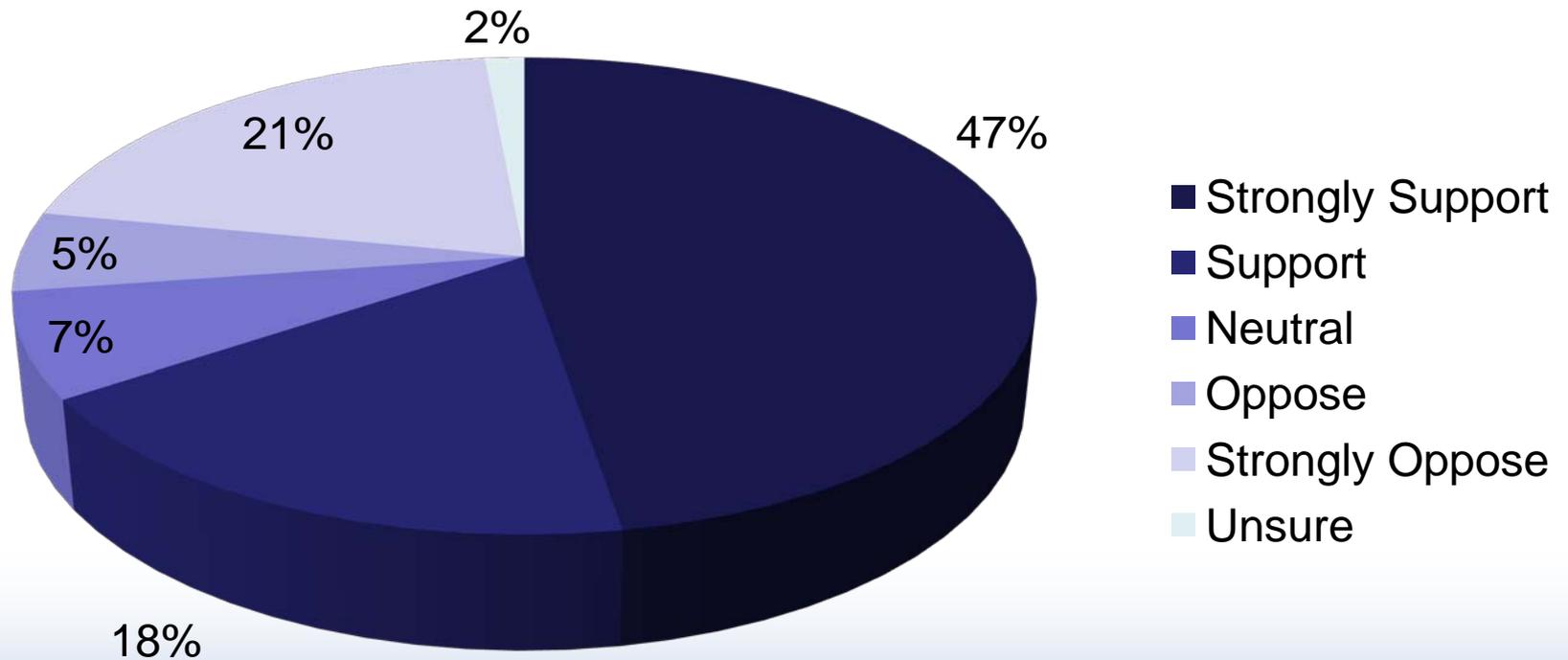
<http://en.wikipedia.org/wiki/File:DanishWindTurbines.jpg>

