

Countywide Lake Studies



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Purpose

- **Like roads, lakes need maintenance!**
- **Understand current conditions**
- **Identify problems**
- **Enhance involvement and knowledge**
 - Citizens
 - County Staff and Programs
 - University Students
- **Connects** citizens/agencies/organizations
- **Organizes** workload
- Provides a means to **measure successes**
- **Recognize value** of the resources
 - Societal
 - Tourism
 - Economic
- **Guides decisions** based on science and community opinions



Countywide Processes

1. Data collection – 2 years
2. Planning processes
3. Implementation

	Marathon	Portage	Waushara
Number of Lakes in Project*	11	30	33
Countywide Group	No	No	Yes
Lake Associations/Districts	3	7	32**

*did not include large complex systems on the Wisconsin River
**multiple groups for some of the lakes

Study Components

Topic	Marathon	Portage	Waushara
Lake Water Quality	X	X	X
Groundwater Quality and Flow	X	X	
Watersheds and Land Use	X	X	X
Build- outs	X	X	
Shorelands	X	X	X
Fishery	X	X	
Aquatic Plants	X	X	X
Algae	X	X	
Herps (frogs, turtles, salamanders)		X	
Zooplankton	X		
Sediment Cores	X		X
Landowner Surveys	X	X	X

County Lead
County Assisted
UWSP Lead

Waushara County Project Framework

Learn about 33 lakes in Waushara County to enable decision-making based on scientific information

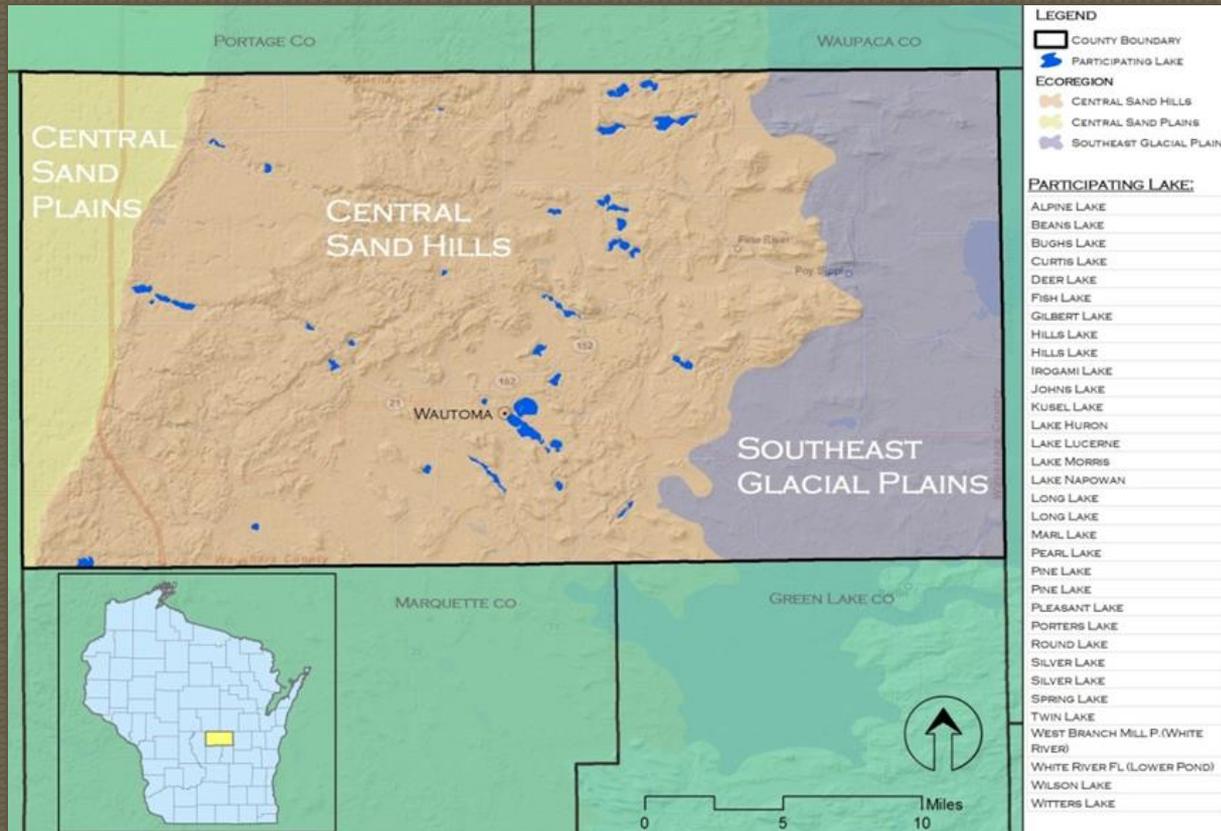
Work with community members to develop plans to guide future decisions



Study Timeline

1. Gather historic data and reports 2010-2011
2. Conduct shoreland inventory
3. Collect lake study data
November 2010 – August 2013
4. Develop Lake Management Plans
November 2013 – Early 2017
5. Implementation - Ongoing





