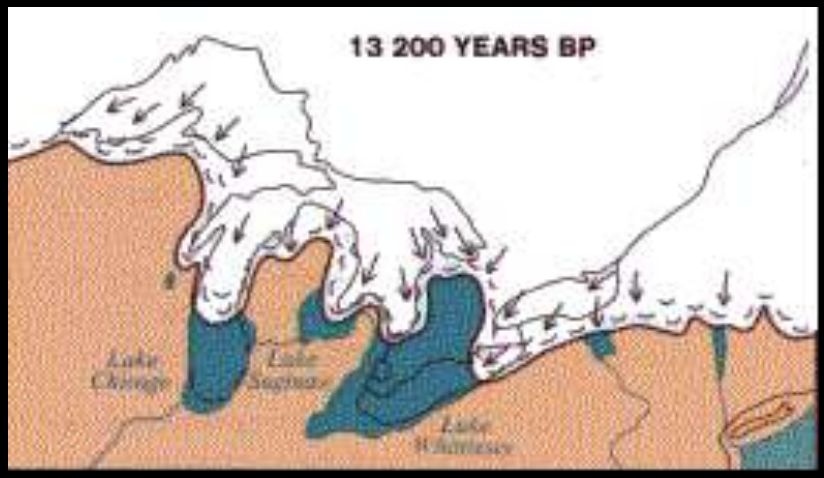
Wisconsin Lakes

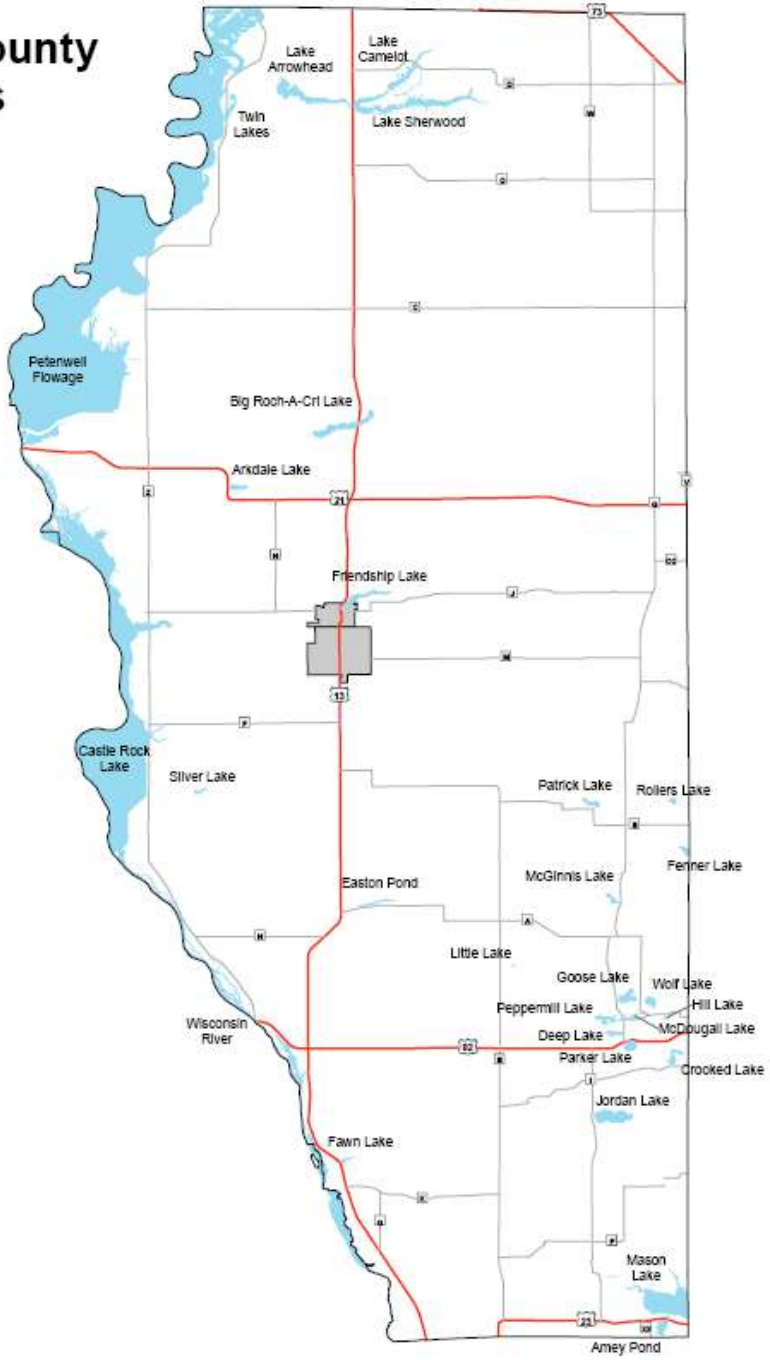
Wisconsin has the 3rd largest concentration of fresh water glacial lakes on the planet.

The Wisconsin Lakes Partnership

Wisconsin's Glacial Legacy



Adams County Lakes



Wisconsin's Lakes are Changing Faster than Ever:

Algae blooms
(phosphorus pollution)