Public Meeting Participation

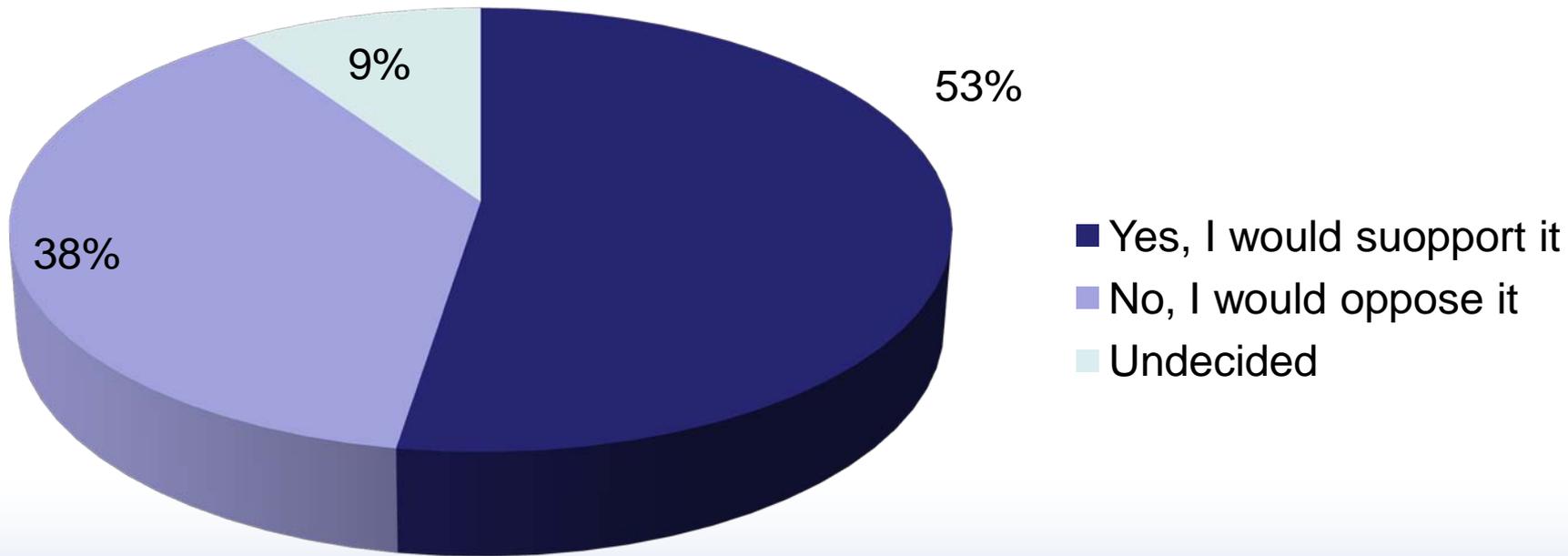
Place and Date	Approximate number of attendees	Evaluation forms received
Saginaw (March 25, 2010)	80	24
Escanaba (April 14, 2010)	40	31
Muskegon (May 4, 2010)	270+ (exceeded room capacity)	135
Grand Rapids (July 20, 2010)	110	51
Dearborn (July 21, 2010)	75	40
Total	575+	281

SOURCE Michigan Great Lakes Wind Council, 2010.

Support for Offshore Wind Farms to Help Meet RPS



Preference for Offshore Wind Turbines Located 6 Miles from Shore



Permitting & Legislation Work Group

- Existing Michigan bottomland leasing and permitting statute was not designed to address offshore wind
- Comprehensive legislation for leasing and permitting should be enacted



Photo by Brian Charles Watson

http://en.wikipedia.org/wiki/File:Michigan_state_capitol.jpg

Council's Recommendation on Legislation

- An **auction process** for assigning development rights to the indentified sites
- A **detailed set of requirements** for required plans:
 - Site assessment
 - Development
 - Construction
 - Operation
 - Decommissioning
- A process for **public involvement** in decision making; notice and comment opportunities throughout the auction, site assessment, and development process



