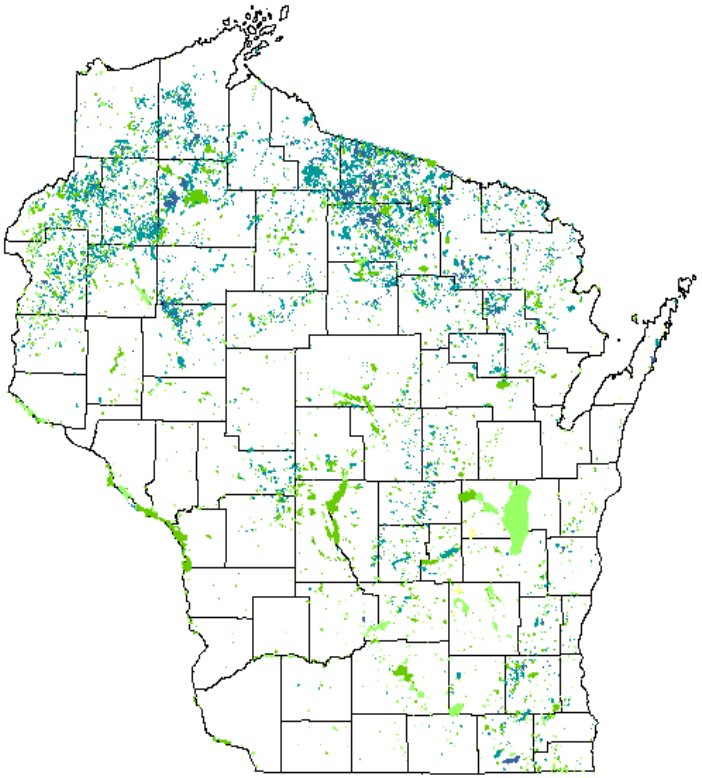
Wisconsin's Lake Monitoring

- Citizen Lake Monitoring Network (Self-Help)
- WDNR Baseline/Long Term Trend Monitoring
- Satellite (Lakesat.org)
- Other (grants, research, special studies)

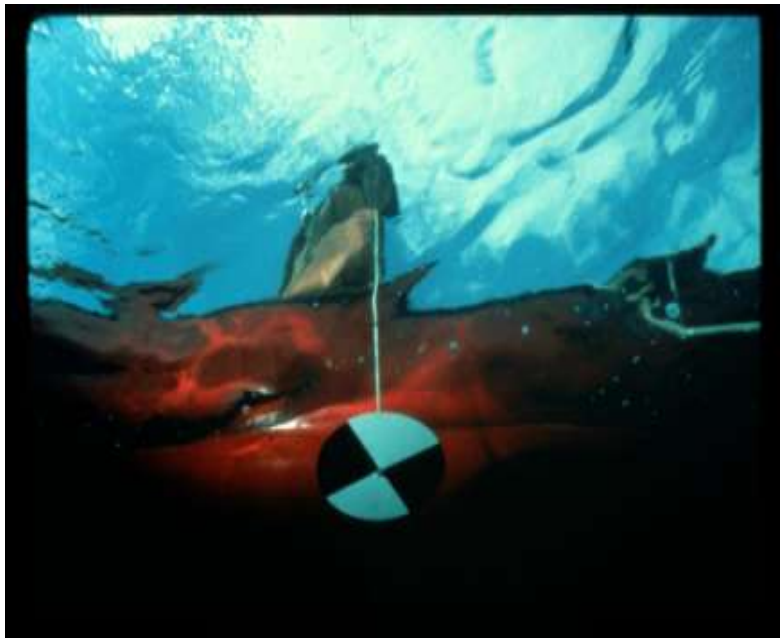


Metrics to assess lake ecosystem health

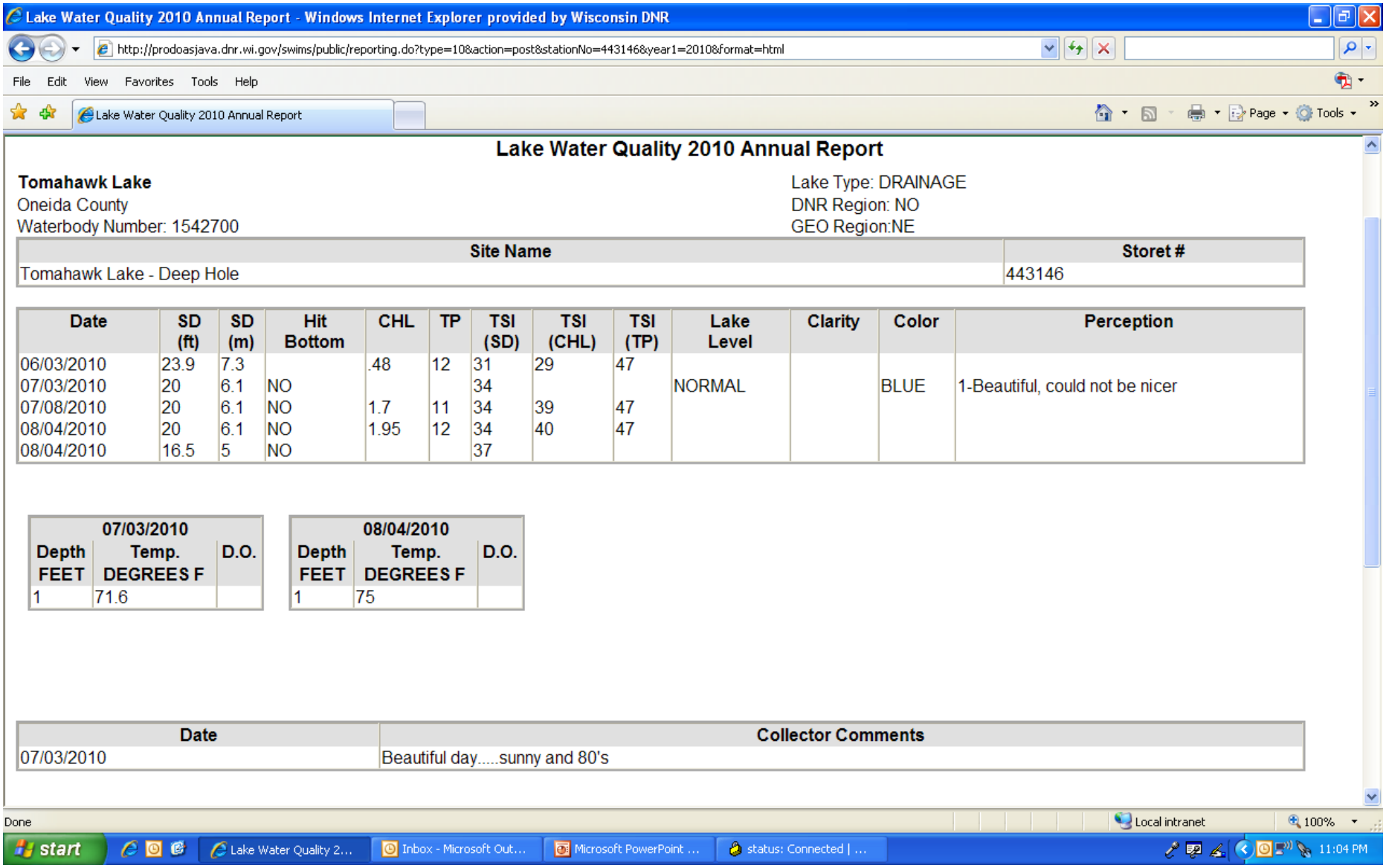
- *Water Quality / Trophic Status (TSI)*
  - *Water clarity, algal growth, nutrients*
- *Habitat Quality /Aquatic Plants (FQI, AMCI)*
  - *Plant species richness, maximum rooting depth, frequency of occurrence*
  - *Shoreland disturbance, littoral habitat index*
- *Fish Community attributes (IBI, etc.)*
  - *Game fish growth, size-structure, relative abundance, & recruitment*

Water Quality Monitoring

- Secchi disk transparency
- In situ profiles (DO, temp, pH, conductivity)
- Chl *a* and Total P
- Water Chemistry (other nutrients, anions, cations, ANC, DOC)
- Color and turbidity



http://dnr.wi.gov/lakes/CLMN/reportsanddata



Lake Water Quality 2010 Annual Report

Tomahawk Lake
Oneida County
Waterbody Number: 1542700

Lake Type: DRAINAGE
DNR Region: NO
GEO Region:NE

Site Name	Storet #
Tomahawk Lake - Deep Hole	443146

Date	SD (ft)	SD (m)	Hit Bottom	CHL	TP	TSI (SD)	TSI (CHL)	TSI (TP)	Lake Level	Clarity	Color	Perception
06/03/2010	23.9	7.3		.48	12	31	29	47				
07/03/2010	20	6.1	NO			34			NORMAL		BLUE	1-Beautiful, could not be nicer
07/08/2010	20	6.1	NO	1.7	11	34	39	47				
08/04/2010	20	6.1	NO	1.95	12	34	40	47				
08/04/2010	16.5	5	NO			37						

07/03/2010		
Depth FEET	Temp. DEGREES F	D.O.
1	71.6	

08/04/2010		
Depth FEET	Temp. DEGREES F	D.O.
1	75	

Date	Collector Comments
07/03/2010	Beautiful day.....sunny and 80's

Secchi Graph - Windows Internet Explorer provided by Wisconsin DNR

http://prodoasjava.dnr.wi.gov/swims/public/reporting.do?type=11&action=post&format=html&stationNo=443146

File Edit View Favorites Tools Help

Secchi Graph

Wisconsin Department of Natural Resources

Search

Program

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Tomahawk Lake
Oneida County
Waterbody Number: 1542700

Lake Type: DRAINAGE
DNR Region: NO
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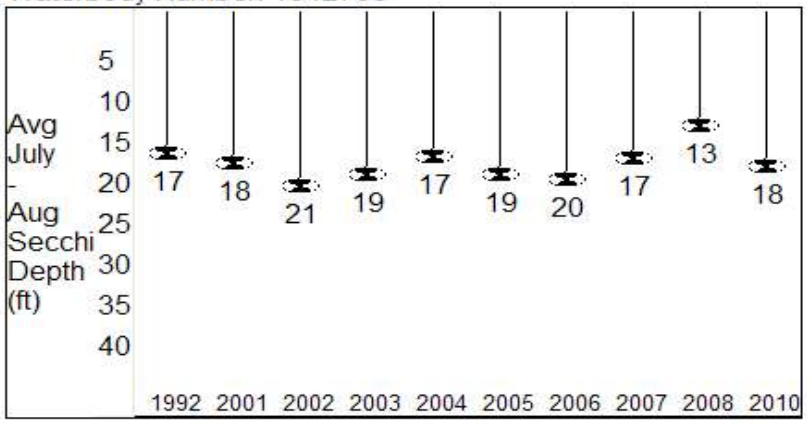
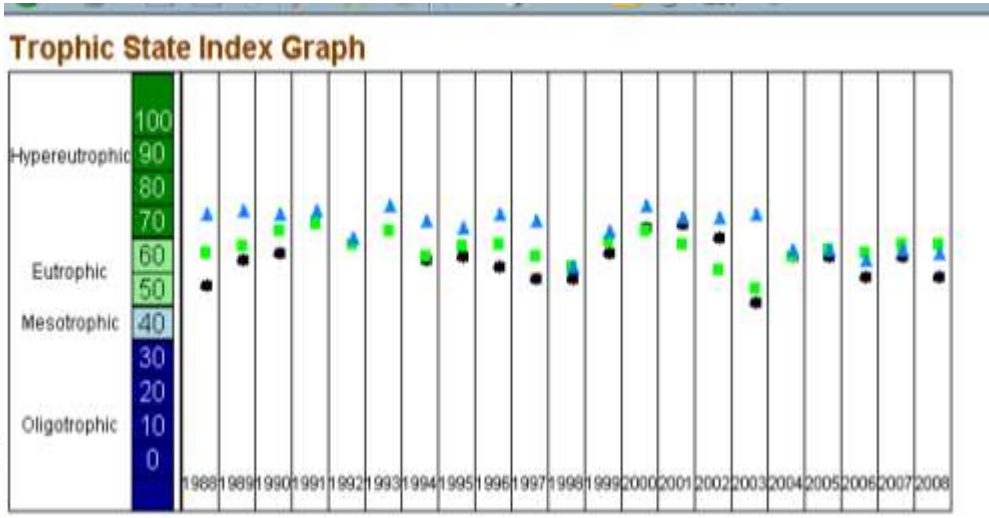


Past secchi averages in feet (July and August only).

Year	Secchi Mean	Secchi Min	Secchi Max	Secchi Count
1992	16.7	15	18	3
2001	17.9	13	20.5	6
2002	20.8	20.5	21	2

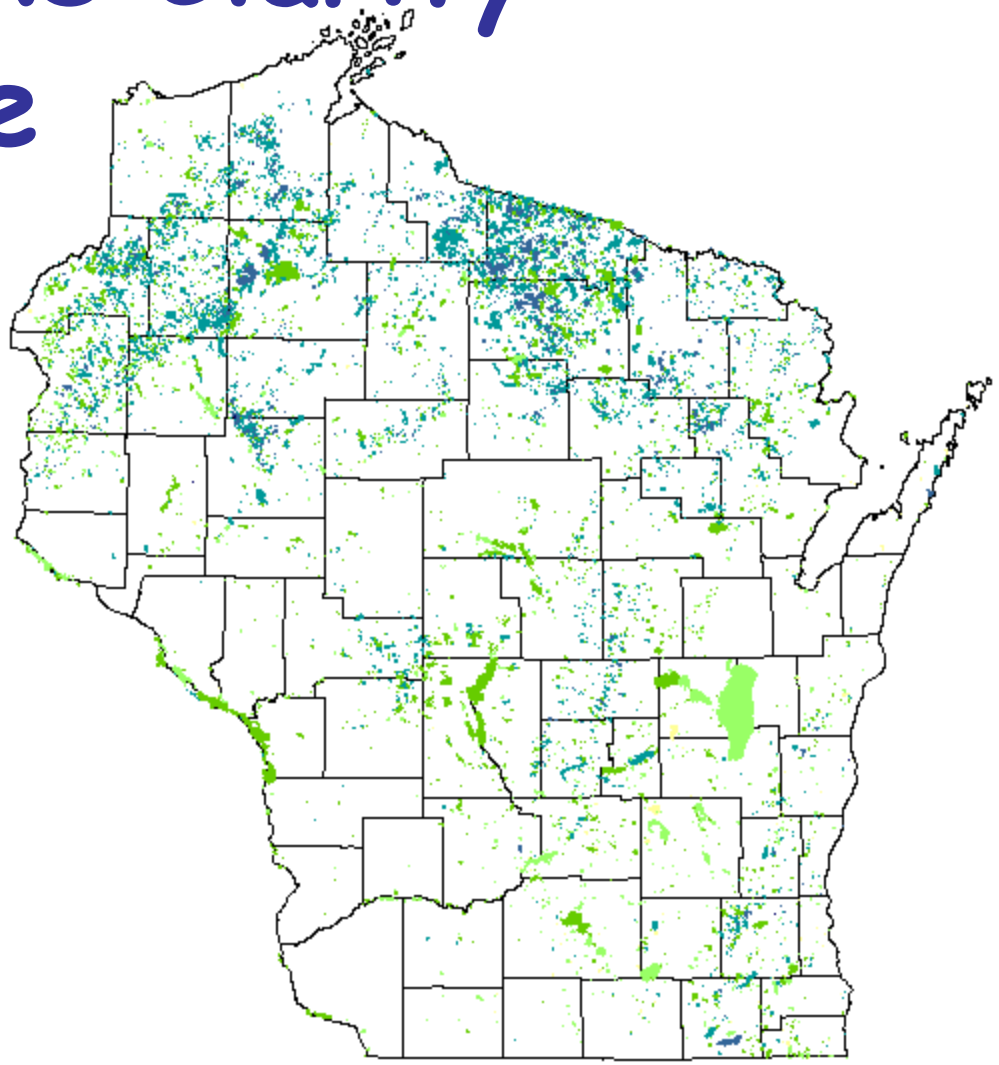


Done

start | Secchi Graph - Windo... | Inbox - Microsoft Out... | Microsoft PowerPoint ... | status: Connected | ...

Wisconsin Lake Clarity - Trophic State From Space

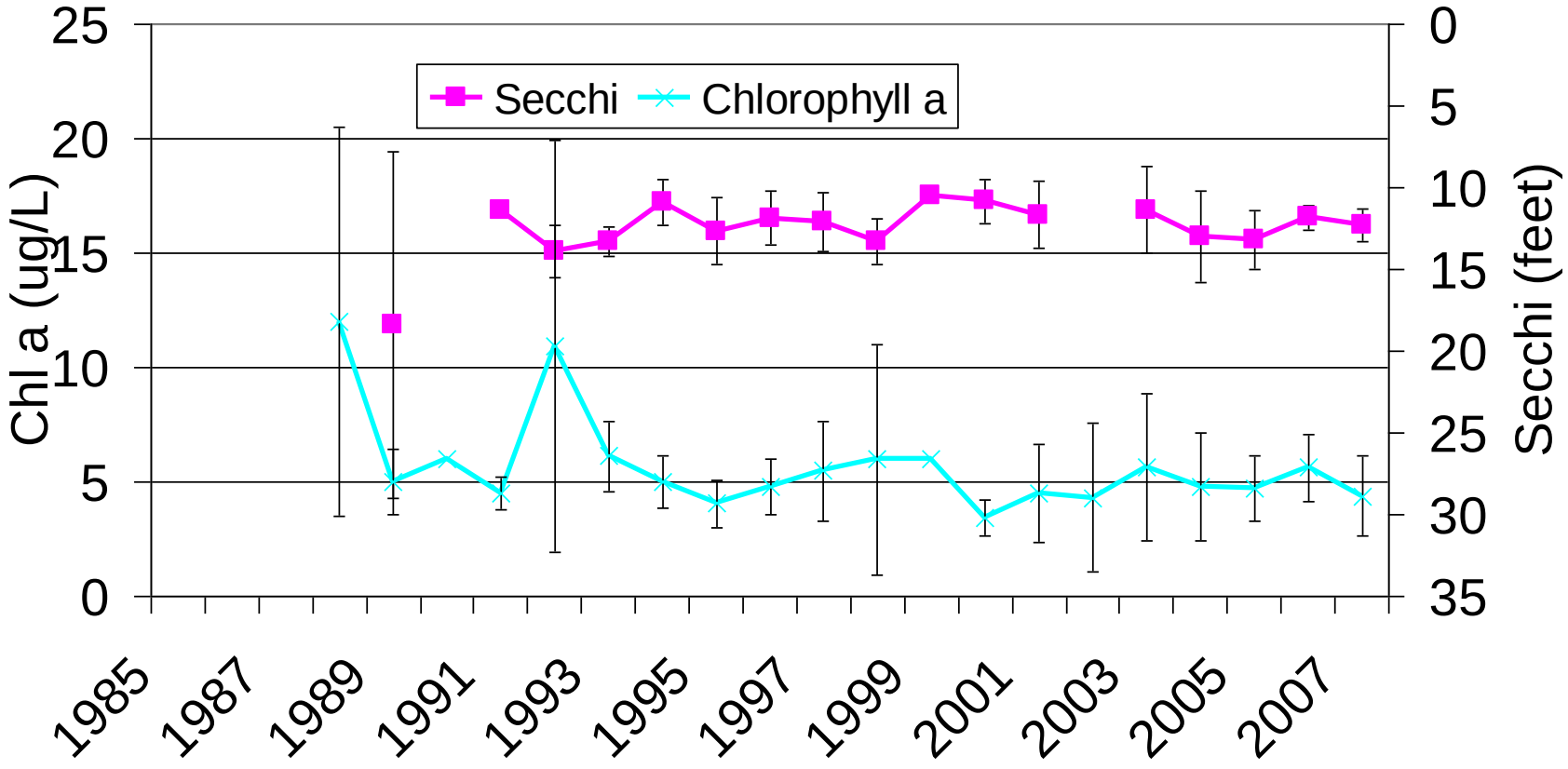
Trophic State Index	Estimated Secchi Depth
> 80	< 0.25 m (< 0.8 ft)
70 to 80	0.25 - 0.5 m (0.8 - 1.6 ft)
60 to 70	0.5 - 1 m (1.6 - 3.3 ft)
50 to 60	1 - 2 m (3.3 - 6.6 ft)
40 to 50	2 - 4 m (6.6 - 13.1 ft)
30 to 40	4 - 8 m (13.1 - 26.2 ft)
< 30	> 8 m (> 26.2 ft)