Destruction of
shoreline habitat

Invading plants and animals

Steve Carpenter 2004

Lakes Provide Services

Ecosystem

Cultural

Recreational

Buffers Provide Services

- Natural Beauty
- Peace and Quiet
- Water Quality Protection
- Habitat

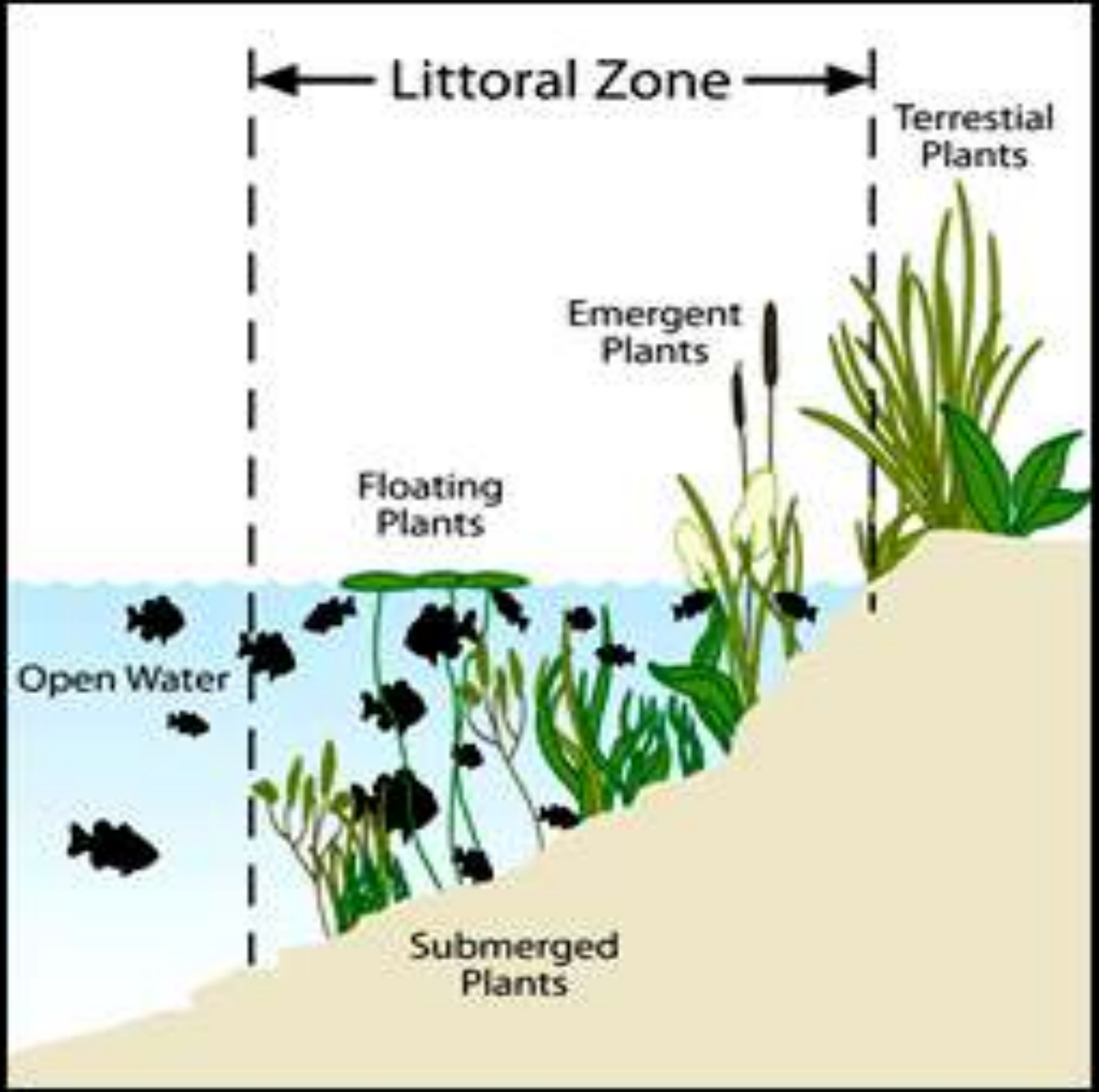
NATURAL BEAUTY
PEACE AND QUIET

Photos

Reesa Evans


WATER QUALITY PROTECTION


HABITAT
Crooked Lake
Reesa Evans


Littoral Zone
Terrestial Plants
Emergent Plants
Floating Plants
Open Water
Submerged Plants

