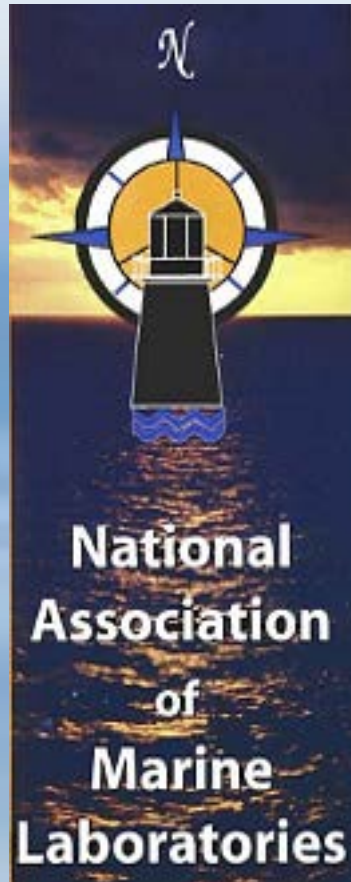


National Association of Marine Laboratories (NAML) Northeastern Association of Marine & Great Lakes Laboratories (NEAMGLL)



Guy Meadows, PhD.
Founding Director, Great Lakes Research Center
Robbins Professor of Sustainable Marine Engineering
Michigan Technological University



The Great Lakes

- Economic Value
- Coastal Resiliency with rising water levels
- Risk Analysis
- Ice/Winter Observations



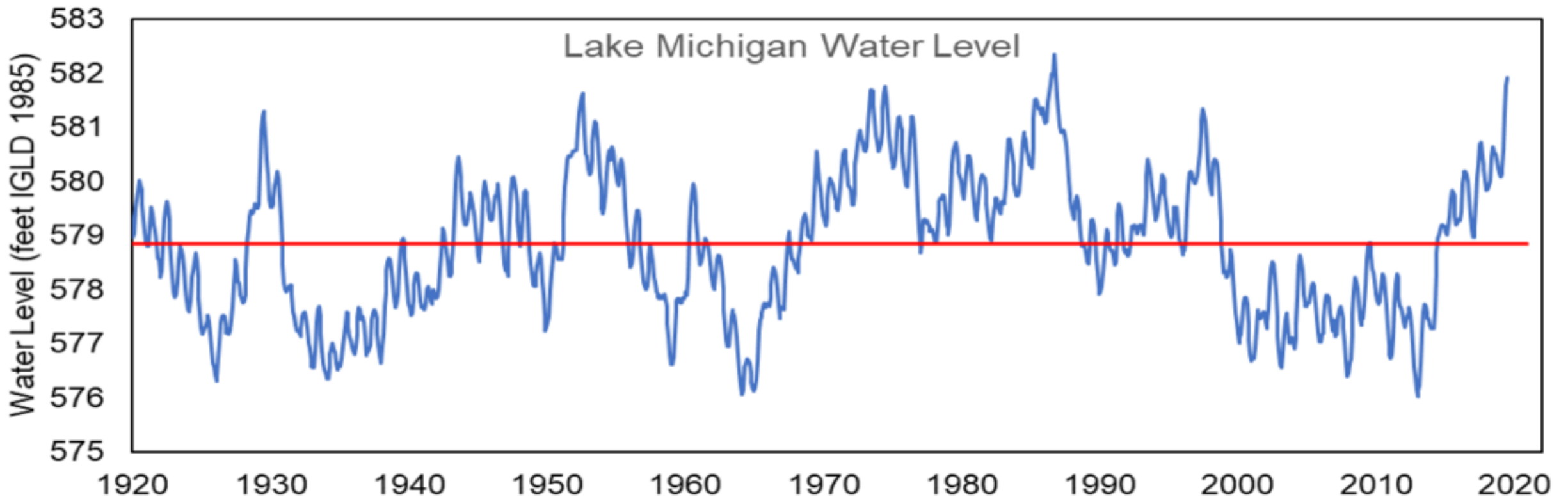
Value of the Great Lakes and St. Lawrence Basin

- **Eight States and Two Provinces**
 - Population 107 million
 - Jobs 51 million
- **Largest group of freshwater lakes on Earth by total area**
- **84% of North America's surface fresh water**
- **21% of the world's supply of surface fresh water**
- **Third largest combined economy in the world**
 - >50% of all U.S./Canadian bilateral border trade
 - Over 200 million tons of cargo shipped annually
 - GDP US \$6 trillion



