Muskegon Lake: An AOC case study combining science, community, and philanthropy

Photo by Marge Beaver:
www.photography-plus.com

Grand Valley State University
Robert B. Annis Water Resources Institute

Sawmills: late 1800s

Muskegon Lake, MI: 1900-1960

Over 16% of open water filled in

AWRI Monitoring Program for Muskegon Lake

GOALS:

- Observe short-term and long-term changes in the ecological health of Muskegon Lake
- Use information to help de-list Muskegon Lake as an Area of Concern
- Engage Muskegon community in the process of ownership of the lake

AWRI Monitoring Program for Muskegon Lake

J. Great Lakes Res. 30(2):341–343
Internat. Assoc. Great Lakes Res., 2004

COMMENTARY

An Innovative Funding Mechanism for the Muskegon Lake AOC

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AWRI science instructor preparing to deploy an instrument in Muskegon Lake to measure water quality parameters.

AWRI scientist analyzing chemicals from Muskegon Lake in the laboratory.

GRAND VALLEY STATE UNIVERSITY
www.gvsu.edu

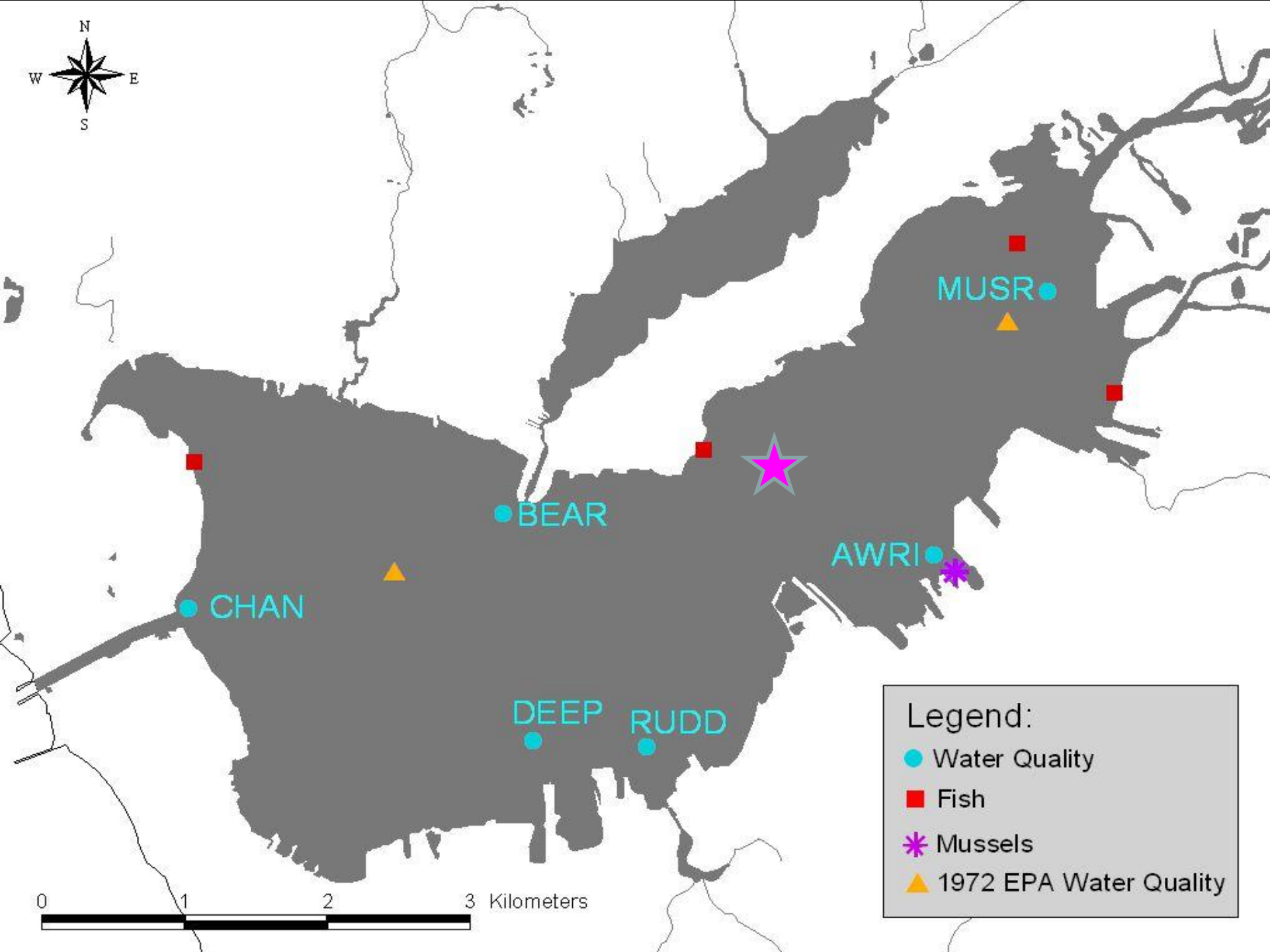
community founds
Muskegon County

ANNIS WATER RESOURCES INSTITUTE

Research Fund

community founds
Muskegon County

ANNIS WATER RESOURCES INSTITUTE


N
W
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Legend:
Water Quality
Fish
Mussels
1972 EPA Water Quality
0
1
2
3 Kilometers

Selected Variables

- Total Phosphorus
- Chlorophyll *a*
- Algae
- Fish
- Dreissenid Mussels

Muskegon Lake Fish Monitoring

- Fyke nets set in shallow littoral zone of lake
- Nets in place overnight
- Supplemented by electrofishing
- Led by Carl Ruetz

Setting Targets:

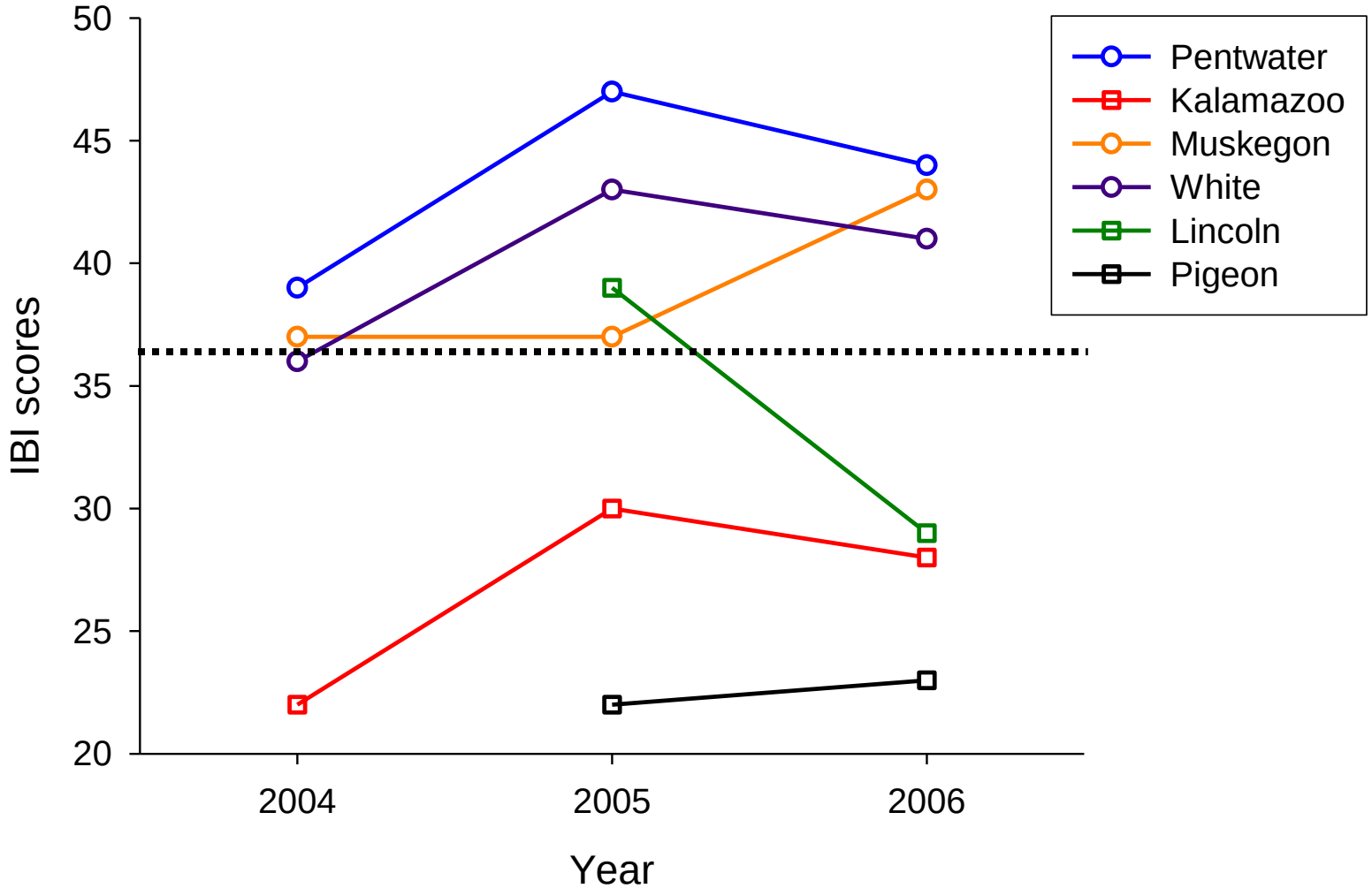
- Use AWRI data (2004-2006)
- IBI (index of biotic integrity)

