IMPACTS OF SHORELAND DEVELOPMENT

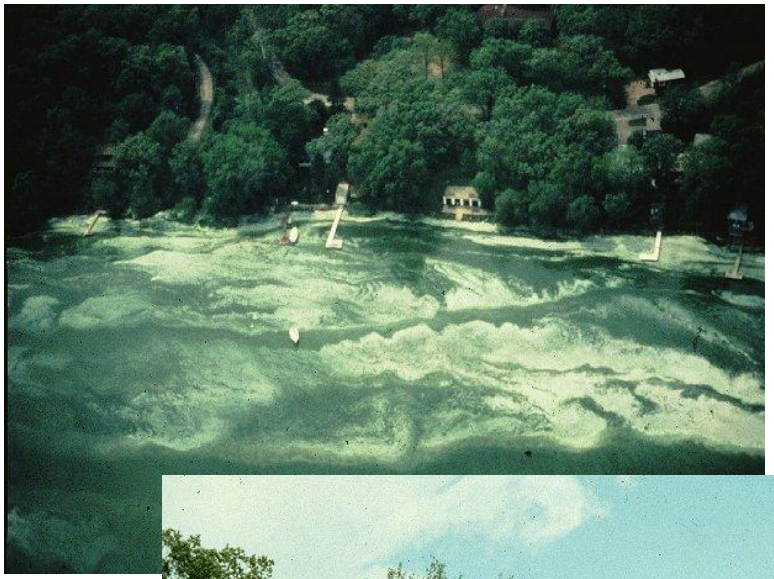
Wisconsin has the 3rd largest concentration of fresh water glacial lakes on the planet.

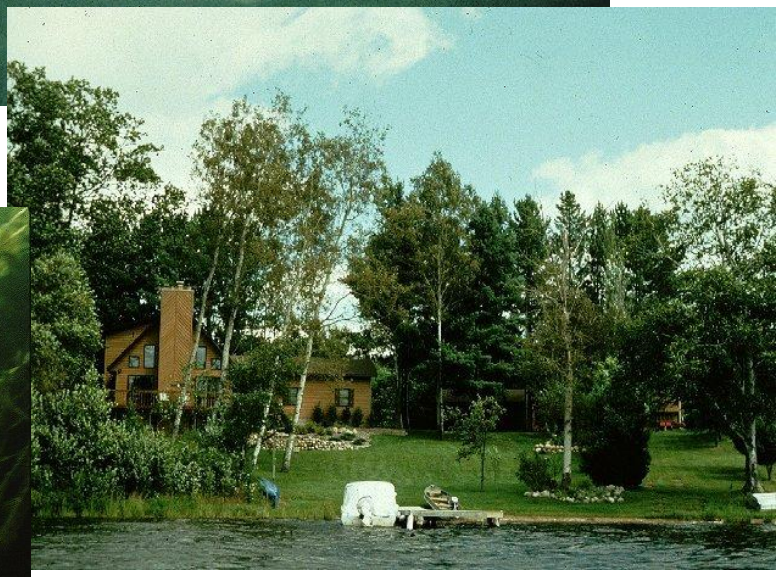
Wisconsin's Lakes are Changing Faster than Ever:

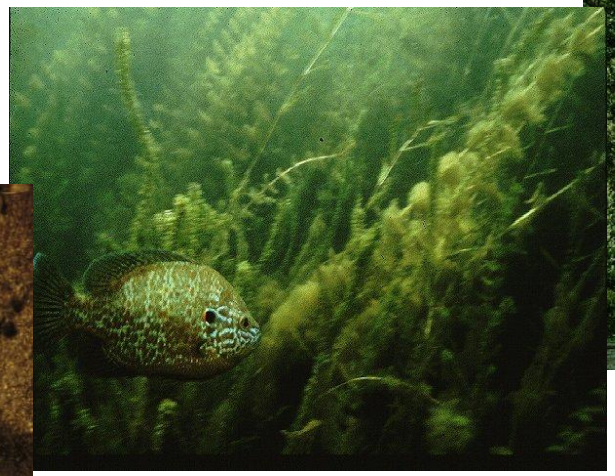
Algae blooms
(phosphorus pollution)

Destruction of
shoreline habitat

Invading plants and animals

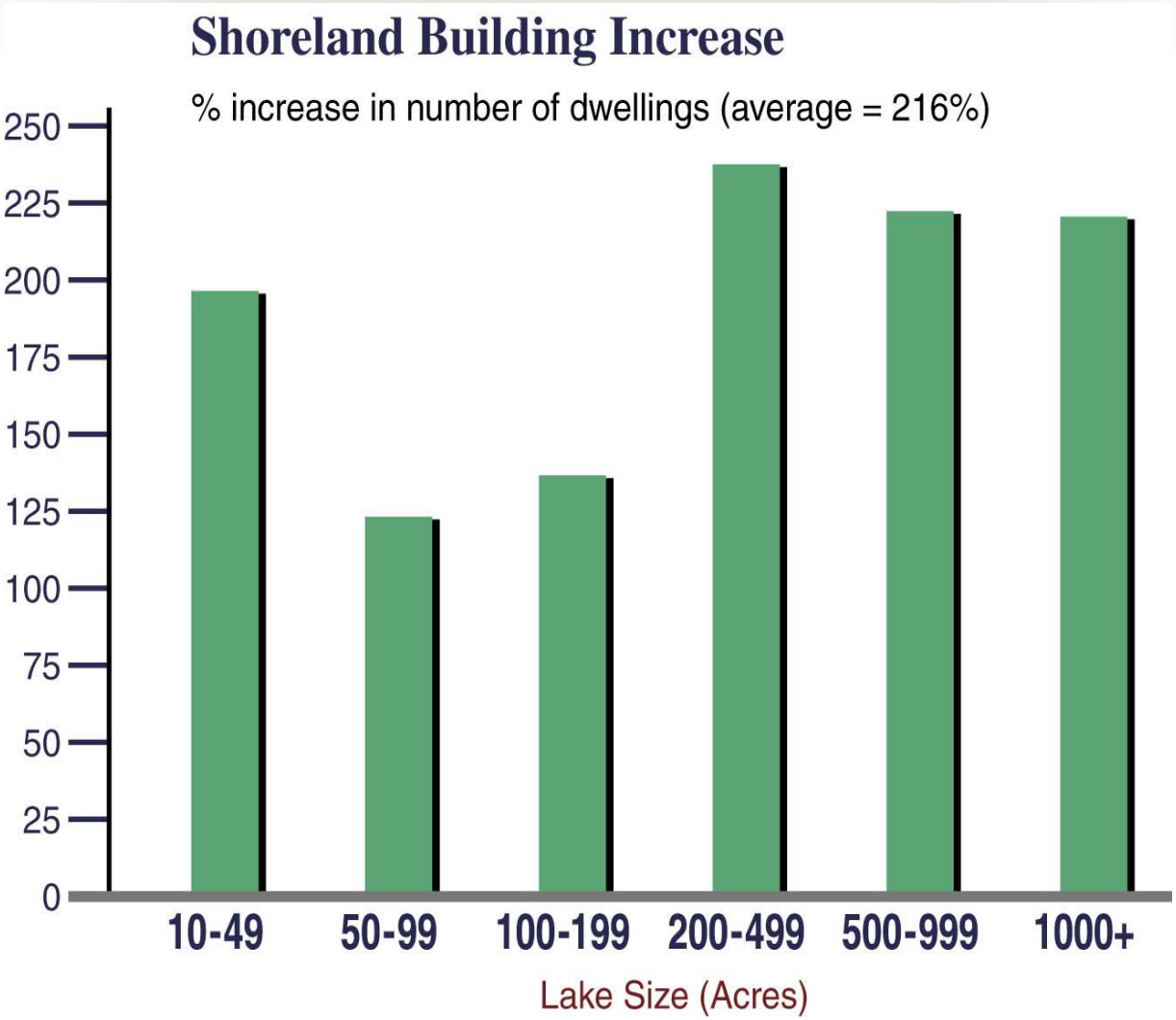






Steve Carpenter 2004

Shoreland building increase, 1965-1995



Source: Wisconsin Dept. of Natural Resources

The Wisconsin Lakes Partnership

General-development lake type

LAND USE AND WATERSHED IMPACTS

LIMITING NUTRIENT PRINCIPLE

…That Nutrient in Least Supply
Relative to Plant Needs

N:P Ratio in plant Tissue 10:1 - 15:1

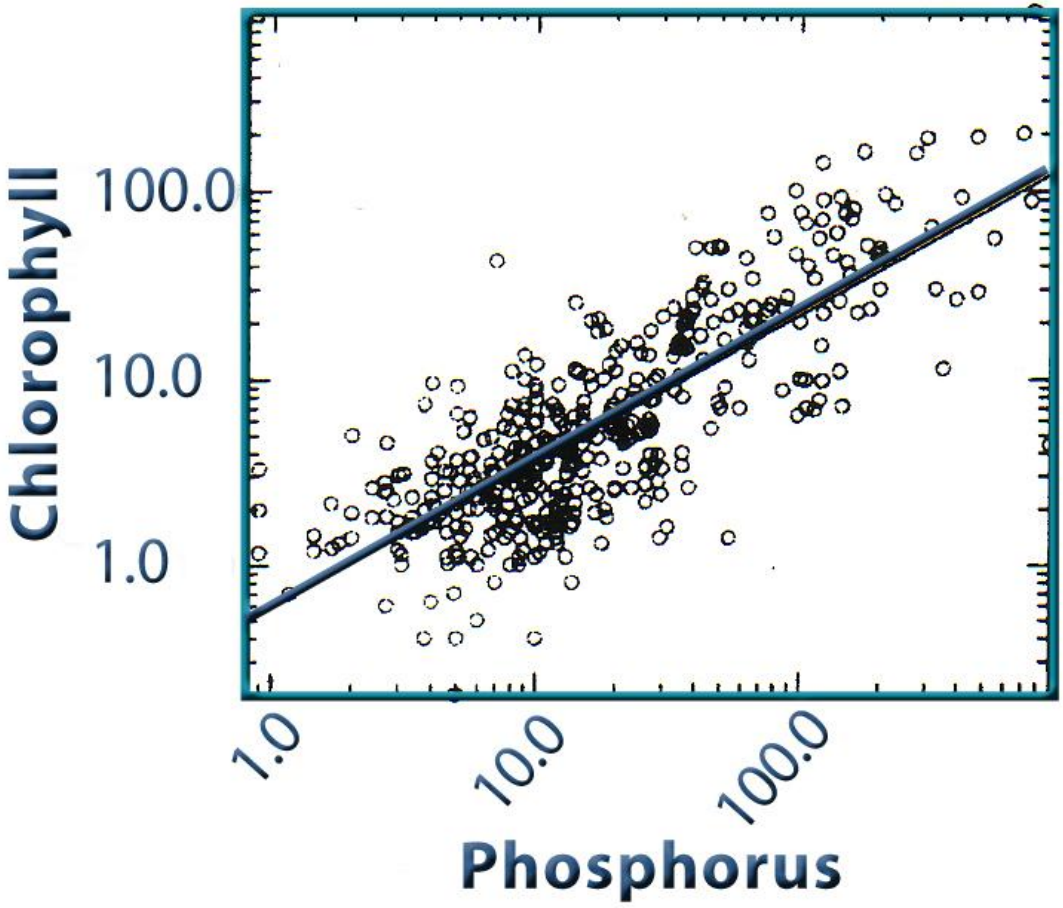
If the Ratio of N:P in Water is

<10:1 Nitrogen Limited

>15:1 Phosphorus Limited

TOTAL PHOSPHORUS/ CHLOROPHYLL a RELATIONSHIP

- Phosphorus causes algae to grow

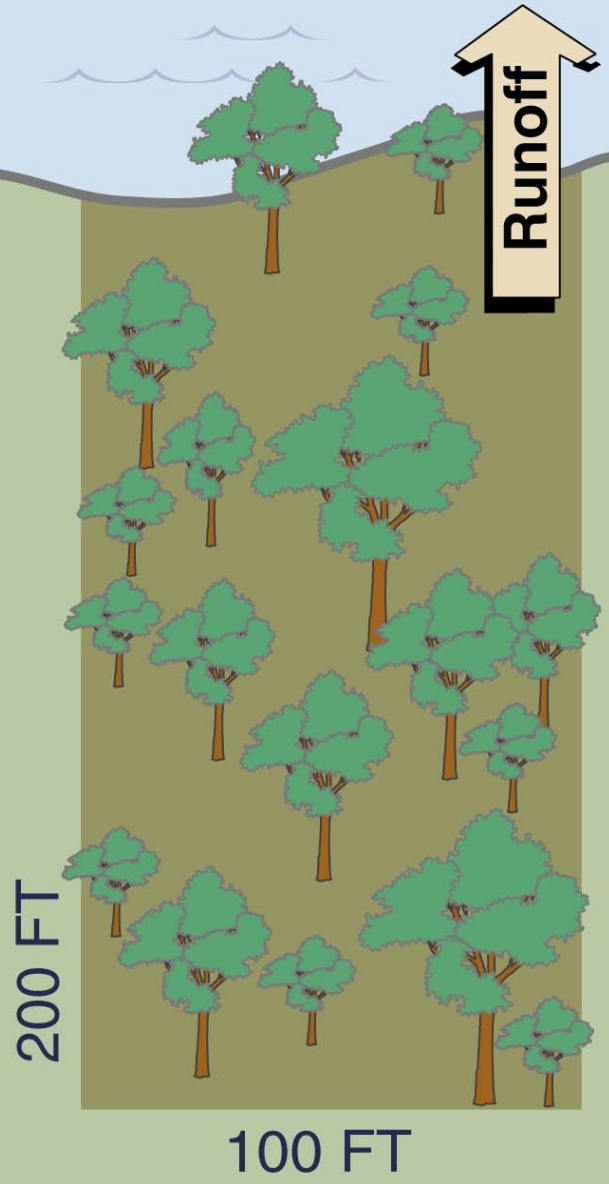


Riparian Development --Research Questions

- What attributes of lakes are changing?
- What are the consequences for fish and other aquatic life?
- What are the appropriate scales at which to measure and/or manage effects?
- Can we identify reliable signals for monitoring lake condition?

Undeveloped – Apr.-Oct. phosphorus/sediment runoff model

- maple-beech forest
- 6% slope to lake
- sandy loam soil



IMPACT ON LAKE
(April - Oct.)