General-development lake type

LAND USE AND WATERSHED IMPACTS

LIMITING NUTRIENT PRINCIPLE

…That Nutrient in Least Supply
Relative to Plant Needs

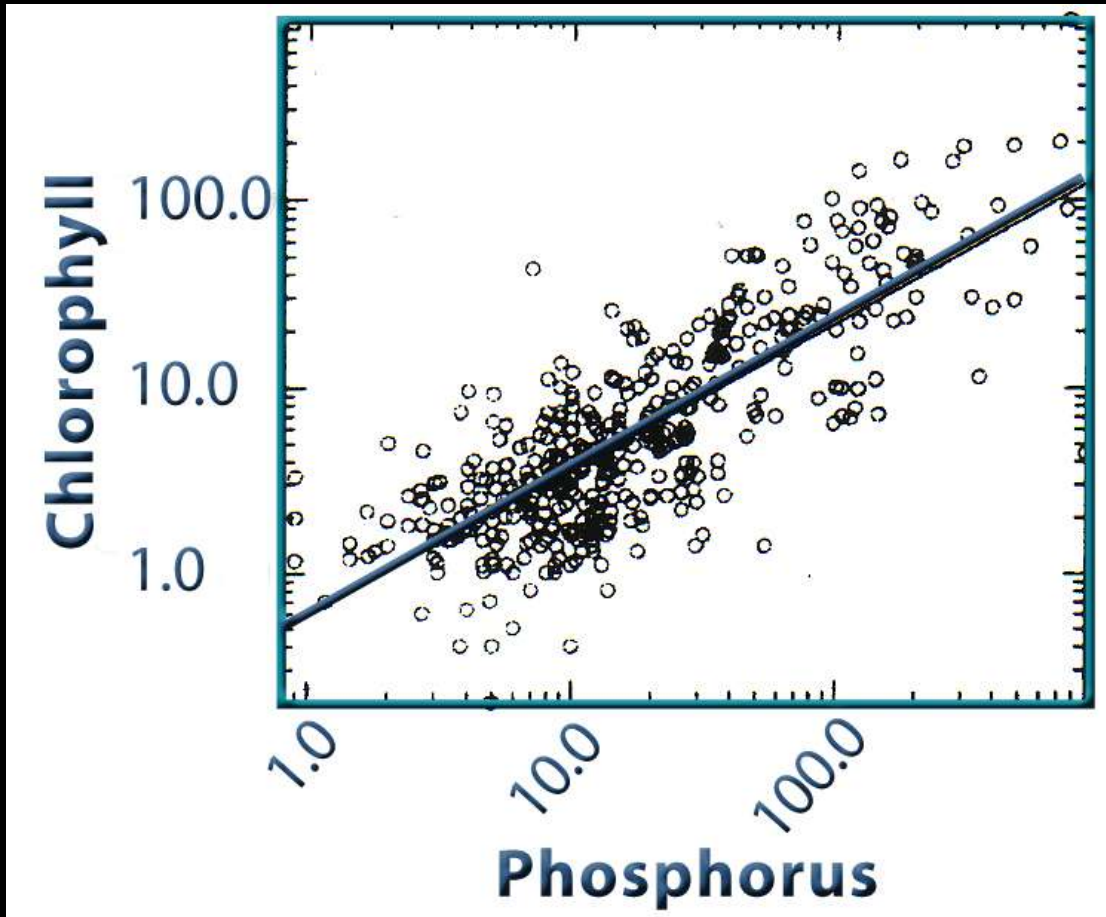
N:P Ratio in plant Tissue 10:1 - 15:1

If the Ratio of N:P in Water is
<10:1 Nitrogen Limited
>15:1 Phosphorus Limited

PHOSPHORUS LIMITATION LAKE 227

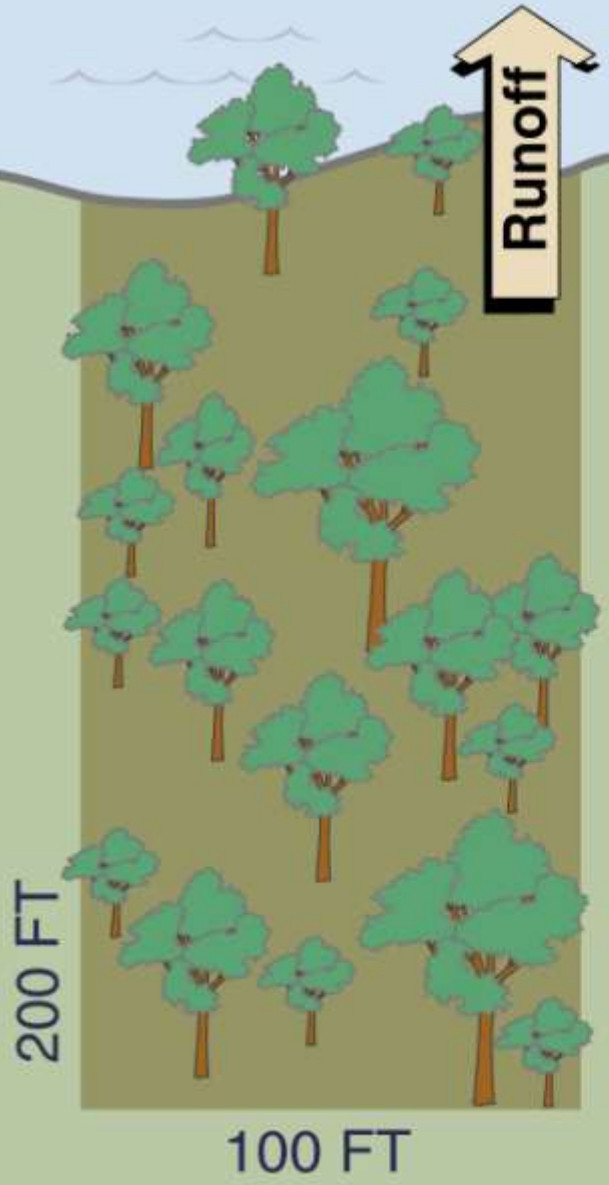
TOTAL PHOSPHORUS/ CHLOROPHYLL a RELATIONSHIP

- Phosphorus causes algae to grow



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

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



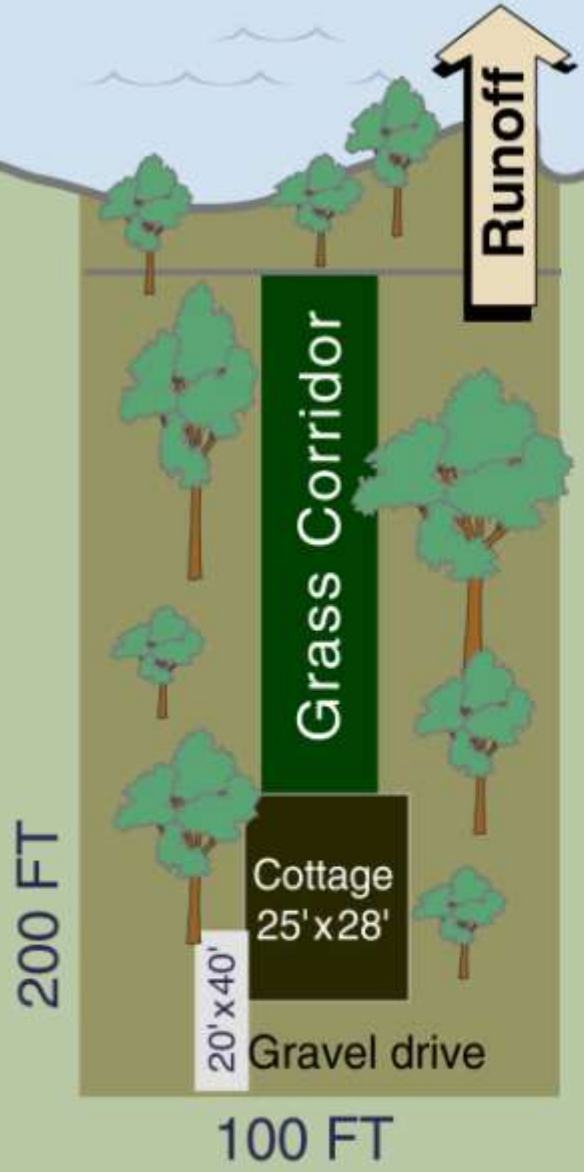
IMPACT ON LAKE
(April - Oct.)