Coastal Resiliency – High Waves and High Water

- **Lake Michigan water levels rise 2013 – 2019**
 - 6 feet rise in 6 years...1 ft/year
- **East coast sea level rise past 100 years**
 - 5 – 8 inches !
- **Breaking 100+ year records**

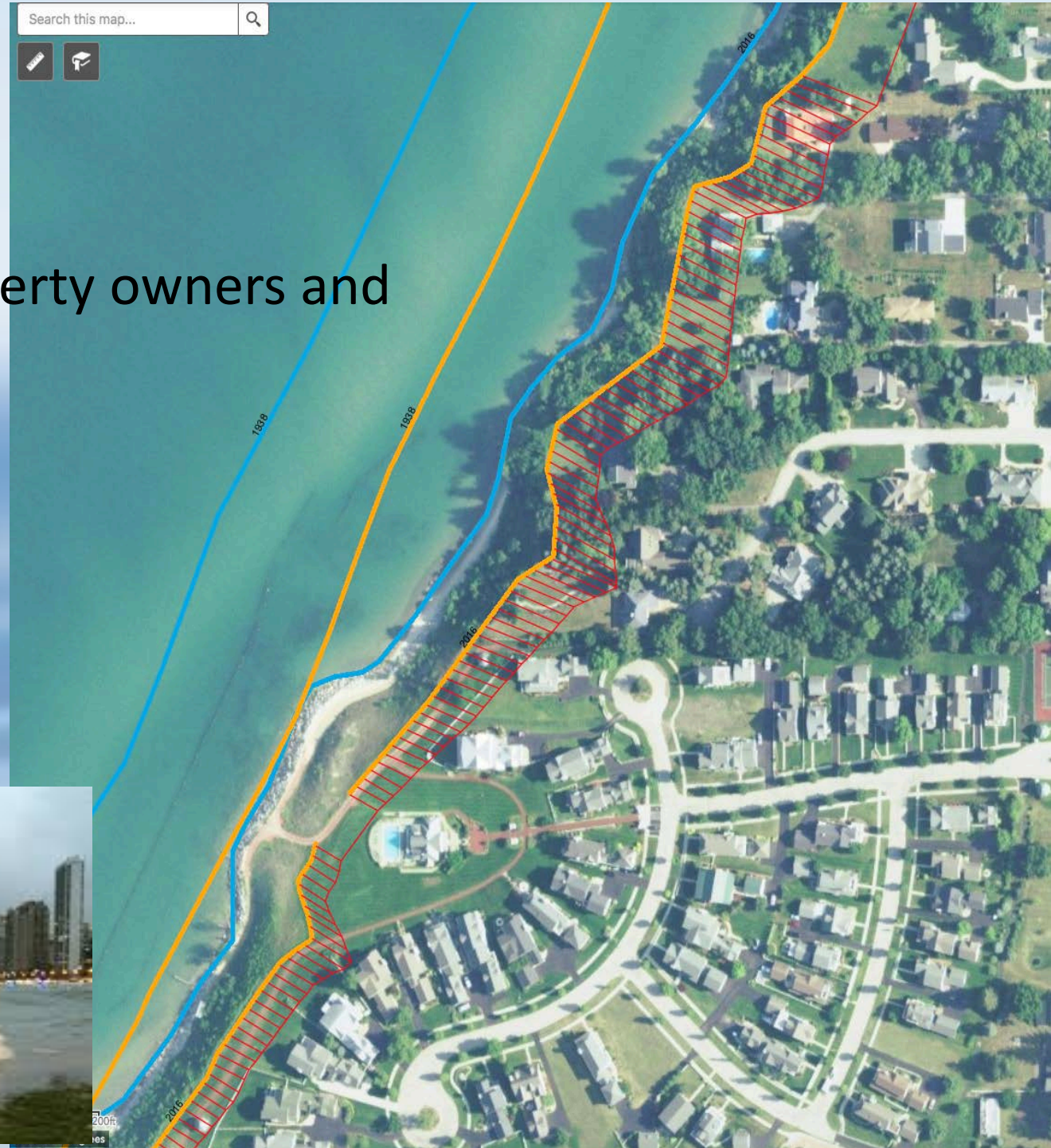


Great Lakes Serve as an Example to Coastal Ocean



A “Teachable Moment”