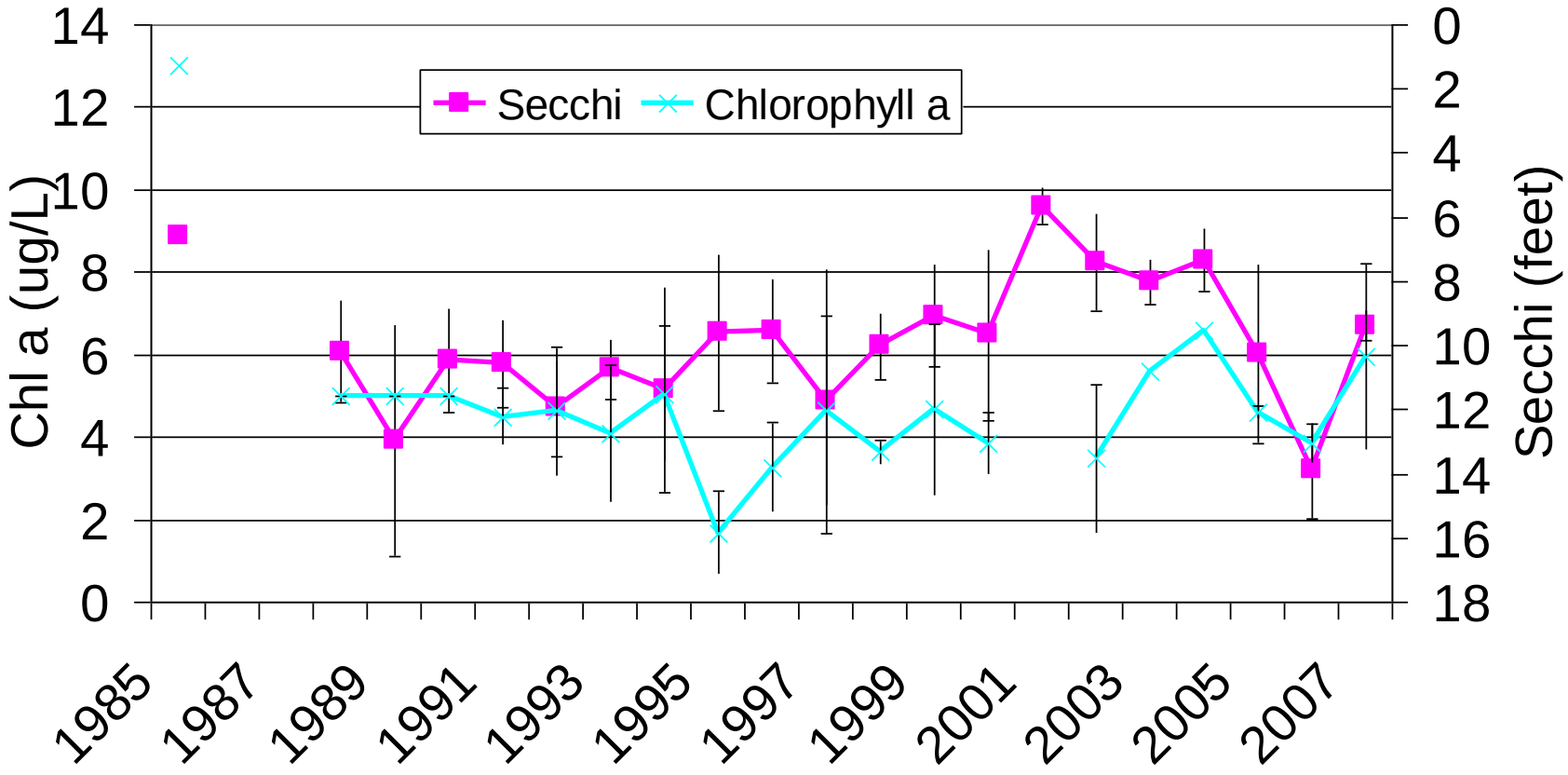
Ground-truthed by hundreds of volunteers

DNR Science Services generates annual estimates for >3200 lakes

Long Term Water Quality Trends – Lake Minocqua, Oneida Co.



Long Term Water Quality Trends – Rock Lake, Jefferson Co



Lake Assessment Framework

Step 1. Compare monitoring results to expected values by lake natural community

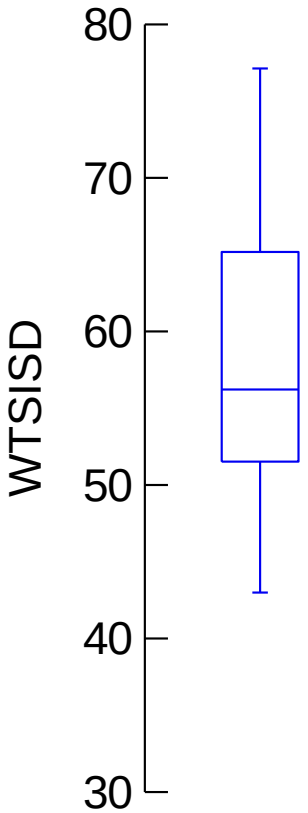
- Flag lakes that exceed a defined threshold

Step 2. Conduct additional monitoring on flagged lakes

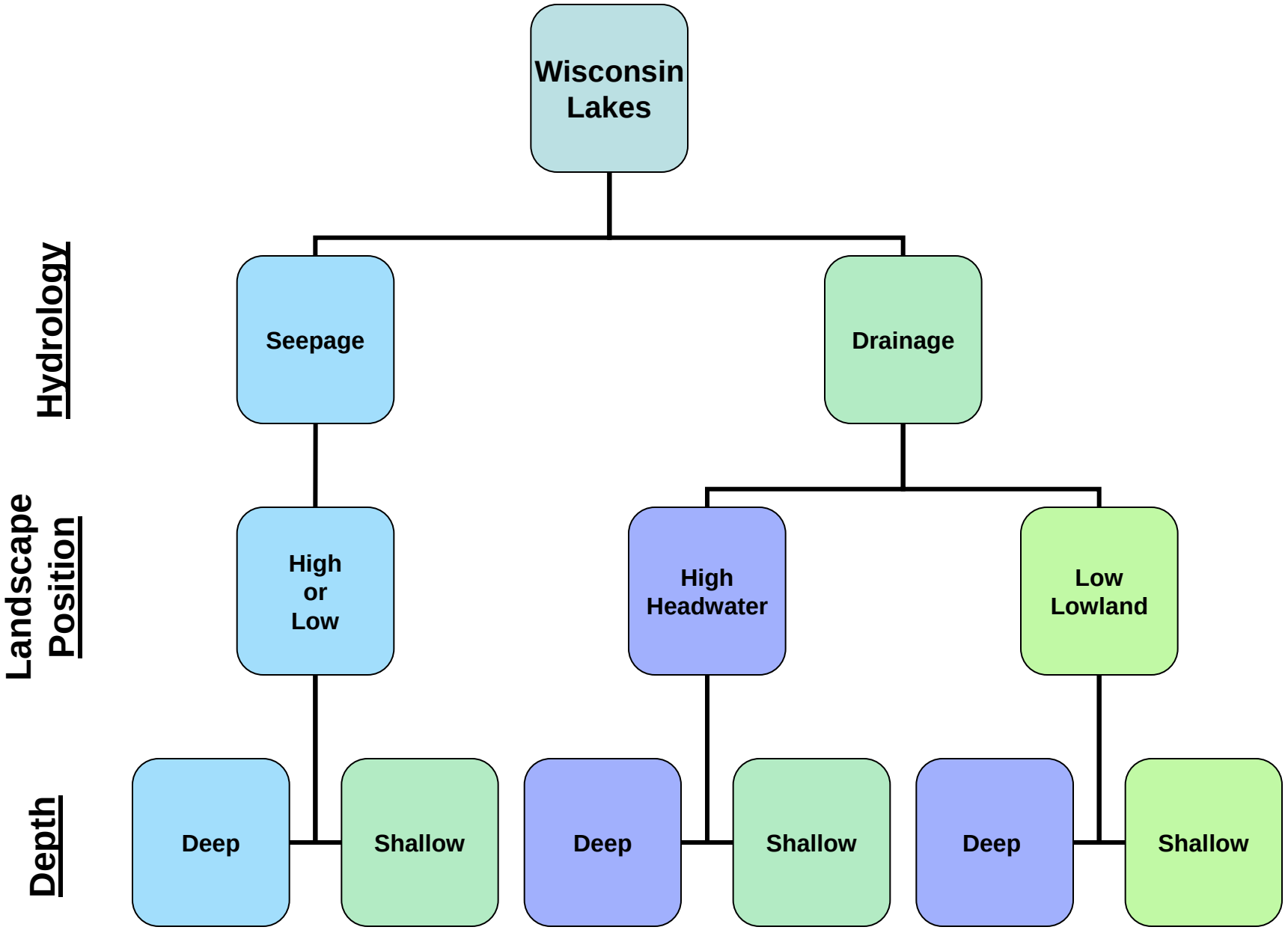
- Prioritize based upon how far below the given threshold or number of metrics that are exceeded

Step 3. Determine use attainment and set management goals

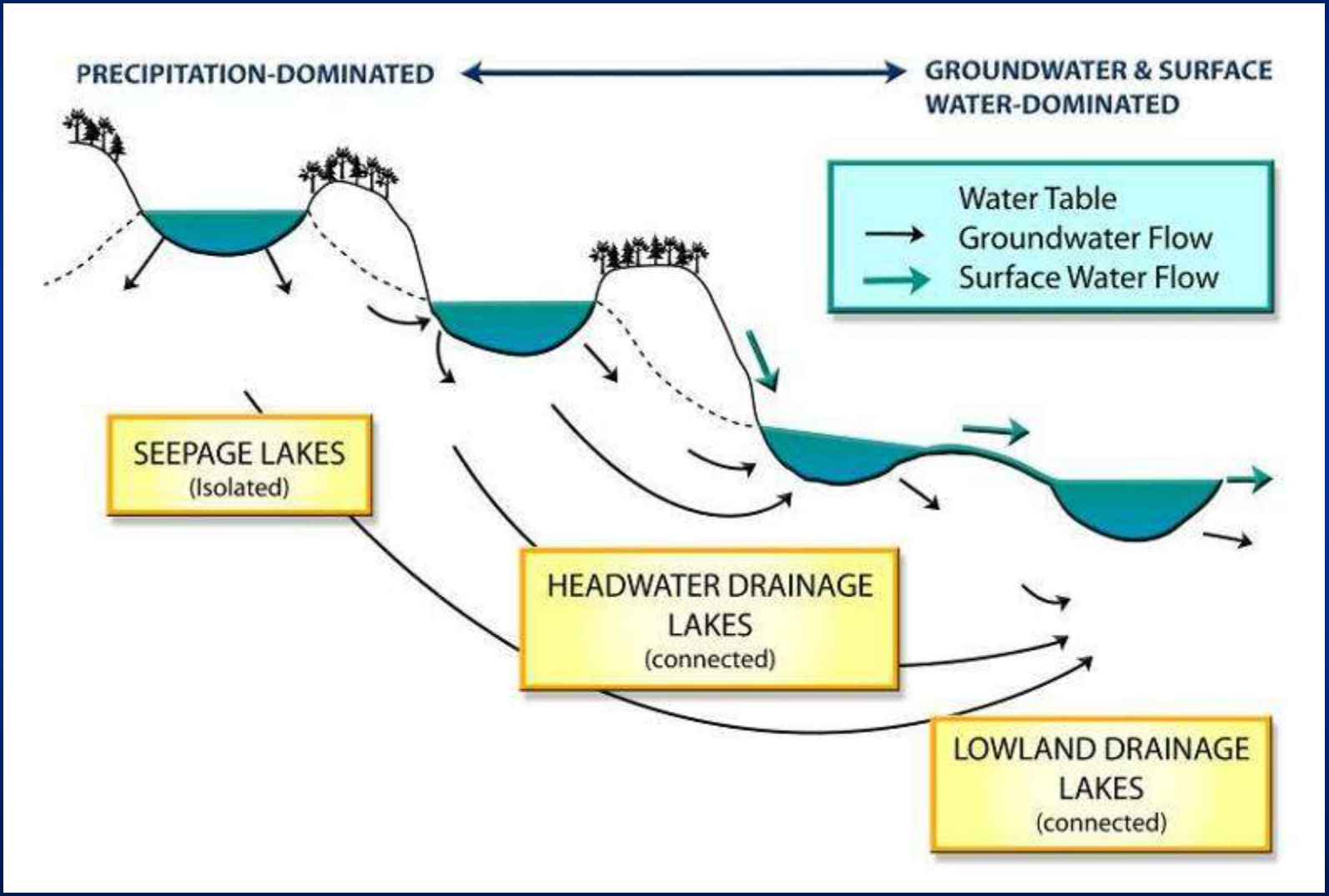
- Reference (lake protection goals, ORW candidates)
- High or low attainment (lake improvement goals)
- Impaired (lake rehabilitation goals, candidates for 303(d) list)