- 1,000 ft^3 runoff to lake
- 0.03 lbs. phos. to lake
- 5 lbs. sediment to lake

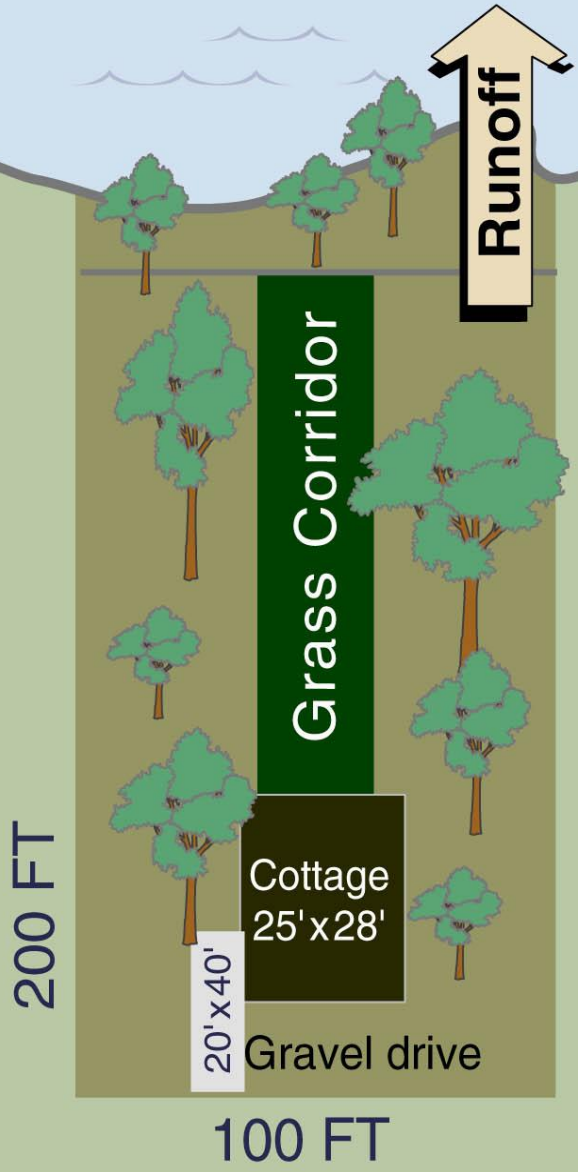
Source: Wisconsin Dept. of Natural Resources 1995 John Panuska

The Wisconsin Lakes Partnership


1940's DEVELOPMENT

1940s development – Apr.-Oct. phosphorus/sediment runoff model

- maple-beech forest
- 6% slope to lake
- grass corridor 20'-wide
- cottage 700 ft^2 perimeter
- gravel drive 800 ft^2
- 35'-wide buffer strip



IMPACT ON LAKE
(April - Oct.)

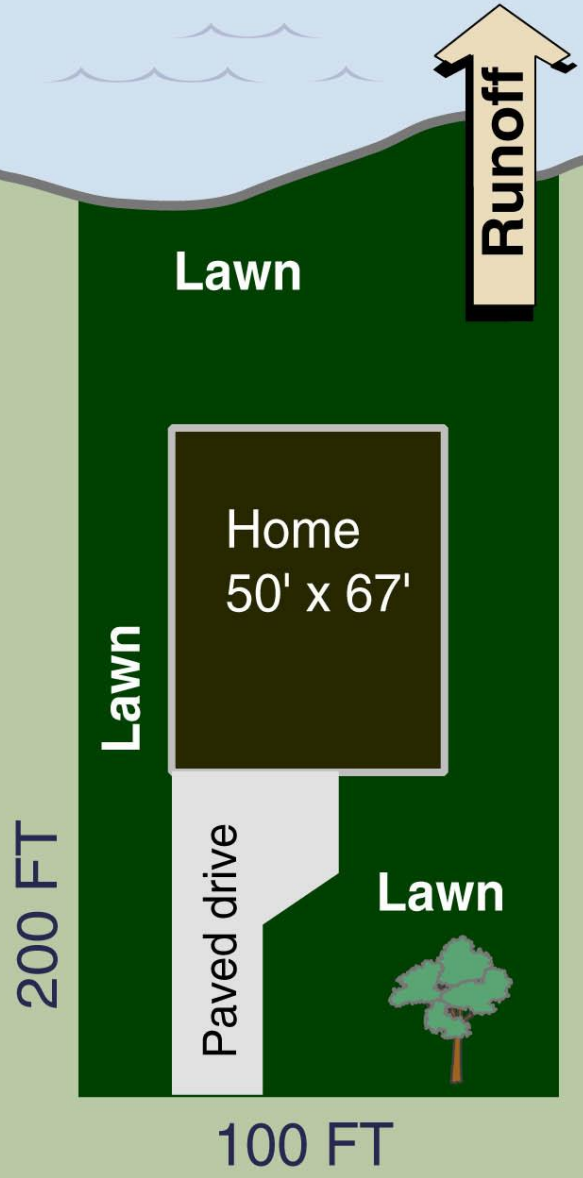
- 1,000 ft^3 runoff to lake
- 0.03 lbs. phos. to lake
- 20 lbs. sediment to lake

Source: Wisconsin Dept. of Natural Resources 1995 John Panuska


1990's DEVELOPMENT
4 26 94

1990s development – Apr.-Oct. phosphorus/sediment runoff model

- maintained lawn, soil graded
- 6% slope to lake
- home 3,350 ft² perimeter
- paved drive 770 ft²



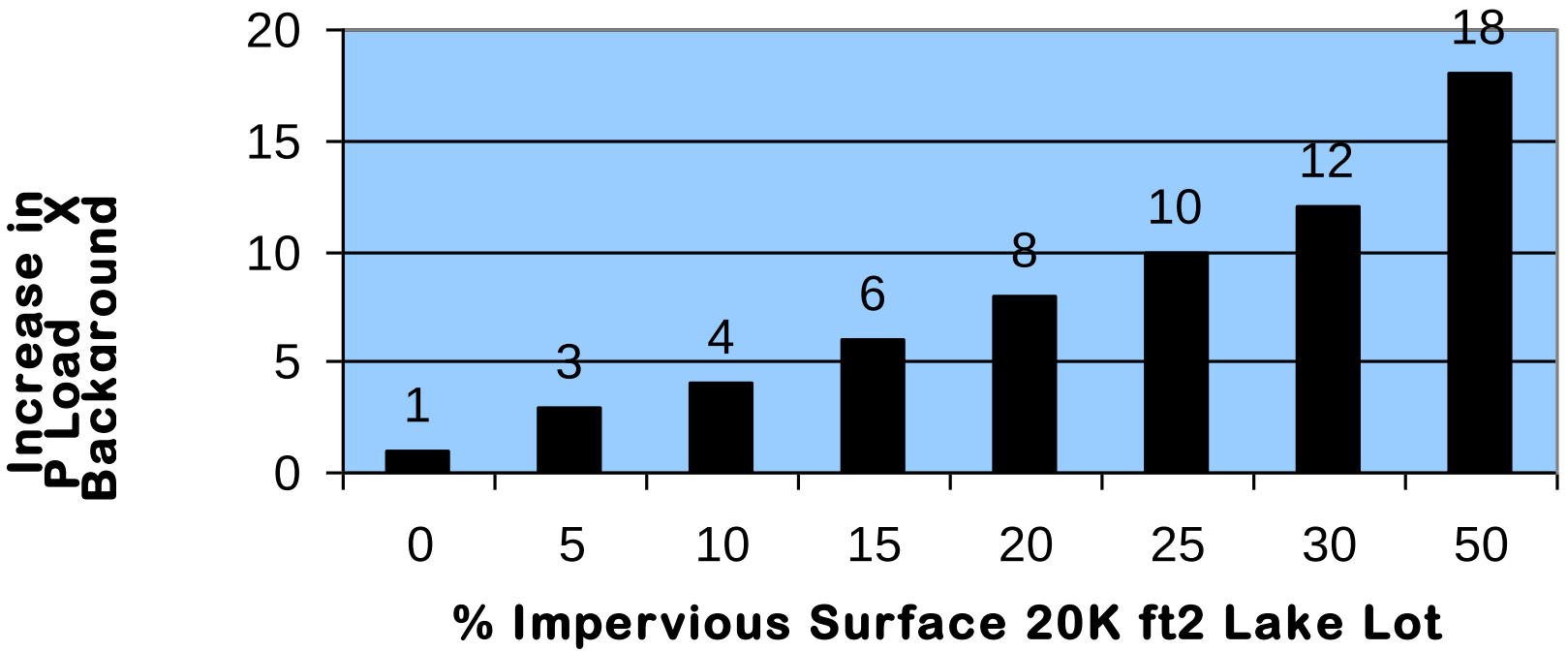
IMPACT ON LAKE
(April - Oct.)