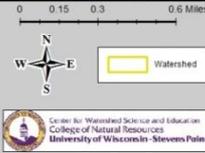
WAUSHARA COUNTY STUDY DESIGN

Watersheds and Land Use

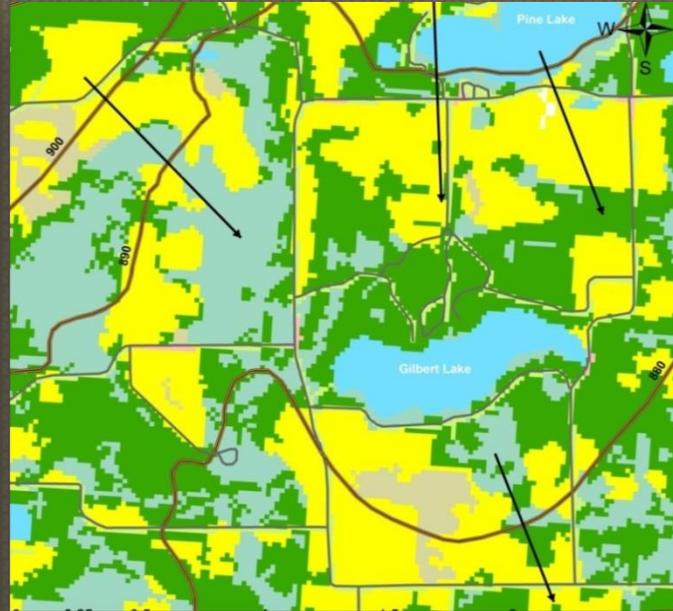
Gilbert Lake Watershed



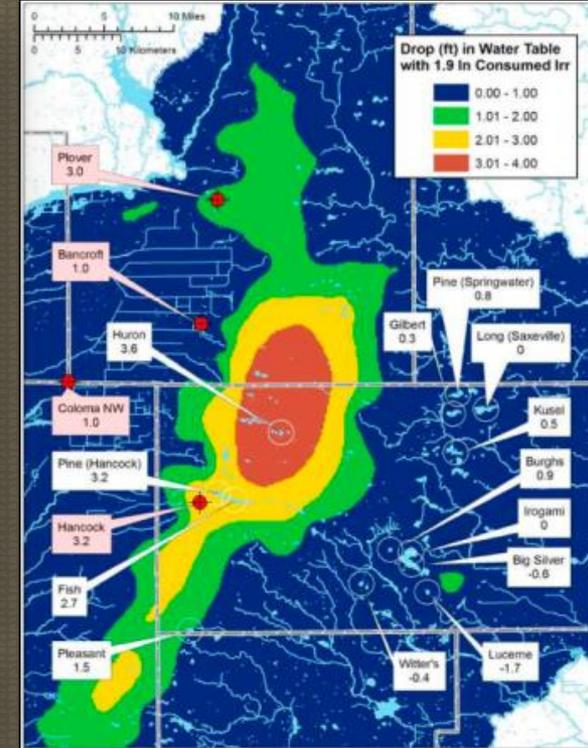
Land Use in the Gilbert Lake Watershed



Center for Watershed Science and Education
College of Natural Resources
University of Wisconsin-Stevens Point