Delisting Targets:

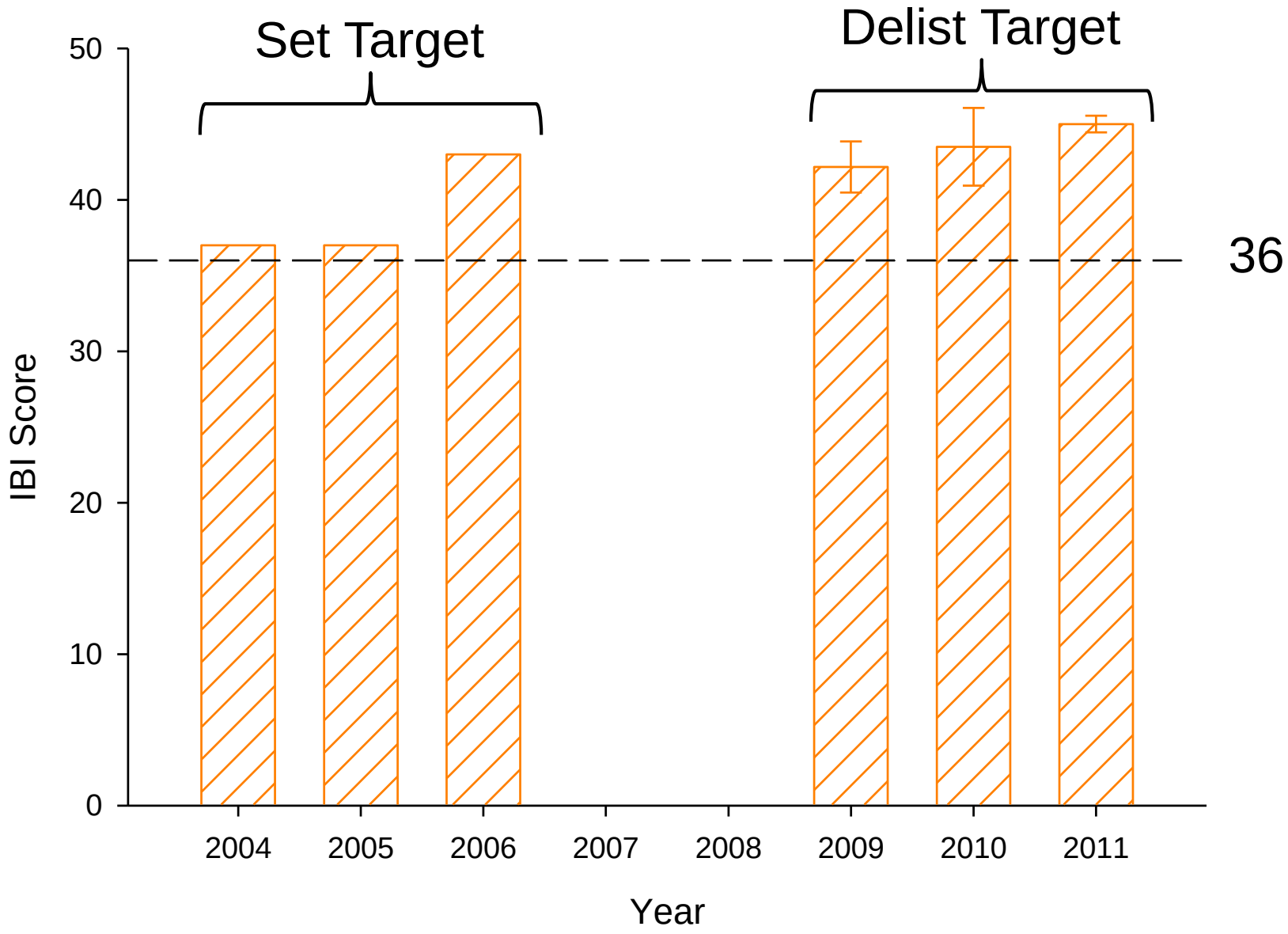
- Maintain or improve the lake's ecosystem health over a 3-yr period (2009-2011)
- Average IBI score ± 1 SD