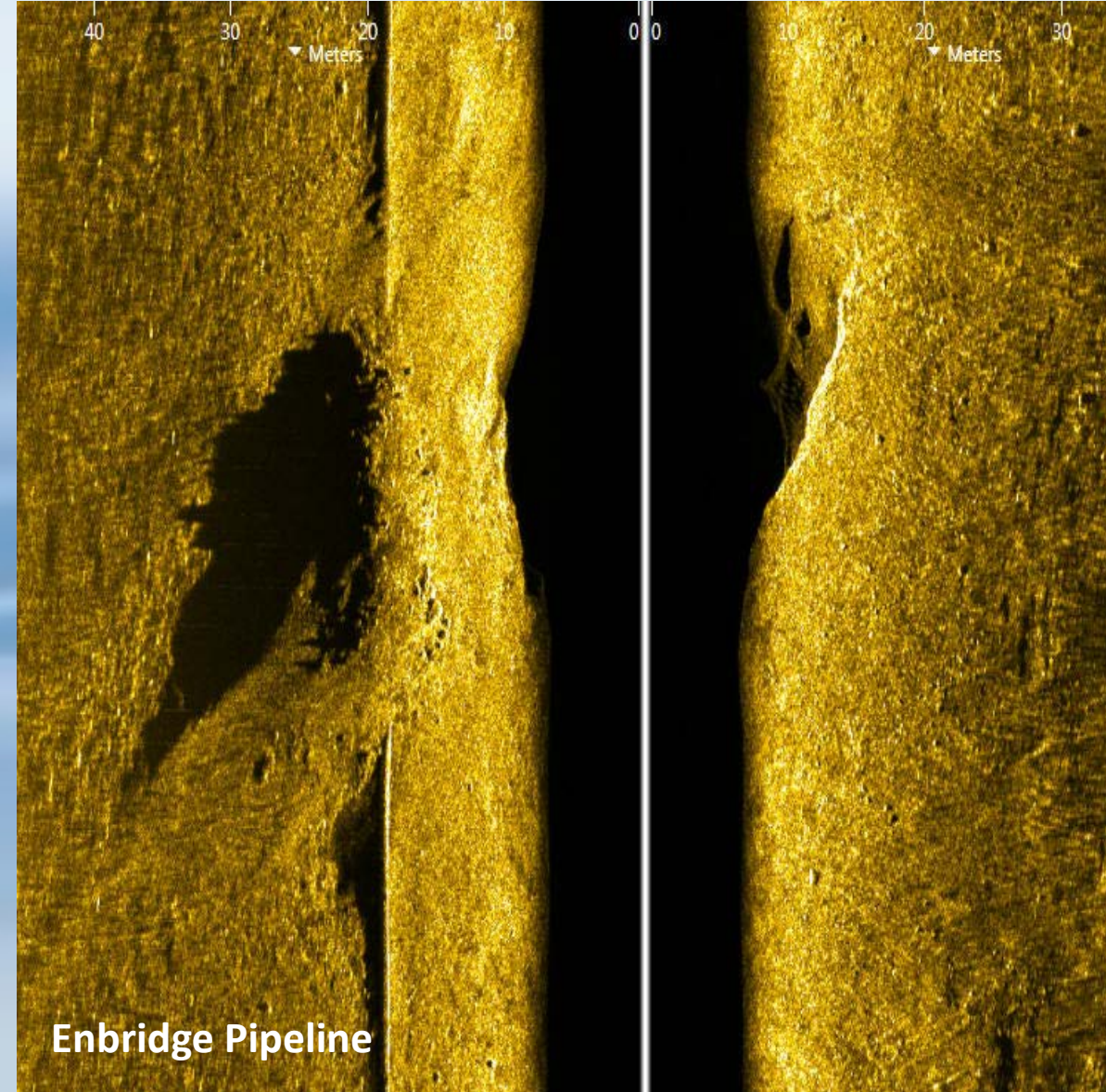
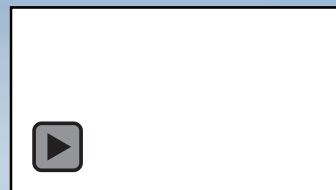
- An 80 – Year look at the shoreline
- Educating coastal communities, property owners and coastal planners