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

Source: Wisconsin Dept. of Natural Resources

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

- maple-beech forest
- 6% slope to lake
- grass corridor 20'-wide
- cottage 700 ft² perimeter
- gravel drive 800 ft²
- 35'-wide buffer strip



IMPACT ON LAKE
(April - Oct.)

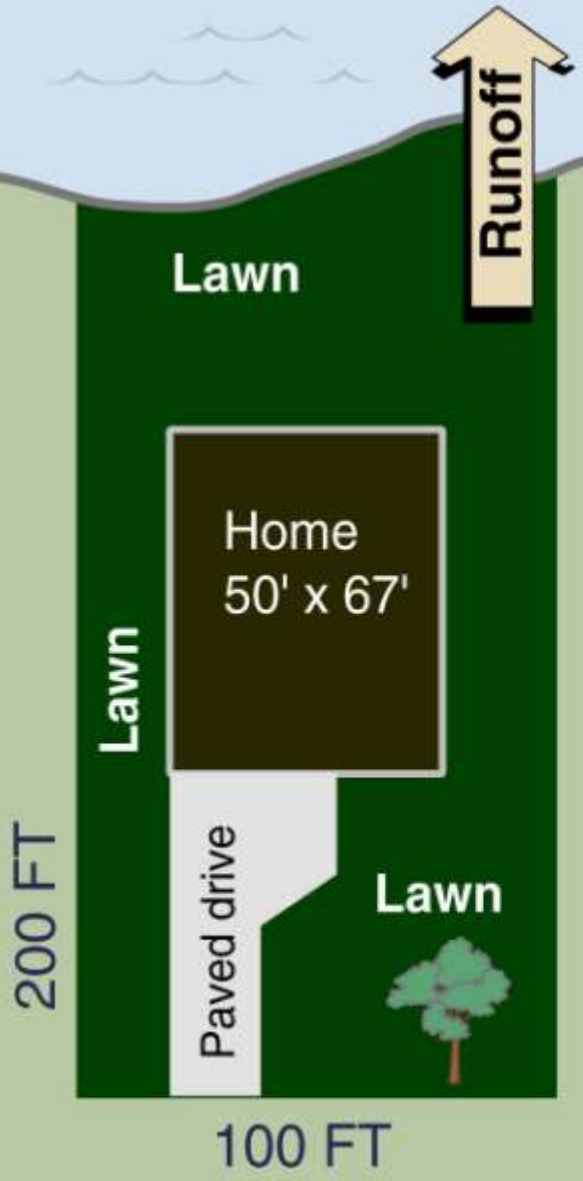
- 1,000 ft³ runoff to lake
- 0.03 lbs. phos. to lake
- 20 lbs. sediment to lake

Source: Wisconsin Dept. of Natural Resources


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

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

Lower Ninemile Lake

Pfefferkorn Residence, Butternut Lake

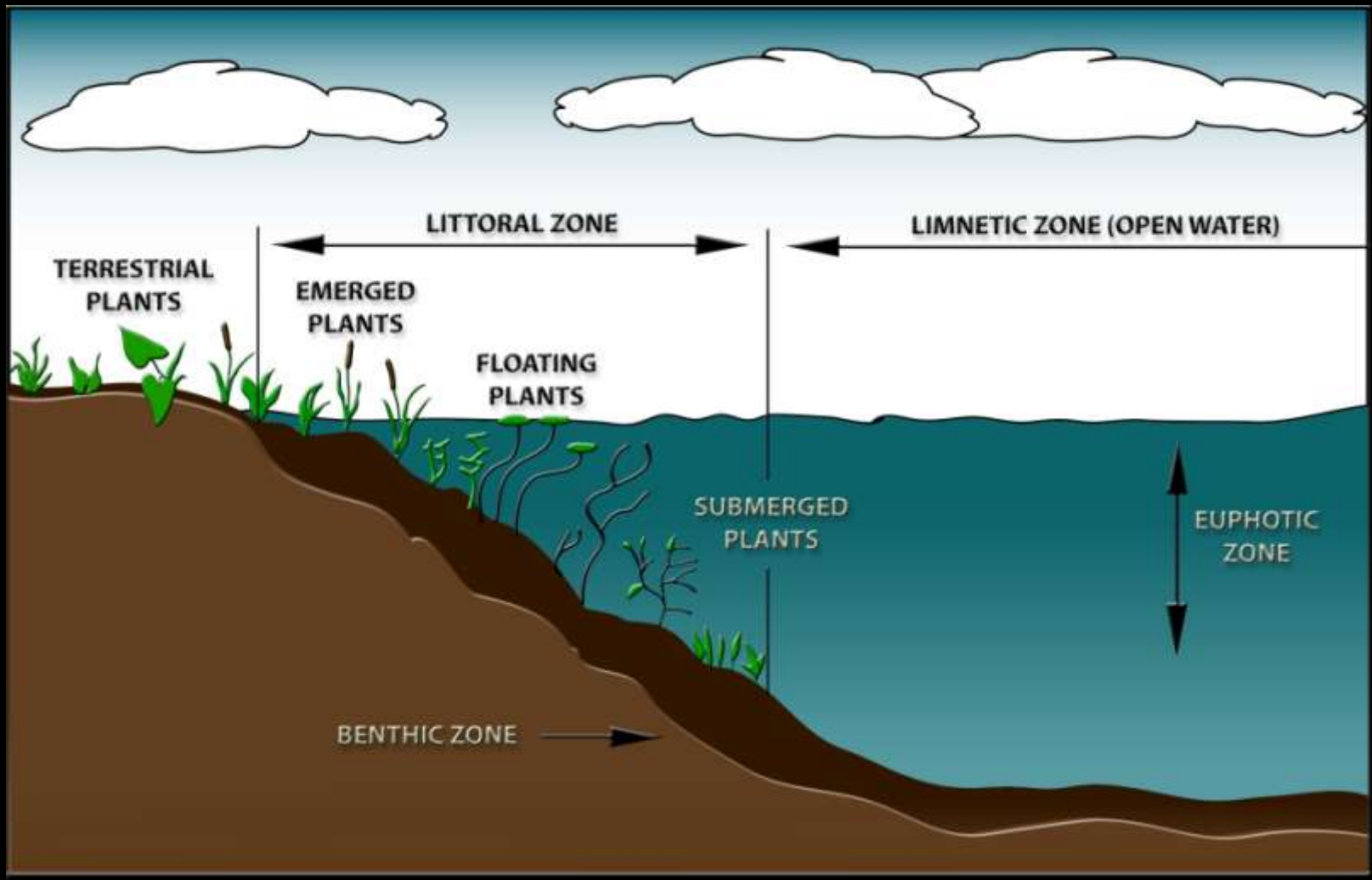
Comparison of Median Nutrient Yields with Past Studies (kg/ha/yr)