- 5,000 ft³ runoff to lake
- 0.20 lbs. phos. to lake
- 90 lbs. sediment to lake

Source: Wisconsin Dept. of Natural Resources 1995 John Panuska

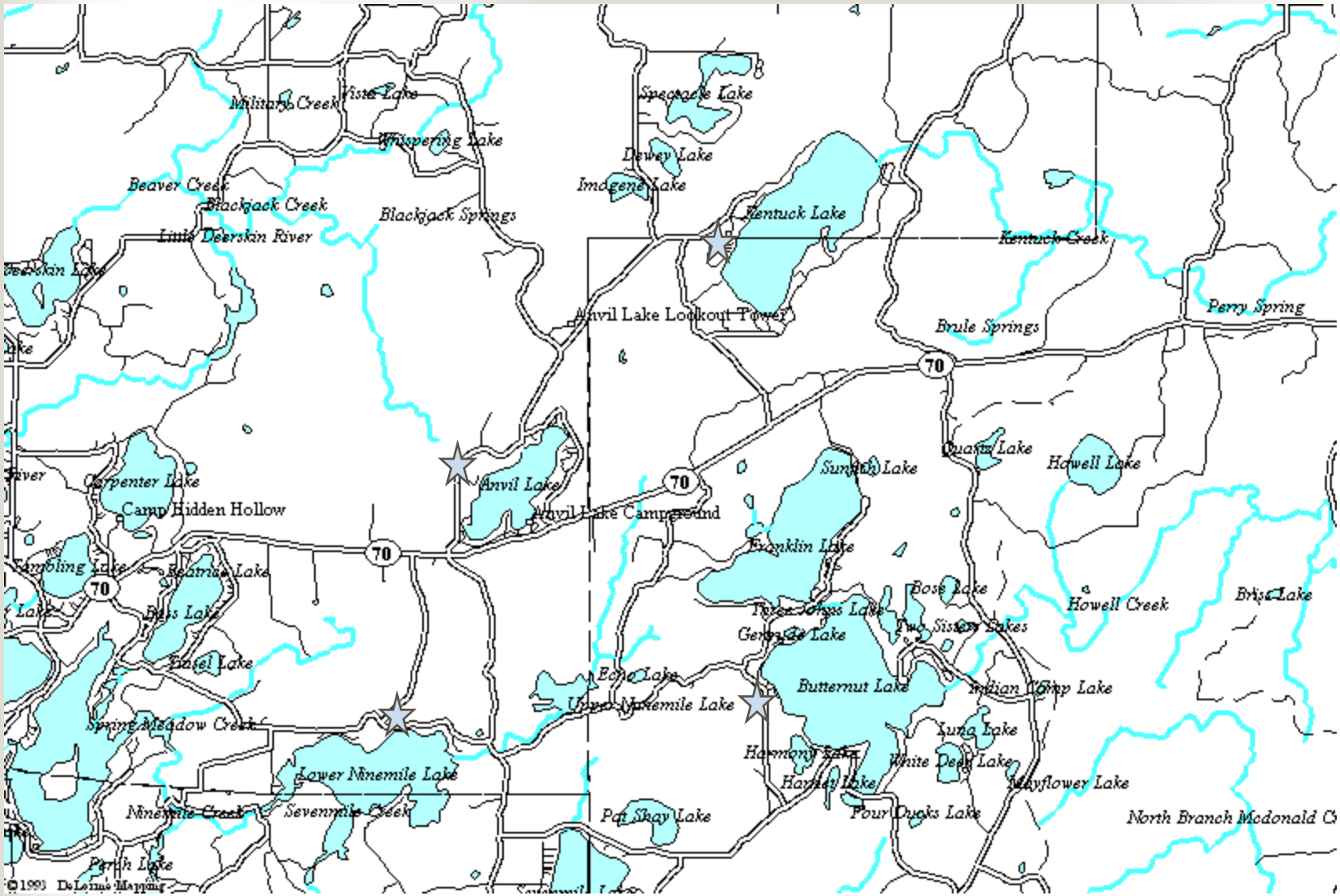
The Wisconsin Lakes Partnership

Impacts from Impervious Surfaces on Phosphorous Loading



THE EFFECT OF NEAR-SHORE DEVELOPMENT ON WATER QUALITY LOADINGS TO LAKES IN NORTHERN WISCONSIN

Lower Ninemile Lake

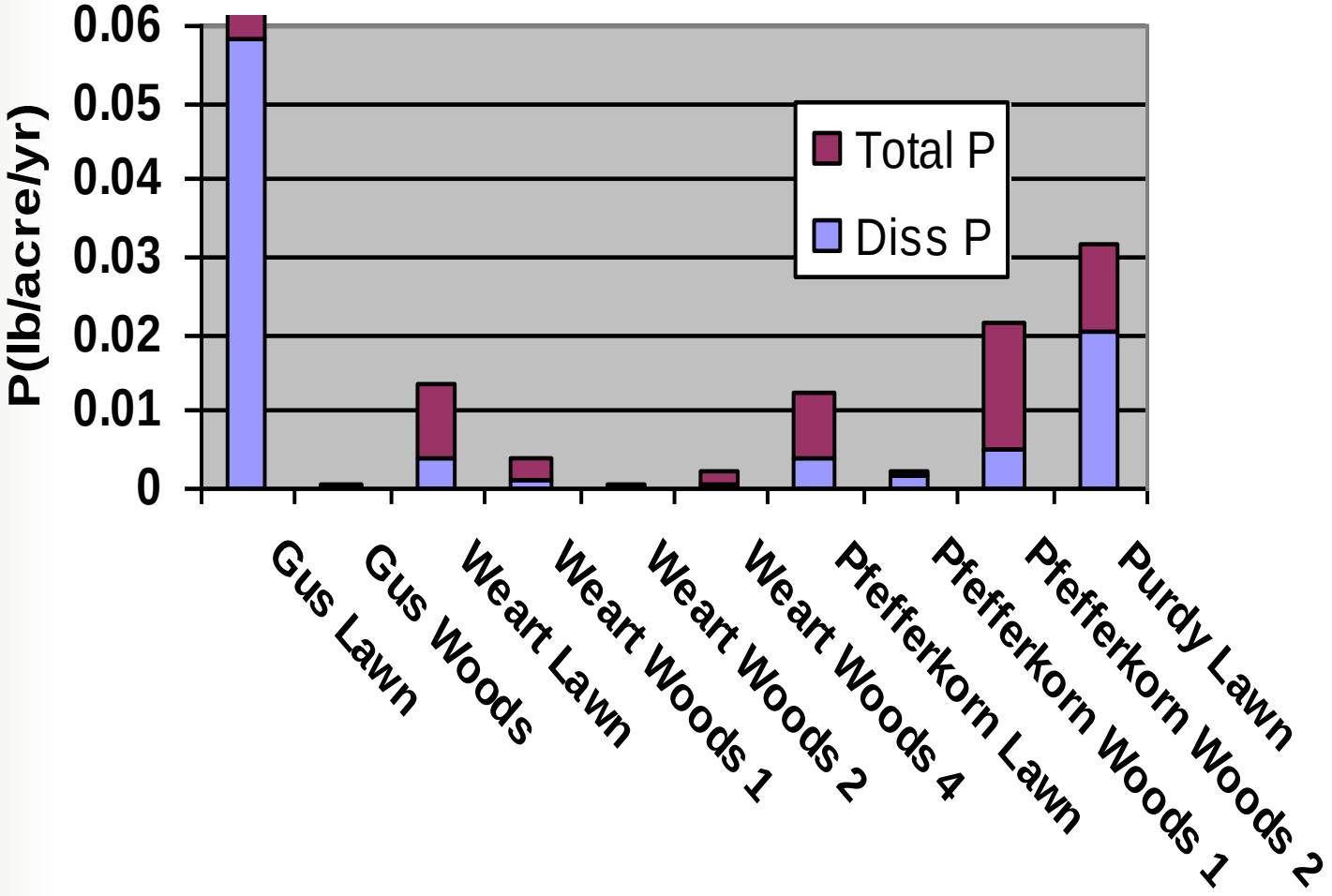


Site Locations

Pfefferkorn Residence, Butternut Lake

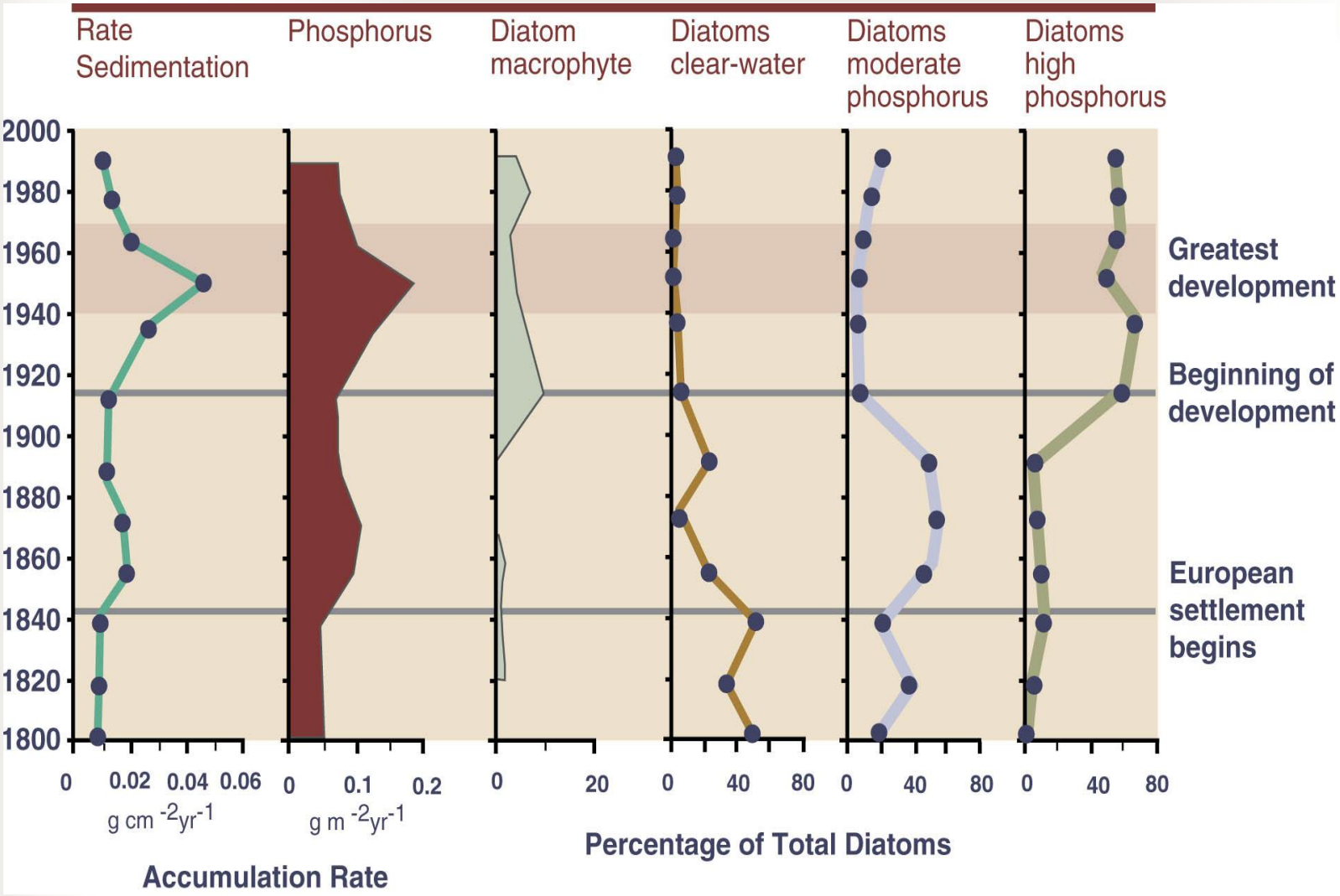
0.082

Phosphorus Yield



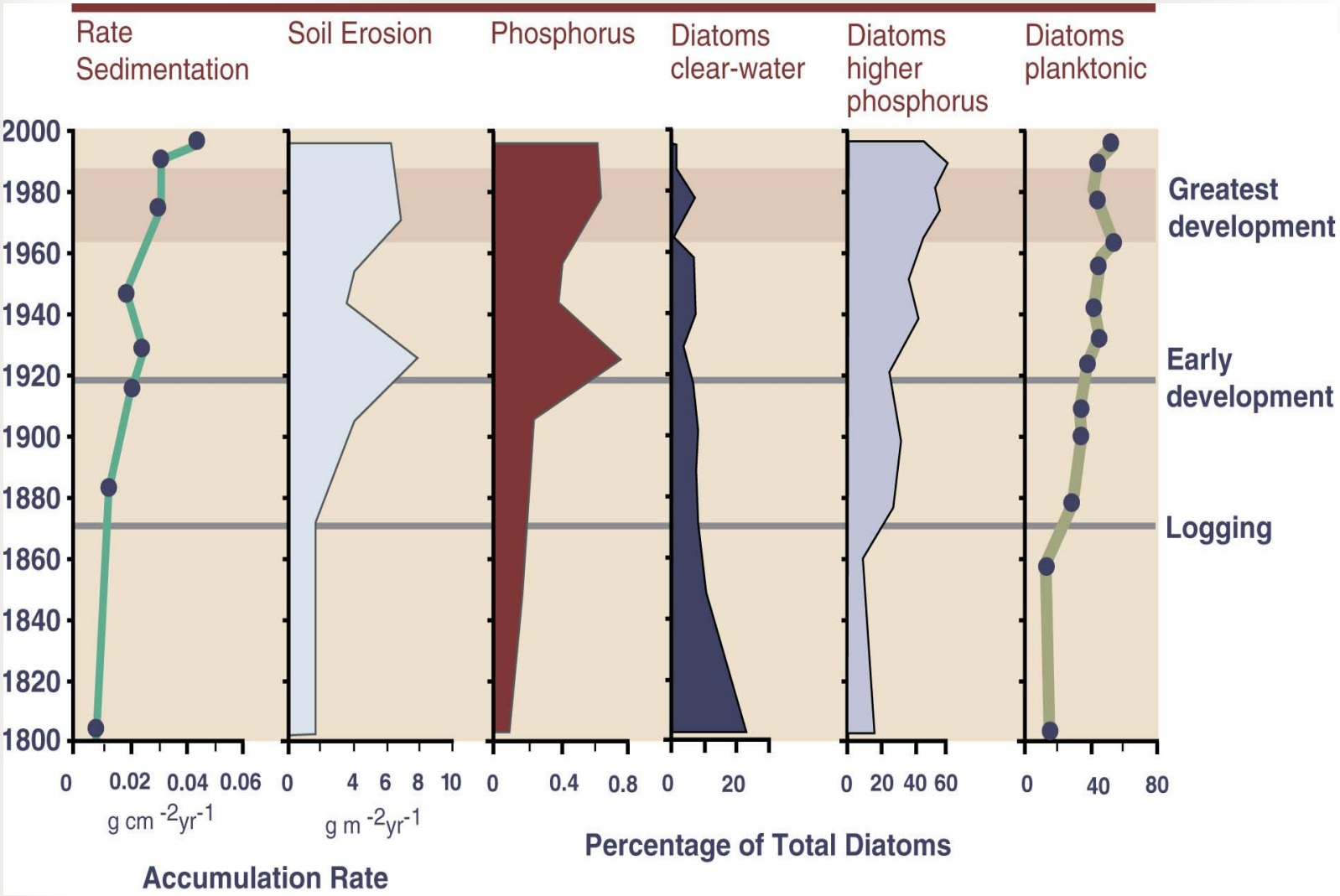
USGS 2003

Moose Lake (Waukesha Co.) diatom history



Source: Wisconsin Dept. of Natural Resources

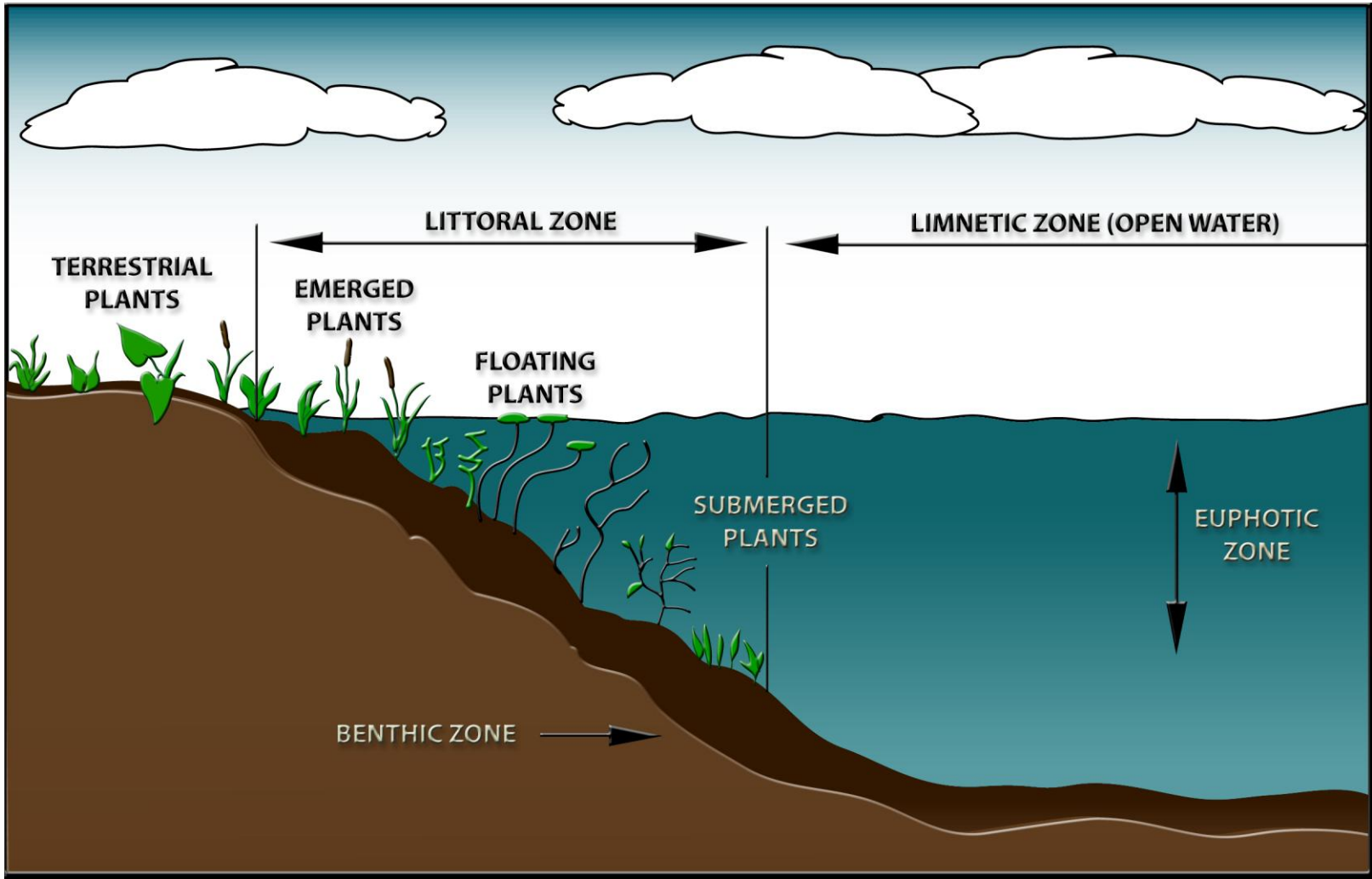
Round Lake (Chippewa Co.) diatom history



