Integrated Assessment on Water Level Variability and Coastal Bluff Erosion in Northern Milwaukee County and Southern Ozaukee County, Wisconsin

University of Wisconsin Sea Grant Institute
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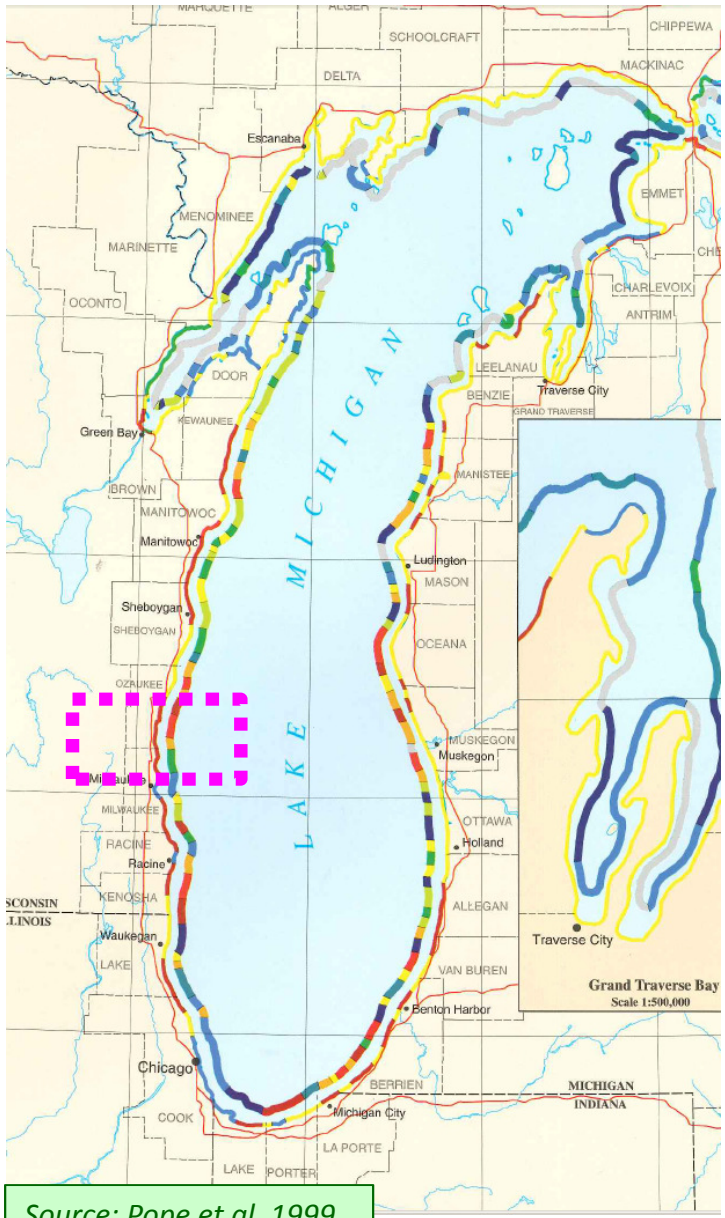
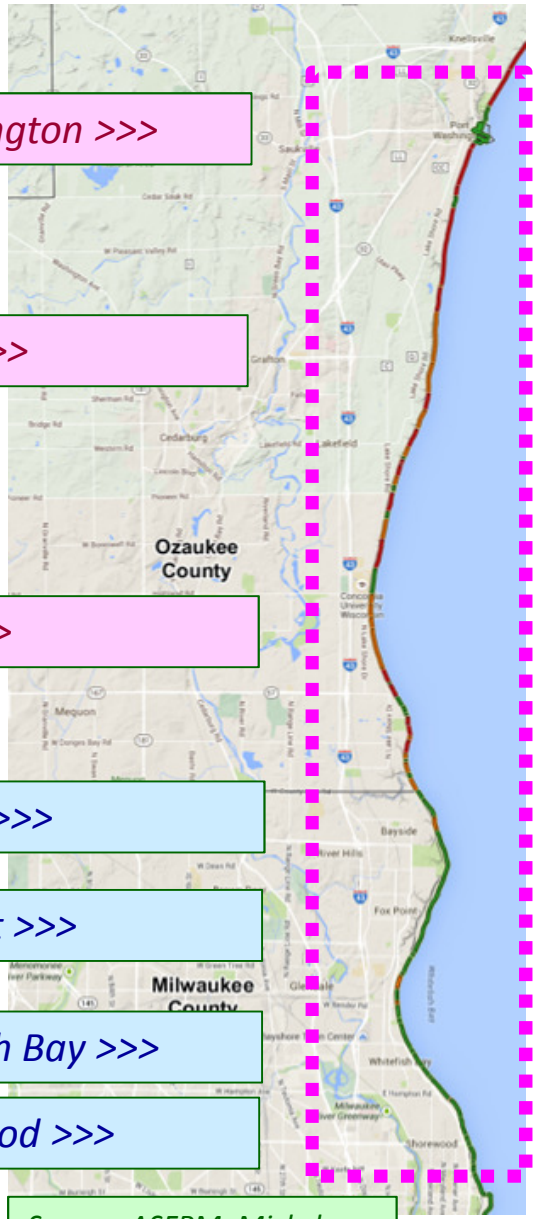
Dept. of Civil and Environmental Engineering,
Dept. of Urban and Regional Planning,
Dept. of Geoscience