Citation	Landuse	TKN	T-P
King et.al.(2001)	Stream draining turf		0.33
Dennis (1996)	Residential		1.75
Rechow et.al.(1980)		5.5	1.1
Panuska,Lillie (1995)	Urban		0.52
Thomann (1987)	Urban	5.0	1.0
Panuska, WiLMS	Rural Res.		0.1
Rechhow et.al.(1980)	Residential	2.46	0.2
Barten (2001)	Lawn		
Our Study	**Lawn**	**0.16**	**0.025**

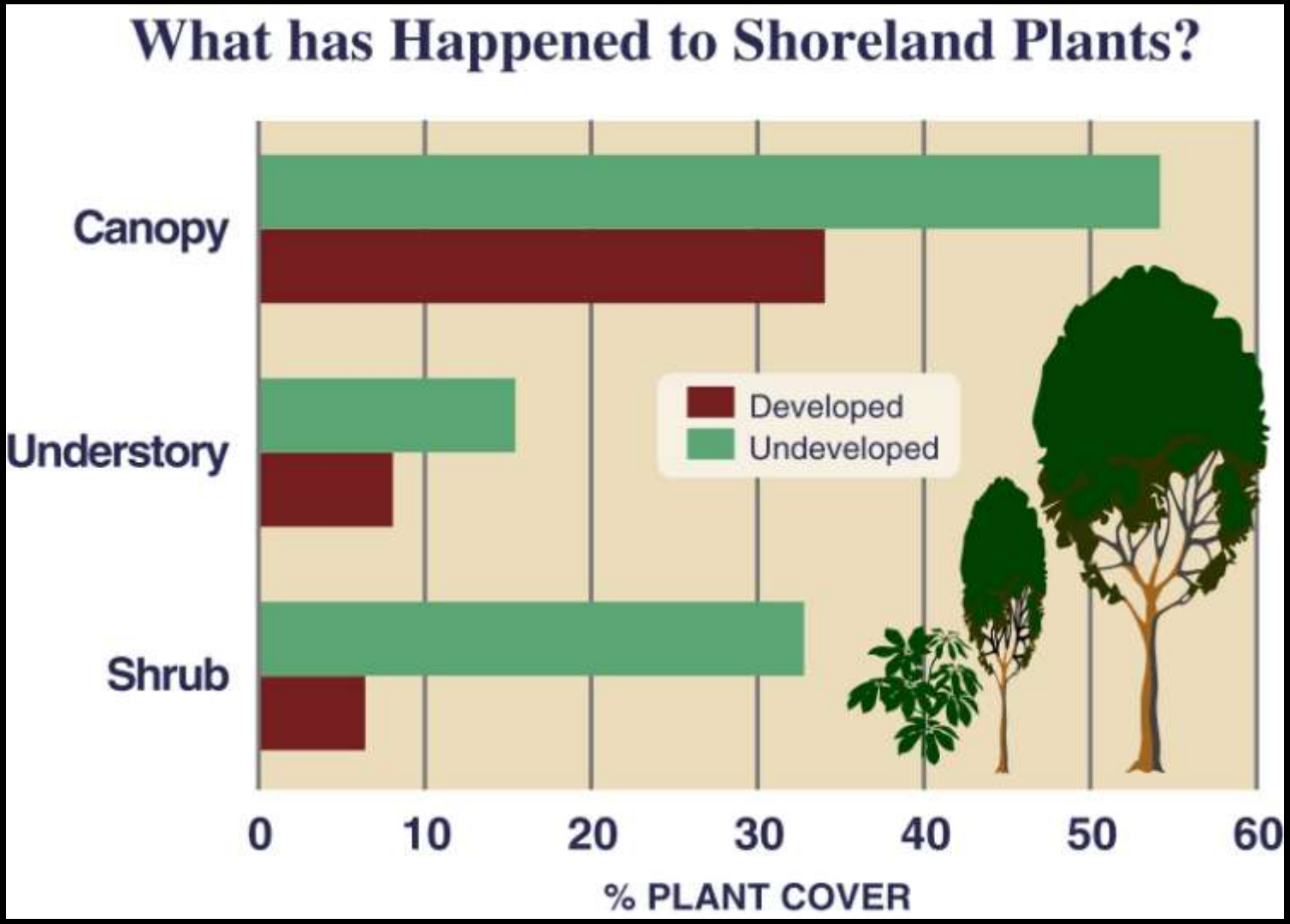
Panuska,Lillie (1995)	Forest		0.09
Thomann (1987)	Forest	3.0	0.4
Dennis (1996)	Forest		0.19
Panuska (WiLMS)	Forest		0.08
Our Study	**Forest**	**0.015**	**0.003**