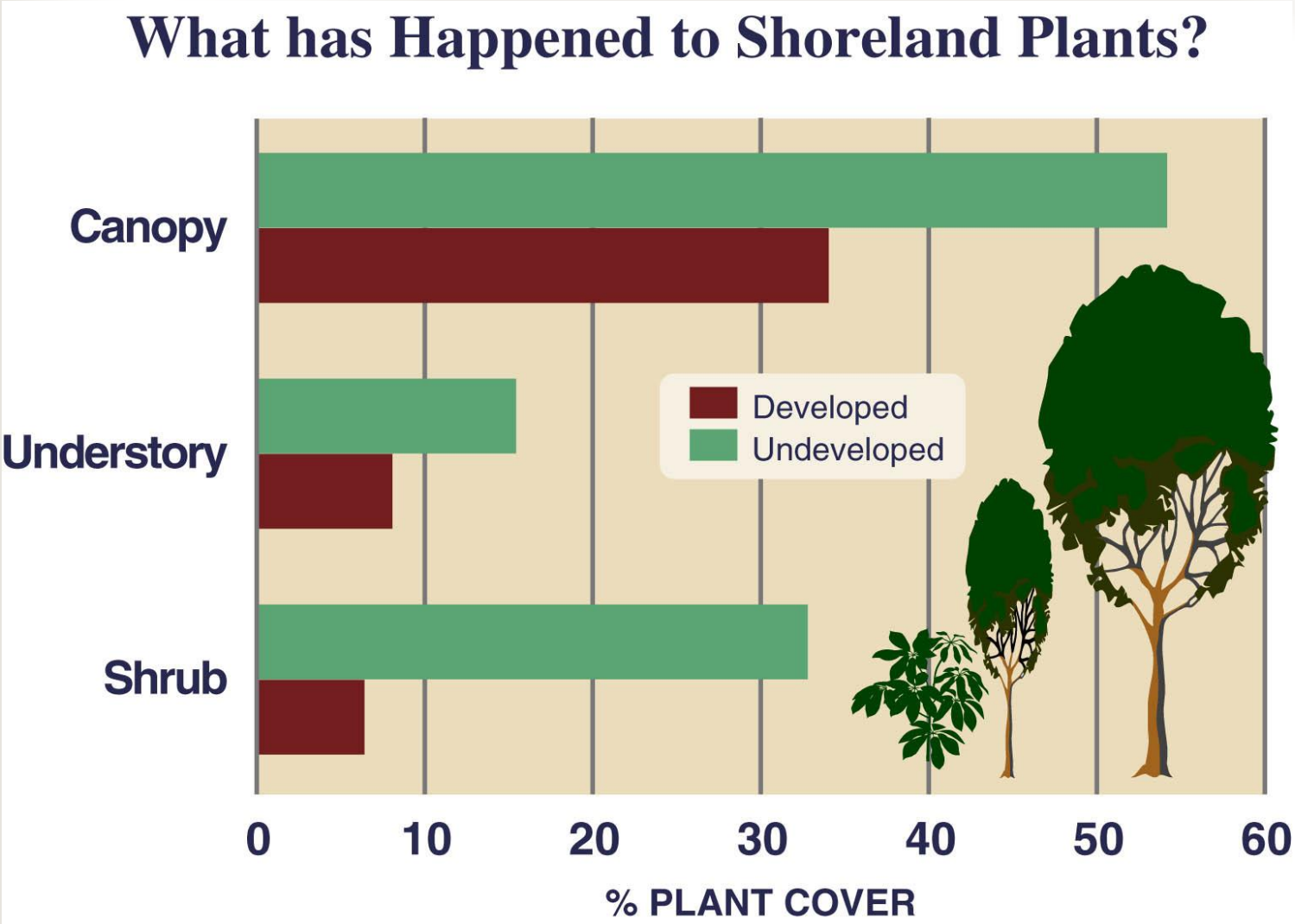
Source: Wisconsin Dept. of Natural Resources

The Wisconsin Lakes Partnership

LAKE HABITAT ZONES

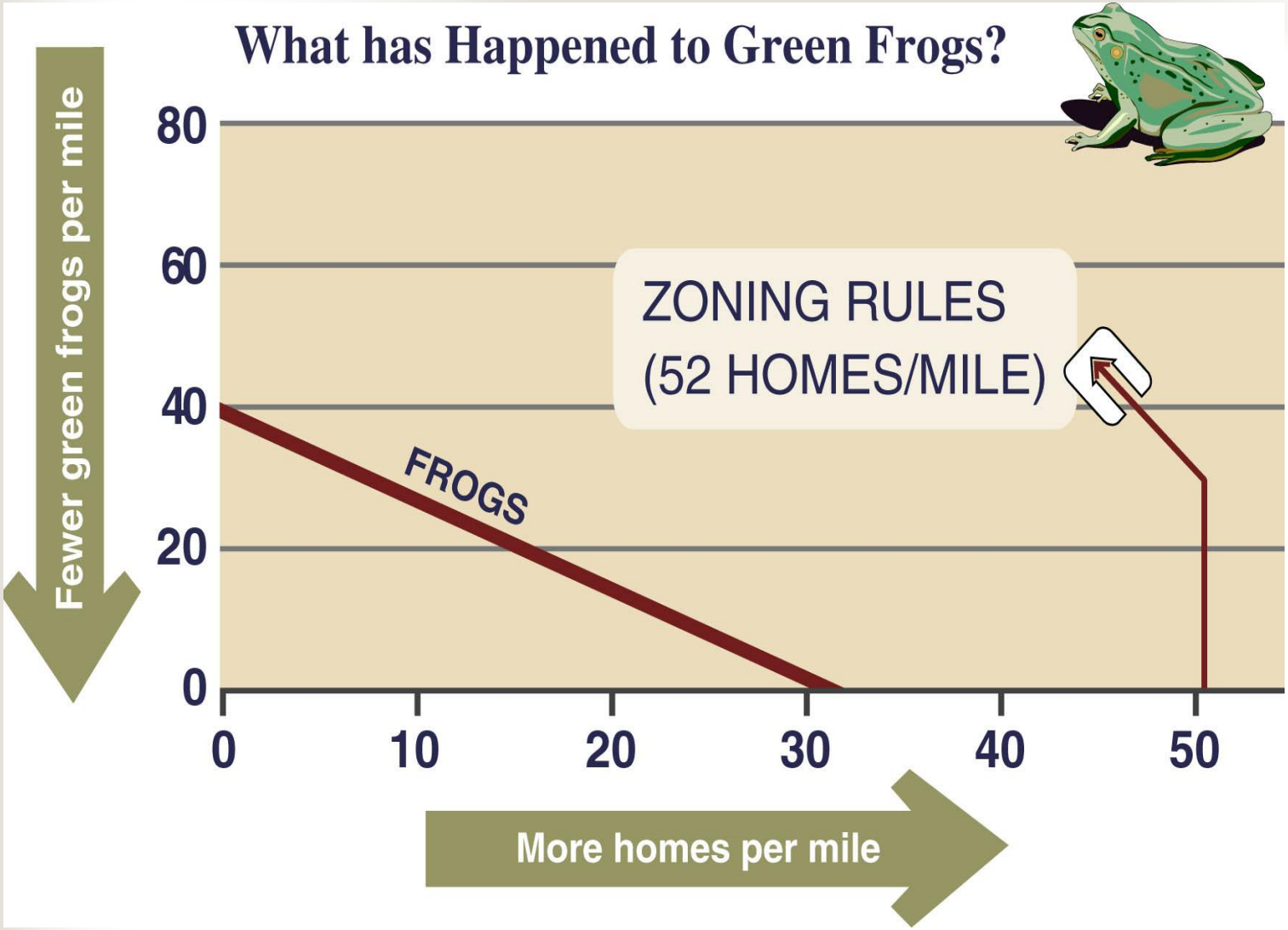


Shoreland plants trends



Source: Wisconsin Dept. of Natural Resources

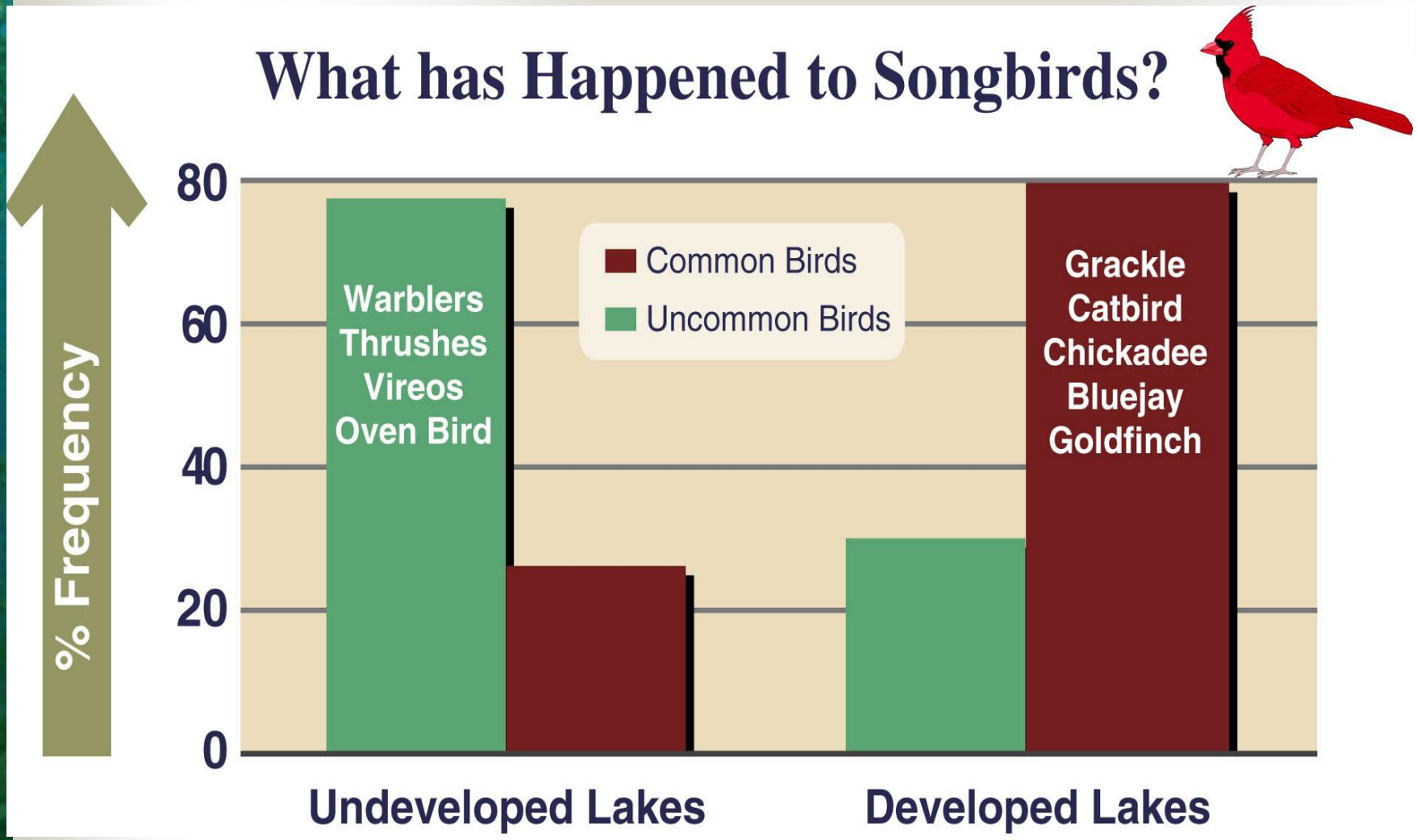
Shoreland green frog trends



Source: Wisconsin Dept. of Natural Resources

The Wisconsin Lakes Partnership

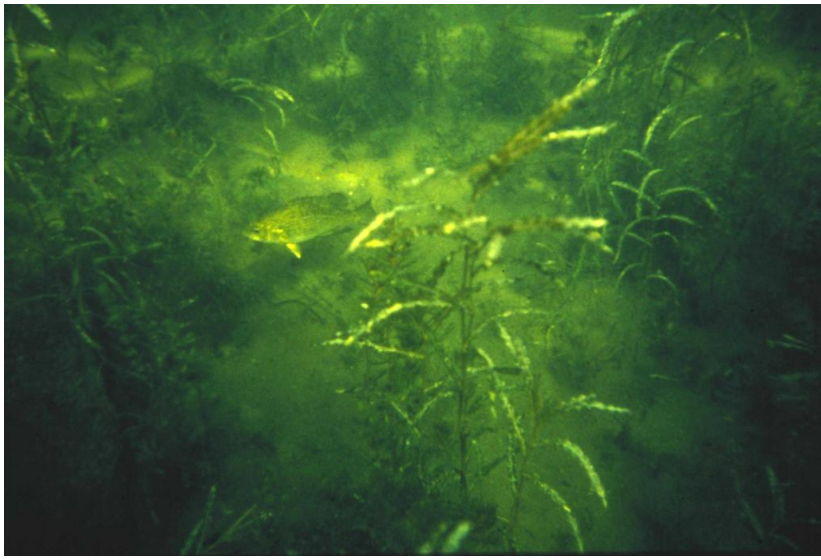
Shoreland bird trends

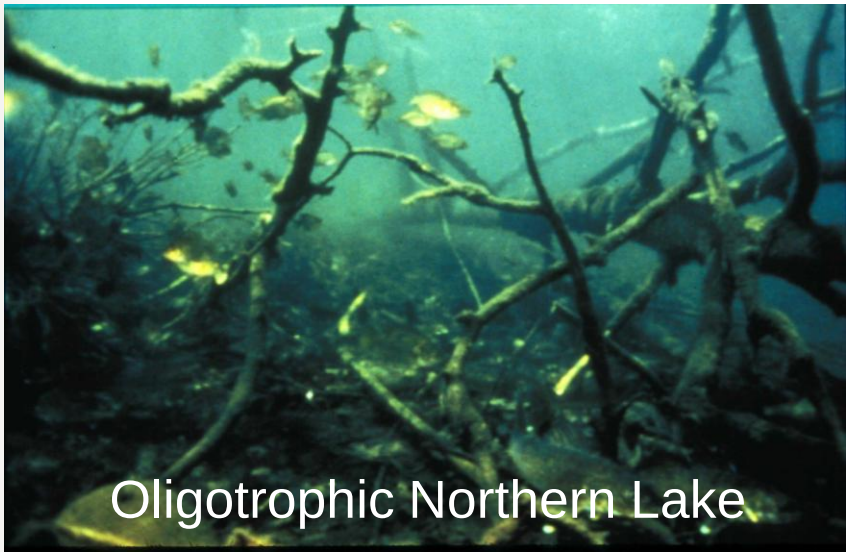


Source: Wisconsin Dept. of Natural Resources

LAKE LITTORAL ZONE

- Functions
  - Intercepts Nutrients
  - Refuge from Predators
  - Nursery for Fish