Project Location



Source: Pope et al. 1999



City of Port Washington >>>

Town of Grafton >>>

City of Mequon >>>

Village of Bayside >>>

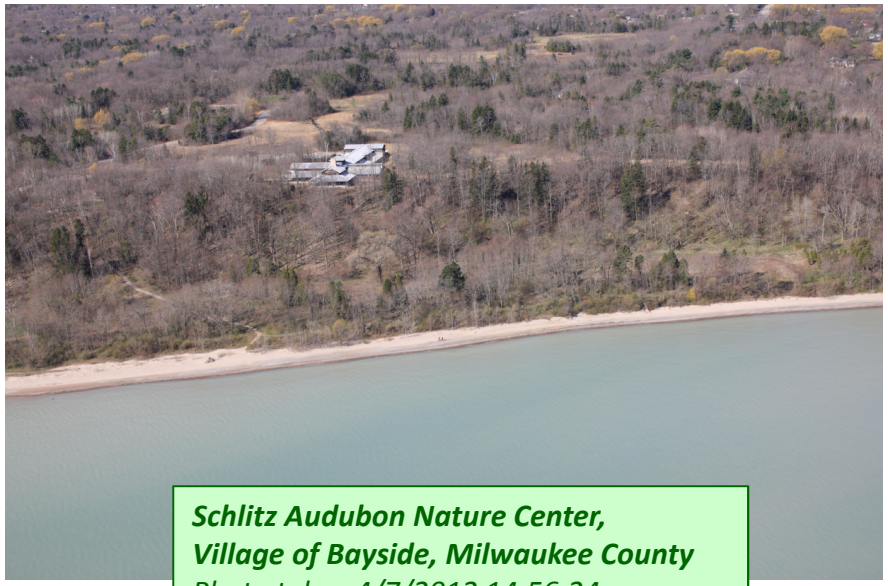
Village of Fox Point >>>

Village of Whitefish Bay >>>

Village of Shorewood >>>

Source: ASFPM, Mickelson

The bluffs in northern Milwaukee County are generally more stable than the bluffs in southern Ozaukee County