Wisconsin Lake Classification



LANDSCAPE POSITION



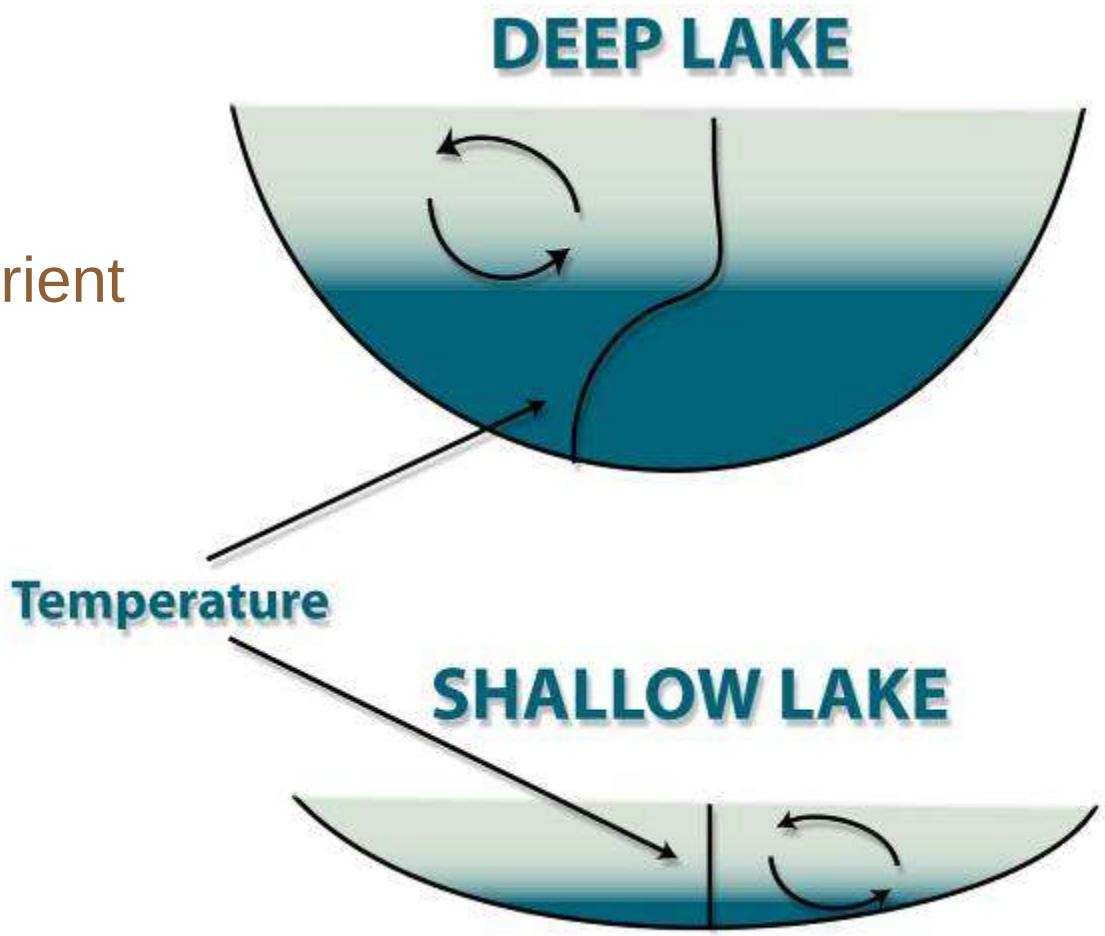
LAKE DEPTH MATTERS

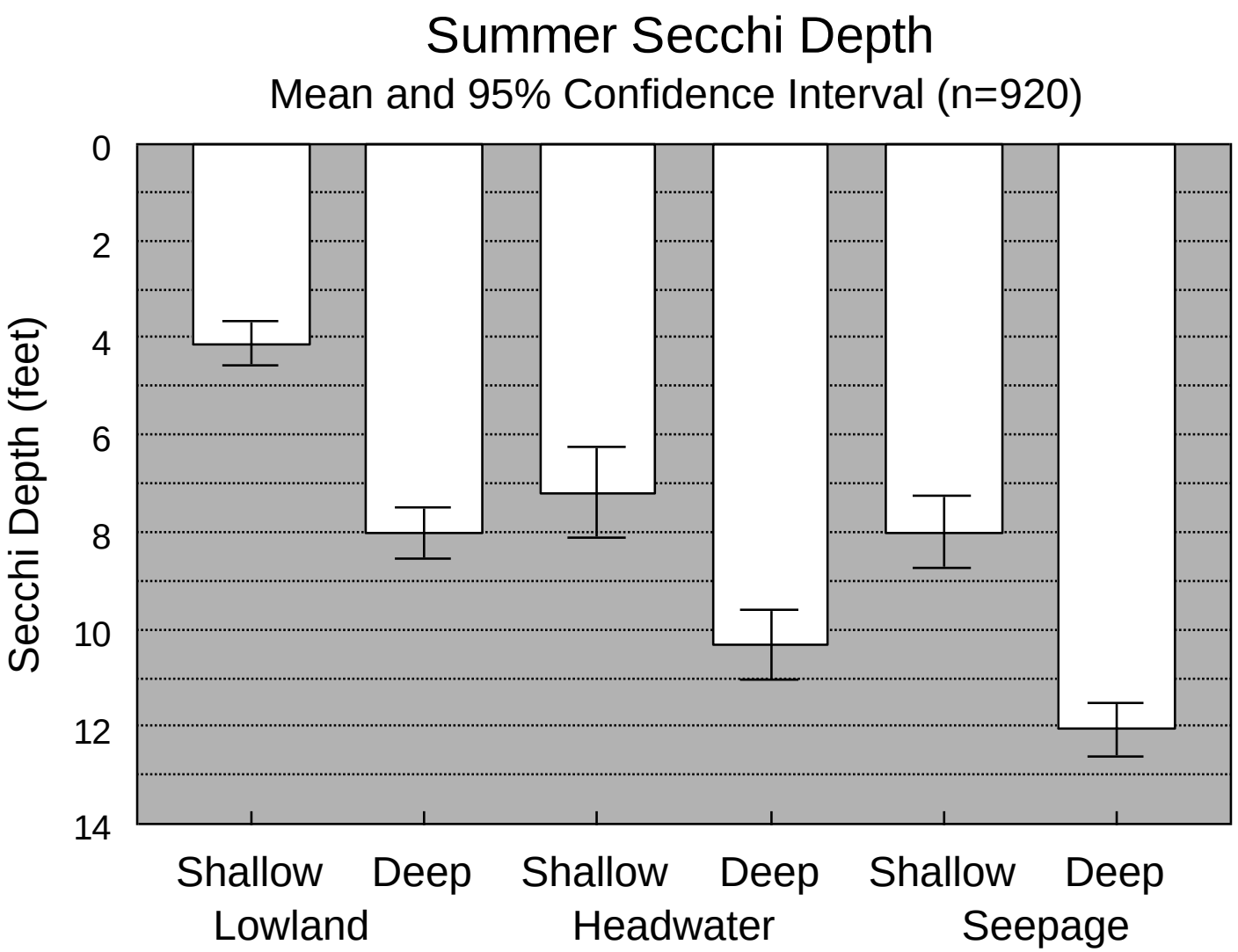
- **Deep Lakes**

  Stratify

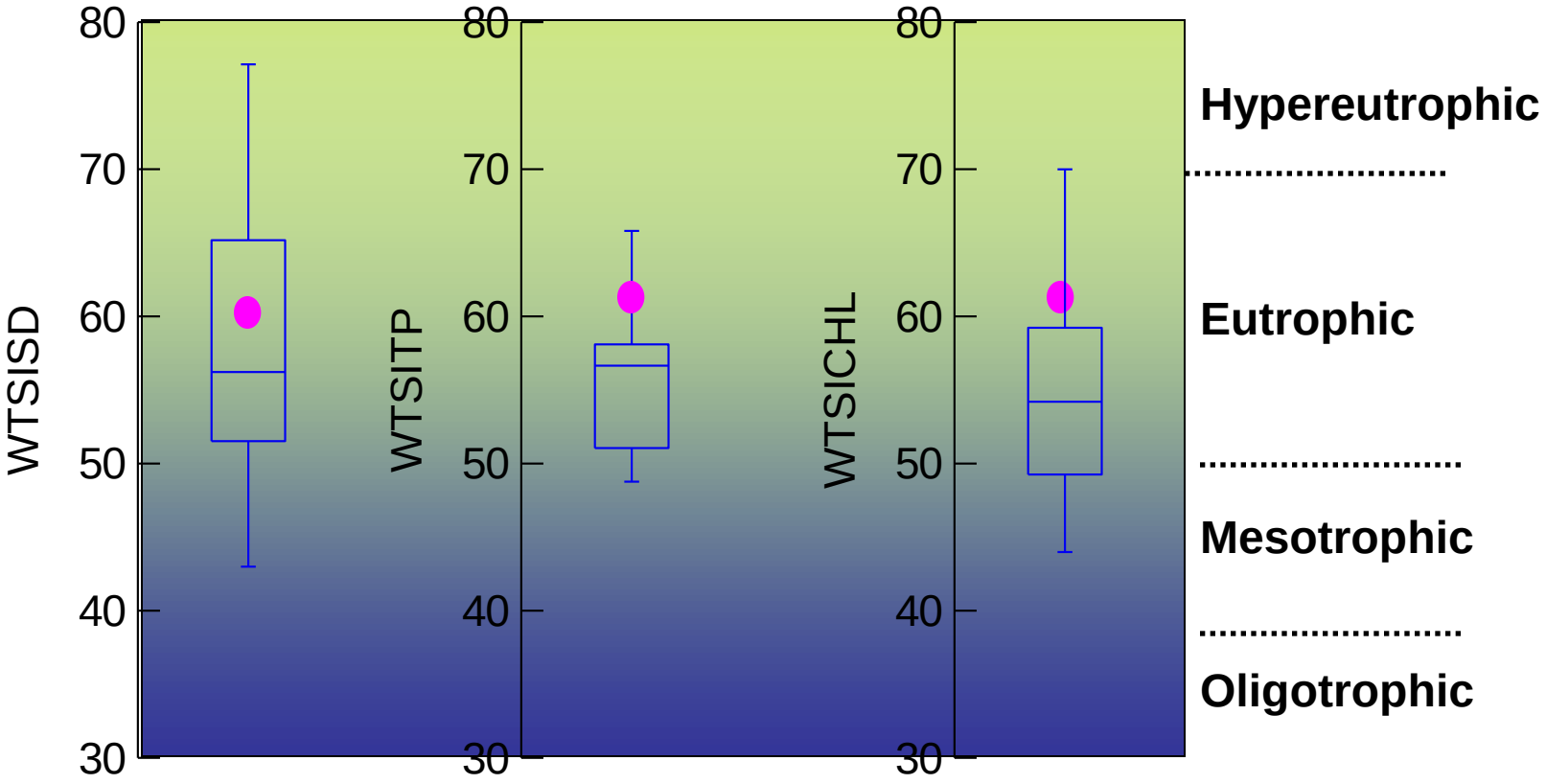
- **Shallow Lakes**

  Continuous Nutrient Recycling




Summer Secchi Depth
Mean and 95% Confidence Interval (n=920)
Secchi Depth (feet)
0
2
4
6
8
10
12
14
Shallow
Deep
Shallow
Deep
Shallow
Deep
Lowland
Headwater
Seepage

Comparative Lake Assessment: Trophic State Indices



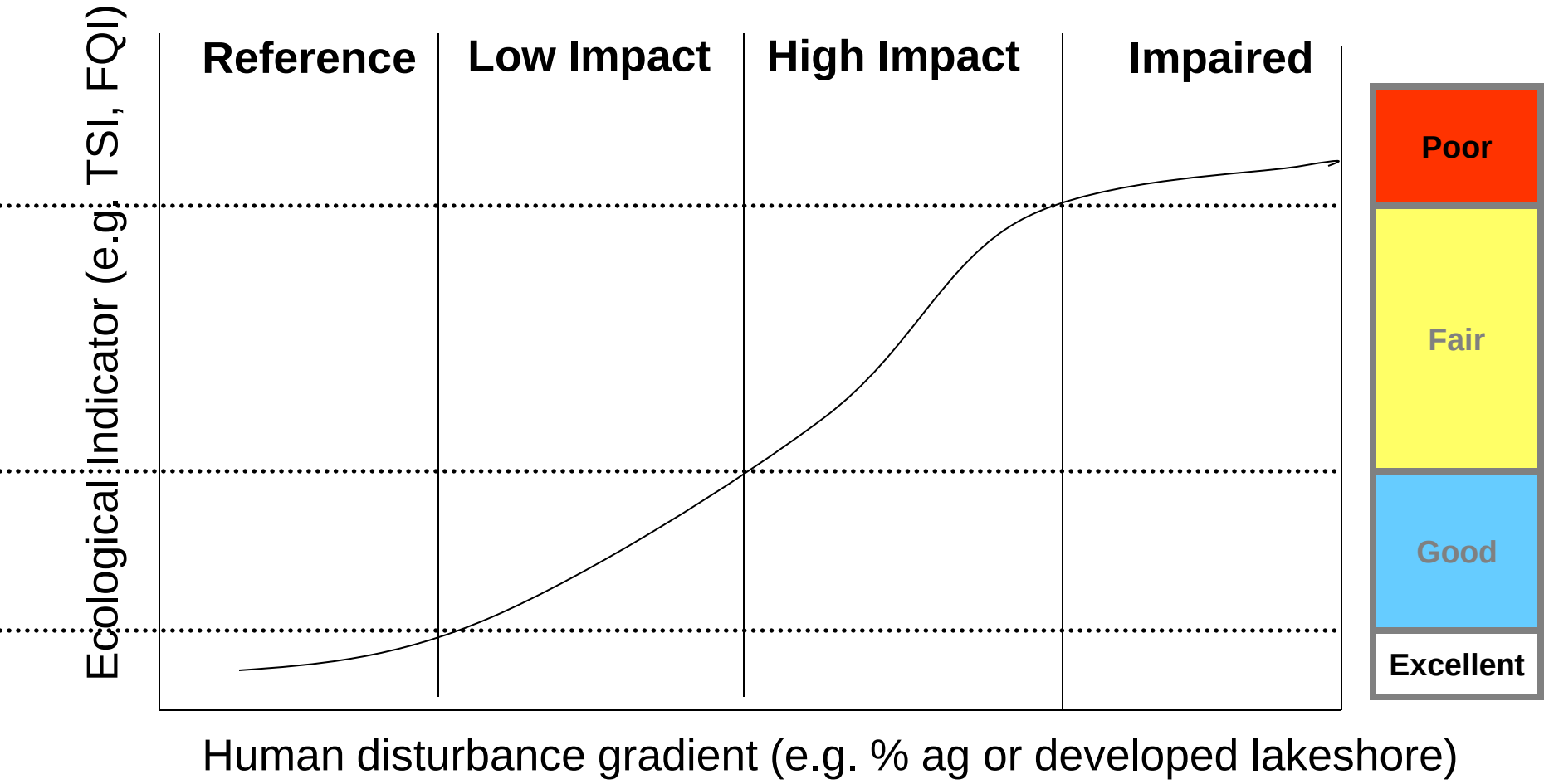
Box plots: Shallow lowland drainage lakes in Southern Wisconsin

● 2003-2005 (mean) Eagle Lake TSI values (summer)

But is that good or bad?

- Some lakes are naturally eutrophic
- Expectations are different for different landscapes and populations, as well as lake types and ecoregions
- Need to compare to standards or thresholds

Setting assessment thresholds



Attainment Status	Condition	Management Strategy Recommendation
Attaining	**Excellent**	• Identify water body as a *candidate* for Outstanding or Exceptional Resource Water (O/ERW) status based upon Tier 1 monitoring. • Review other O/ERW decision factors to determine if any are applicable. • Conduct Tier 2 monitoring to confirm excellent water quality if O/ERW potential is corroborated with other decision factors.
Attaining	**Good**	• Maintain or enhance condition through use of Best Management Practices, lake planning & protection grants, and other similar programs where feasible. • Encourage involvement of property owners and interested parties in volunteer monitoring efforts (i.e., CLMN or WAV program).
Attaining	**Fair**	• Consider for improvement and restoration through the use of lake planning & protection grants, river protection grants, and other similar programs where feasible. • Conduct Tier 2 monitoring to determine to confirm assessment status. • Conduct periodic Tier 1 monitoring to determine if there is a trend of declining water quality. • Encourage involvement of property owners and interested parties in volunteer monitoring efforts (i.e., CLMN or WAV program).
Not Attaining	**Poor**	• Screen for applicability of "modified" use designation through the Use Attainability Analysis (UAA) process. • Include on 303(d) list if UAA does not support a "modified" use designation.

Natural Lake “Communities”

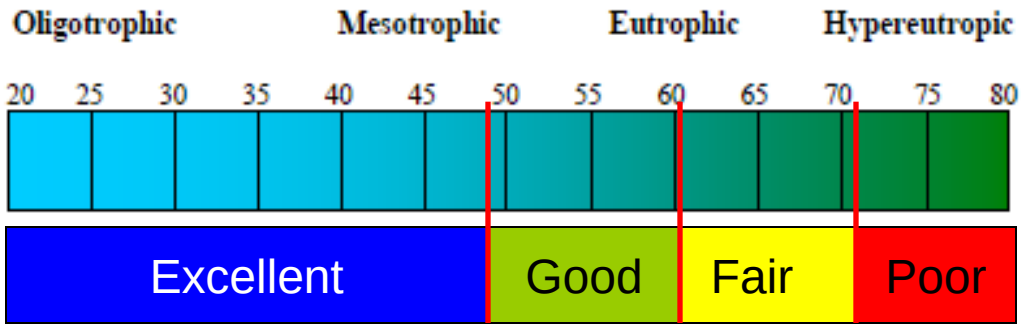
Natural Community	Stratification Status	Hydrology
Lakes less than 10 acres		
Small	Variable	Any Hydrology
Lakes 10 acres or greater		
Shallow Seepage	Mixed	Seepage
Shallow Headwater	Mixed	Headwater Drainage
Shallow Lowland	Mixed	Lowland Drainage
Deep Seepage	Stratified	Seepage
Deep Headwater	Stratified	Headwater Drainage
Deep Lowland	Stratified	Lowland Drainage
Other Classifications (any size)		
Spring Ponds	Variable	Spring Hydrology
Two-Story Lakes	Stratified	Any hydrology
Impounded Flowing Waters	Variable	Headwater or Lowland Drainage

Assessment Methodology

Ex: Shallow, Lowland Drainage Lakes

1. General Condition Assessment

Trophic State Index (Secchi, Satellite Chl a)



Excellent/Good Thresholds – Sediment Cores

Fair/Poor Threshold:

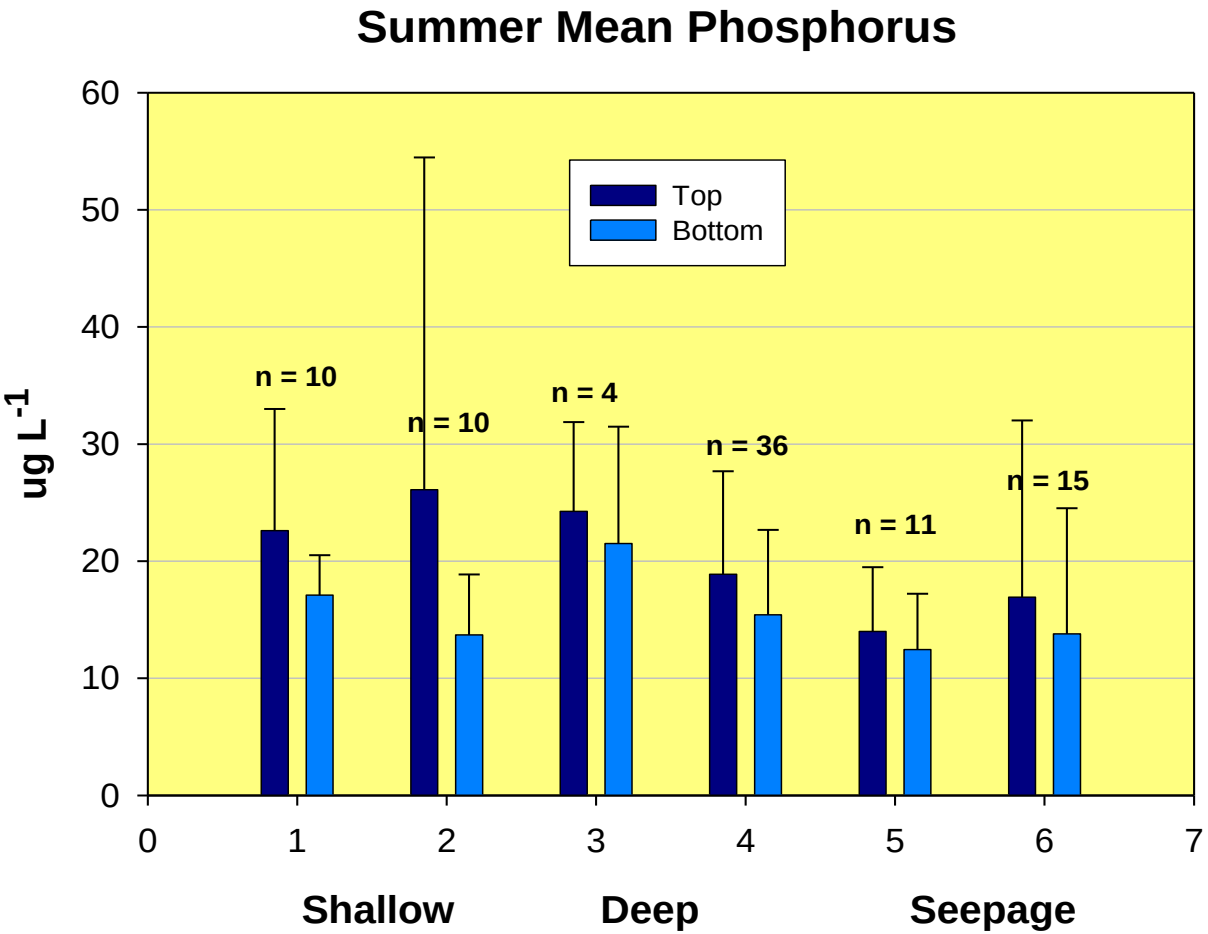
Deep Lakes: Excessive algal growth (hypereutrophic)

Shallow Lakes: Flip from plant dominated to algal dominated

Paleolimnology

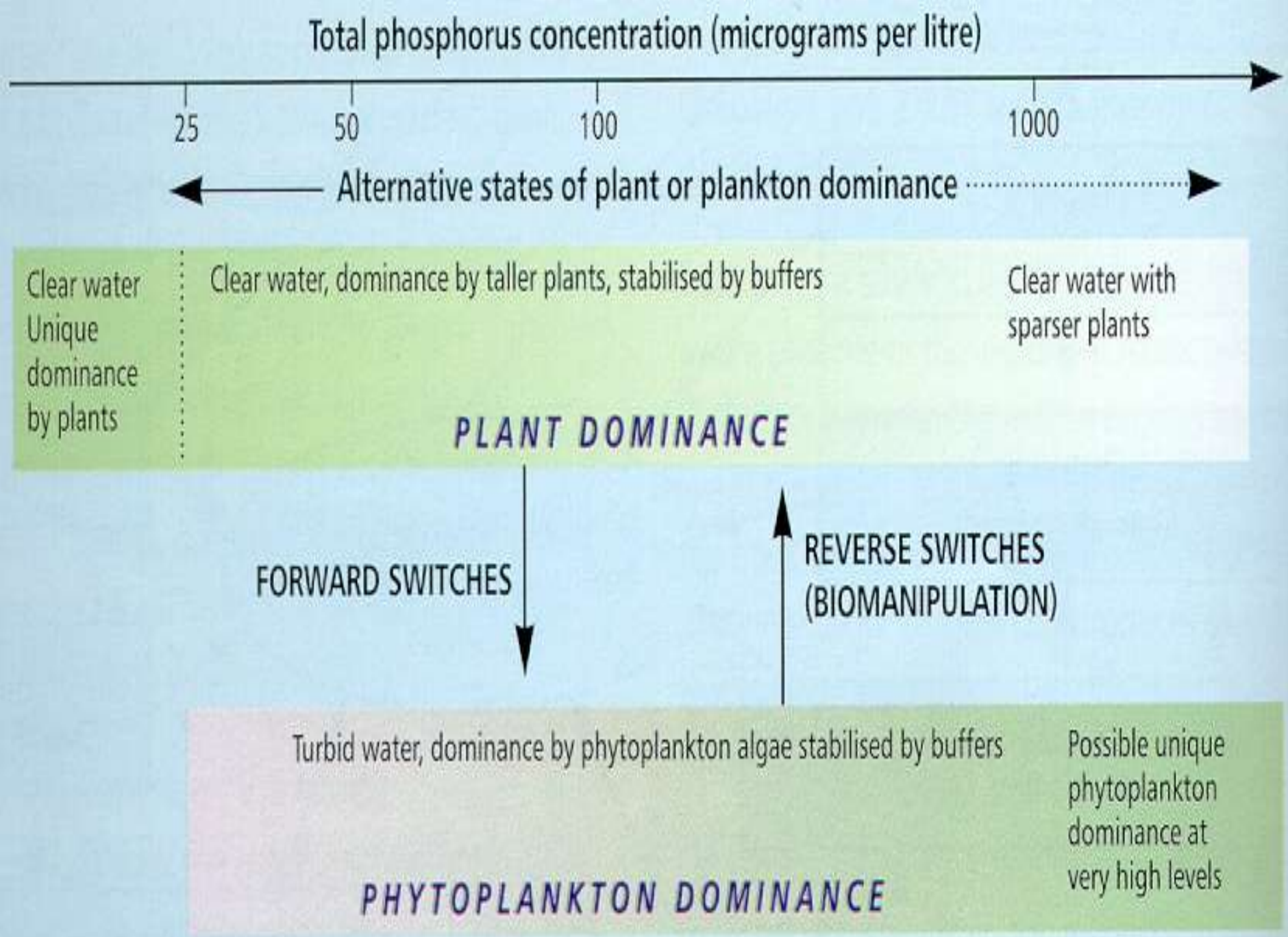
- Indicator of some previous ecological state
- Pre-settlement
- Undeveloped lakes
- Minimally impacted lakes
- Top/bottom (Tier 1) or full core (Tier II)