Setting Target:

Muskegon Lake: IBI = 38 ± 2 (min: 36)



Muskegon Lake



Muskegon Lake Area of Concern Habitat Restoration Project Partners

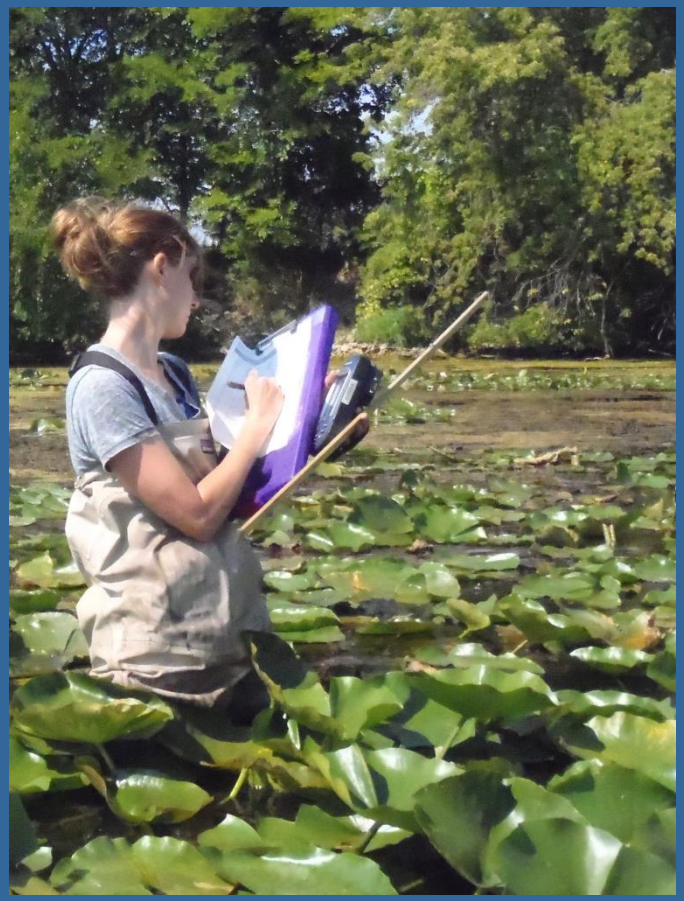
- $10 million project: American Recovery and Reinvestment Act (NOAA)