Oligotrophic Northern Lake

Eutrophic Southern Lake

AQUATIC PLANTS

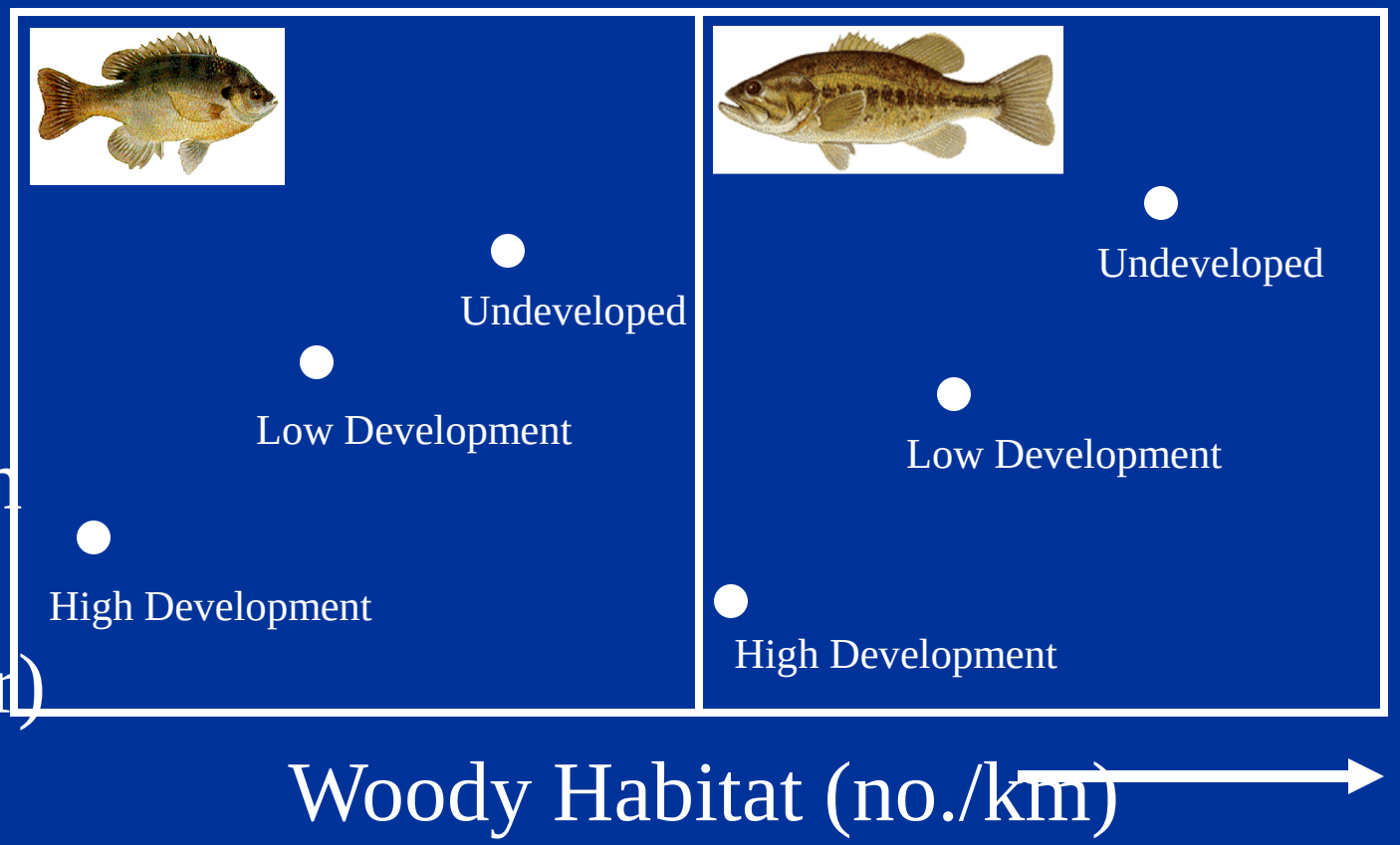
- Habitat
- Energy Dissipation
- O_2 Producers

LARGE WOODY DEBRIS

- Local Scale: Developed sites have less wood (p=.026)
- Lake Scale: More development associated with reduced wood abundance (p=.004)
- Significant interaction, with least wood found at developed sites in highly developed lakes (p=.030)

Jennings et al 2003

Fish grow ~3X faster in lakes with lots of woody habitat



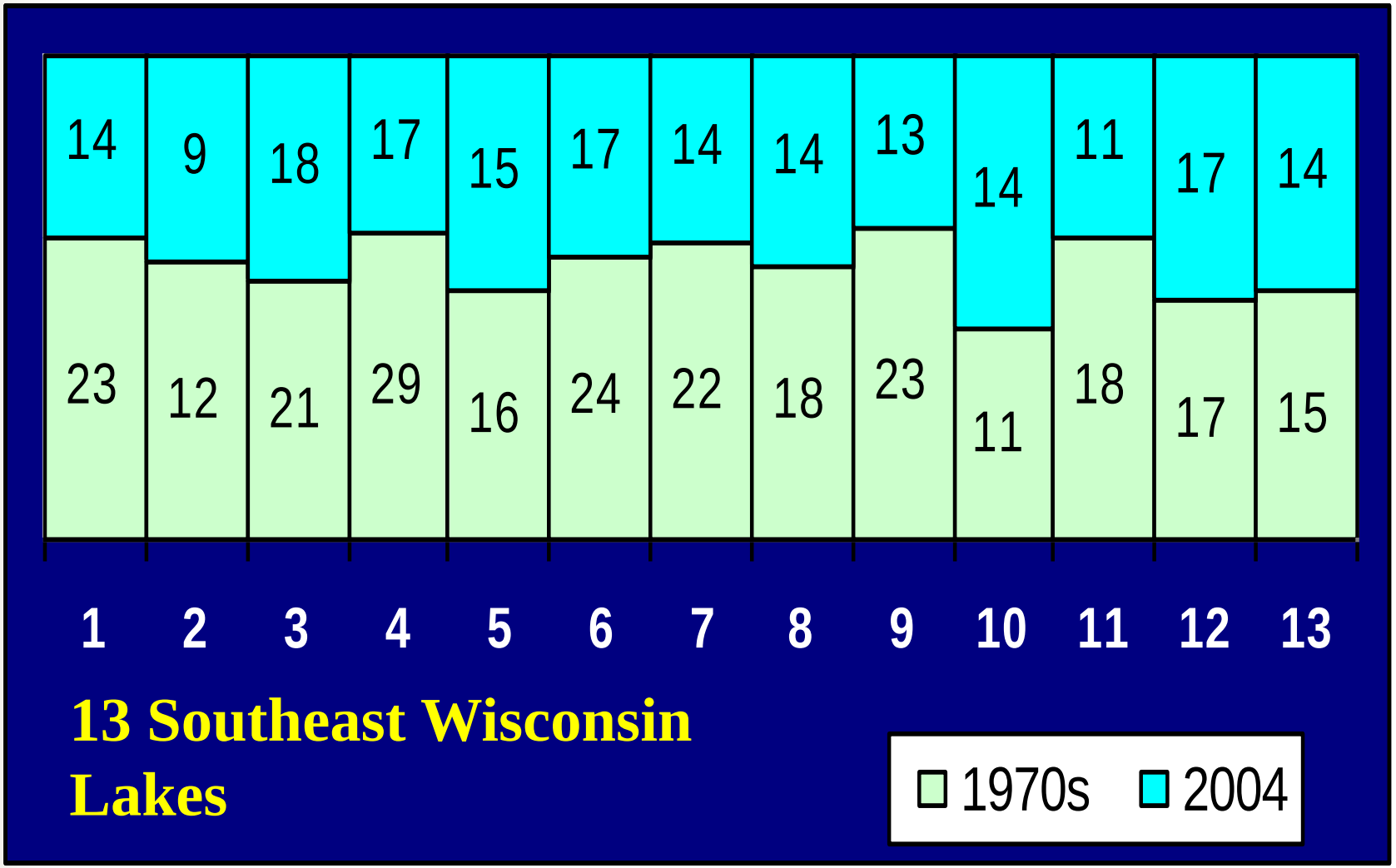
From Schindler et al. 2000

RECENT NEARSHORE FISH DECLINES IN SOUTHEAST WISCONSIN LAKES

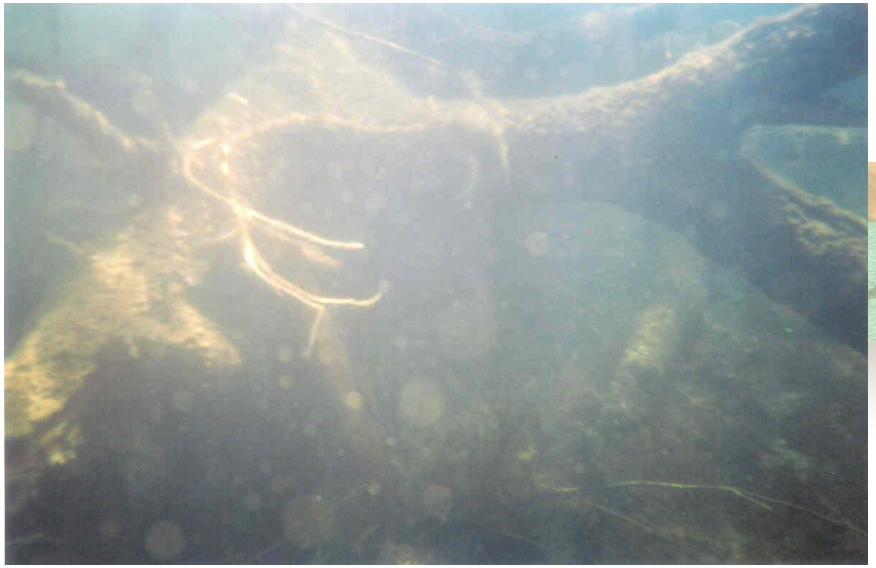
Tadpole madtom (*Noturus notatus)* - ~ 4”

John Lyons, Laura Stremick, Steve Galarneau, Will Wawrzyn and Dave Marshall

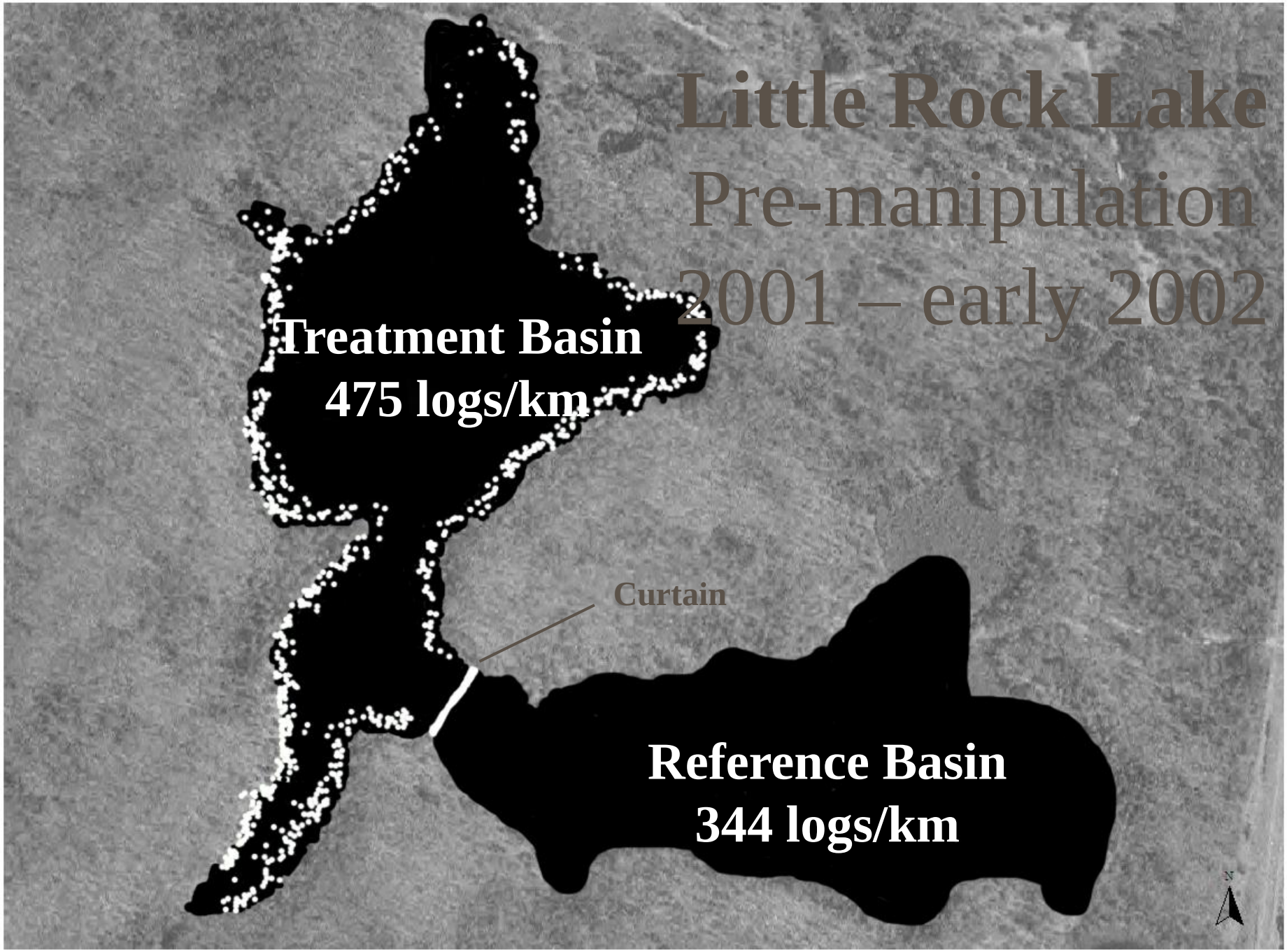
Seining Survey Results: Species Richness