Phosphorus trends using lake bottom sediment core data

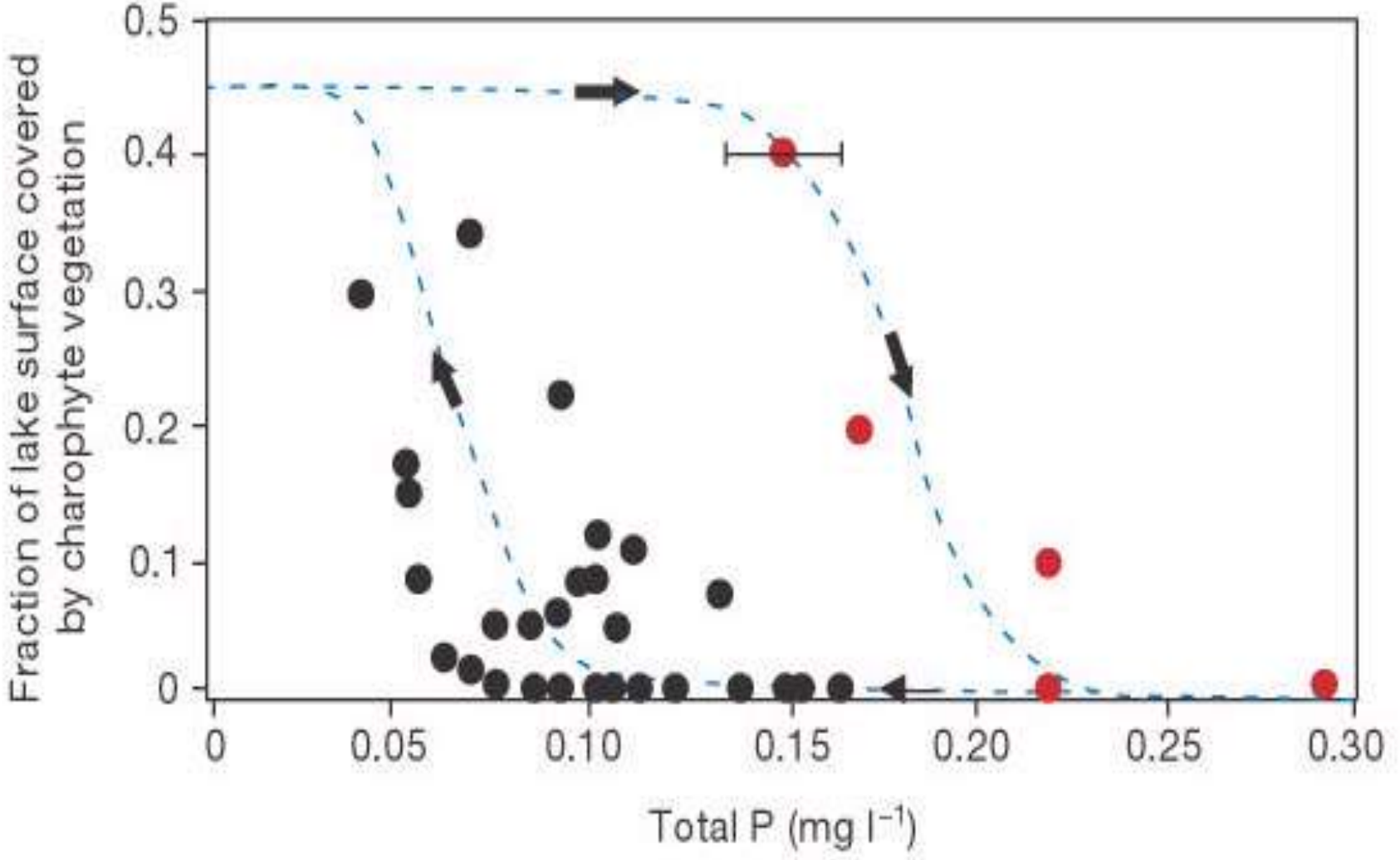


akes

Source: Paul Garrison



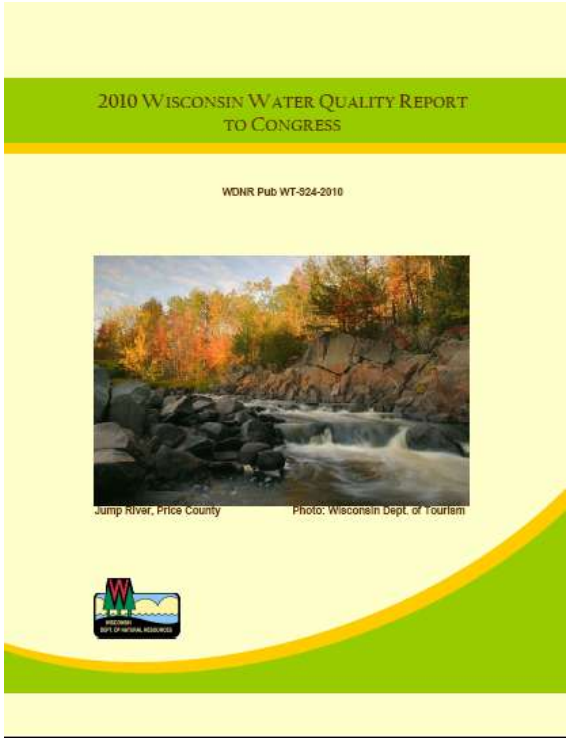
Taken from (Moss et al.



Hysteresis in the response of charophyte vegetation in the shallow Lake Veluwe to increase and subsequent decrease of the phosphorus concentration. Red dots represent years of the forward switch in the late 1960s and early 1970s. Black dots show the effect of gradual reduction of the nutrient loading leading eventually to the backward switch in the 1990s.

Current TSI Thresholds By Natural Lake Community

Condition Level	Shallow			Deep			
	Headwater	**Lowland**	**Seepage**	**Headwater**	**Lowland**	**Seepage**	**Two-Story**
Excellent	< 45	< 49	< 39	< 47	< 46	< 44	< 44
Good	45 – 57	49 – 59	39 – 54	47 – 54	46 – 53	44 – 52	44 – 47
Fair	58 – 70	60 – 70	55 – 70	55 – 62	54 – 62	53 – 62	48 – 52
Poor	≥ 71	≥ 71	≥ 71	≥ 63	≥ 63	≥ 63	≥ 53



How are Wisconsin lakes doing?

Figure 16. Trophic State of Assessed Wisconsin Lakes, 2010

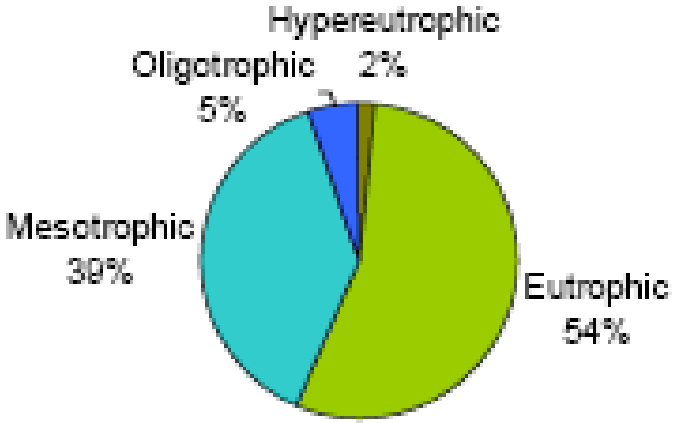


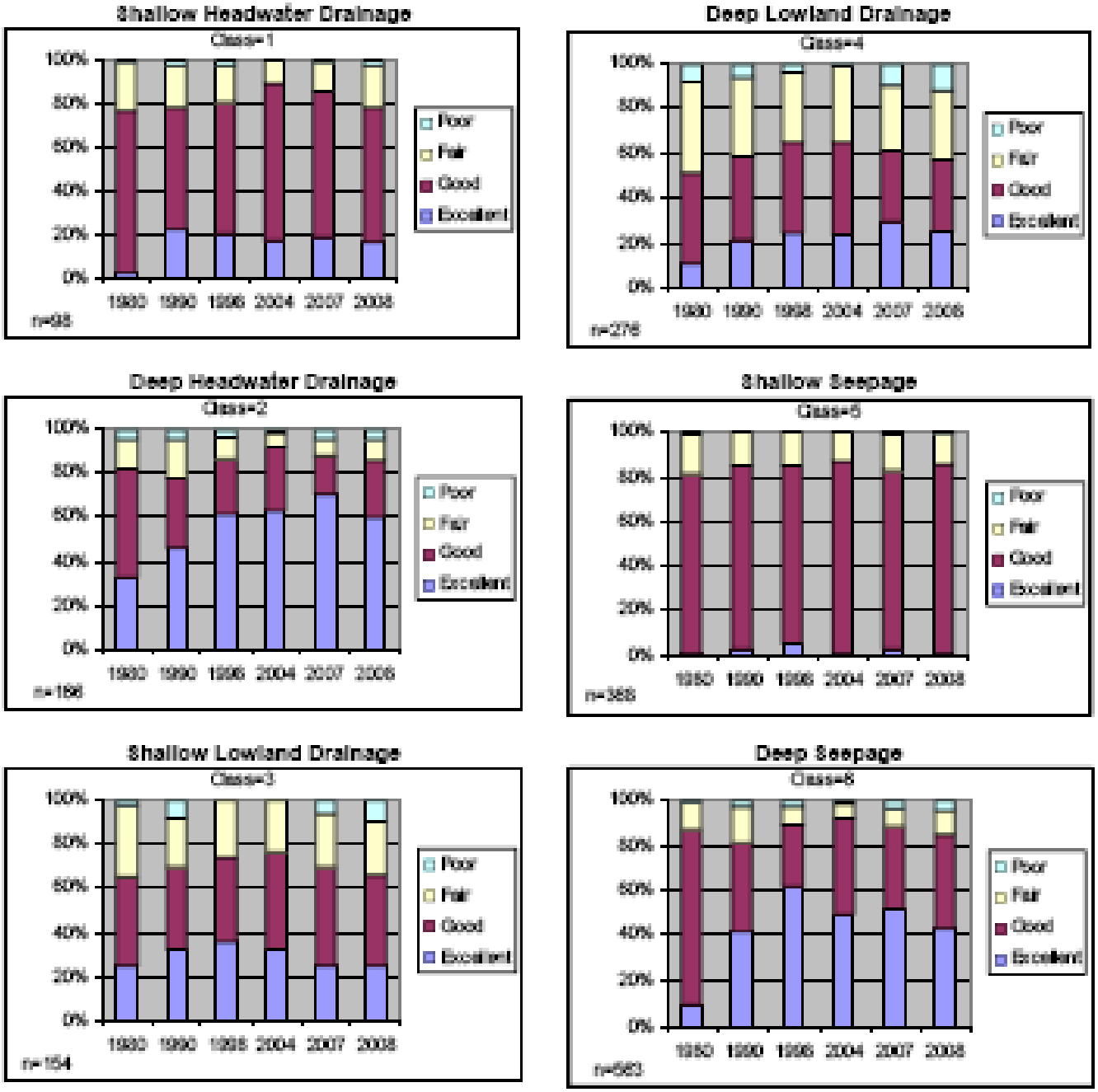
Table 37. Summary of General Condition of TSI Assessed Lakes, 2010

All Lakes Assessed by 2010 TSI Methodology	Number Lakes	Percent (# Lakes)	Lake Acres	Percent (# Acres)
Excellent	604	14%	129,769	19%
Good	1762	41%	231,677	33%
Fair	680	16%	264,128	38%
Poor	127	3%	35,825	5%
No Condition Rating*	1074	25%	32,360	5%
Total TSI Assessed Lakes	**4247**	**100%**	**693,778.57**	**100%**

**Either no natural community assigned or small lake*

http://dnr.wi.gov/org/water/condition/2010_IR/

Figure 21. Changes in lake clarity by lake classification, based on satellite data from 1980-2008

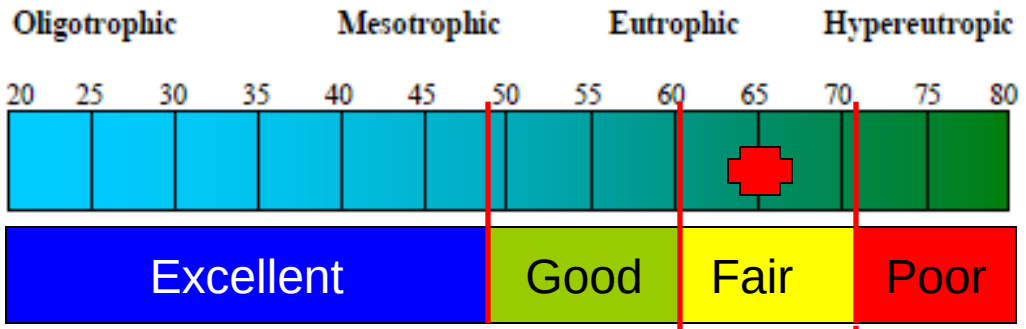


Assessment Methodology

Ex: Shallow, Lowland Drainage Lakes

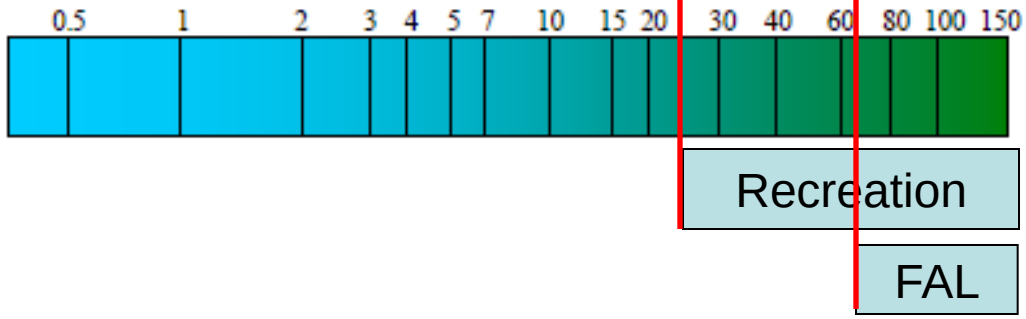
1. General Condition Assessment

Trophic State Index (Secchi, Satellite Chl a)



2. Impairment Assessment

Chl a (Impairment – Eutroph.)



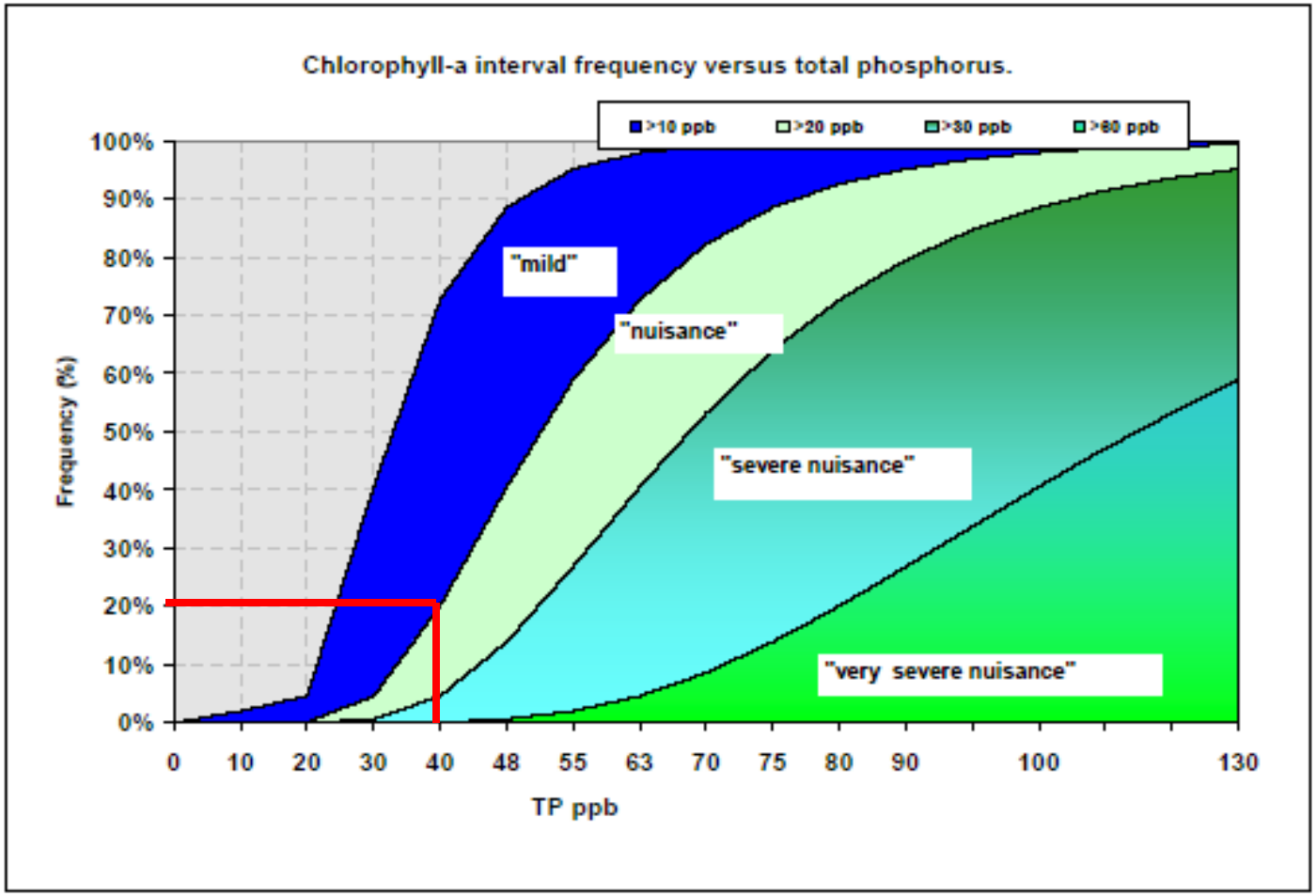
Tier II Monitoring

- Chlorophyll a and Total P (if not collected)
- Dissolved oxygen profiles
- Paleo core
- Plankton identification
- Documentation of algae blooms, toxins

What data do we use to determine whether thresholds are exceeded?