Muskegon Lake Habitat Restoration Project

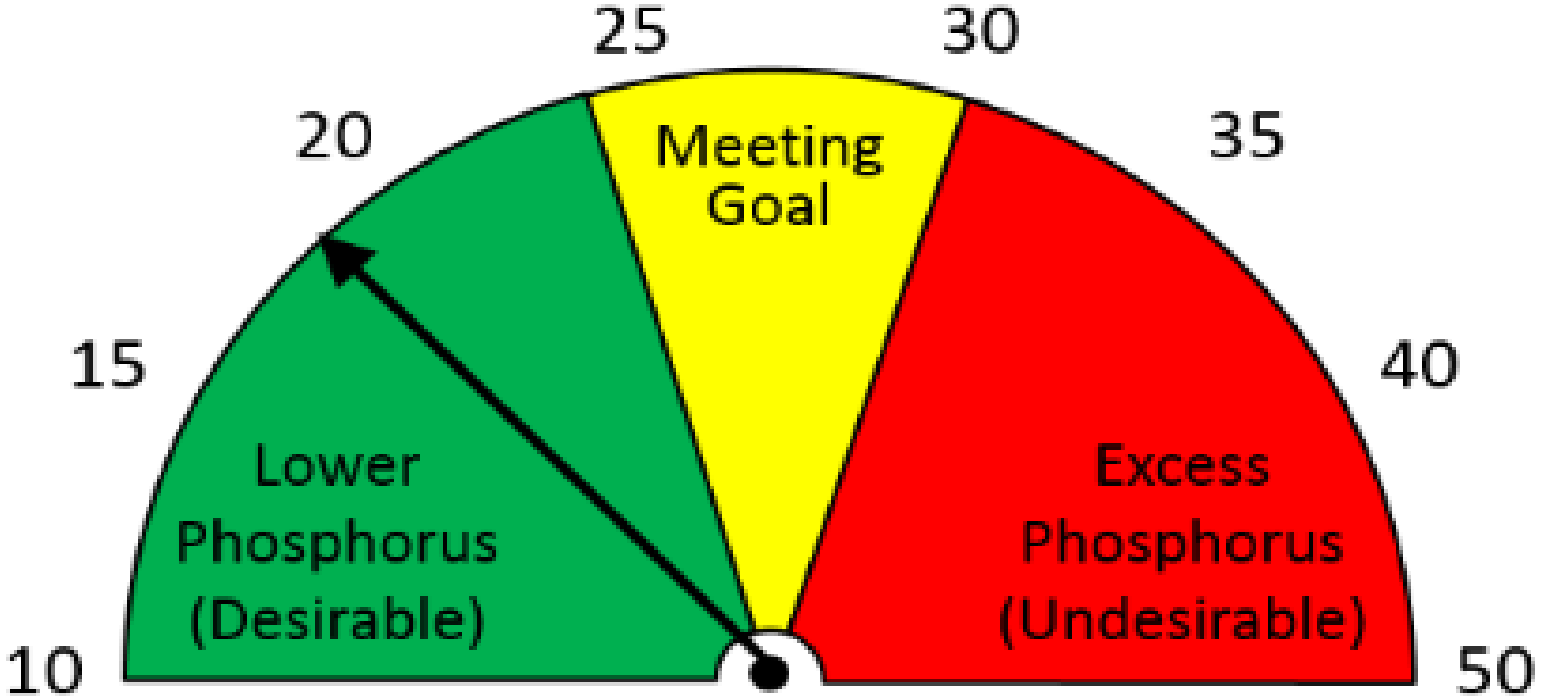
- Restoration goals:
  - Soften ~3,050 m of hardened shoreline
  - Create or restore wetlands (11 ha)
  - Remove unnatural fill (10 ha): 135,000 yd^3
- Restoration design, construction, and monitoring

Monitoring

- 3 monitoring elements
  - Macrophytes
  - Fish
  - Socio-economics
- Used science to assess success and inform restoration design