Risk Analysis: Protecting the Environment and Underwater Infrastructure



Reduced survey time from years to two days



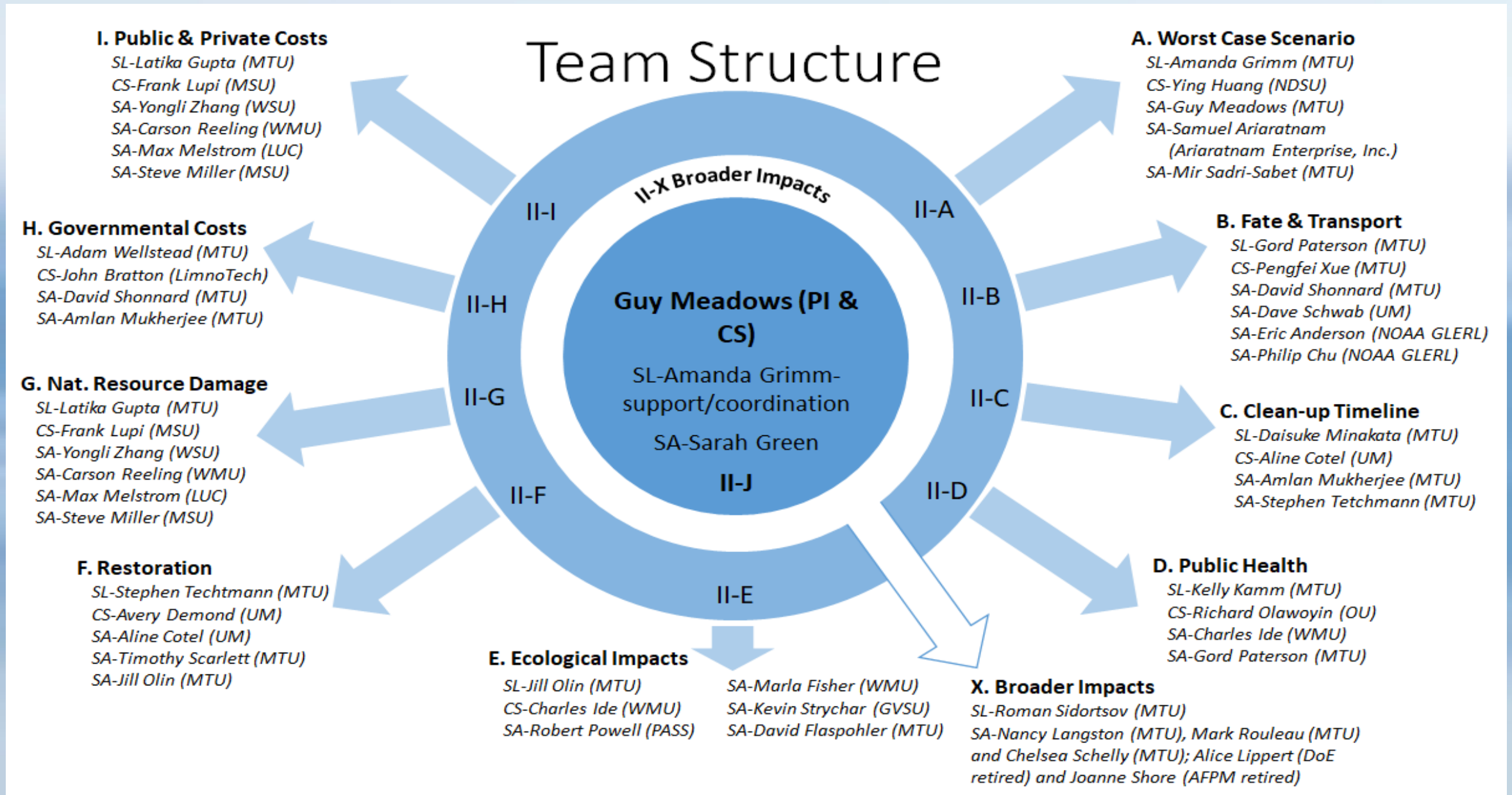
Independent Risk Analysis for the Straits of Mackinac for the State of Michigan



Michigan Technological University



Project Scope



Advanced Supercomputing Cluster: Numerical Modeling for Great Lakes



Section Team:

Chief Scientist: Pengfei Xue (MTU)

Section Authors: David Shonnard (MTU), David Schwab (UM), Philip Chu (NOAA), Eric Anderson (NOAA)

Section Lead: Gordon Paterson (MTU)

Example: Dec. 27 scenario identified as worst case for Task C

Punchline

- Marine Labs Brought in as the “Honest Broker”
- Science was not challenged by
 - Companies
 - Federal or State Agencies
 - General Public

Winter Observations for the Great Lakes and “Arctic Like” Coastlines

- Scientifically Blind November – April (Lake Superior)
 - No real-time observations
 - No ships, buoys, gliders, people on the water
- Developing Cost Effective Cabled Observatories and Autonomous Technologies



A satellite image of the Great Lakes region in North America, showing extensive ice cover. The lakes are mostly white and grey, with some dark patches of open water. The surrounding land is a mix of brown and green, indicating a winter or early spring scene. The text is overlaid on the right side of the image.

February 20, 2014
92.5 % Great Lakes Ice Cover
The “Arctic” You Can Drive To

Thank You For Your Support!

Questions ?



Photo courtesy of FTC&H