Legend



Shorelands

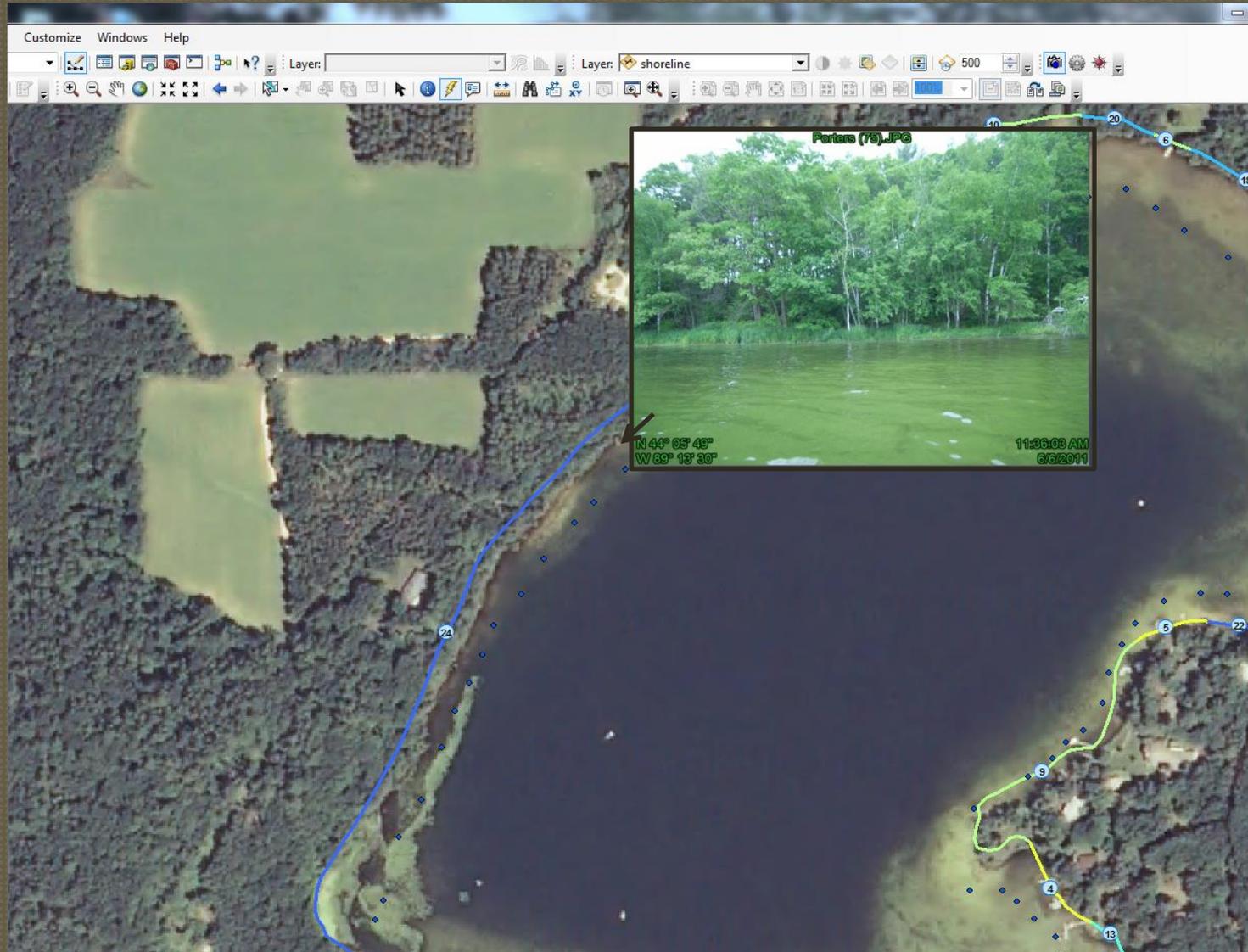
Vegetation

- Canopy
- Understory
- Native grasses
- Woody structure
- Wetlands

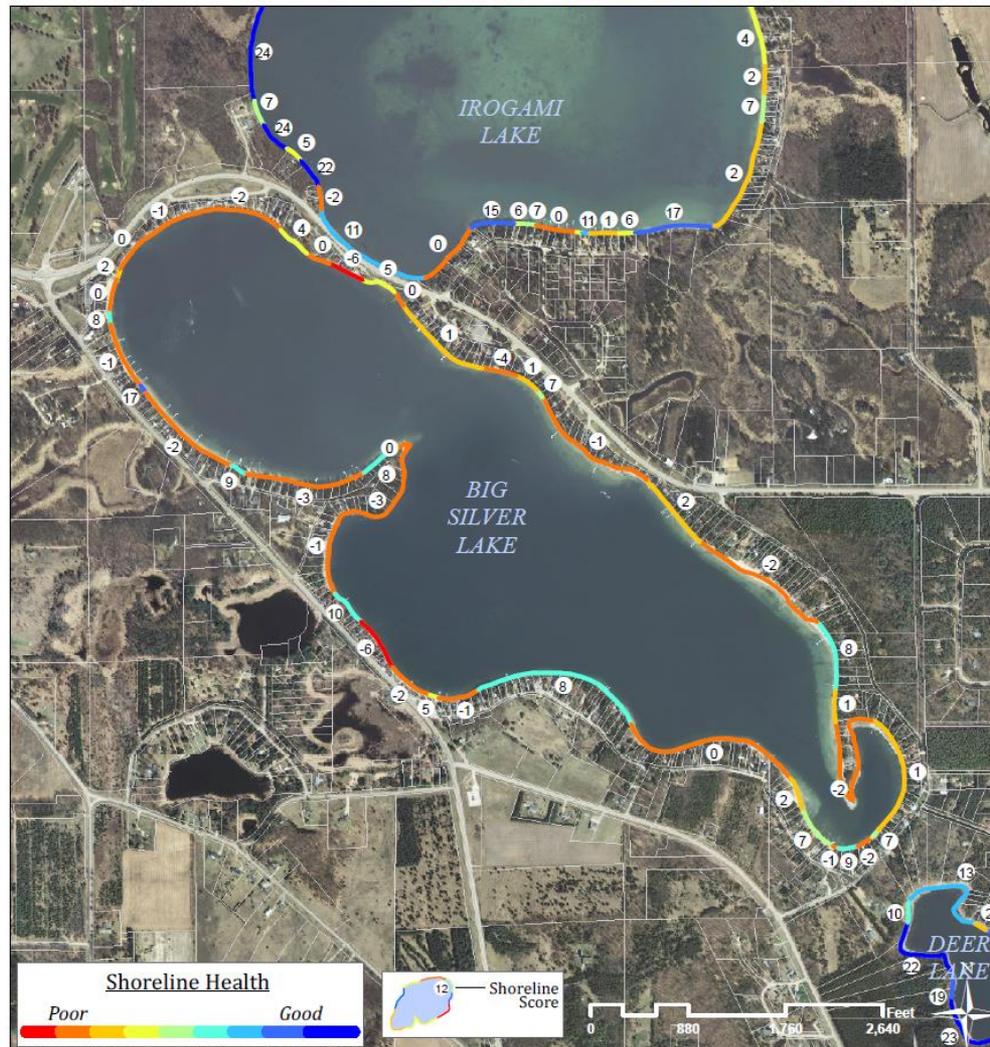
Human Influence

- Docks
- Seawall
- Rip-Rap
- Beach
- Erosion
- Structures

Photo Documented



Shoreline Assessment *BIG SILVER LAKE*



Summary

Shorelines are color-coded to show their overall health based on natural and physical characteristics. For example, shorelines shown in red indicate locations where management or mitigation may be warranted. Blue shorelines mark healthy riparian areas with natural vegetation and few human influences.