Wisconsin Department of Natural Resources

LAKE HABITAT ZONES



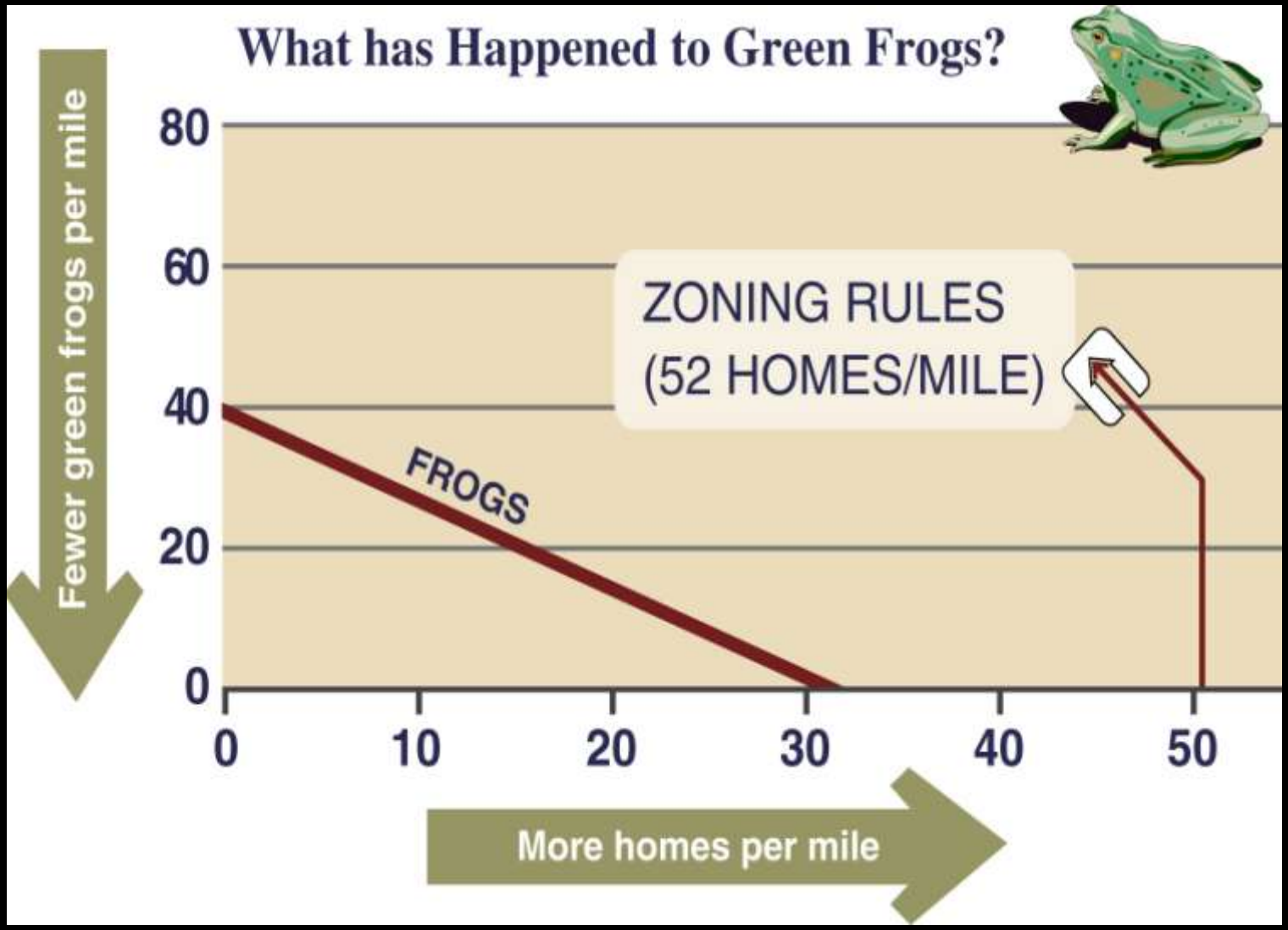
Shoreland plants trends



Source: Wisconsin Dept. of Natural Resources

The Wisconsin Lakes Partnership

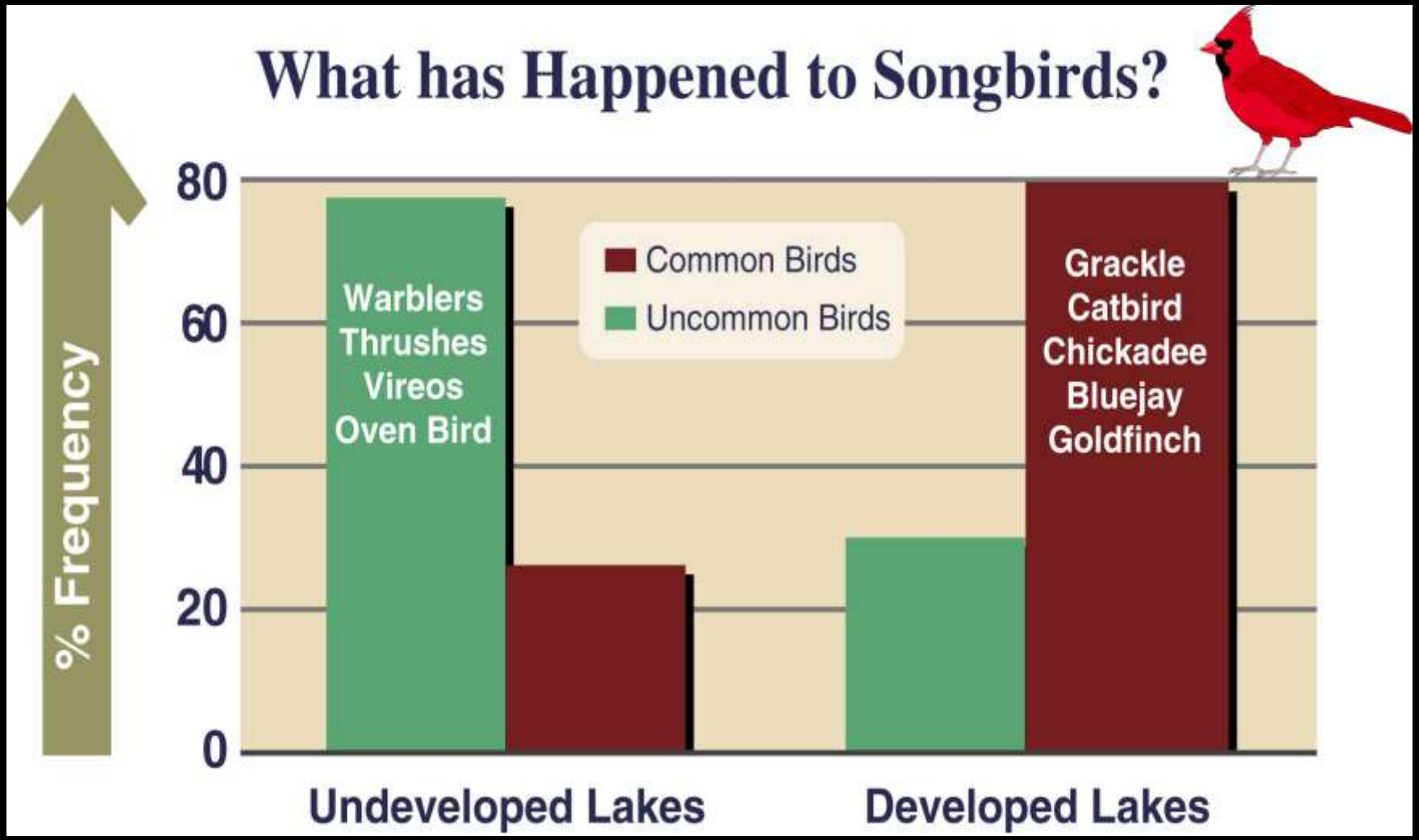
Shoreland green frog trends