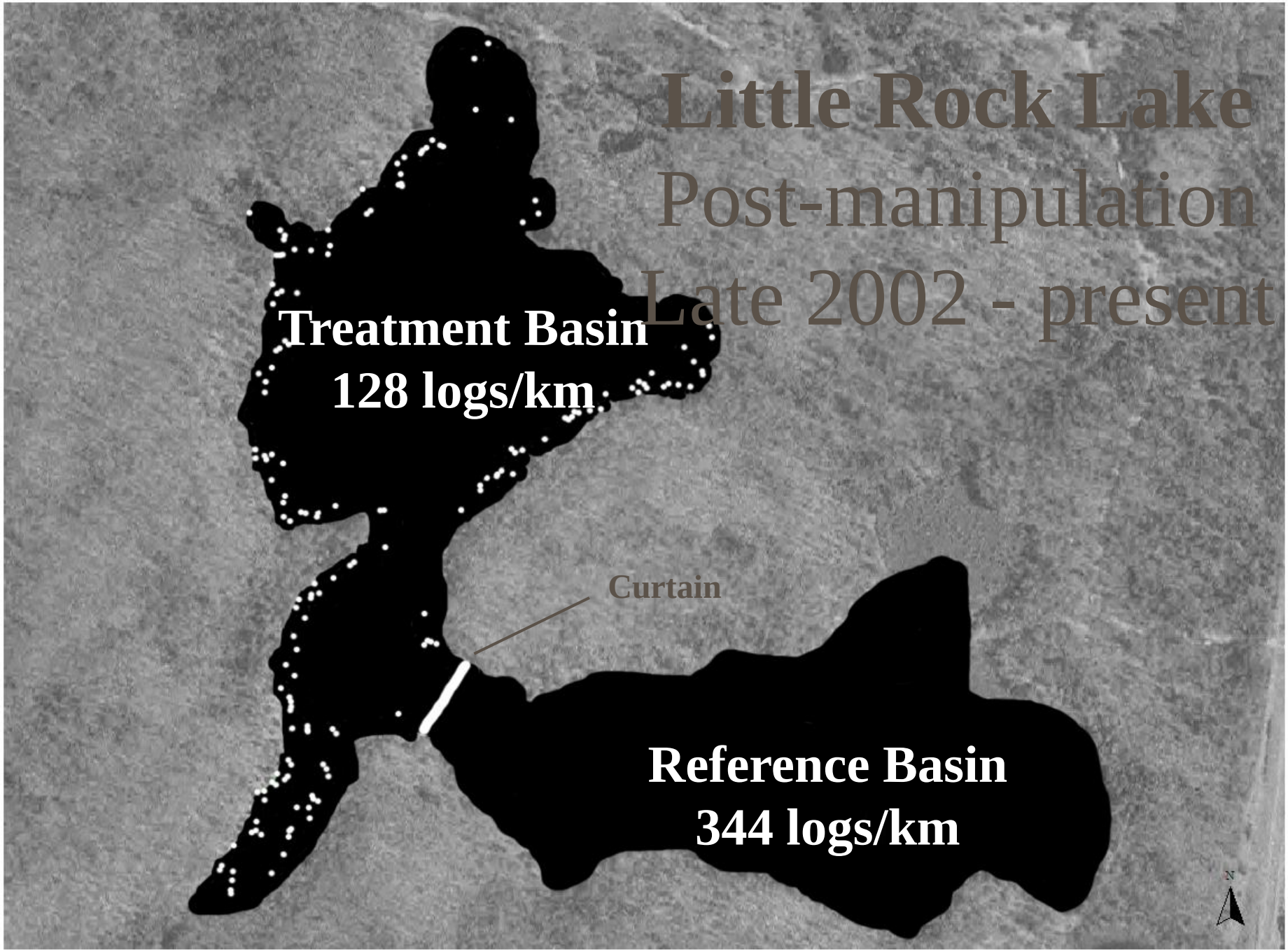


Fish Community Responses to a Whole-lake Removal of Coarse Woody Habitat

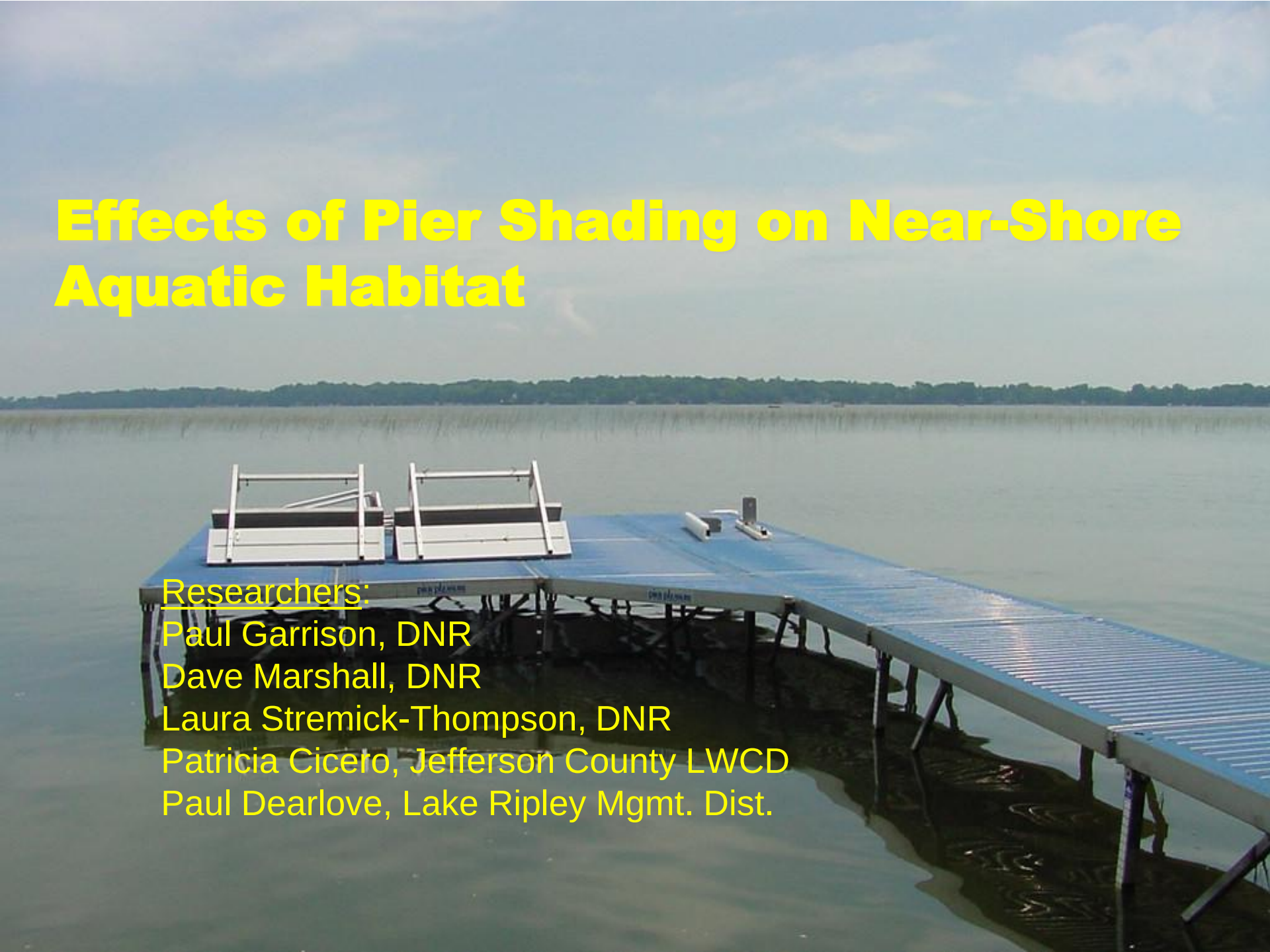


Greg G. Sass, James F. Kitchell, and Stephen R. Carpenter
Center for Limnology
University of Wisconsin - Madison


Little Rock Lake
Pre-manipulation
2001 – early 2002
Treatment Basin
475 logs/km
Curtain
Reference Basin
344 logs/km
N


Little Rock Lake
Post-manipulation
Late 2002 - present
Treatment Basin
128 logs/km
Curtain
Reference Basin
344 logs/km
N

Effects of Pier Shading on Near-Shore Aquatic Habitat



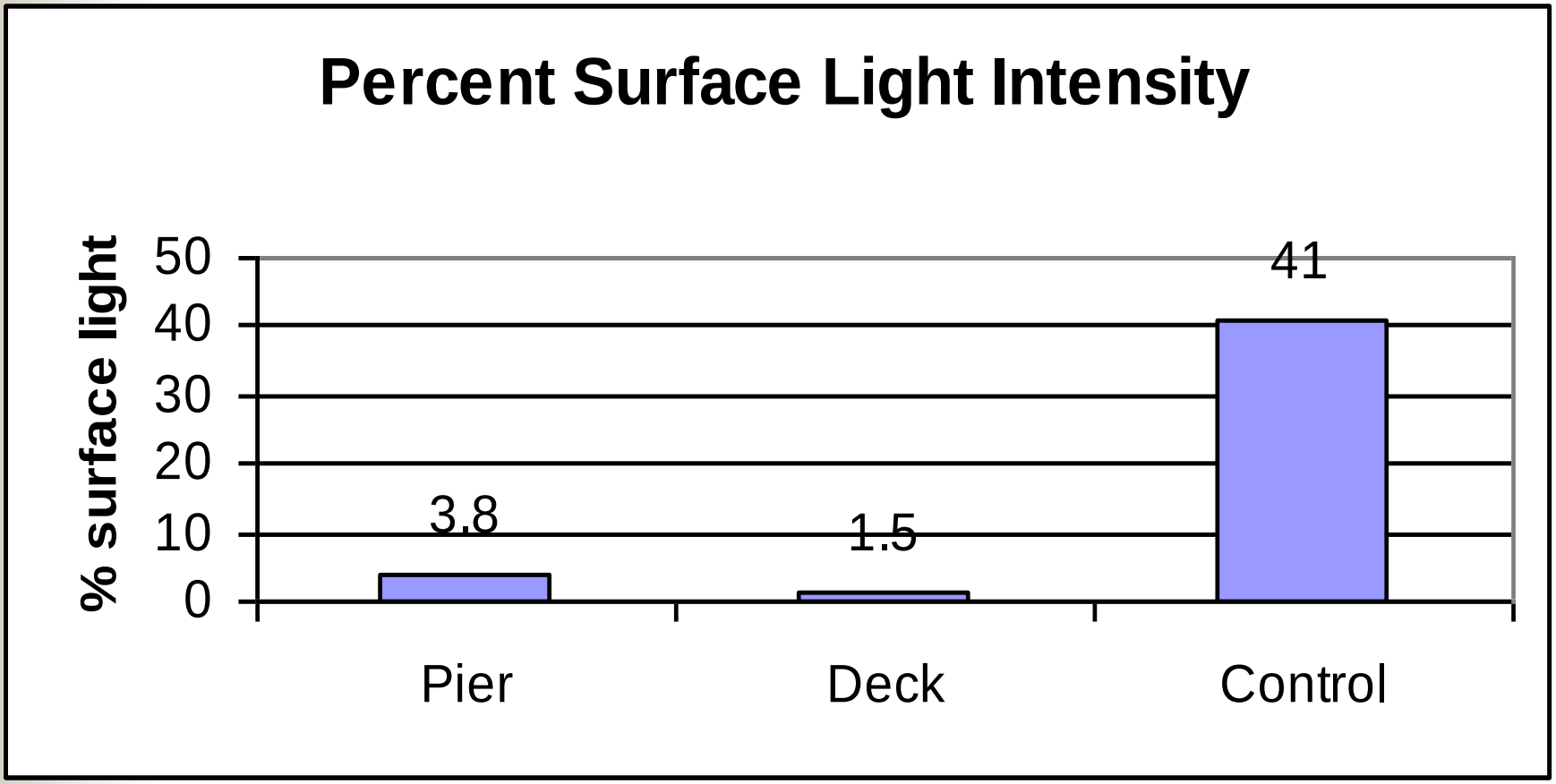
Researchers:
Paul Garrison, DNR
Dave Marshall, DNR
Laura Stremick-Thompson, DNR
Patricia Cicero, Jefferson County LWCD
Paul Dearlove, Lake Ripley Mgmt. Dist.

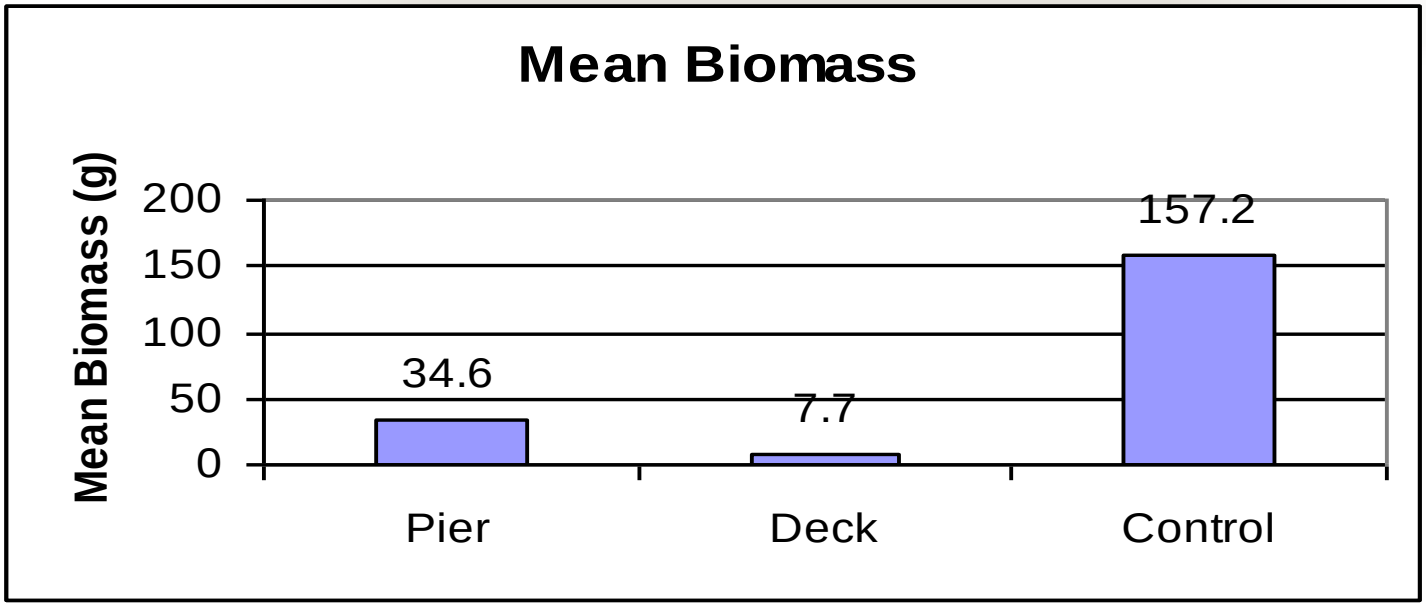
Existing Research

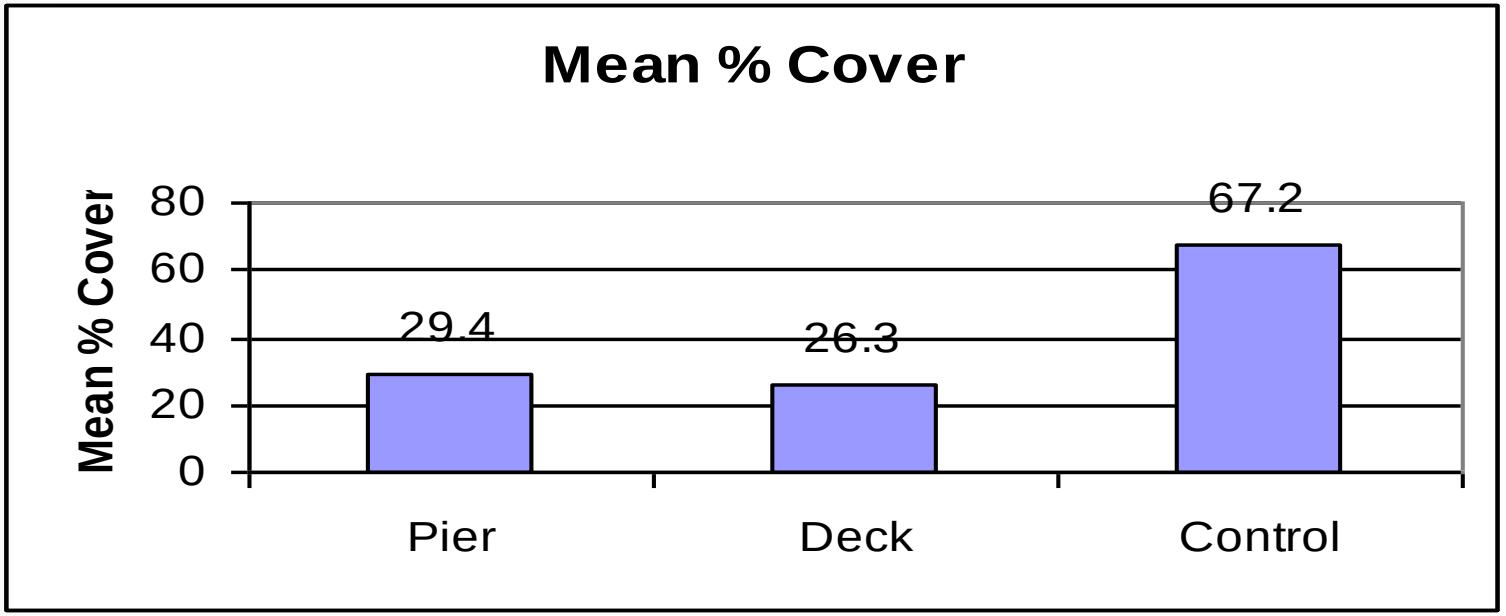
- Piers have both a site specific and cumulative effect on near-shore plant communities and their habitat functions (Engel and Pederson 1998, Bryan and Scarnecchia 1992, Myer et al 1997, Jennings et al 2003)
- Piers linked to declines in emergent and floating-leaf plants, and fish growth rates (Radomski 2001, Schindler et al)
- Piers alter plant habitat by inhibiting photosynthesis (Engel and Pederson 1998, Loflin 1995, Burdick and Short 1999, Shafter 1999)