Photo © Hans Hillewaert

http://en.wikipedia.org/wiki/File:Windmills_D1-D4_%28Thornton_Bank%29.jpg

Recommended State's Evaluation to be Coordinated with Others



**Federal Aviation
Administration**



**US Army Corps
of Engineers®**



**Homeland
Security**



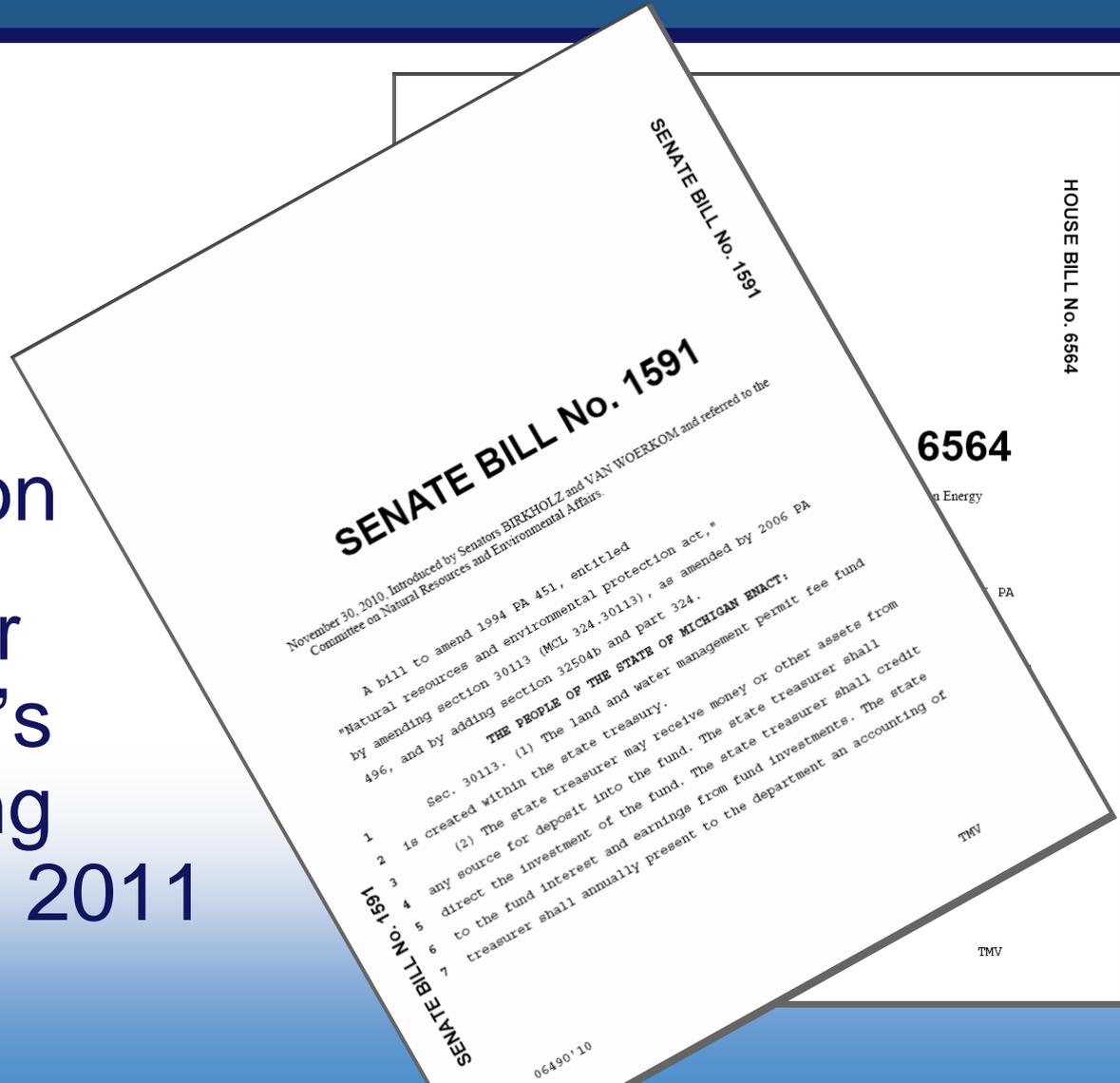
**Federal
Communications
Commission**

Legislation

Introduced in
November 2010

Died with the
end of the
legislative session

Governor Snyder
has indicated he's
"open to exploring
legislation" in fall 2011



For More Information

- Go to: www.michiganglowcouncil.org
 - Get background on council and other offshore wind references
 - Download September 1, 2009 and October 1, 2010 reports