Calculating Shoreline Scores

Scores are based on the presence/absence of:

- + Natural vegetation
- + Human influences (docks, boathouses, etc)
- + Erosion
- + Structures



Map created by Dan McFarlane
Center for Land Use Education

Shorelands

Lake *	Vegetation Score
Lake Lucerne	15
White River Flowage	14
Beans Lake	14
Curtis Lake	12.4
Twin Lake	12.1
Spring Lake	11.9
Deer Lake	11.6
Pine Lake Hancock	11
Lake Napowan	10.9
Mill Pond	10.9
Little Hills Lake	10.1
Porters Lake	9.9
Kusel Lake	9.6
Gilbert Lake	9.5
Fish Lake	9.4
Round Lake	9.3
Pearl Lake	9.1
Big Hills Lake	8.6
Lake Huron	8.1
Pine Lake Springwater	8
Wilson Lake	7.3
Lake Morris	7.2
Marl Lake	7.1
Johns Lake	7.1
Irogami Lake	6.7
Long Lake Saxville	6.7
Lake Alpine	6.5
Witters Lake	6.2
Pleasant Lake	6.2
Bughs Lake	5.2
Little Silver Lake	4.6
Big Silver Lake	4



High vegetation score



Medium vegetation score



Low vegetation score

Shorelands

Lake *	Erosion Scores
Bughs Lake	8
Curtis Lake	8
Wilson Lake	8
White River Flowage	8
Lake Alpine	8
Spring Lake	7.9
Johns Lake	7.6
Irogami Lake	7.5
Porters Lake	7.4
Lake Huron	7.4
Pine Lake Hancock	7.3
Mill Pond	7.2
Kusel Lake	7.2
Lake Morris	7.1
Little Silver Lake	7.1
Witters Lake	7
Pine Lake Springwater	6.4
Lake Napowan	6.4
Little Hills Lake	6.3
Beans Lake	6.2
Pleasant Lake	6.1
Marl Lake	6.1
Big Silver Lake	6
Big Hills Lake	6
Deer Lake	6
Twin Lake	5.9
Fish Lake	5.7
Long Lake Saxville	5.7
Gilbert Lake	5.3
Pearl Lake	4.9
Round Lake	4.2
Lake Lucerne	4.2



Low erosion score



Medium erosion score



High erosion score

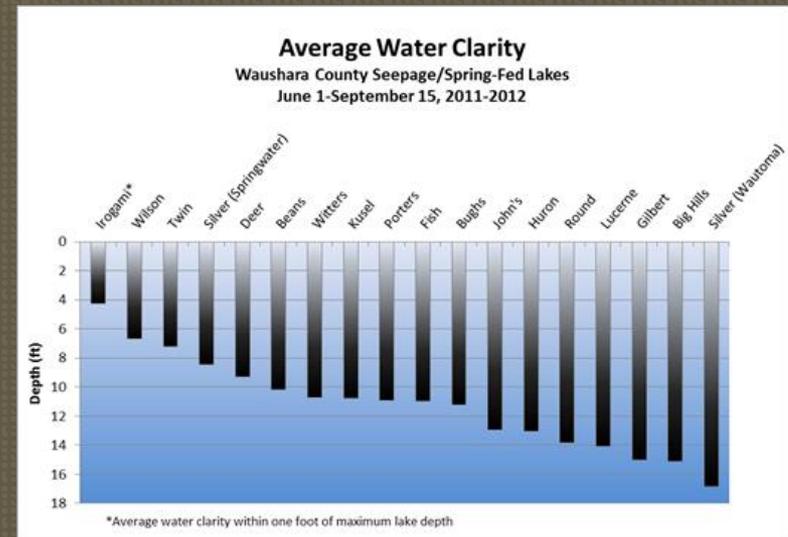
Sediment Cores

- Subset of lakes
- History of the lake and land use changes
 - More plants, fewer plants
 - Affects of land management practices
- Diatoms, pollens, sediment characteristics
- Top/Bottom cores
 - Pre/Post-settlement