Source: Wisconsin Dept. of Natural Resources

The Wisconsin Lakes Partnership

Shoreland bird trends

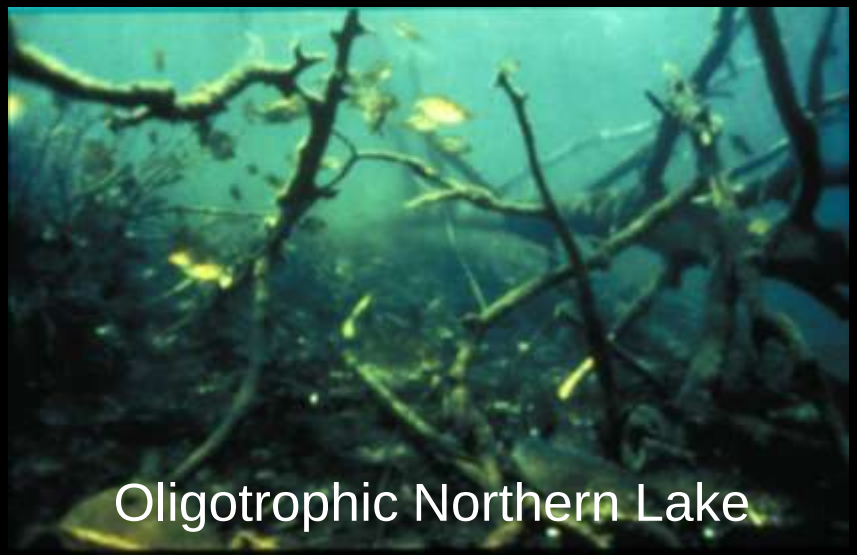


Source: Wisconsin Dept. of Natural Resources

The Wisconsin Lakes Partnership

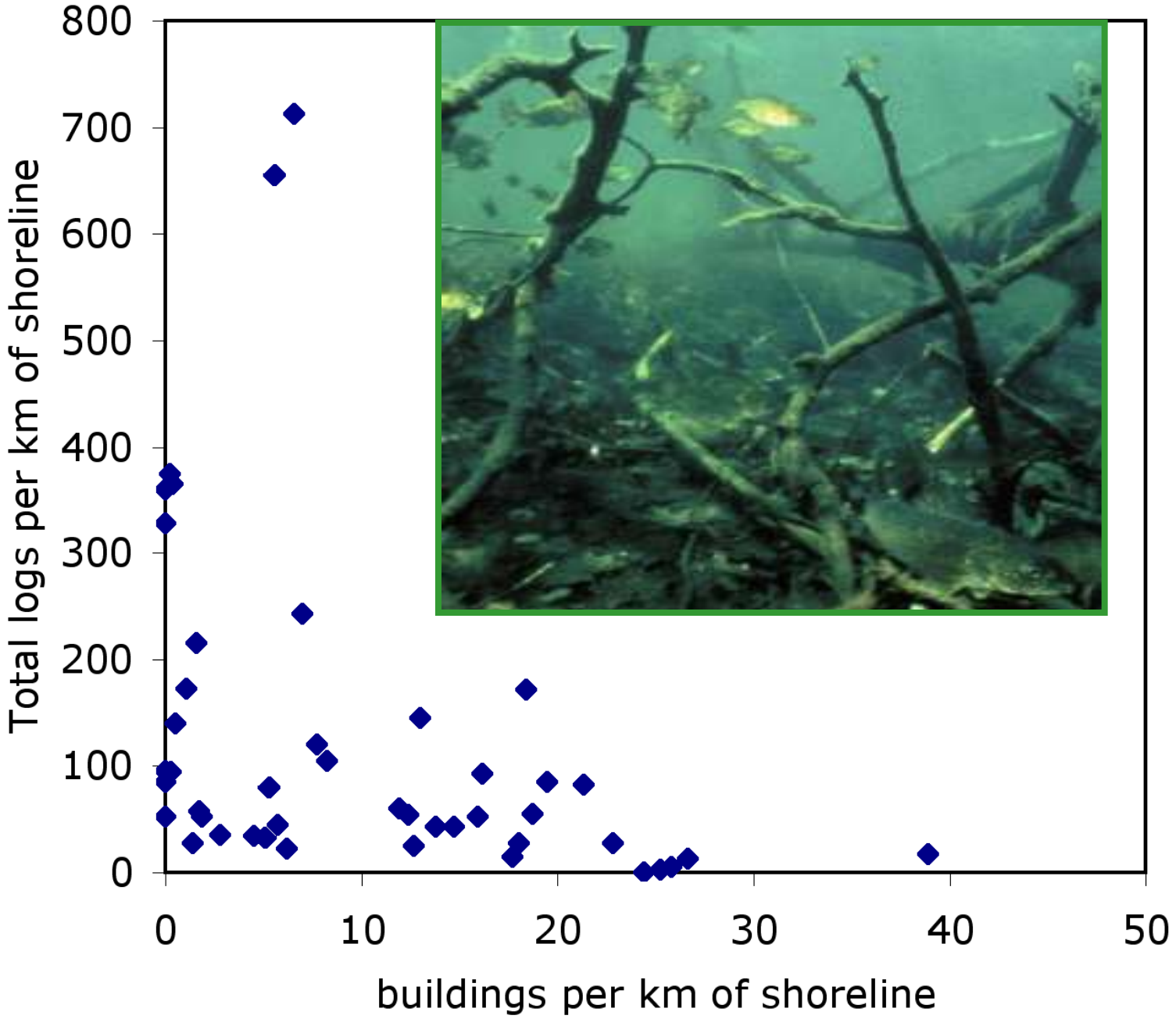