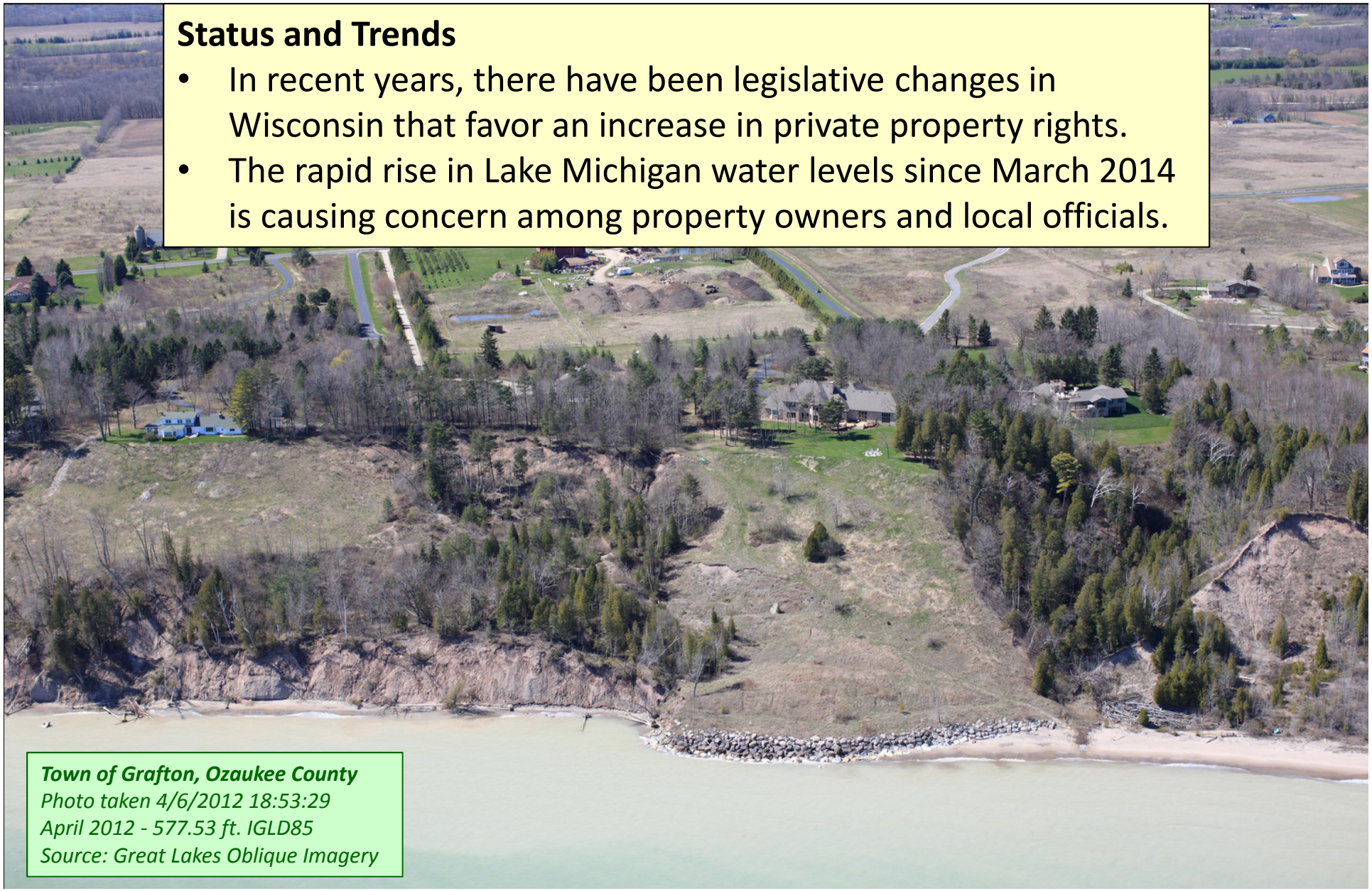
Schlitz Audubon Nature Center, Village of Bayside, Milwaukee County
Photo taken 4/7/2012 14:56:24
April 2012 - 577.53 ft. IGLD85
Source: Great Lakes Oblique Imagery

South of the City of Port Washington, Ozaukee County
Photo taken 4/6/2012 18:50:09
April 2012 - 577.53 ft. IGLD85
Source: Great Lakes Oblique Imagery

Status and Trends

- From 1976 to 2007/08, armoring of the Lake Michigan shore has increased from 9.6% to 27.3% in Ozaukee County and from 44.6% to 62.7% in Milwaukee County.
- From 1976 to 2012, there has been a general trend towards more stable coastal bluffs in the study area.

The impact of shore structures on neighboring property



Status and Trends

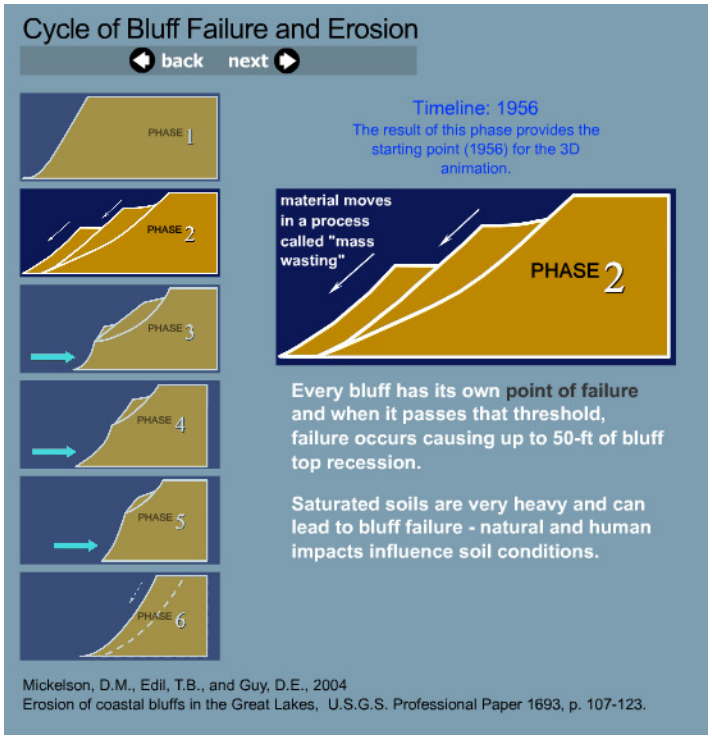
- In recent years, there have been legislative changes in Wisconsin that favor an increase in private property rights.
- The rapid rise in Lake Michigan water levels since March 2014 is causing concern among property owners and local officials.