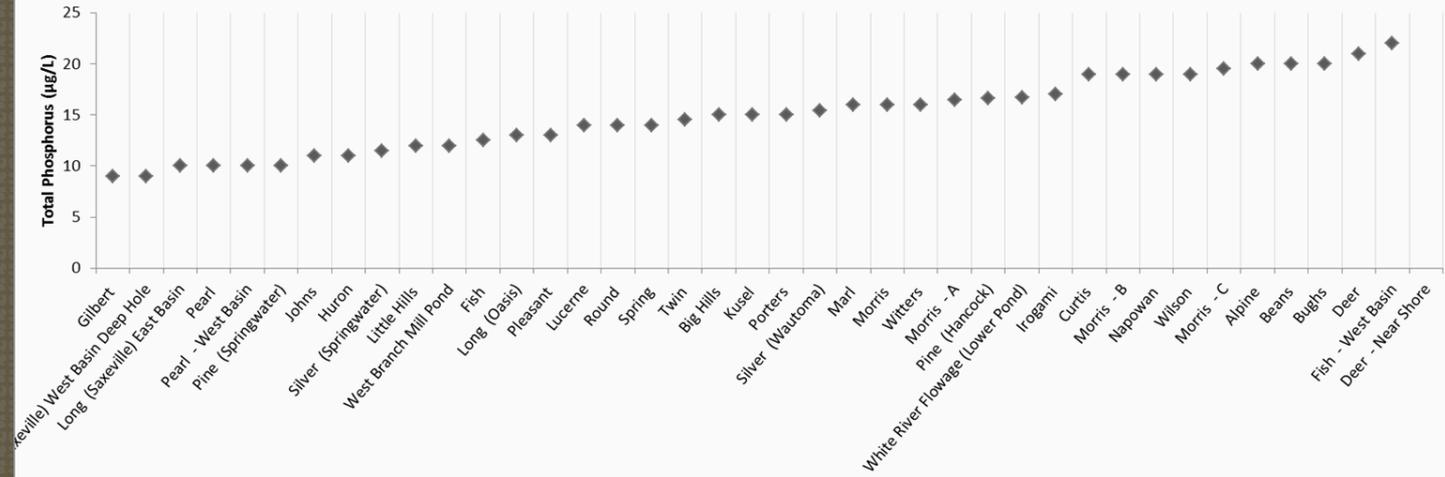


Water Quality

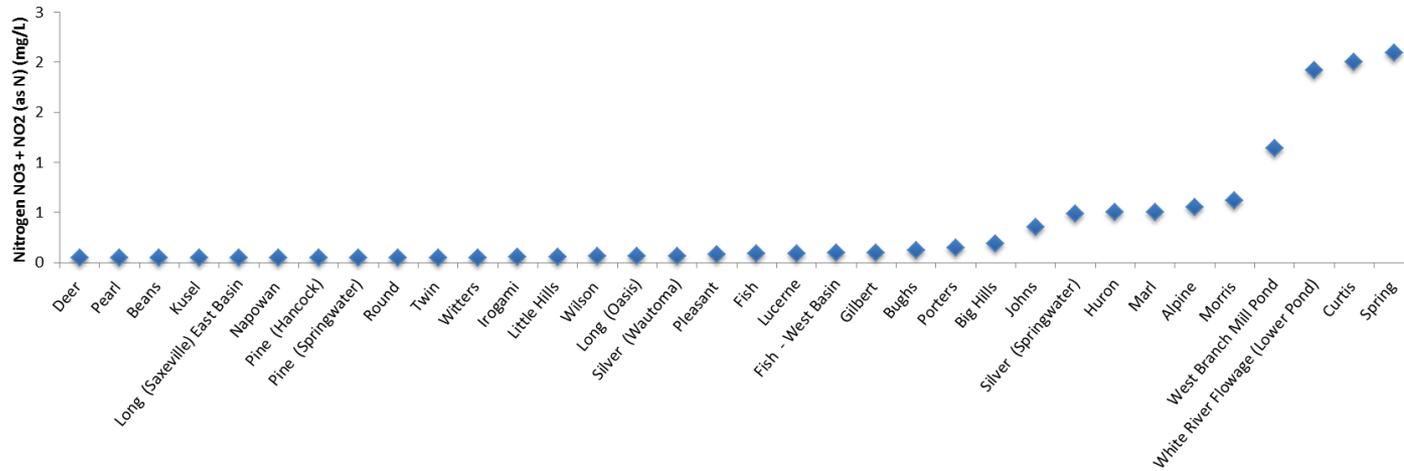
- 33 Lakes
- Sample Collection
 - Two Years
 - Year Round
- Profiles
 - Dissolved Oxygen
 - Temperature
 - Conductivity
 - pH
- Nutrients
 - Phosphorus
 - Nitrogen
- Herbicide - Atrazine
- Other Contaminants



Total Phosphorus Median Concentrations ($\mu\text{g/L}$) Waushara Lakes (2010-2012)



Nitrate ($\text{NO}_3 + \text{NO}_2 - \text{N}$) Median Concentrations (mg/L) Waushara Lakes (2010-2012)

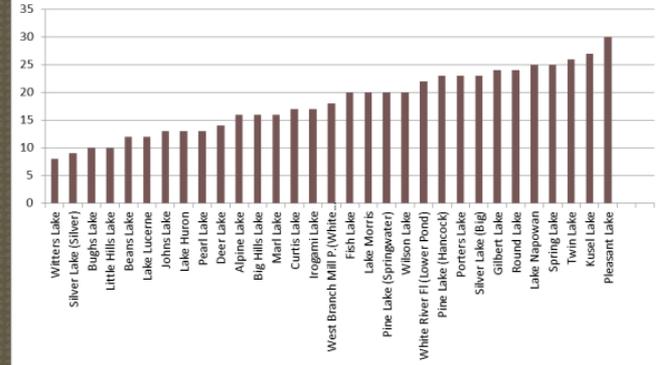


Aquatic Plants

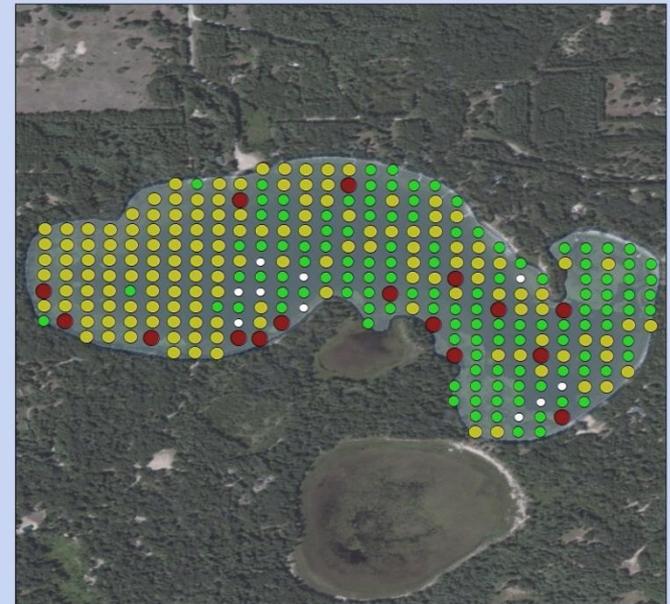
- Health of community
- Abundance
- Invasive species



Waushara County Lakes
Total Species



Big Twin Lake Aquatic Plant Survey 2013:
Total Rake Fullness



0 300 600 1,200 1,800 Feet



Total Rake Fullness

- 0
- 1
- 2
- 3



Center for Watershed Science and Education
College of Natural Resources
University of Wisconsin-Stevens Point

Waushara County Planning Strategy

- 1-3 lakes per planning group with 2-3 concurrent planning groups
- Opinion Surveys
 - Prior to each planning session
- Planning Sessions
 - 4-5 monthly meetings
 - Lake Habitat - Aquatic Plants, Fishery
 - Water Quality/Quantity
 - Land Use, Shorelands
 - Recreation, Communication
- Adopt Plans
 - Associations and Districts
 - Local municipality
 - County
 - Wisc Dept. Natural Resources