	TP	Chl a
Years	Last 5 yrs (10 yrs shown for context)	
Stations	Deep hole stations (additional stations may be specified)	
Season	June 1-Sep 15	July 15-Sep 15
Timing	1 sample/mo., separated by 15 days	
Frequency	3 samples for each of 2 yrs	2 samples for each of 3 yrs
Exceedance → Flag	2 yrs exceed (or majority of yrs)	3 yrs exceed

Setting Impairment Thresholds



Chapter NR 102 – P Criteria

- Rivers – 100 ug/l (46 listed)
- Streams – 75 ug/l
- Lakes and Reservoirs – 15 – 40 ug/l
- Lake Michigan – 7 ug/l
- Lake Superior – 5 ug/l
- No ephemeral streams, wetlands, LAL waters

Specific Lake Criteria

- 2-story lakes – 15 ug/l
- Stratified drainage lakes – 30 ug/l
- Stratified seepage lakes – 20 ug/l
- Non-stratified lakes – 40 ug/l
- Stratified reservoirs – 30 ug/l
- Non-stratified reservoirs – 40 ug/l

Basis for Lake Criteria

- Minimize risk of nuisance algal blooms –
  - 5% chance of 20 ug/l chl. *a* bloom
  - 1% chance of 30 ug/l chl. *a* bloom
- Protect sport fisheries
- Prevent shift in shallow lakes from macrophytes to algal domination
- Maintain dissolved oxygen in hypolimnion of 2-story lakes
- Protect and provide margin of safety for deep seepage lakes

FAL and Recreation Thresholds

	Shallow			Deep			
	Headwater Drainage	**Lowland Drainage**	**Seepage**	**Headwater Drainage**	**Lowland Drainage**	**Seepage**	**Two Story Fishery**
TOTAL PHOSPHORUS							
REC	≥ 40 ug/l	≥ 40 ug/l	≥ 40 ug/l	≥ 30 ug/l	≥ 30 ug/l	≥ 20 ug/l	≥ 15 ug/l
FAL	≥ 100 ug/l	≥ 100 ug/l	≥ 100 ug/l	≥ 60 ug/l	≥ 60 ug/l	≥ 60 ug/l	≥ 15 ug/l
CHLOROPHYLL A							
REC*	≥ 25 ug/l	≥ 25 ug/l	≥ 17 ug/l	≥ 14 ug/l	≥ 12 ug/l	≥ 10 ug/l	≥ 6 ug/l
FAL	≥ 60 ug/l	≥ 60 ug/l	≥ 60 ug/l	≥ 27 ug/l	≥ 27 ug/l	≥ 27 ug/l	≥ 10 ug/l

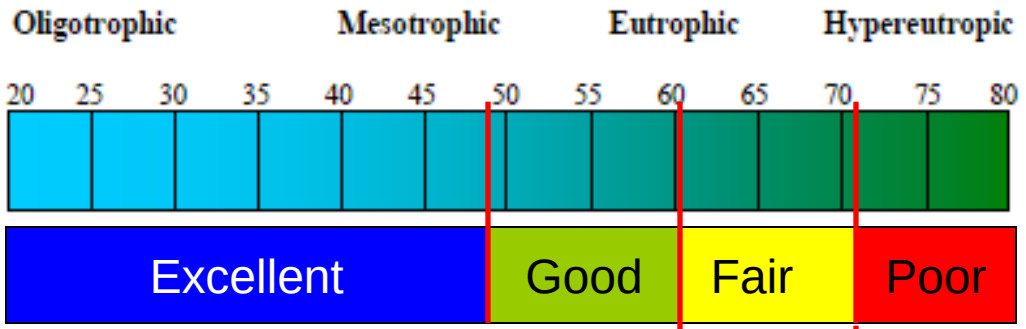
*Chl a Recreation Thresholds should only be used as loose guidance.

Assessment Methodology

Ex: Shallow, Lowland Drainage Lakes

1. General Condition Assessment

Trophic State Index (Secchi, Satellite Chl a)



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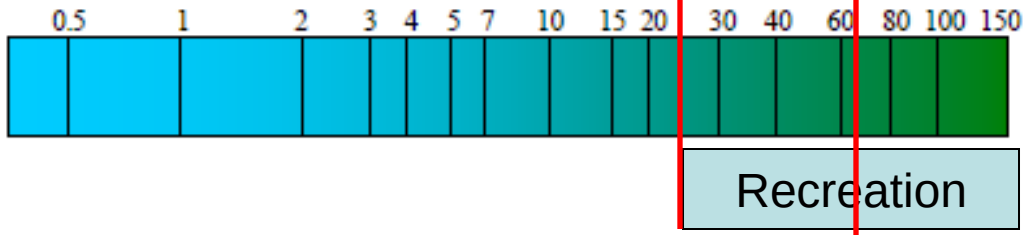
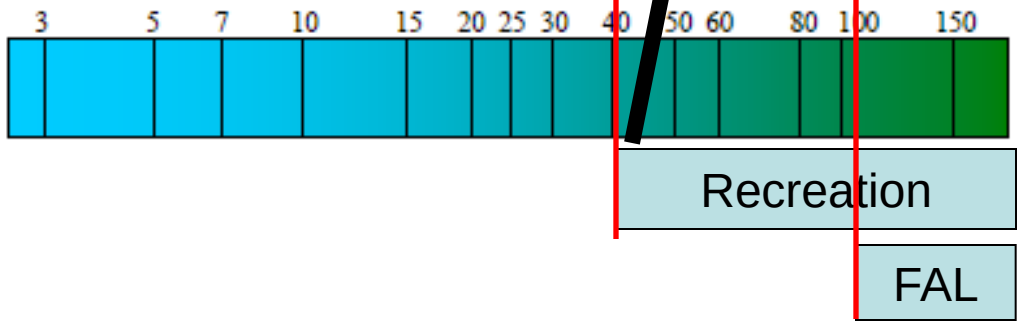
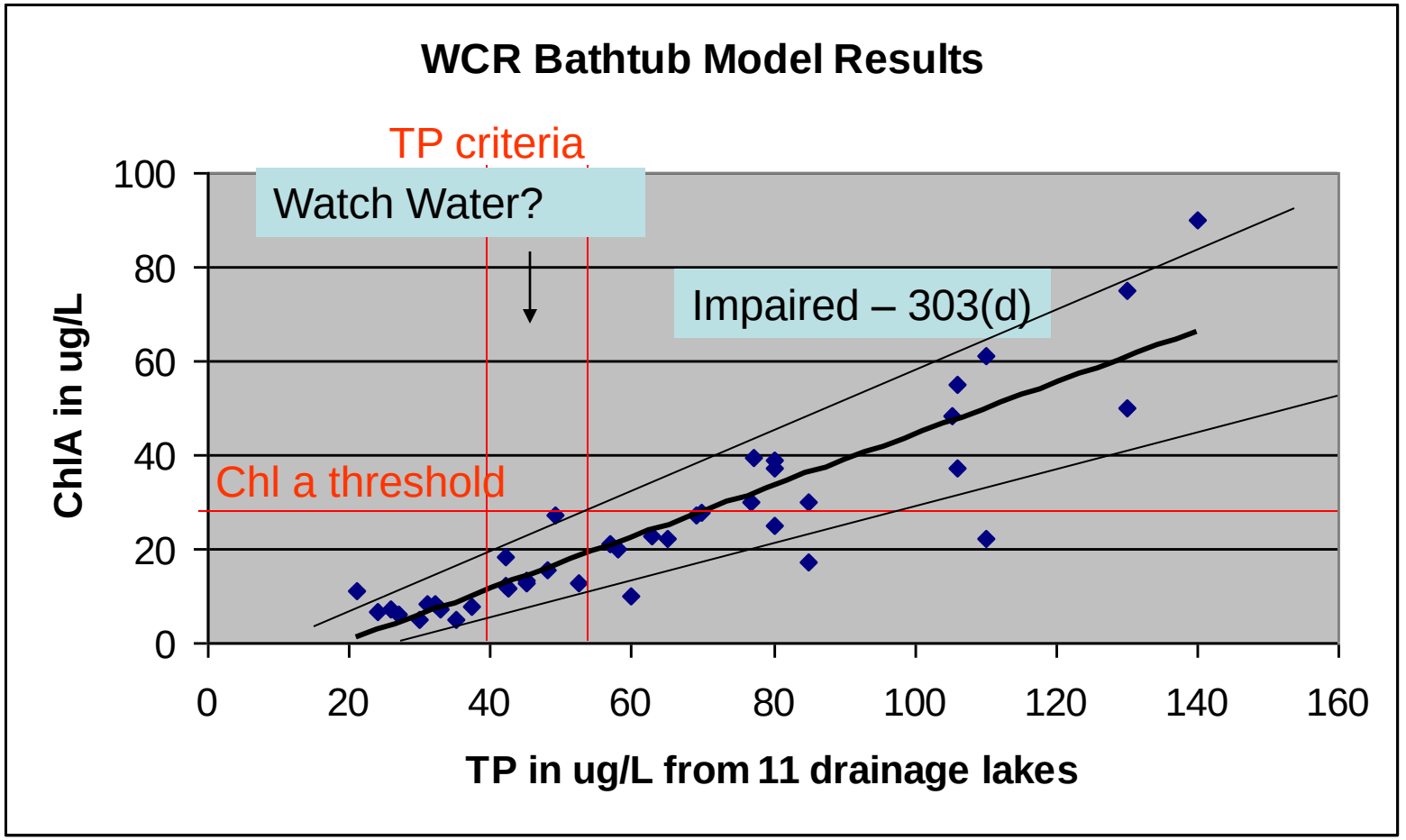
Chl a (Impairment – Eutroph.)



TP Criteria

Total Phosphorus ug/l (Pollutant)




WCR Bathtub Model Results
TP criteria
Watch Water?
Impaired – 303(d)
Chl a threshold
ChlA in ug/L
TP in ug/L from 11 drainage lakes
0
20
40
60
80
100
120
140
160

Aquatic Plants

- Species lists, Floristic Quality Index (FQI)
- Transect methods – targeted, site specific
- Point-intercept surveys – lakewide, systematic – species information, as well as structural information

Recommended Baseline Monitoring of Aquatic Plants in Wisconsin:

Sampling Design, Field and Laboratory Procedures, Data Entry and Analysis, and Applications

Jennifer Hauxwell, Susan Knight, Kelly Wagner, Alison Mikulyuk, Michelle Nault, Meghan Porzky and Shaunna Chase

March 2010

Document citation:
Hauxwell, J., S. Knight, K. Wagner, A. Mikulyuk, M. Nault, M. Porzky and S. Chase. 2010. Recommended baseline monitoring of aquatic plants in Wisconsin: sampling design, field and laboratory procedures, data entry and analysis, and applications. Wisconsin Department of Natural Resources Bureau of Science Services, PUB-SS-1068 2010. Madison, Wisconsin, USA.

Protocol available at:

http://wiatri.net/ecoatlas/ReportFiles/Reports2/1757AquaticPlantReport.pdf

http://www.uwsp.edu/cnr/uwexlakes/ecology/APM/Appendix-B.pdf

Baseline sampling of aquatic plants

Goals and Applications

1) In-lake ecology and management

-Snapshot of one lake today…
and over time

-Summary statistics on plant community
(Species list, frequency, max depth)
-Species Distributions (Geographic info)
-General ecological questions
(species-depth relationship, change in maximum depth from year to year)
-Assess major management actions

2) Regional and state-wide ecology and management

-Comparisons among many lakes today…
and over time
-Provides *CONTEXT* for assessing individual lakes

-Relationship between plant communities and:
Lake type and region
Land use (watershed and lakeshore)
Invasive species introductions
Climate
-General ecological questions
(species-depth relationship - how does occurrence of various species relate to depth and vary with water clarity statewide?)

Data Collection

- Point-intercept method (Hauxwell *et al*., 2010)
- Species list and distributions for each lake
- Density rating for each species (1,2,3)

Fullness Rating	Coverage	Description
1		Only few plants. There are not enough plants to entirely cover the length of the rake head in a single layer.
2		There are enough plants to cover the length of the rake head in a single layer, but not enough to fully cover the tines.
3		The rake is completely covered and tines are not visible.

In-lake examples:

Summary statistics

Enterprise Lake, Langlade County

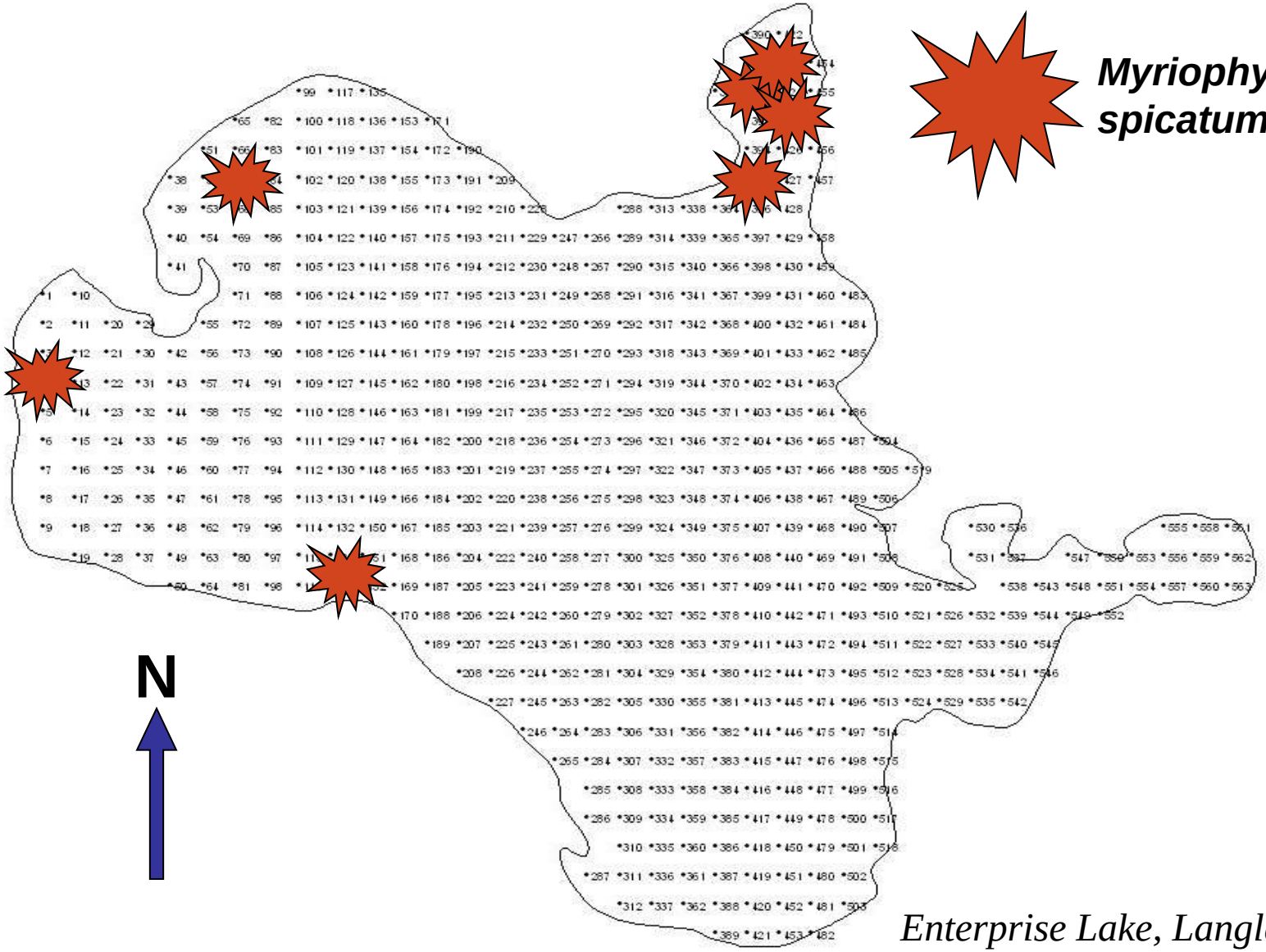
Size - 200 ha; Max depth - 8.2 m

Summary Statistics	
Total lake points	**563**
Number of points with plants	**178**
Maximum depth of plants (m)	**4.1**
Littoral area (% of lake)	**32**
Mean # species/point	**1.7**
Species Richness	**27**
Simpson's Diversity Index	**0.87**

Species	Frequency of occurrence (%)	Species	Frequency of occurrence (%)
E. canadensis	48.1	*M. tenellum*	1.9
Nitella spp.	26.4	*Chara* spp.	1.9
V. americana	14.3	*Isoetes* spp.	1.9
C. demersum	12.0	*P. amplifolius*	1.6
N. flexilus	11.6	*M. beckii*	1.6
P. pusillus	11.2	*E. acicularis*	1.2
N. gracillima	8.1	*N. odorata*	1.2
P. richardsonii	4.7	*P. strictifolius*	1.2
S. fluctuans	4.7	*E. palustris*	0.8
P. robbinsii	3.9	*M. heterophyllum*	0.8
U. purpurea	3.9	*N. variegata*	0.4
M. spicatum	3.5	*P. crispus*	0.4
P. spirillus	3.1		
B. schreberi	2.3		

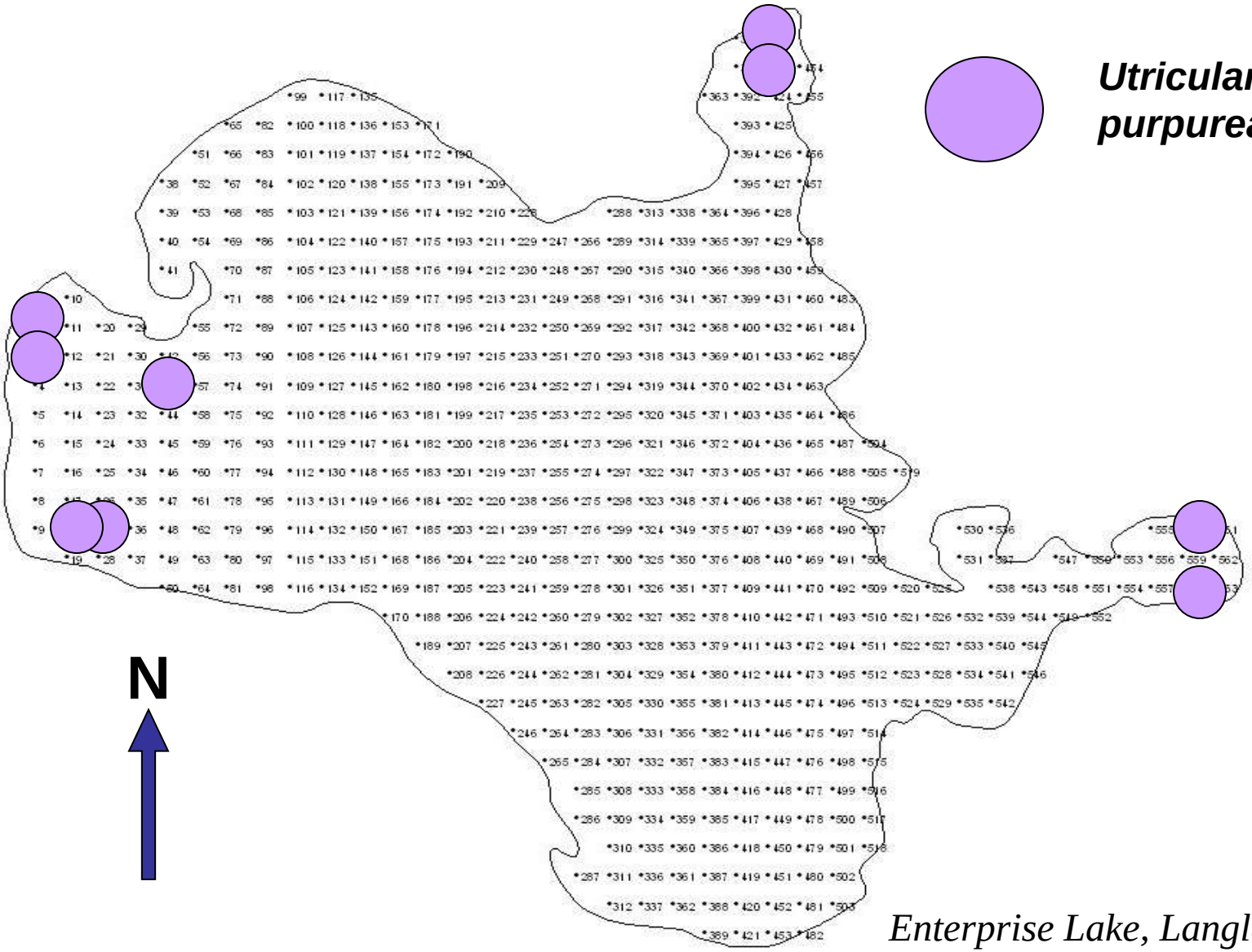
Enterprise Lake, Langlade Co.

Distribution of Eurasian Watermilfoil



Enterprise Lake, Langlade Cty.