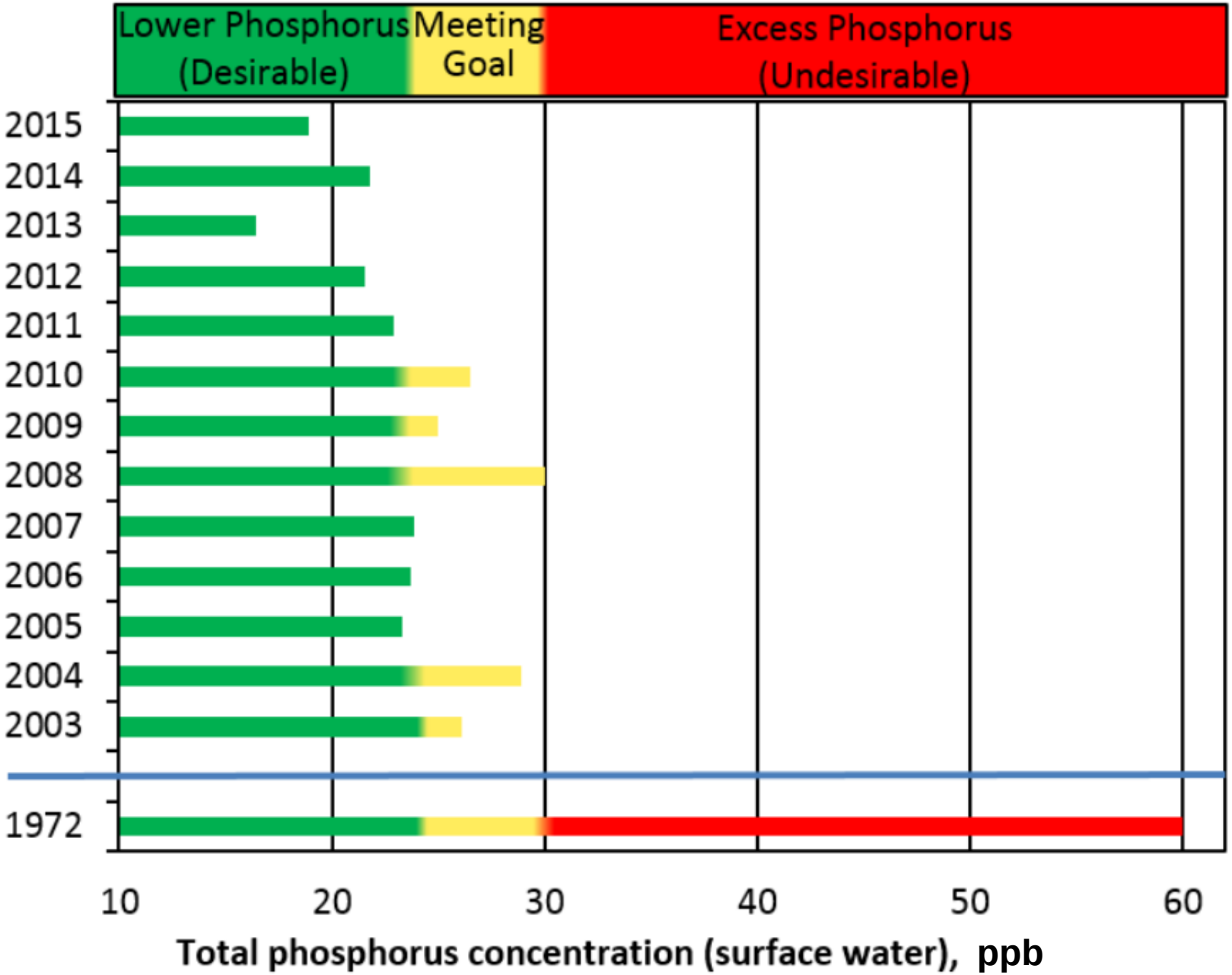
Current Status (2015)



Total Phosphorus Concentration, µg/L

http://www.gvsu.edu/wri/director/muskegon-lake-water-quality-dashboard-78.htm

Historical Status (1972, 2003-2015)



Summary (AWRI)

- 13 Graduate Student Theses
- 17 Student /10 Faculty Publications
- 6 postdoctoral fellows
- Leveraged Funding (to date): >$4,000,000

(Sources: CFMC, NOAA, EPA, FACF, Alcoa, MDEQ, MDNR, NEMWI)

Summary (community)

- Long-term monitoring critical to assess success
- Leveraged Funding: >$25,000,000 (WMSRDC)
- Not all benefits can be quantified
- Builds civic pride

WATCH MUSKEGON