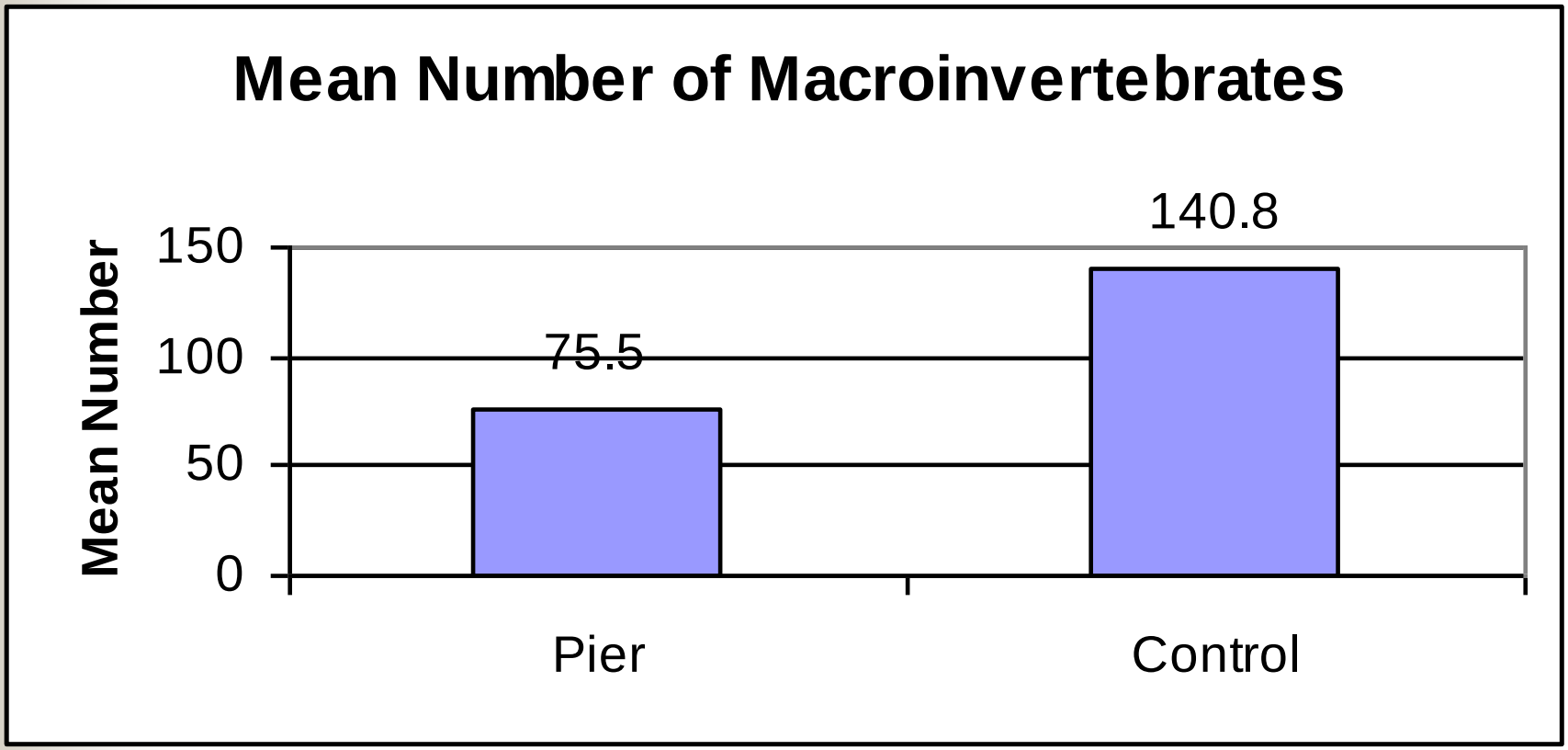
Study Overview

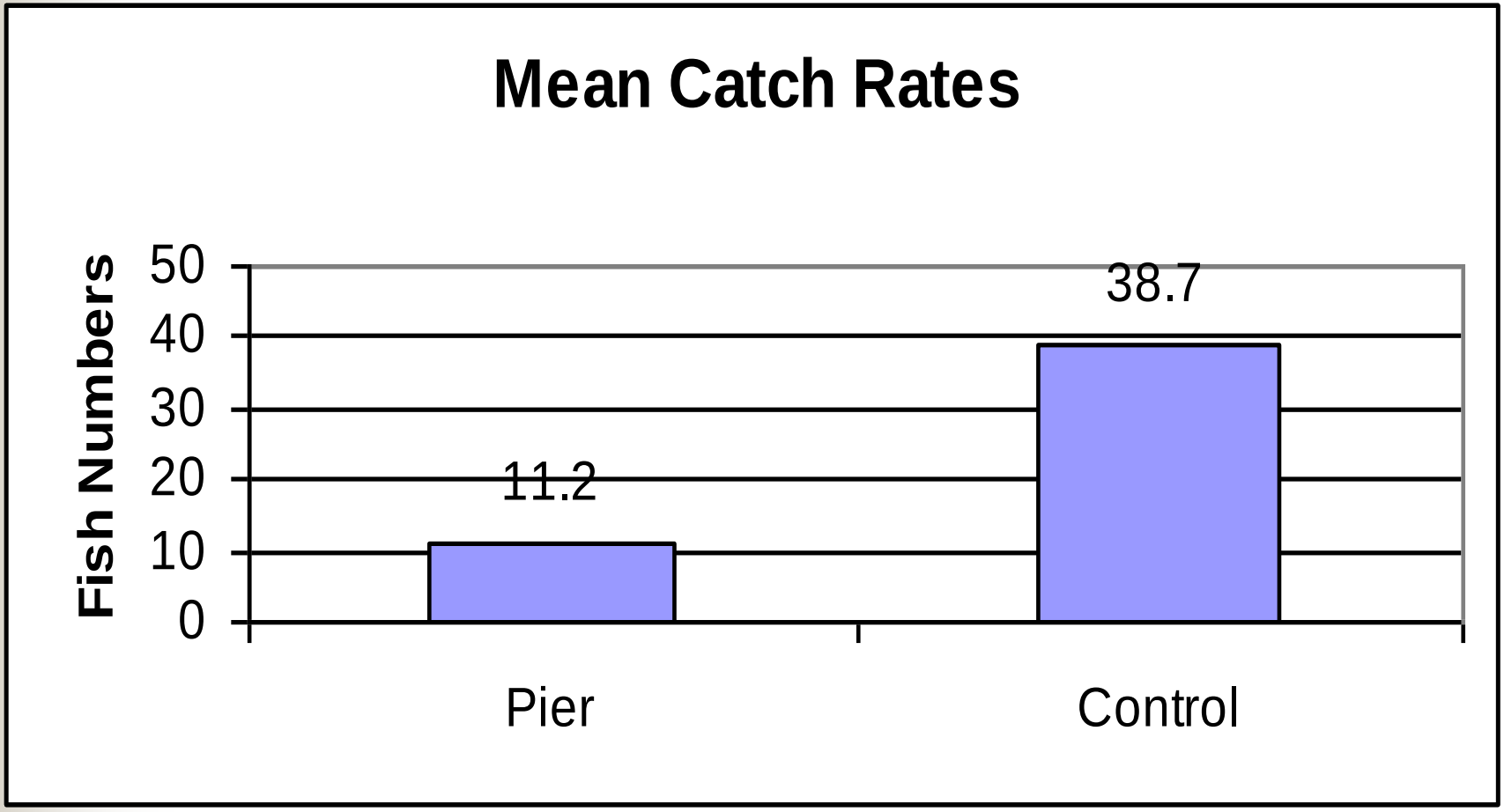
- Evaluated direct and indirect ecological effects of pier shading.
- Measured under piers and nearby control sites:
  - Aquatic Plants
  - Macroinvertebrates
  - Juvenile and small non-game fish


Percent Surface Light Intensity
% surface light
50
40
30
20
10
0
3.8
1.5
41
Pier
Deck
Control


Mean Biomass
Mean Biomass (g)
200
150
100
50
0
34.6
7.7
157.2
Pier
Deck
Control


Mean % Cover
Mean % Cover
80
60
40
20
0
29.4
26.3
67.2
Pier
Deck
Control


Mean Number of Macroinvertebrates
Mean Number
150
100
50
0
75.5
140.8
Pier
Control


Mean Catch Rates
Fish Numbers
50
40
30
20
10
0
11.2
38.7
Pier
Control

History of Zoning: How it Started

- Earliest origins trace back to Germany and France in the 19th Century
- Developed to manage relatively dense populations

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- In the 1910s, officials in New York City utilized the German zoning example to develop urban zoning codes

History of Zoning: How it Started

- Earliest origins trace back to Germany and France in the 19th Century
- Developed to manage relatively dense populations
- In the 1910s, officials in New York City utilized the German zoning example to develop urban zoning codes
- Thus, zoning had a “reactionary” and highly urban origin in the U.S.

History of Zoning: It's Wild Success

- Zoning swept the nation; by the end of the 1920's most cities were zoned
- Milwaukee County sought legislative approval for county-wide zoning in 1925 to better manage "unregulated expansion of commerce and industry into the countryside, destroying nearby residential values."

Why Euclidean???

- VILLAGE OF EUCLID ET AL. v. AMBLER REALTY COMPANY (1926)

"If the validity of the legislative classification for zoning purposes be fairly debatable, the legislative judgment must be allowed to control."

History of Zoning: Zoning Moves to the Country

- As the 1920's came to a close in Wisconsin, the UW Extension and others sought solutions to the problems of the cutover

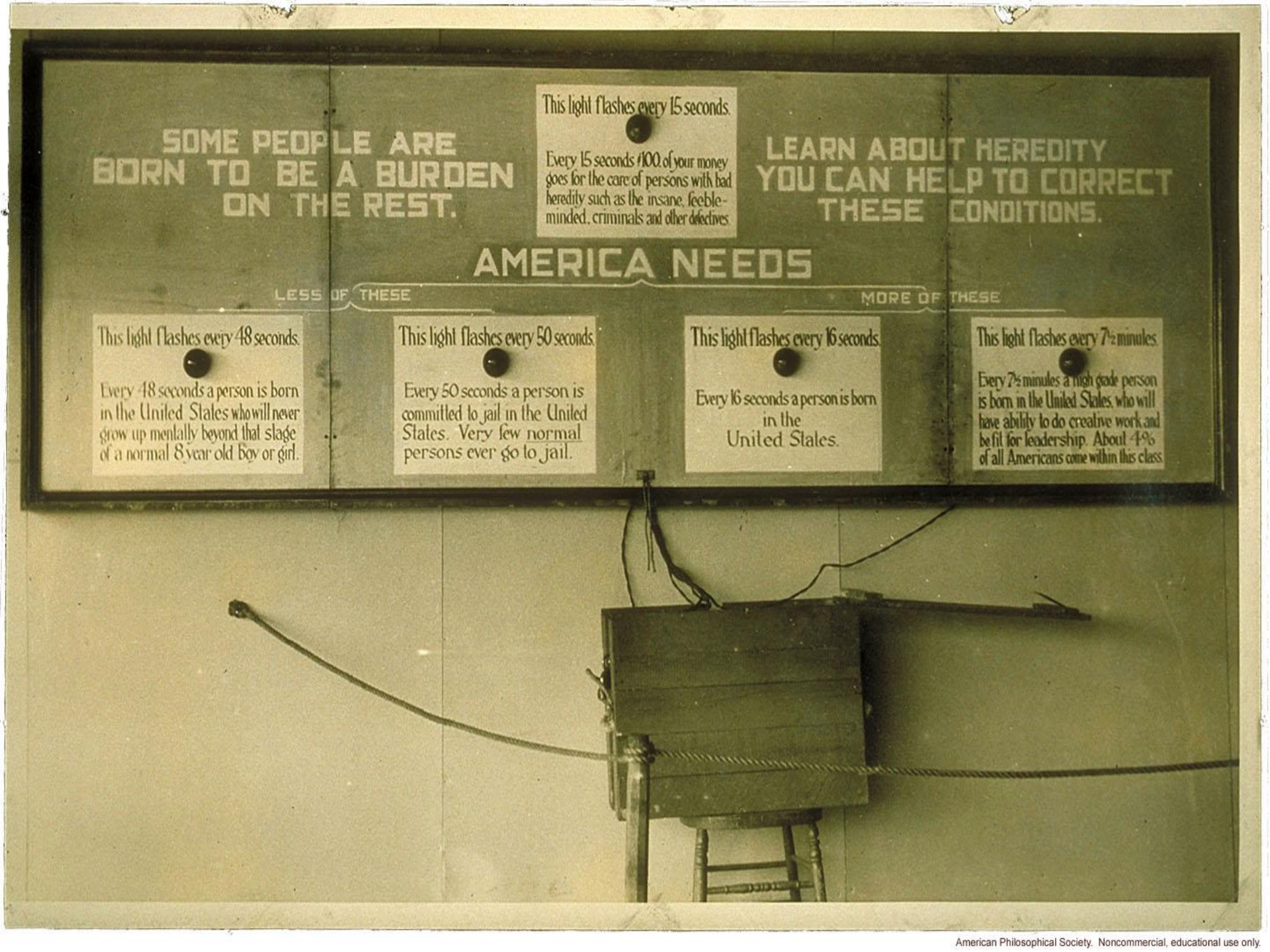
"Timber living and dead, inextricably intermingled . . ."