Species of Special Concern

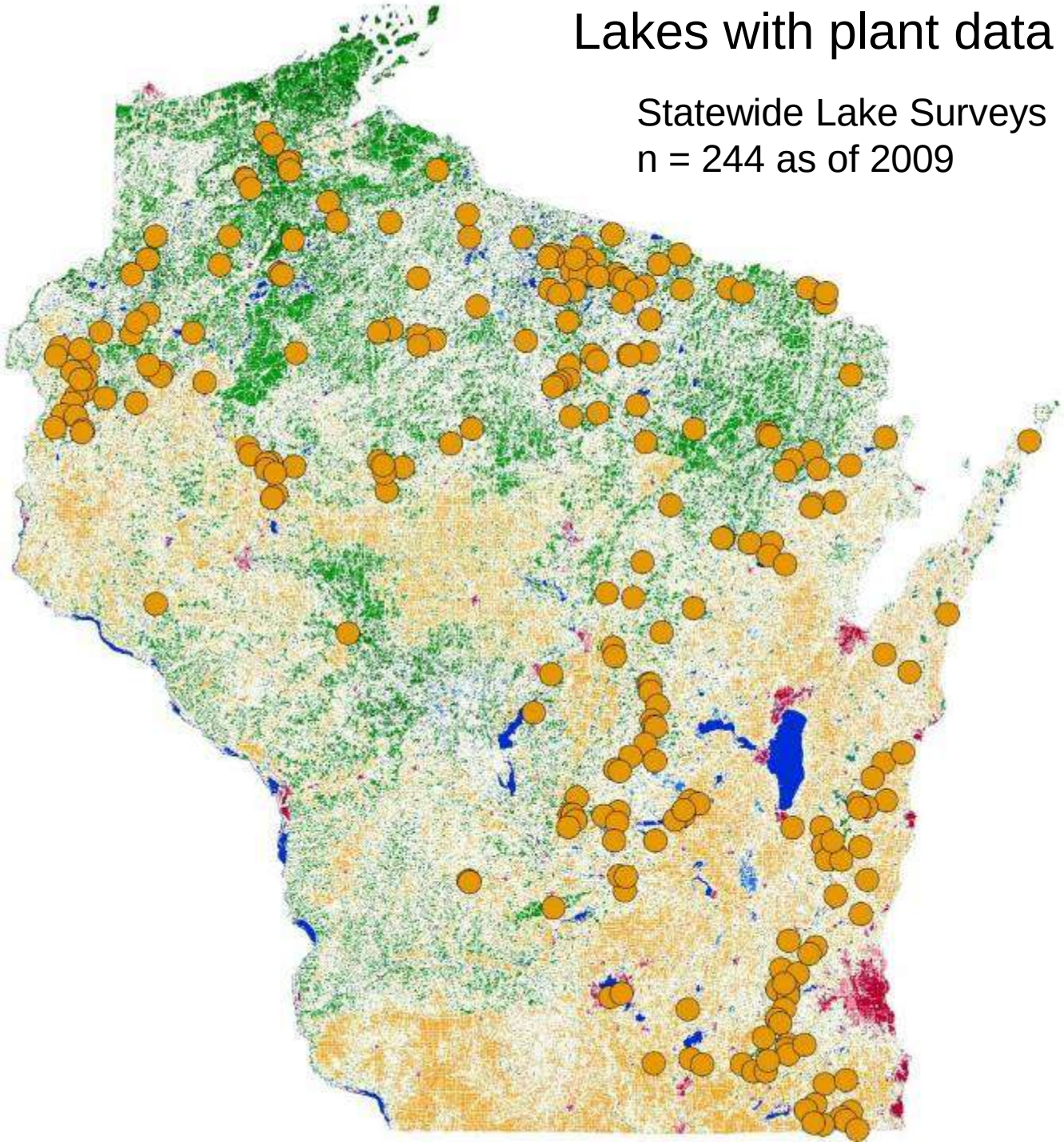


Utricularia purpurea

Enterprise Lake, Langlade Cty.

Lakes with plant data

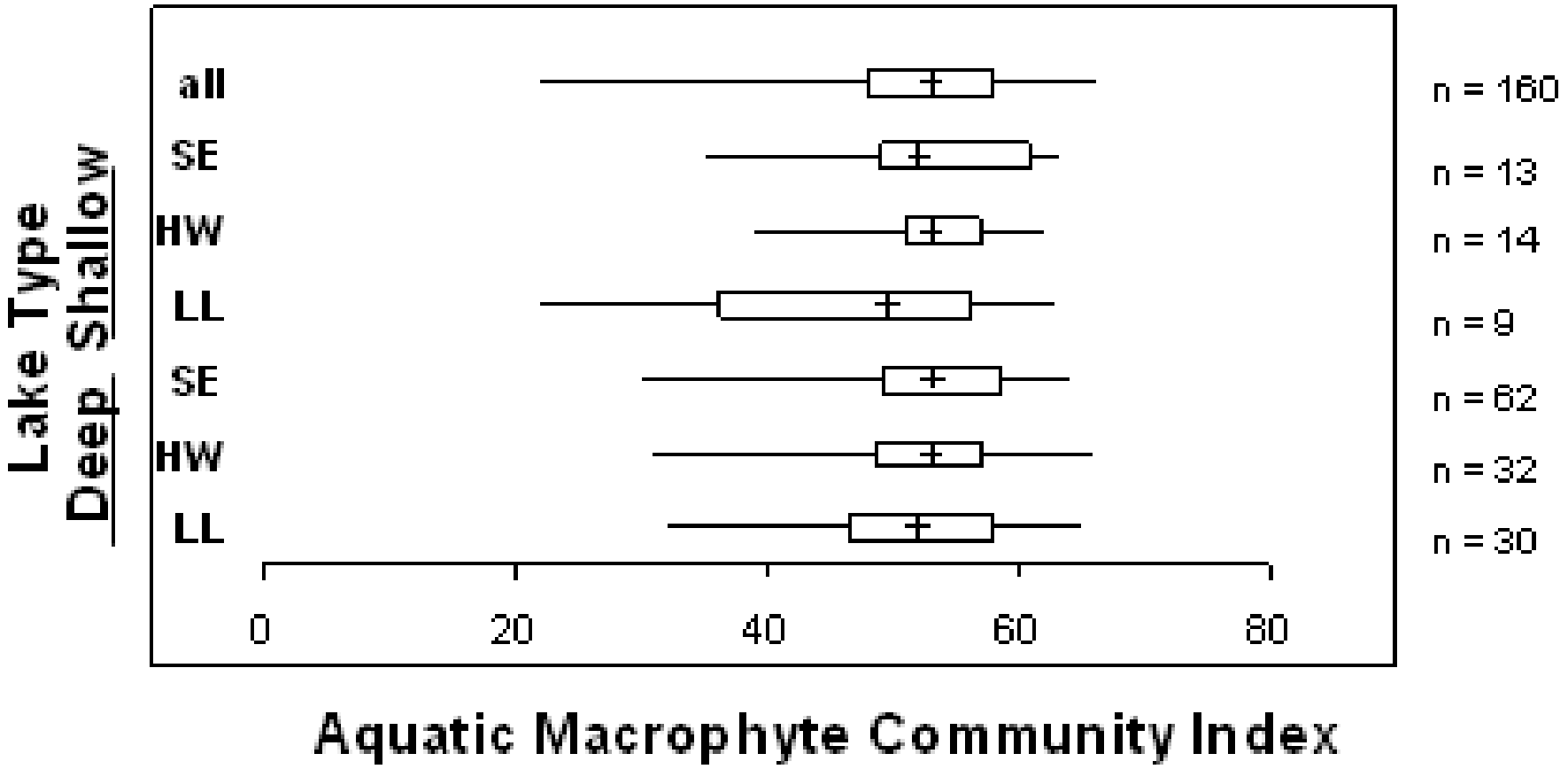
Statewide Lake Surveys
n = 244 as of 2009



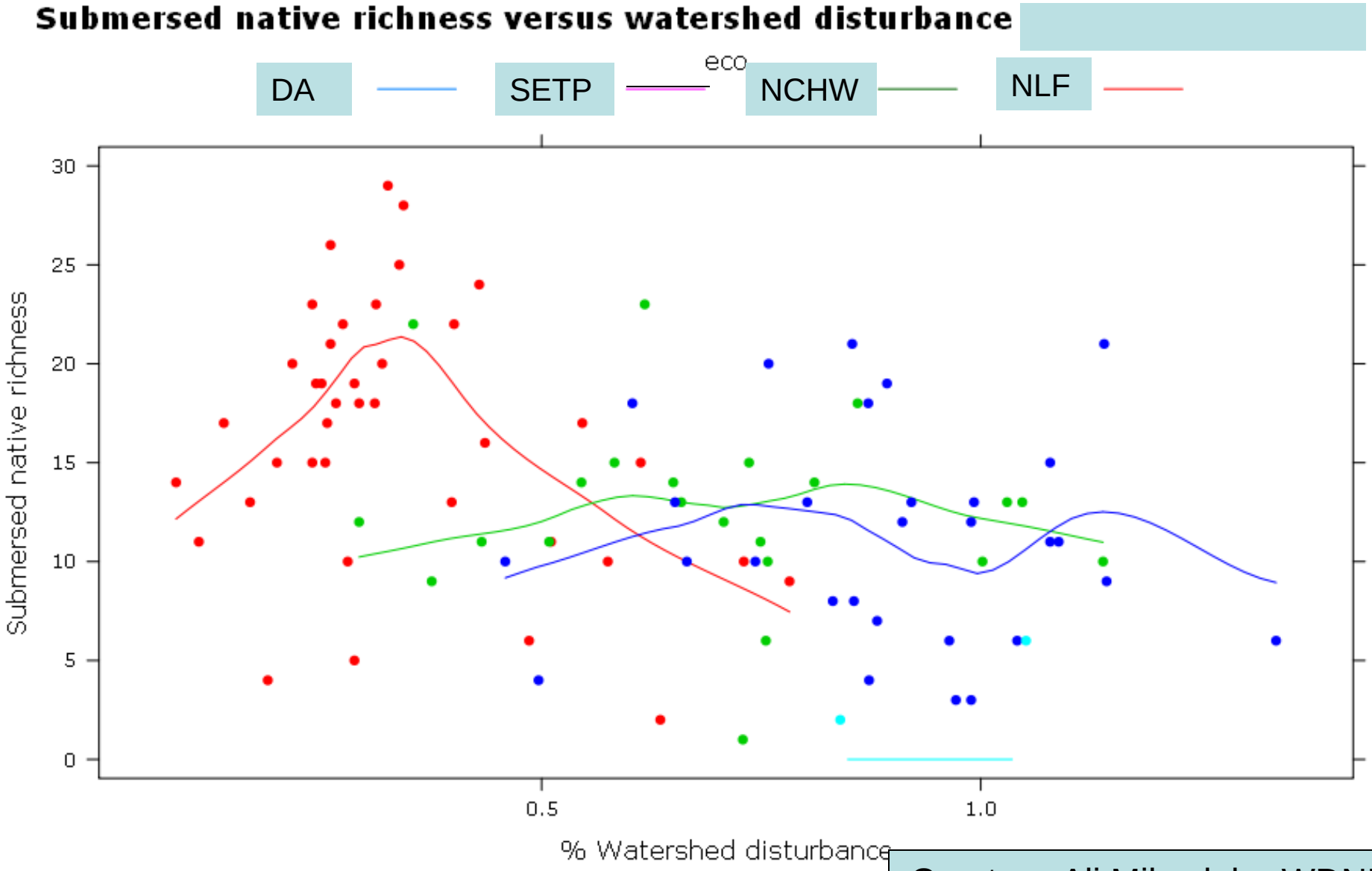
Aquatic Macrophyte Community Index (AMCI) (Nichols 2000)

- A measure of aquatic plant community health combining:
  - maximum depth of plant growth
  - area coverage of plants
  - species richness and diversity
  - relative area covered by
    - submersed plant species
    - sensitive plant species
    - exotic plant species

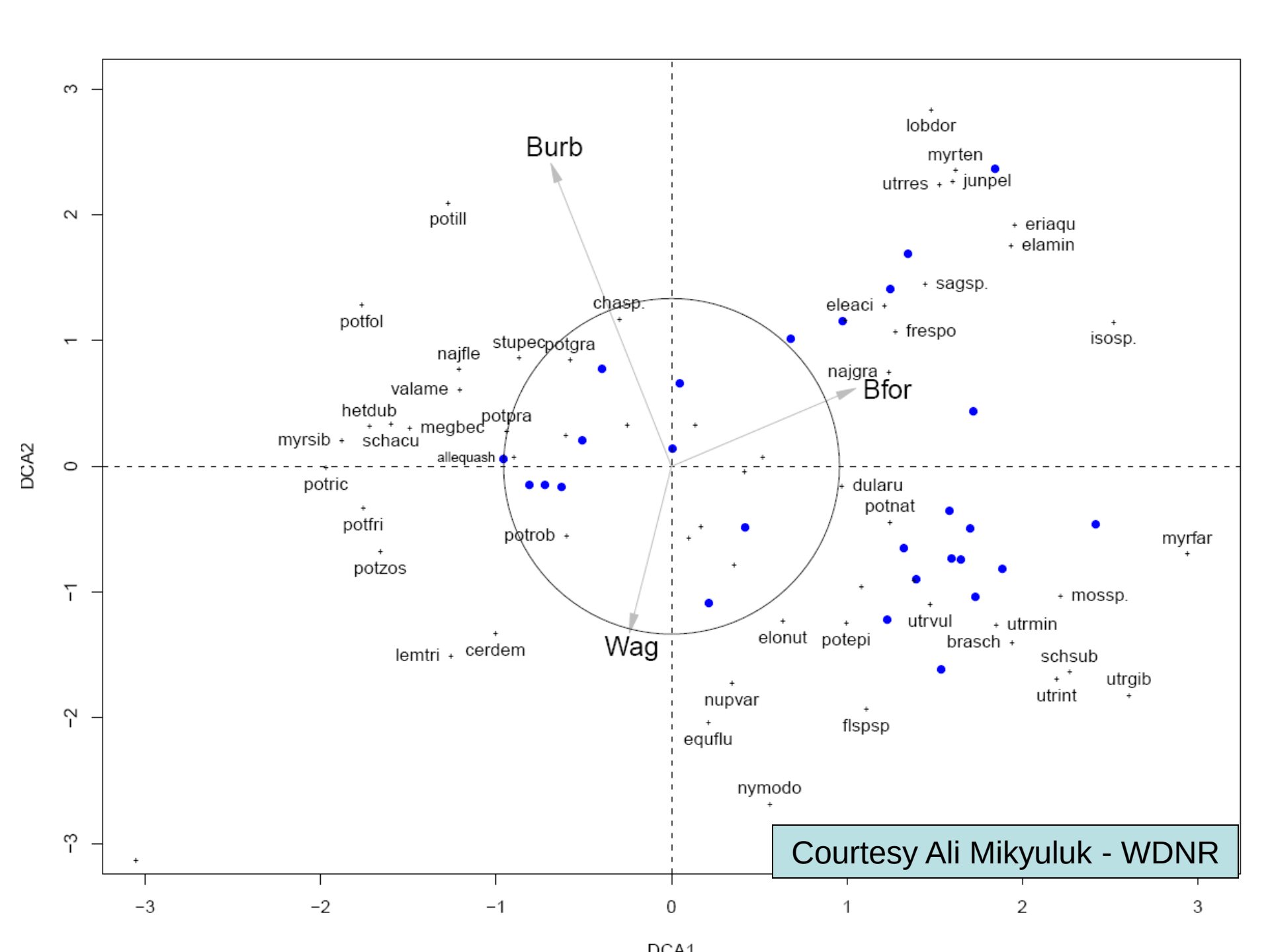
Aquatic Macrophyte Community Index (AMCI)

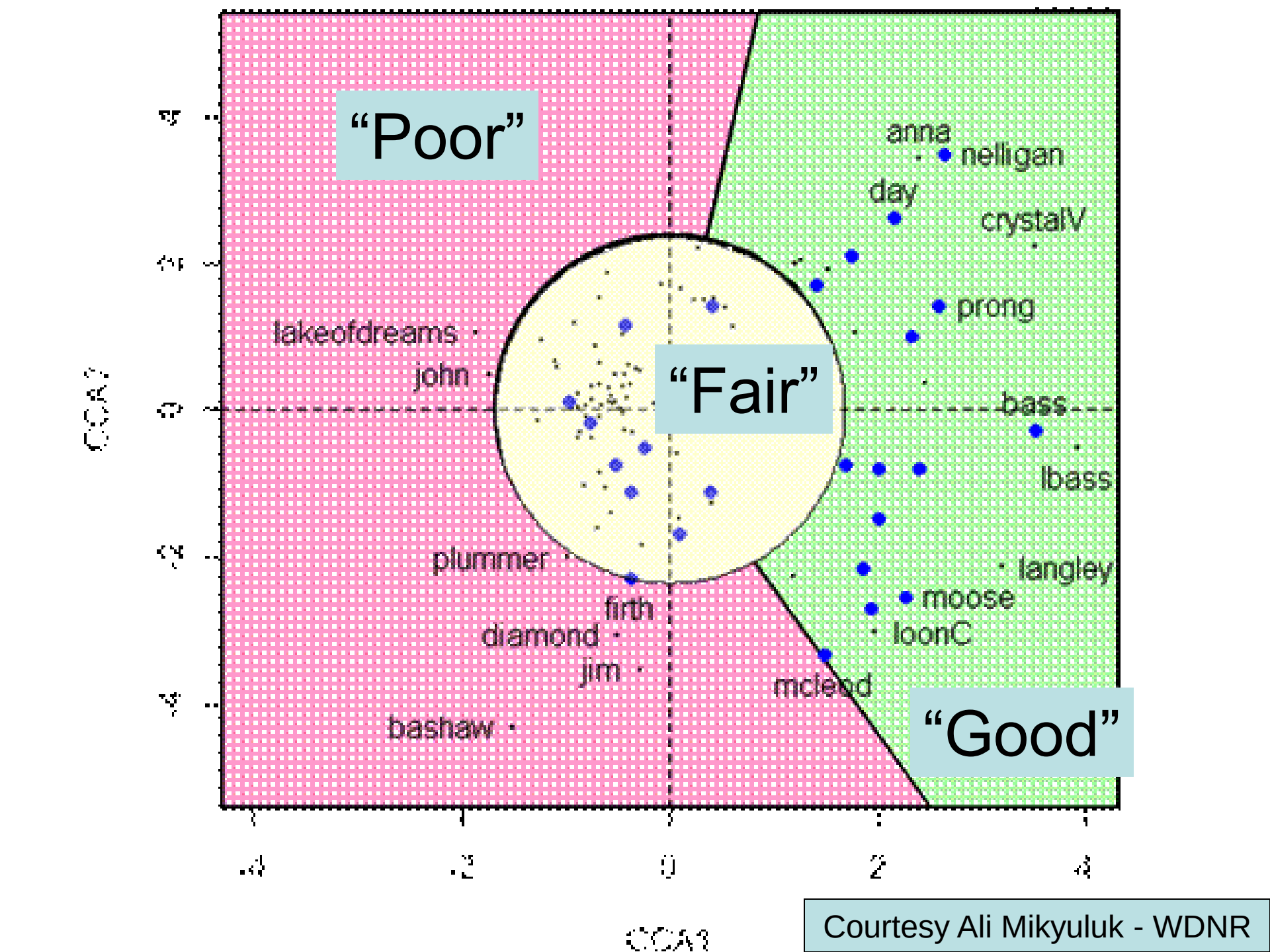


Plants are a bit more complicated



Courtesy Ali Mikyuluk - WDNR


Burb
Bfor
Wag
lobdor
myrten
utrres
junpel
potill
eriaqu
elamin
sagsp.
chasp.
eleaci
potfol
frespo
isosp.
najfle
stupec
potgra
najgra
valame
hetdub
potpra
megbec
myrsib
schacu
allequash
potric
dularu
potnat
potfri
potrob
myrfar
potzos
mossp.
utrvul
utrmin
elonut
potepi
brasch
schsub
lemtri
cerdem
utrgib
utrint
nupvar
flspsp
equflu
nymodo
DCA2
DCA1
−3
−2
−1
0
1
2
3
Courtesy Ali Mikyuluk - WDNR