Town of Grafton, Ozaukee County
Photo taken 4/6/2012 18:53:29
April 2012 - 577.53 ft. IGLD85
Source: Great Lakes Oblique Imagery

Project Focus

The primary impact area covered by the integrated assessment relates to the influence of changing Lake Michigan water levels on the integrity of coastal bluffs.

- placement and design of shore protection structures
- best practices for bluff vegetation
- regulation of coastal development
- protection of nearshore and shoreland habitats



Interdisciplinary Drivers

Environmental Drivers

- Changes in shore protection & the associated relationship to coastal processes
- Potential climate impacts on water levels, waves, temperature and precipitation

Social Drivers

- Interaction between property owners related to shore management choices
- Receptivity to education, outreach and resilience planning efforts

Political Drivers

- Increased political support for private property rights
- Changes to planning & zoning legislation at state level
- Local and regional plans

Economic Drivers

- Damage to coastal property and infrastructure
- Costs and benefits of shore protection
- Changes in property values

Project Team

- A team of 9 **investigators** representing disciplines including coastal engineering, geology, urban and regional planning, law, policy studies, ecology, landscape architecture, and social science. **(Hart, Janssen, Kehl, LaGro, Mednick, Mickelson, Ohm, Peroff, Wu)**
- Additional support from staff and students with Wisconsin Sea Grant and the School for Freshwater Sciences at UW-Milwaukee. **(Clark, Noordyk, Kranner)**
- **Project partners** include organizations with broader perspectives on coastal bluff erosion, including regional and state agencies, professional associations, and non-profits. **(SEWPRC, Wisconsin Coastal Management Program, Wisconsin Dept. of Natural Resources, Wisconsin Emergency Management, Association of State Floodplain Managers)**

WI Planning Grant Activities

- Interviews of project stakeholders, partners, and investigators to explore the impacts of variable water levels on coastal bluffs (May-July 2015).
  - [19 interviews with a focus on issues, solutions, barriers, and info needs – interviewees expressed interest in education and outreach tools]
- Investigators prepared summary of existing relevant research, data and decision tools (May-July 2015).
  - [developed on-line annotated bibliography & report]
- Workshop to provide information about Great Lakes Water Levels Integrated Assessment and decide whether Wisconsin should continue participation (July 27, 2015)
  - [30 attended – strong support expressed for continuing with the project]

Phase 1 of Integrated Assessment

- Synthesis workshop on March 31, 2016 prioritized the most relevant reports, studies and data for the IA.
  - Categories: Reports addressing coastal hazards in Wisconsin; Technical studies (bluff stability, recession rates, lakebed erosion); Regulatory approaches; Interactive mapping/visualizations; Geospatial data; Integration resources
- The Phase 1 report includes short syntheses of the understanding of:
  - changes to beach and bluff toes due to higher water levels
  - impacts of shore protection structures
  - changes to the bluff face and bluff top, lakebed downcutting

Preliminary Options

What are potential regulatory and non-regulatory options for responding to coastal bluffs & lake level variability?

Shore and Nearshore

- Guidance for design of shore protection
- Potential for pocket beaches
- Analysis of lakebed erosion/changes in nearshore

Bluff Face

- Best practices for bluff vegetation management
- Identification of bluff feeder zones

Top of Bluff

- A model ordinance for setbacks from an erosion reference feature (vs. OHWM)
- Surface runoff mgmt
- Septic placement

Integrated Approaches

- Integrated bluff management/Regional sediment management
- Outreach on the spectrum of options for bluff management

Community Engagement

Led by Bert and Linda Stitt (Stitt Facilitations) and Deidre Peroff (WISG Social Science Outreach Specialist)

Part 1 – Setting the context for community engagement

- Tour of the study area (complete)
- Individual and small group discussions (underway)

Part 2 – Community conversations

- Round 1 –Introduce the project; Listen to hopes, wishes, concerns and issues for a healthy and vital future for coastal bluffs; Generate possible solutions (June/July)
- Round 2 – Prioritization of policy alternatives/adaptive actions (August/September)
- Round 3 – Endorsement of project report (Nov./Dec.)

Sharing the final results of the IA and continued engagement

Desired Project Outcomes

- **Near-term:** Development of a comprehensive set of policy alternatives and adaptive actions to increase resilience of coastal bluffs to the possibility of increased variability of Lake Michigan water levels and increased intensity of storms.
- **Mid-term:** Adoption of a select set of aforementioned policy alternatives by local governments in the study area and adoption of a select set of adaptive actions by coastal property owners and associated stakeholders.
- **Long-term:** A measurable increase in the resilience of bluffs to coastal erosion.