SAFETY WITH EXPLOSIVES
CAP CRIMPERS
HELP
PREVENT ACCIDENTS
USE THEM ALWAYS TO:
CRIMP CAPS. PUNCH HOLE
IN CARTRIDGE FOR CAP.
CUT FUSE SQUARE & CLEAN.
PYROTOL PETE
HAS SOME
AT COST.
FUSE PROTECTS
IF USED RIGHT
"NO NEED TO RUN IF
YOU USE ENOUGH"
PYROTOL PETE
SAYS:
CRIMP CAPS WITH CRIMPER.
LEARN TO LIGHT FUSE.
KEEP AWAY FROM MISFIRES.
MAKE THESE THINGS
A HABIT!
THIS IS THE "CREED" OF
WISCONSIN'S BEST BLASTERS.
KNOWLEDGE HAS
DRIVEN BLACK MAGIC
OUT OF EXPLOSIVES
PROPERLY USED THEY'RE SAFE
EXPLOSIVES
FURNISH
SAFE POWER
FOR
INDUSTRY &
DEP'T. OF AGRICULTURAL ENGINEERING - COLLEGE OF AGRICULTURE

Diemer Collection, College of Agriculture Library.

One less stump.

Farm Family with Copious Produce Marinette County, 1895



History of Zoning: Zoning Moves to the Country

- As the 1920's came to a close in Wisconsin, the UW Extension and others sought solutions to the problems of the cutover
- 1929, the Legislature amended the county zoning statutes to permit all counties to zone
- 1931 Attorney General opinion on the constitutionality of county zoning…

History of Zoning: Zoning Moves to the Country

"The county zoning ordinance is undoubtedly in the public welfare. The cut-over areas of northern Wisconsin speak as eloquently against haphazard development as any city condition…"

History of Zoning: Zoning Moves to the Country

- Rural zoning was “smart growth” ahead of its time (fiscally motivated)
- Three zones were allowed: farming, forestry, and “recreation”
- Zoning was only one part of a suite of efforts meant to deal with scattered settlement

History of Zoning: Where's the Plan?

- When the SZEA was created in the 1920s, there was no clear understanding of what "in accordance with a comprehensive plan" meant
- The Standard City Planning Enabling Act was passed two years after SZEA

History of Zoning: Where's the Plan?

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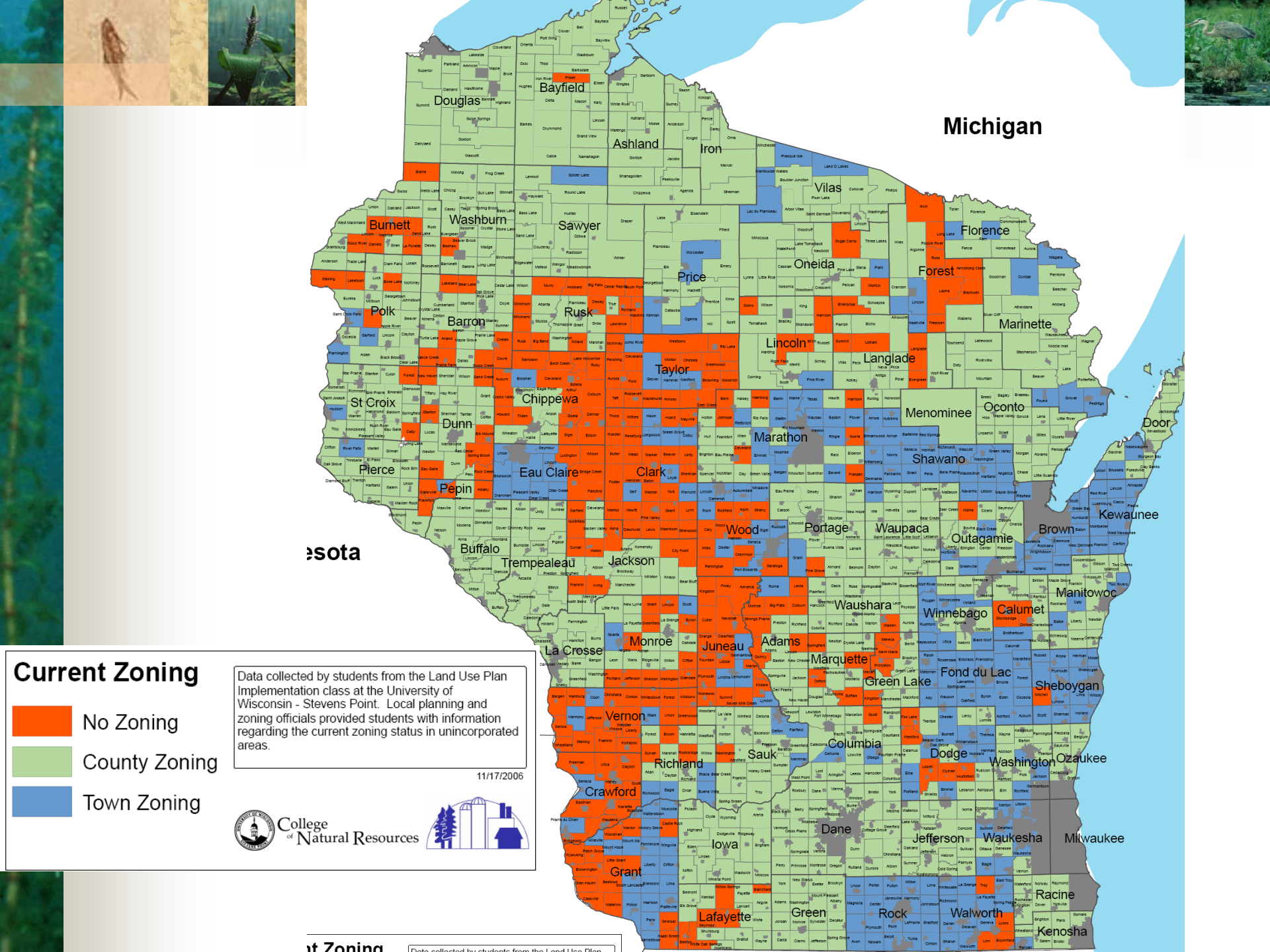
History of Zoning: Where's the Plan?

- Zoning tended to be "map based", much like orthogonal planning
- Planning, however, was evolving into something different than "city beautiful" sketches and street designs



Current Zoning

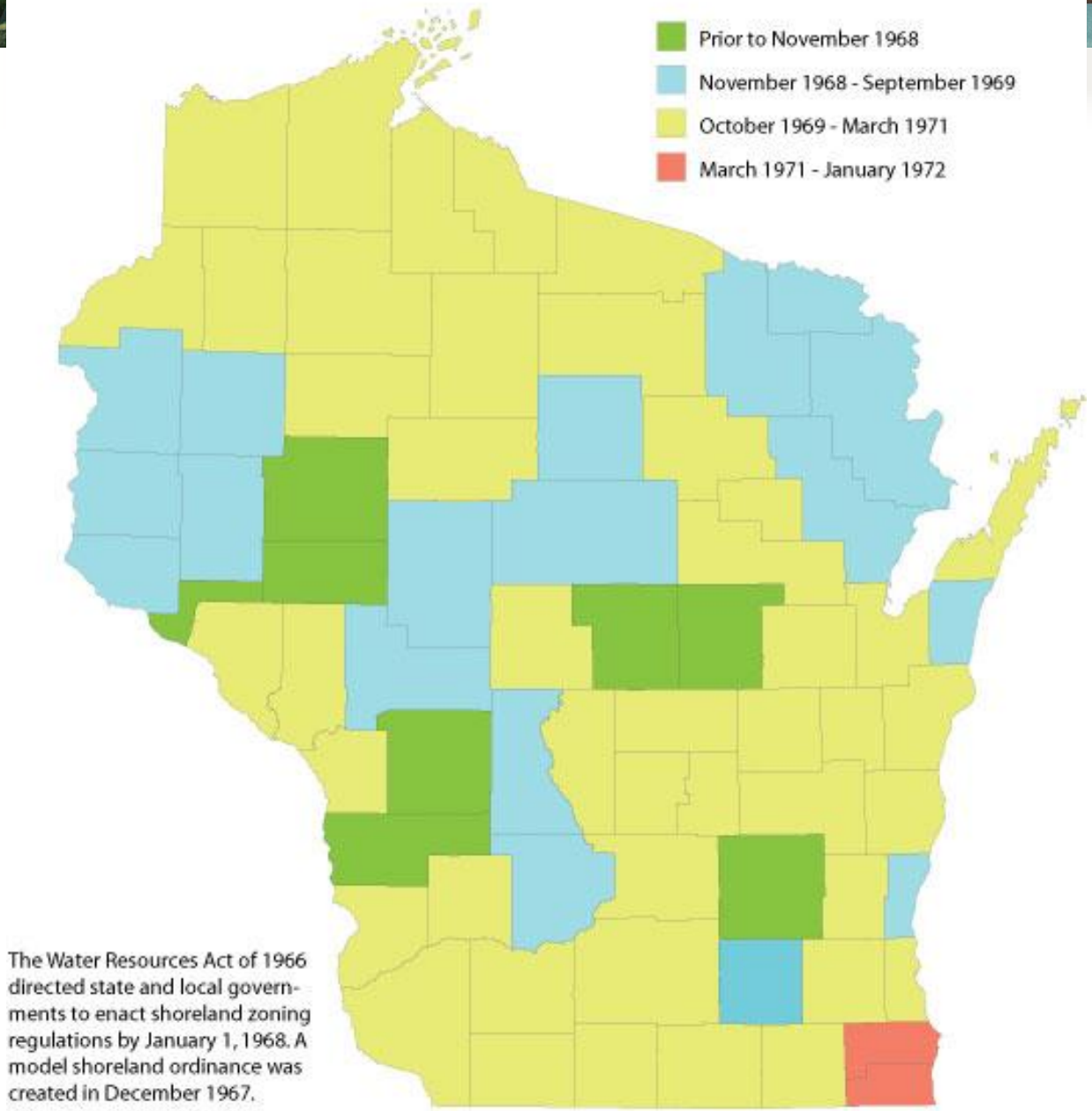
- No Zoning
- County Zoning
- Town Zoning

Data collected by students from the Land Use Plan Implementation class at the University of Wisconsin - Stevens Point. Local planning and zoning officials provided students with information regarding the current zoning status in unincorporated areas.

11/17/2006

College of Natural Resources

County Adoption of Original NR 115 Zoning Requirements



The Water Resources Act of 1966 directed state and local governments to enact shoreland zoning regulations by January 1, 1968. A model shoreland ordinance was created in December 1967.

Data from Witte (1970), Bosselman and Callies (1971) and Weber and Peroff (1977)

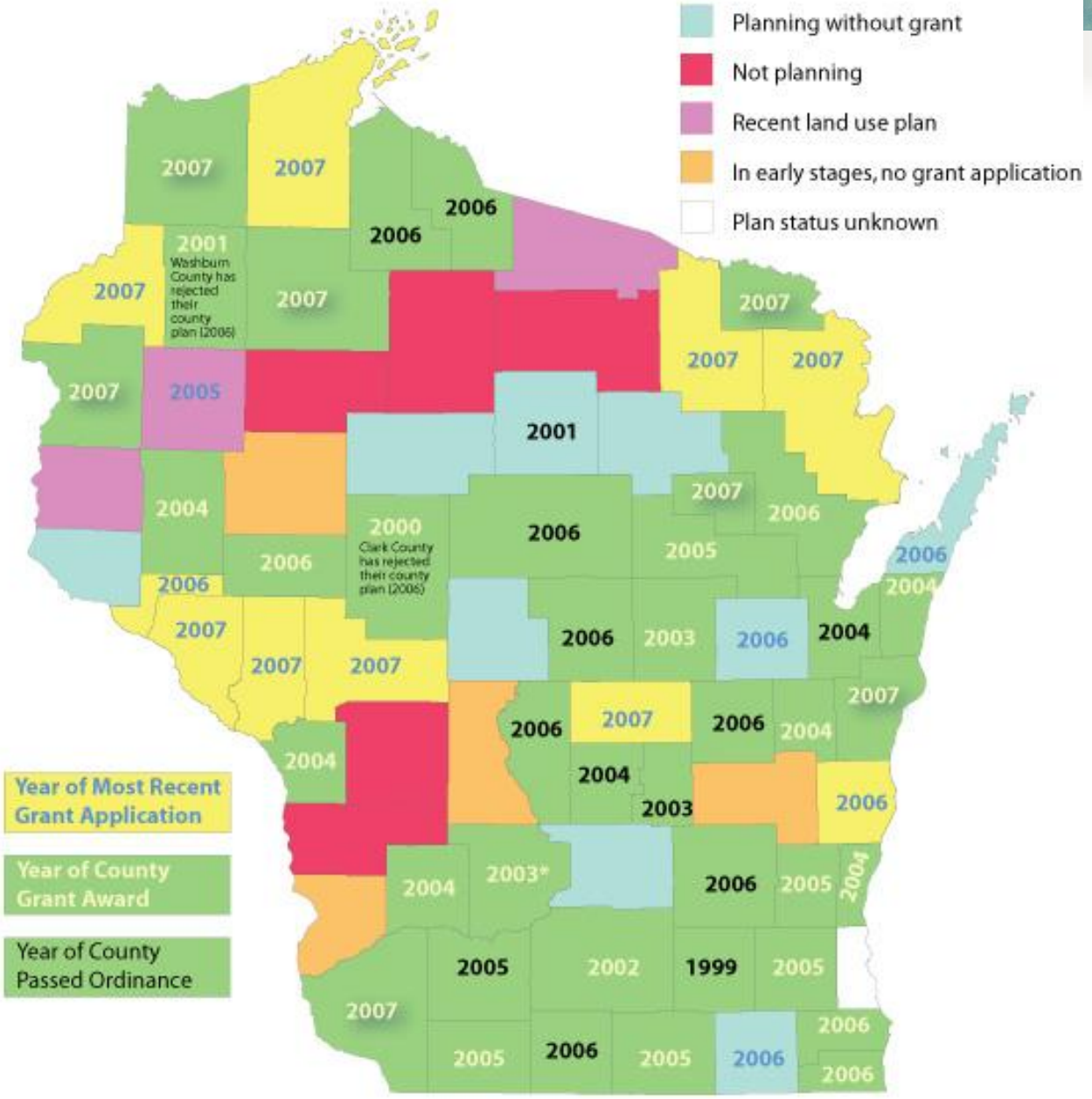
Zoning in the Modern Era (1970-present)

- The 1965 Wisconsin Water Resources act begets shoreland zoning and more
- For many counties, NR115 awoke the zoning giant who had slumbered since WWII
- The pace and scale of shoreland development (and associated prices) was rather unprecedented in rural WI

HARMONY GROVE, COLUMBIA COUNTY (LAKE WISCONSIN)

County-level Plan Status Spring 2007

Updated April 2, 2007



* Sauk County is coordinating multiple grant-funded municipal planning efforts that will likely lead to a county comprehensive plan

Zoning in the Modern Era (1970-present)

"In accordance with a comprehensive plan" now is made more clear…

- Comprehensive plan is defined by statute (9 elements)
- Zoning and subdivision regulations must be consistent with plan (@2010)
- Plans must be updated regularly and involve the public

Use This Information

Help Protect Wisconsin's…

WATER RESOURCES.