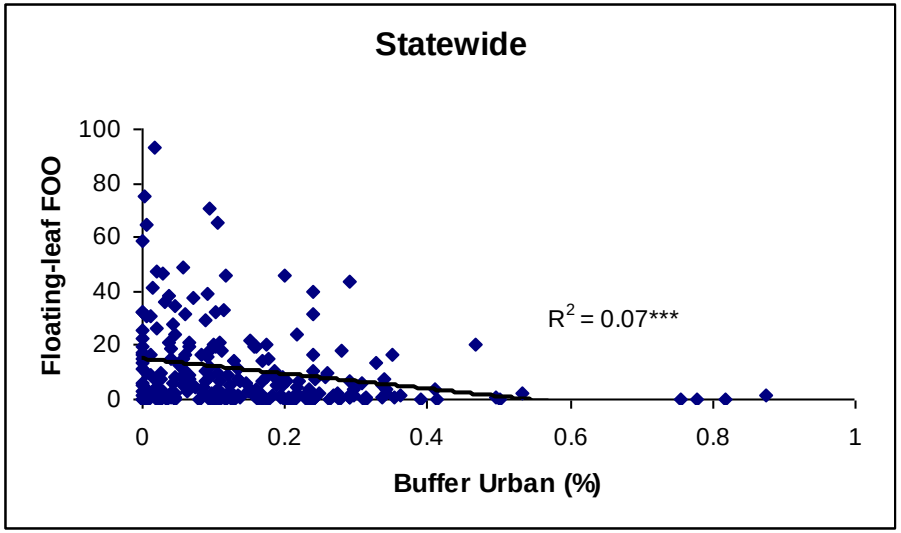


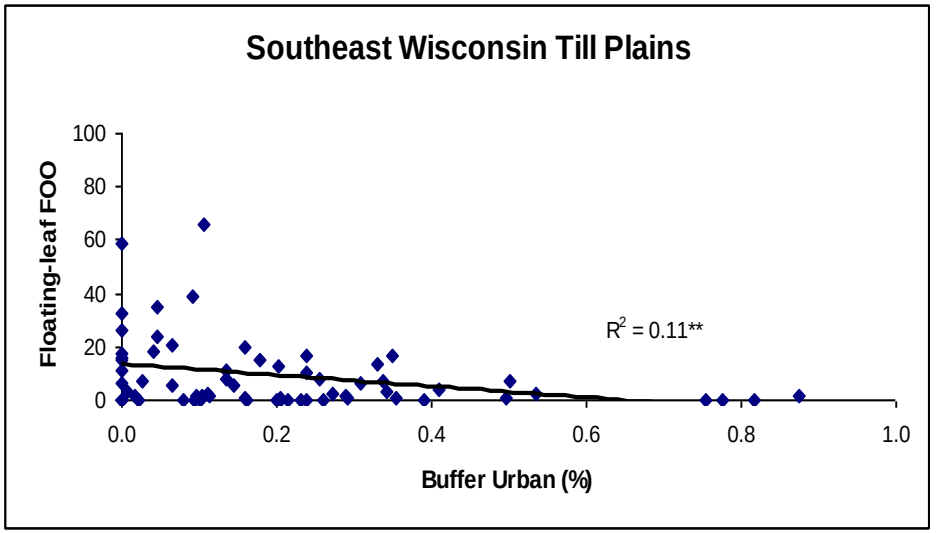
Courtesy Ali Mikyuluk - WDNR

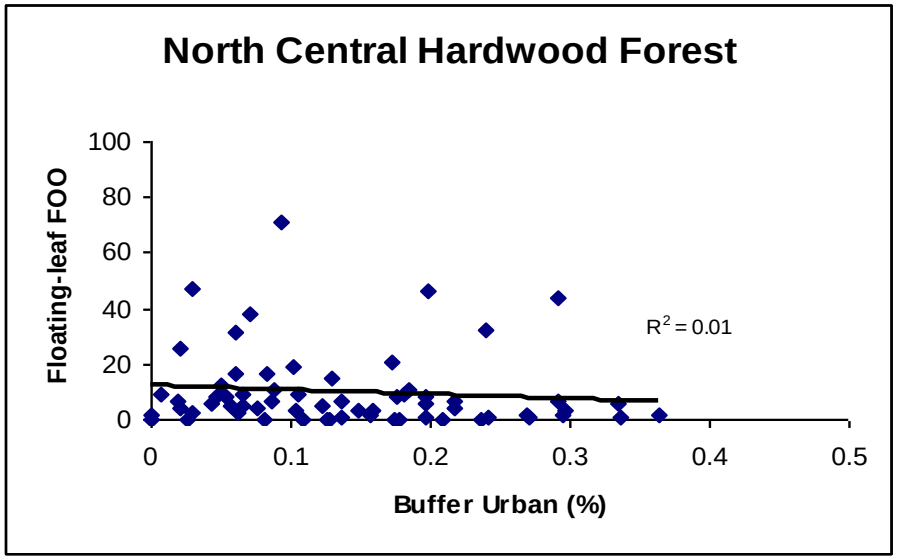
Aquatic Plant Community Index (AMCI)
(Nichols 2000)

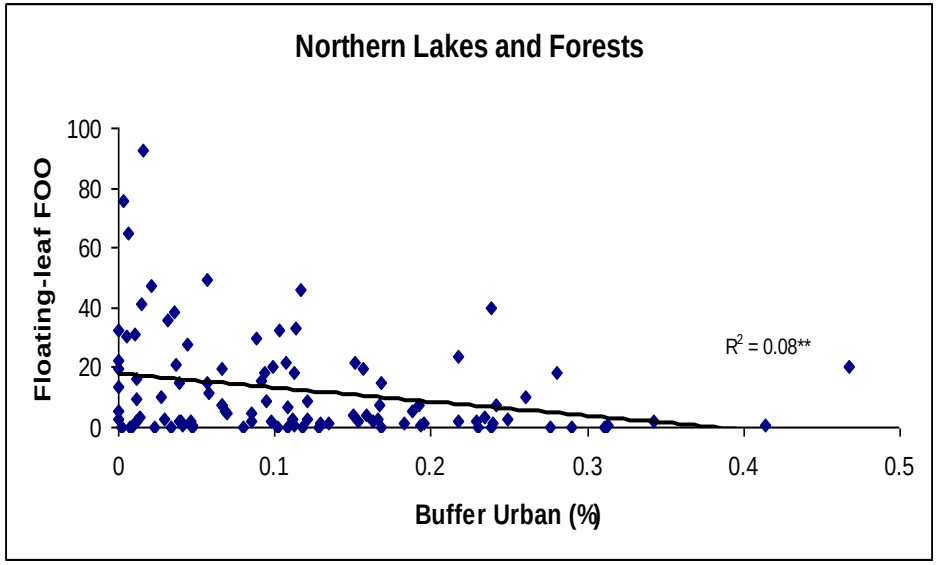
- Max Depth of Plant Growth
  - Update metric to 95% MDPG
  - Negatively related to phosphorus
- Relative % Submersed Species
  - Update to frequency of floating leaved plants or floating leaved plus emergents
  - Negatively related to urban development on the lakeshore
- Relative % Exotic Species
  - Update to relative frequency of tolerant plants, including coontail, sago, stargrass, EWM and CLP
  - Positively related to watershed agricultural development
- Relative % Sensitive Species
  - Update list of sensitive species based on coefficients of conservatism 8-10

Floating-leaf Plants

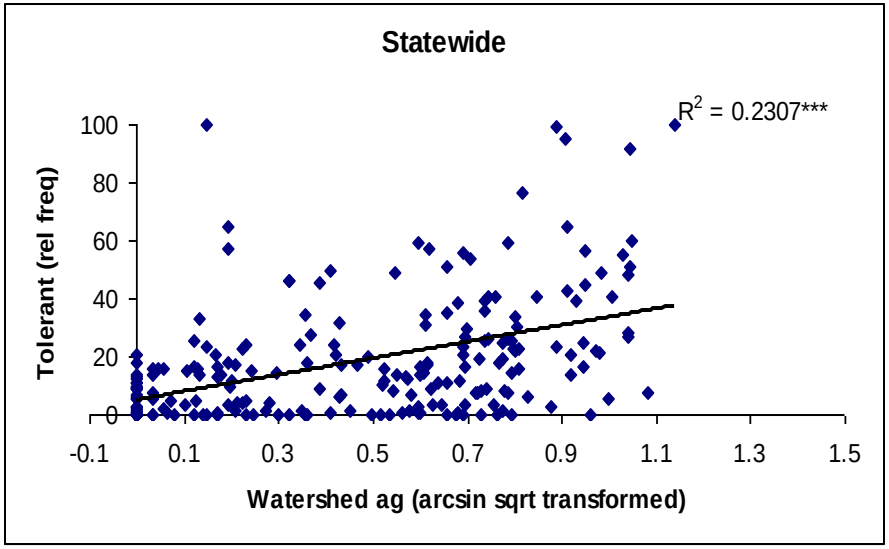


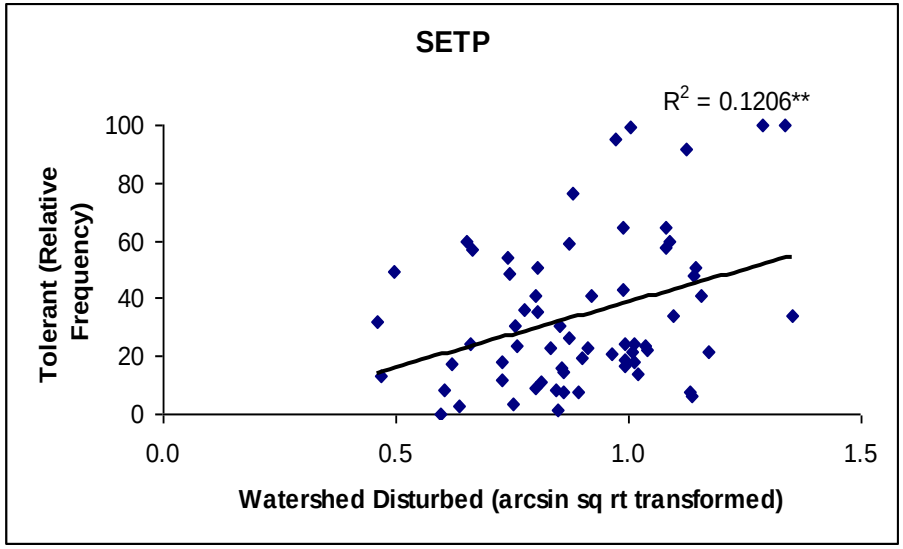


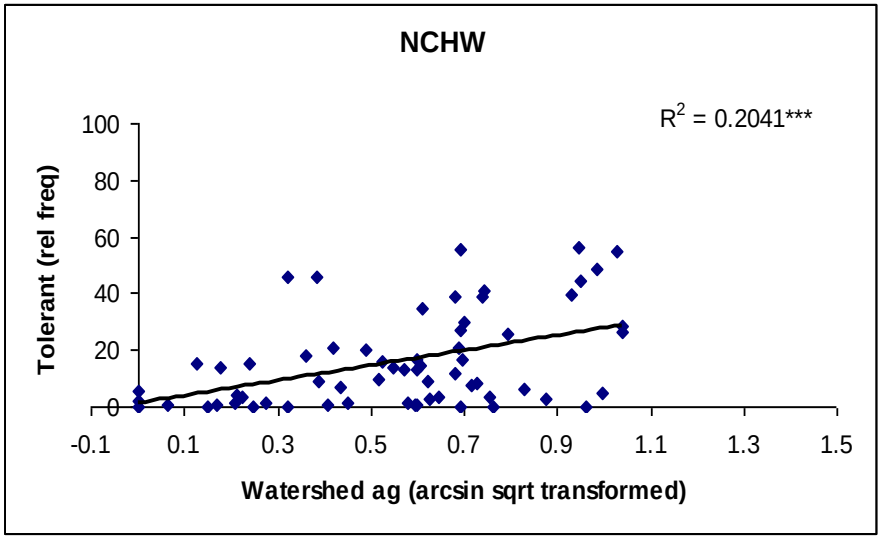


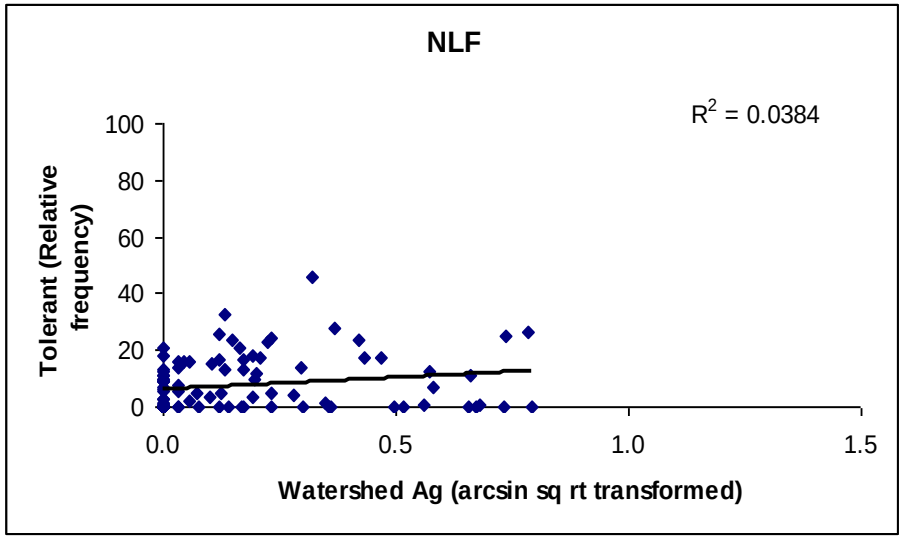


Tolerant Plants









Shoreland Assessments

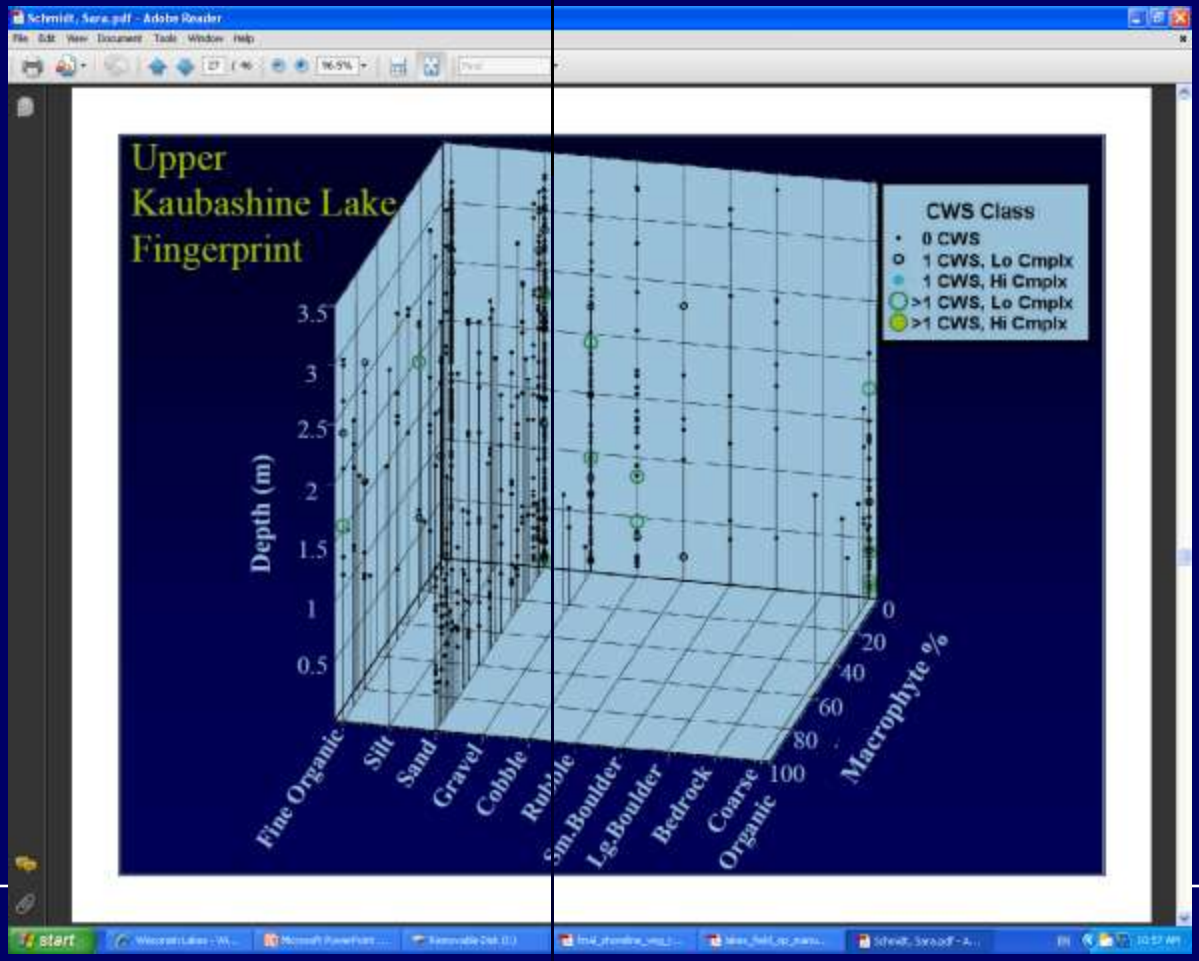
- Riparian Habitat
  - Vegetation cover
  - Shoreline and bank
  - Trees and shrubs
- Littoral Habitat
  - Bottom substrate
  - Aquatic plants
  - Fish habitat
- Human Influences
  - Docks, piers, seawalls
  - Buildings, lawns, driveways

Methods

- Woodford et al and Center for Limnology Biocomplexity project
- EPA National Lake Assessment – first cut
- Shoreland inventories
- Aerial photos
- Littoral habitat indices
- Critical Habitat Designations

Multi-Dimensional Littoral Zone Habitat Fingerprints (Schmidt and Bozek 2009)

Depth, Substrate, Macrophytes, and Coarse Woody Structure



Categories of shoreline vegetation around Jacqueline Lake

[40 acre soft water bog lake] – Portage County lakes study

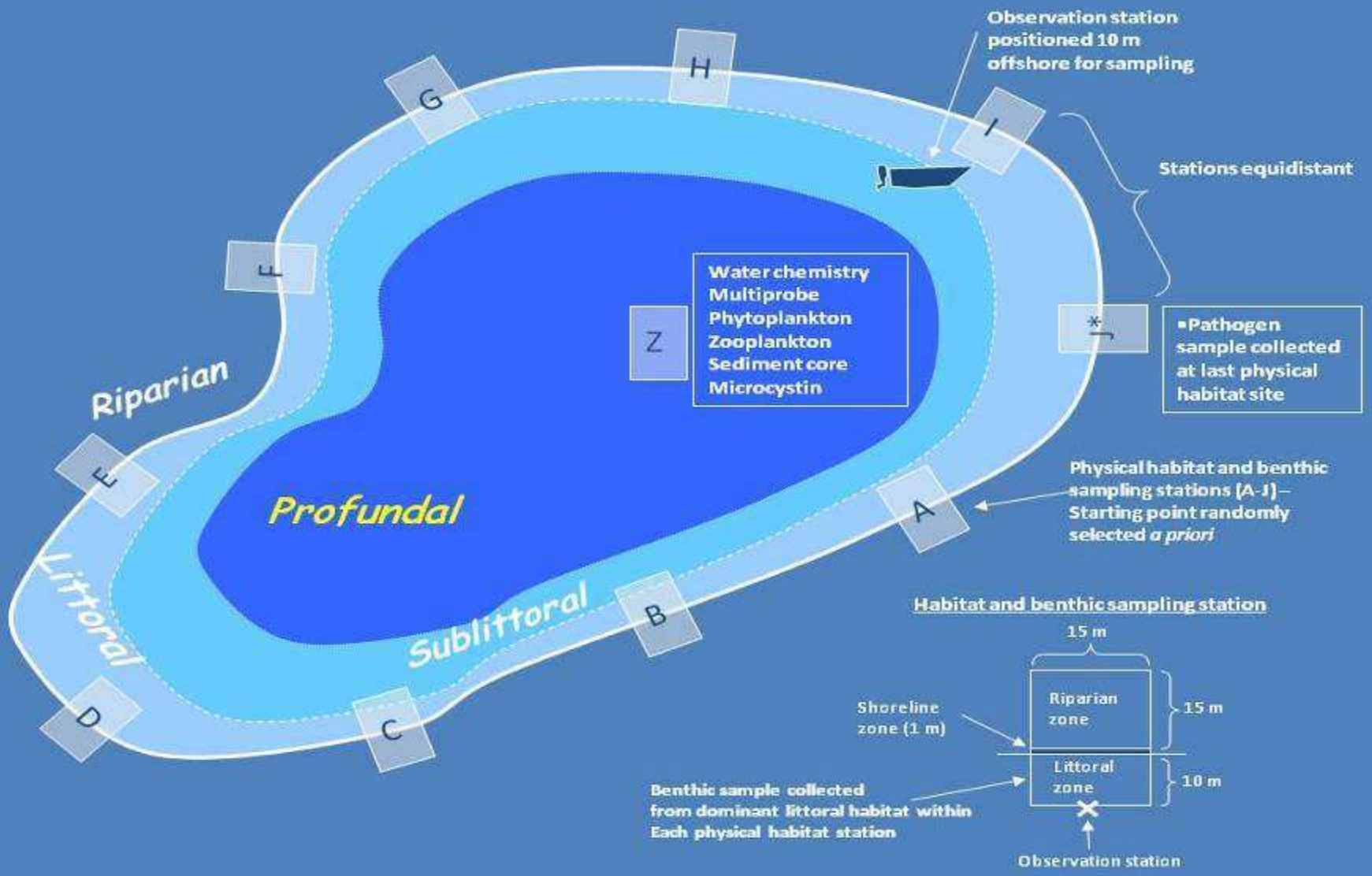
24% = black spruce (*Picea mariana*) and tamarack (*Larix laricina*) wetland-light blue