Communication - Planning

- **Notification of Planning Process and Invitation to Participate**
 - Ed meets with municipal board(s)
 - County Board supervisor notified by letter
 - Riparian landowner notified by mail
 - Email to Waushara Lakes listserv
 - Facebook 
 - Press releases
 - County Lakes Council
- **After LMP is developed**
 - Public meeting (typically municipal board meeting)
 - Public notified by mail, email, Facebook, press releases



Implementation

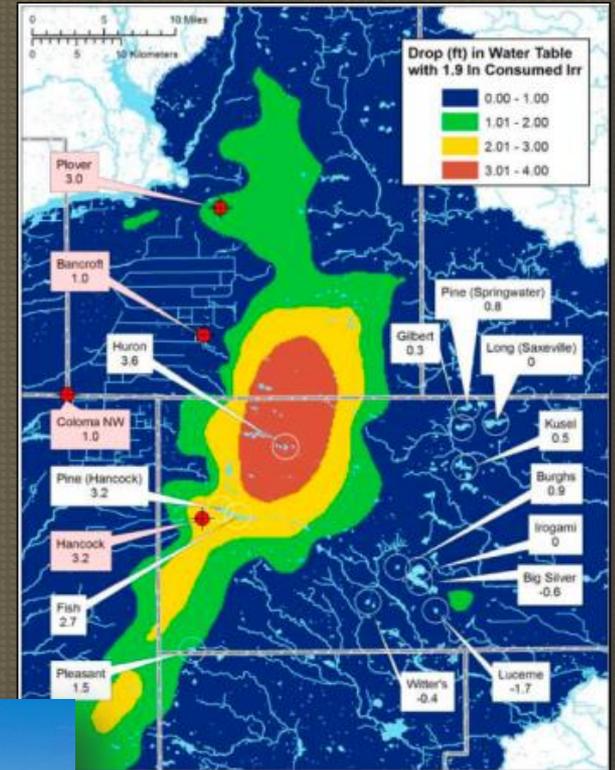


- Ongoing
- BMPs
 - Shorelands
 - Watershed
- Information/Education
- Adjustments in County Policies or Support



Observations – Waushara County

- Time
- Grant Program
- Communication
 - Lakes Council
- Groundwater



Acknowledgements - Waushara County Lake Study

Waushara County Lakes Council
Waushara County Staff and Citizens

Wisconsin Department of Natural Resources Professionals, Mark Sessing and Ted Johnson
Wisconsin Department of Natural Resources Lake Protection Grant Program

Aquatic Plants

Jen McNelly (UW-Stevens Point)
Golden Sands Resource Conservation & Development, Inc.

Sediment Cores

Paul Garrison (Wisconsin DNR)
Samantha Kaplan (UW-Stevens Point)

Shoreland Assessments

Ed Hernandez and Waushara County Land Conservation Department Staff
Dan McFarlane (UW-Stevens Point)

Water Quality and Watersheds

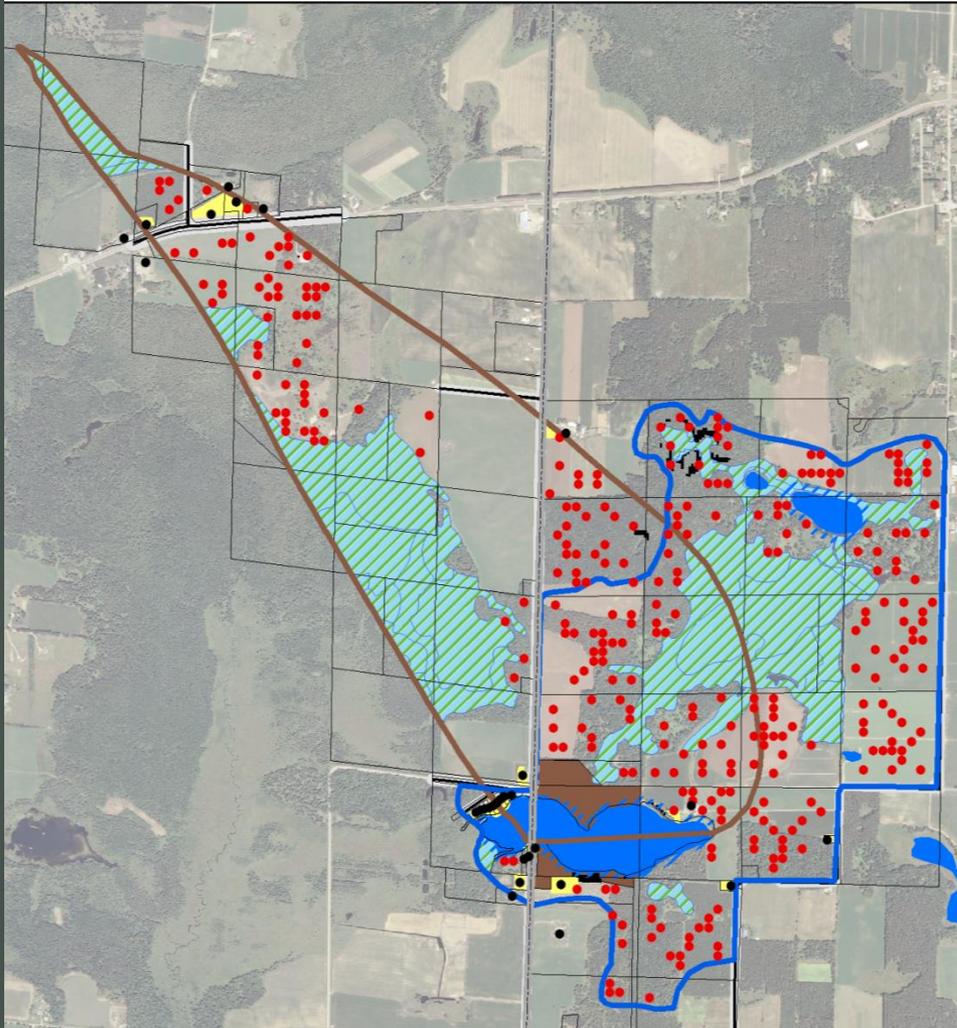
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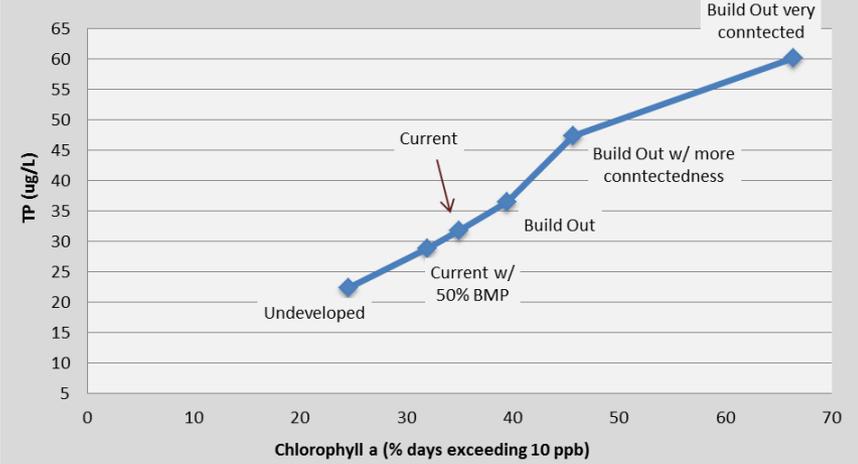
PORTAGE COUNTY IMPLEMENTATION