11.3% = vegetated shoreline-dark green

65% is considered to be disturbed:

- 9.8% = low disturbance developed area-yellow
- 21.3% = moderately disturbed-orange
- 4.1% = highly disturbed development-red

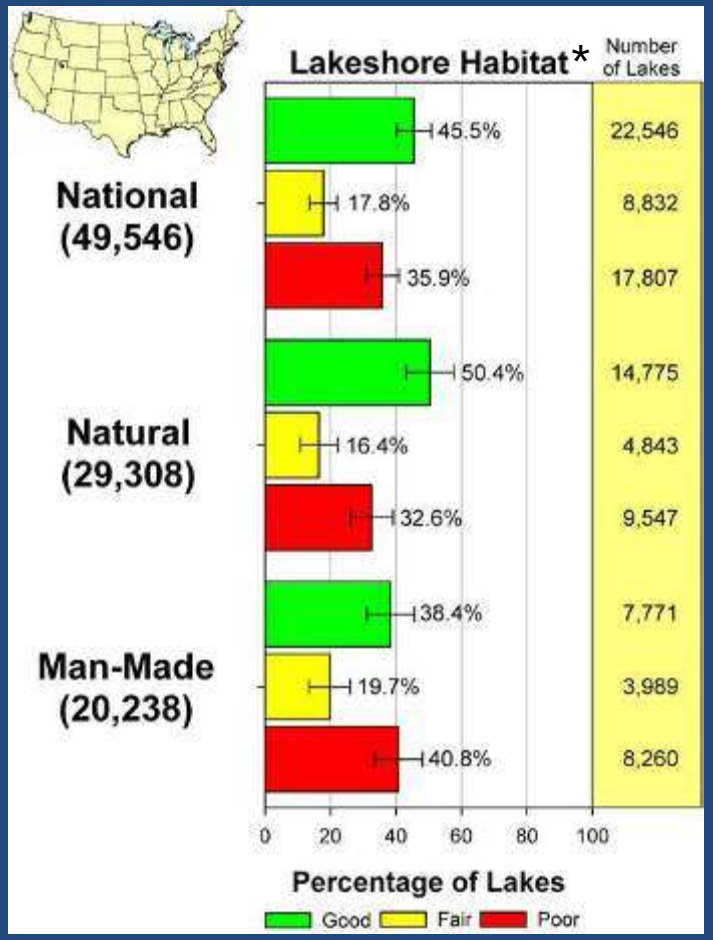
National Lakes Assessment: Sampling Approach

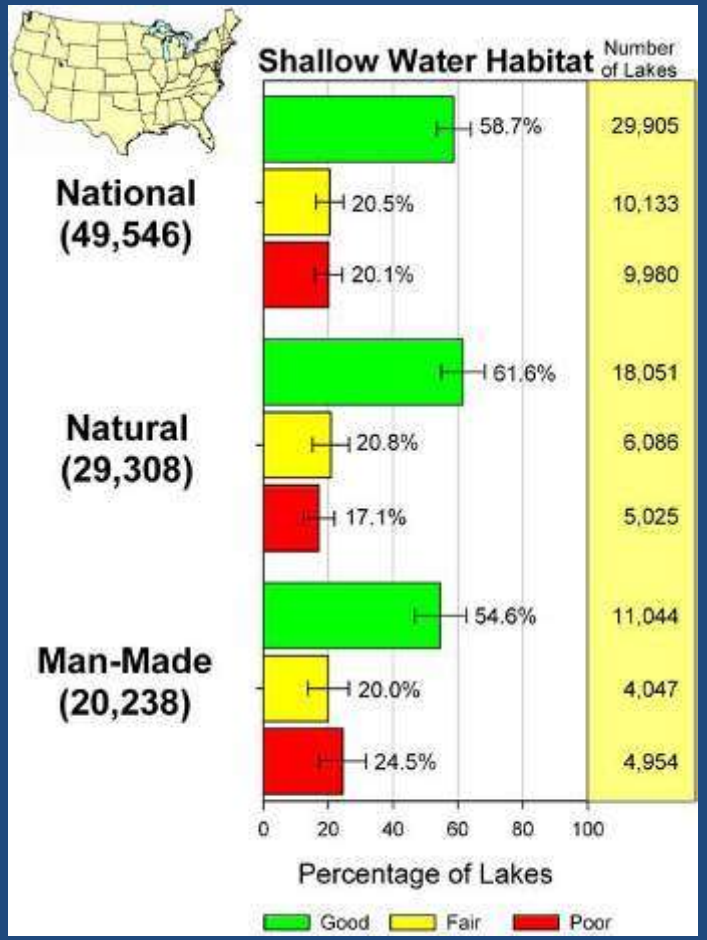


Shoreland Habitat Assessment

- 55 individual habitat metrics captured at each site (550/lake).
- Metrics reduced to four indices of habitat quality:
  - Human Disturbance on Lakeshores
  - Riparian Zone Integrity
  - Littoral Zone Integrity
  - Complexity of Riparian/Littoral Interface
- Disturbance index scores assessed against nationally consistent thresholds
- Riparian/littoral indices assessed against regionally-explicit reference conditions (*corrects for expected regional differences*)

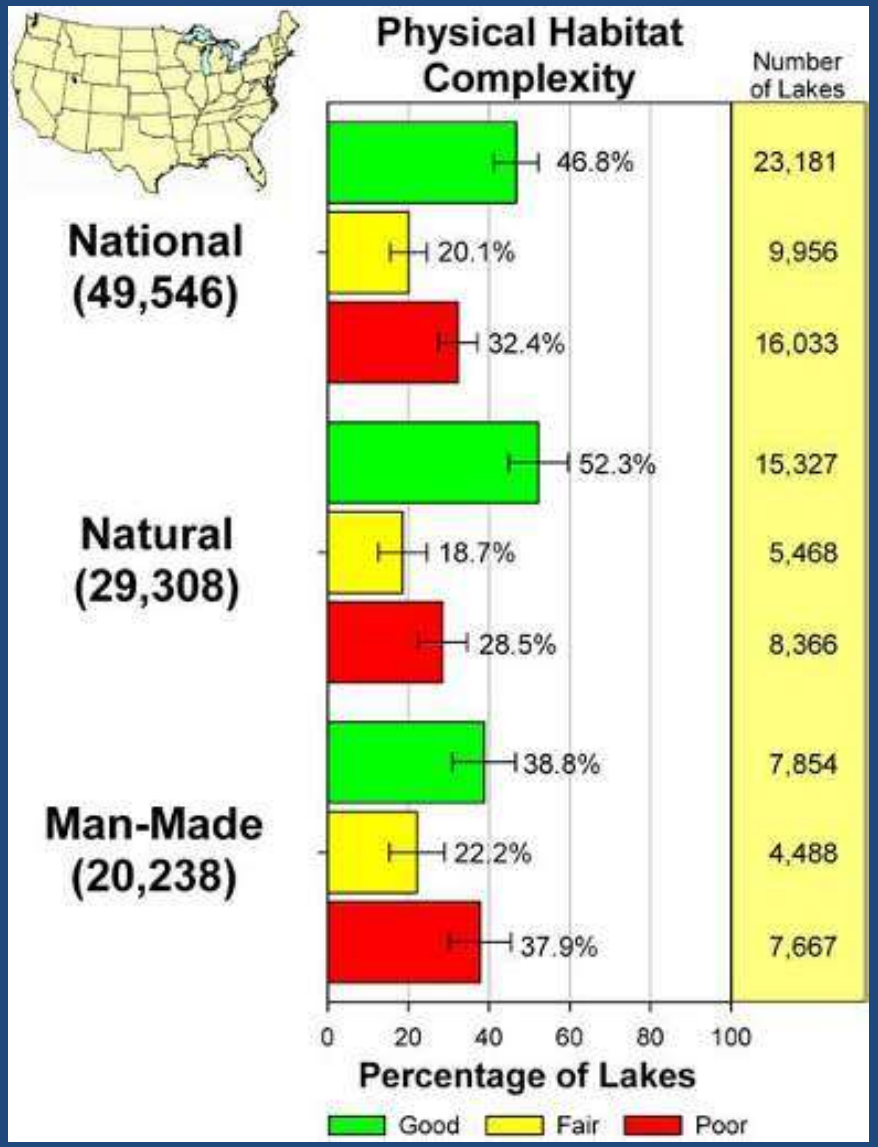
Condition of the Nation's Lakes: Habitat

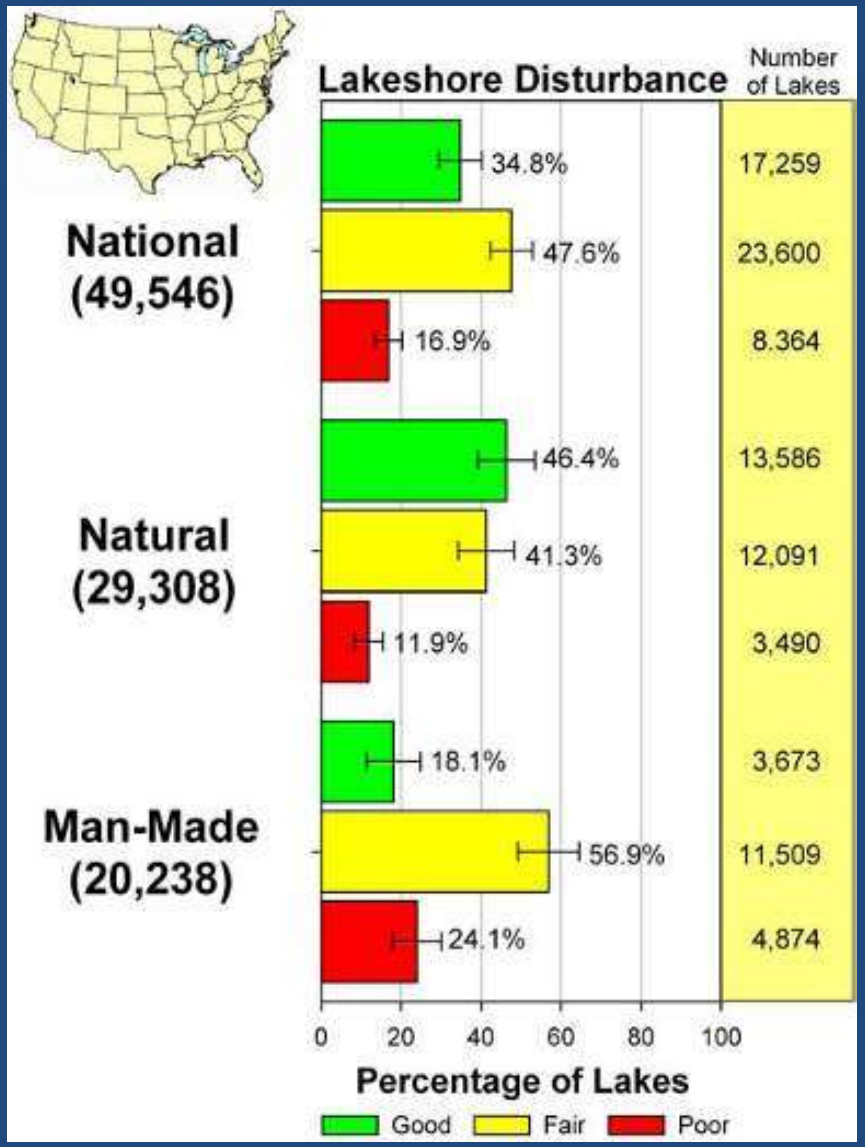




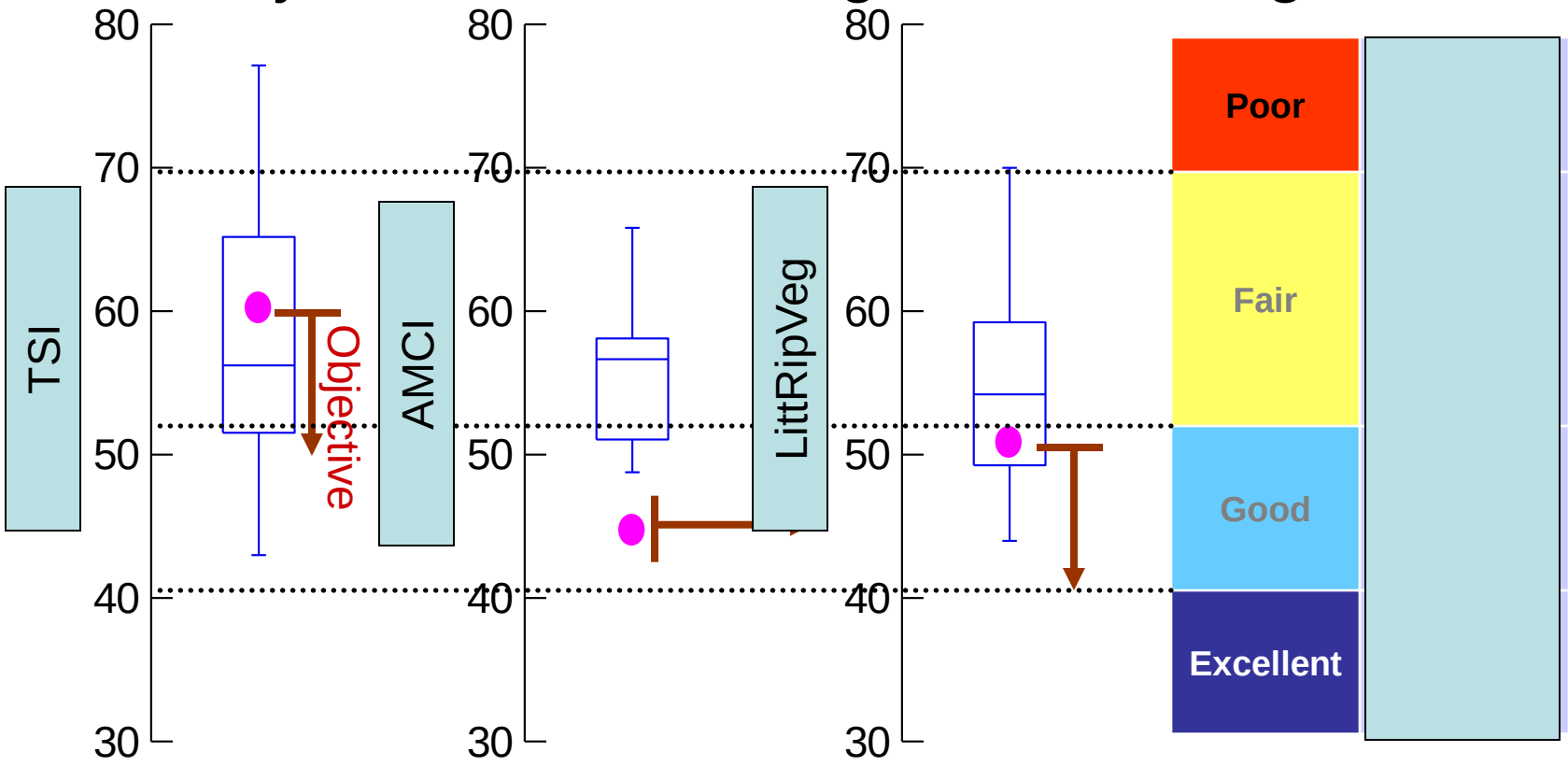
**) NLA Primary indicator is Lakeshore Habitat*

Condition of the Nation's Lakes: Habitat





Putting it together – Setting lake specific objectives and management strategies



Box plots: All lakes in a given natural community and/or ecoregion

Lake Condition Metrics (Water Quality, Plants, Shorelands, etc)


Lake Conditions
Excellent
Good
Fair
Poor
Protect
Manage
Restore
Management Strategy

LAKES

Lakes

Lakes & Maps
Find A Lake
Lake Contour Maps
Interactive Map

Recreation
Boating
Fishing
Swimming

Lake Health & Monitoring
Blue-Green Algae
Climate Change
Invasive Species
Water Level
Water Quality

Management
Aquatic Plant Management
Grants
Lake Organizations & Districts

Volunteers & Success Stories
Volunteer Opportunities
Wisconsin's Lakes Partnership

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Calendar [Exit DNR]
Common Questions

Recreation

Wisconsin is a state rich in lakes. Its approximately 15,000 lakes range in size from small one-and two-acre spring ponds to 137,708-acre Lake Winnebago. Due to variations in chemical and biological composition, physical characteristics, and diversity of origin, each lake should be considered unique.

Of the documented lakes in Wisconsin, only about 40 percent have actually been named. The majority of the unnamed lakes are very small, less than 10 acres. Most lakes are in the northern and eastern parts of the state dotting the path of the glaciers. The unglaciated region, or Driftless Area, of southwestern Wisconsin has very few lakes by comparison.

About 3,620 of the state's lakes are larger than 20 acres, constituting more than 93 percent of the surface area of Wisconsin's inland lakes. The total inland lake surface acreage in the state approaches one million acres.

The depth of Wisconsin's natural inland lakes also varies a great deal, ranging from a few feet to a maximum depth of 236 feet in Green Lake (Big Green) in Green Lake County.

In addition to the inland lakes, portions of Lakes Michigan and Superior lie within Wisconsin's boundaries. These Great Lakes are two of the largest freshwater bodies in the world, and they add nearly 6.5 million acres of water to Wisconsin.

Lake Wingra

Dane County

336 Acres

Lake Wingra is a 336 acre lake located in Dane County. It has a maximum depth of 21 FEET. Features include public boat landings, parks. Fish in the lake include Musky, Panfish, Largemouth Bass, Northern Pike, Walleye.

DNR Photo

Features

- Boat Landings (2)
- Public Parks (2)

Fish

- Panfish (Abundant)
- Musky (Common)
- Largemouth Bass (Common)
- Northern Pike (Present)
- Walleye (Present)

Lakes

Lakes & Maps
Find A Lake
Lake Contour Maps
Interactive Map

Recreation
Boating
Fishing
Swimming

Lake Health & Monitoring
Blue-Green Algae
Climate Change
Invasive Species
Water Level
Water Quality

Management
Aquatic Plant Management
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Overview / Recreation
Map
Lake Health
Plants & Animals
Local Projects
A to Z Facts

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Lake Wingra

Dane County

336 Acres

Lake Health

Excellent / good / fair / poor

A basic graph here

menu of more report options

- **Overview / Recreation**
- **Map**
- **Lake Health**
- **Plants & Animals**
- **Local Projects**
- **A to Z Facts**

Lakes

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