Build Outs and Water Quality

Collins Lake Build-Out Results

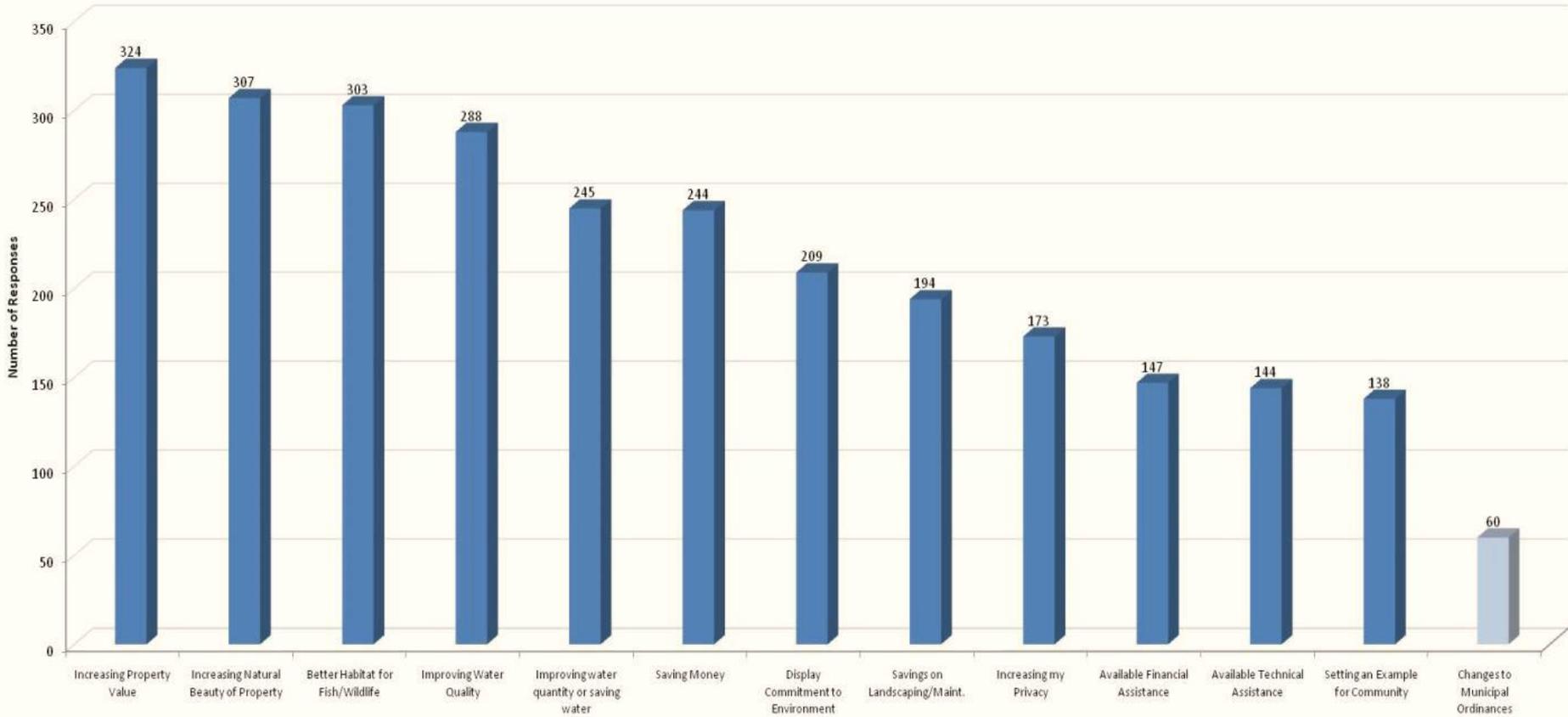


**Phosphorus/Algae Response Curve
Collins Lake**

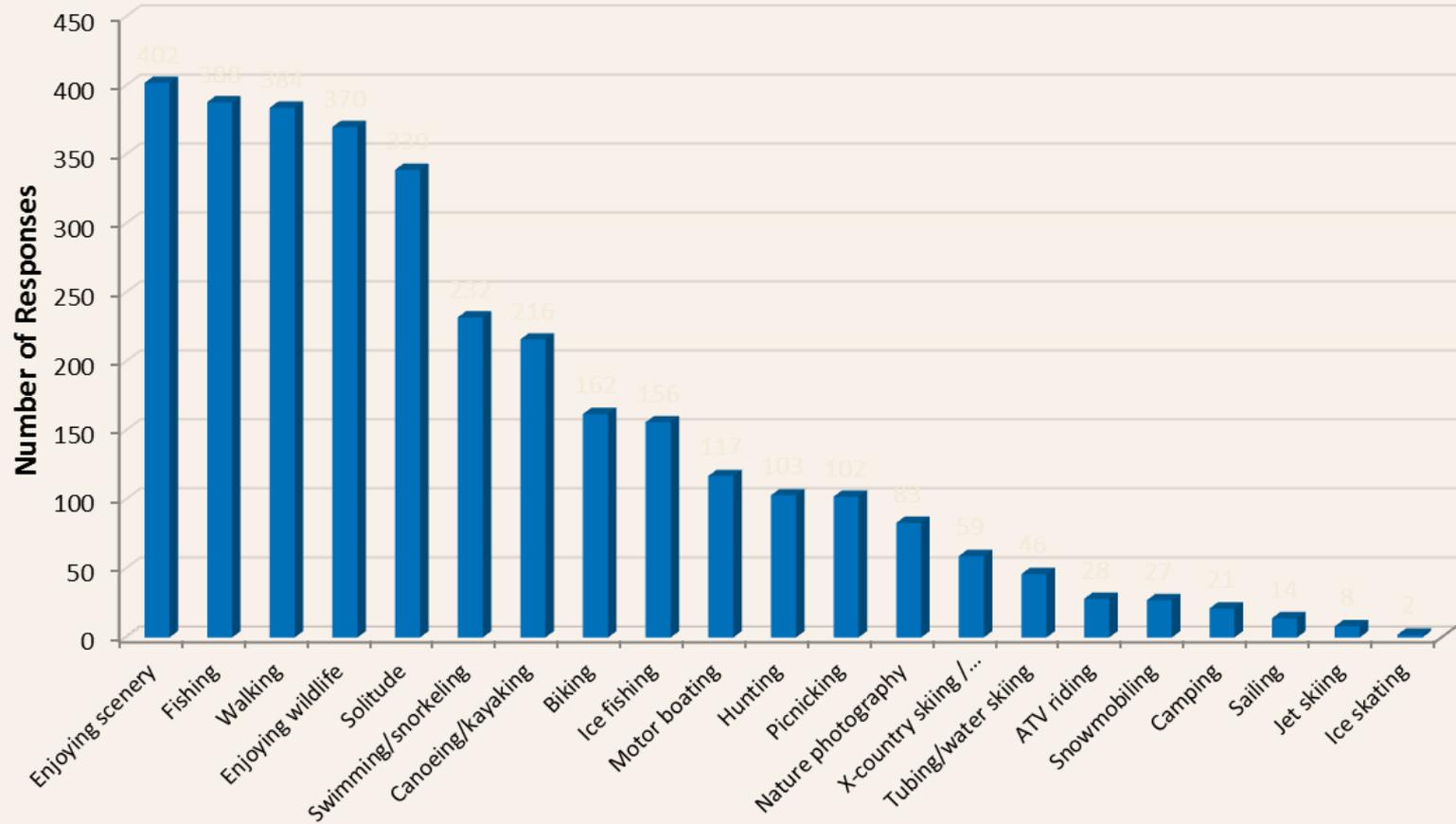


Framing the Message

Motivations for Land Management Change



Recreational Activities



How Portage County has used the Lake Study Results

- Park Commission
 - Management of 9 County Parks
 - Increased shoreland no mow zones
 - Added woody habitat
 - Replaced privies with septic systems



HOW PORTAGE COUNTY HAS USED THE LAKE STUDY RESULTS

- Land Preservation Fund Committee
 - Assisted with purchase of property
 - Sunset, Ministry Lake
 - Contributed to purchase of Conservancy Easement



How Portage County has used the Lake Study Results

- Highway Department
 - Adjusted (some) road designs near lakes
- Land Conservation Committee
 - Help target limited resources
 - Liaison with lake groups



How Portage County has used the Lake Study Results

- Land Conservation Department
 - Educate landowners on conservation BMP's and provide cost share (if available)
 - Subdivision and non-metallic mine review
 - Inform watershed residents about their connection to the lake via groundwater or surface water
 - Assist with riparian erosion control
 - Design shoreland restoration, run tree planting program
 - Respond to citizen's questions



Investment for Portage Co Lake Study, Planning, and Implementation Grants

- DNR Funding \$465,025
- County Funding \$19,366
- County In-Kind \$21,516
- UWSP In-Kind \$99,197
- Citizen/Meeting Attendee In-Kind \$20,750
 - Planning 136 volunteers, 912 hours



Thank you!