LAKE LITTORAL ZONE

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



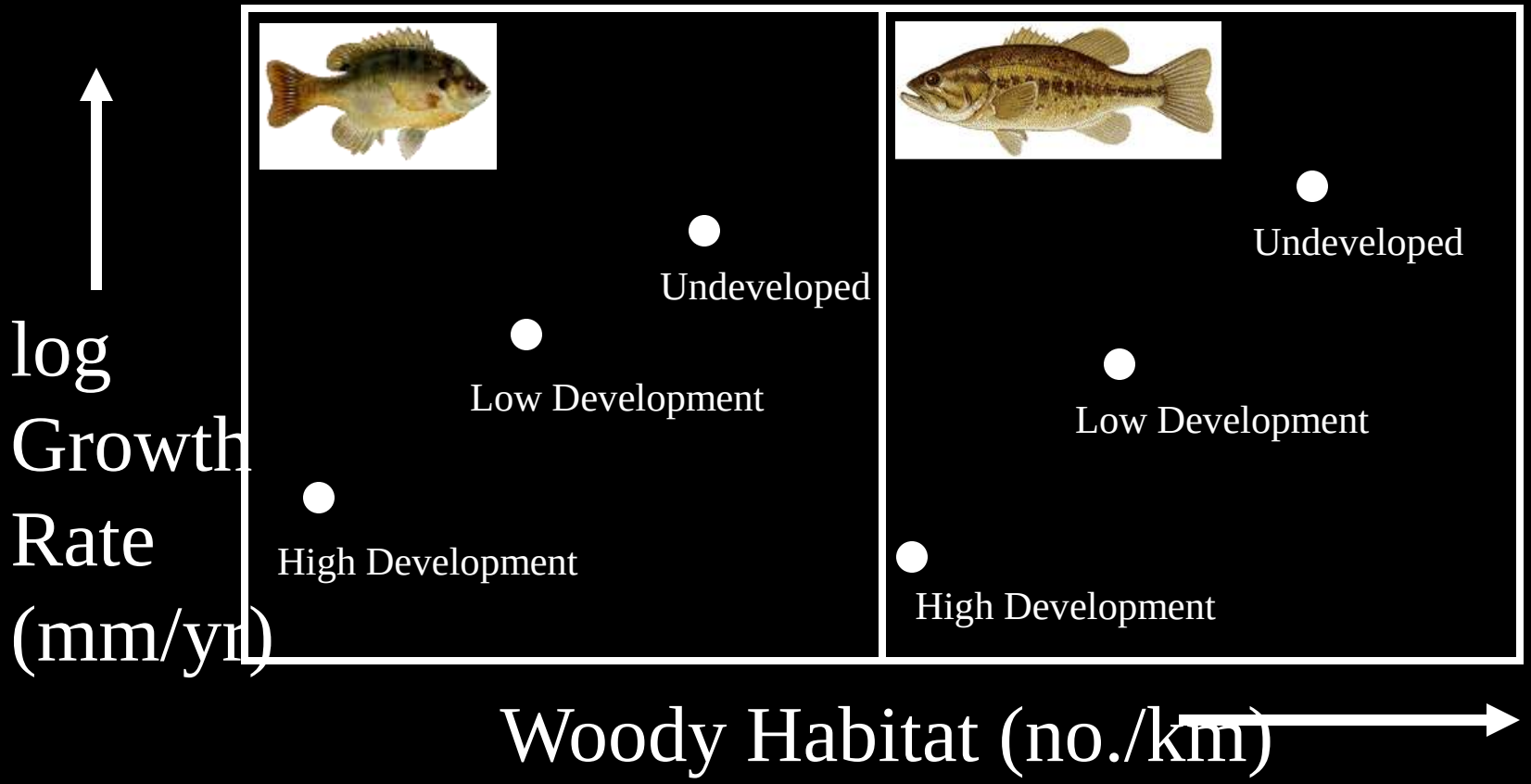
Oligotrophic Northern Lake

Eutrophic Southern Lake



Data: U.W. BioComplexity project

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



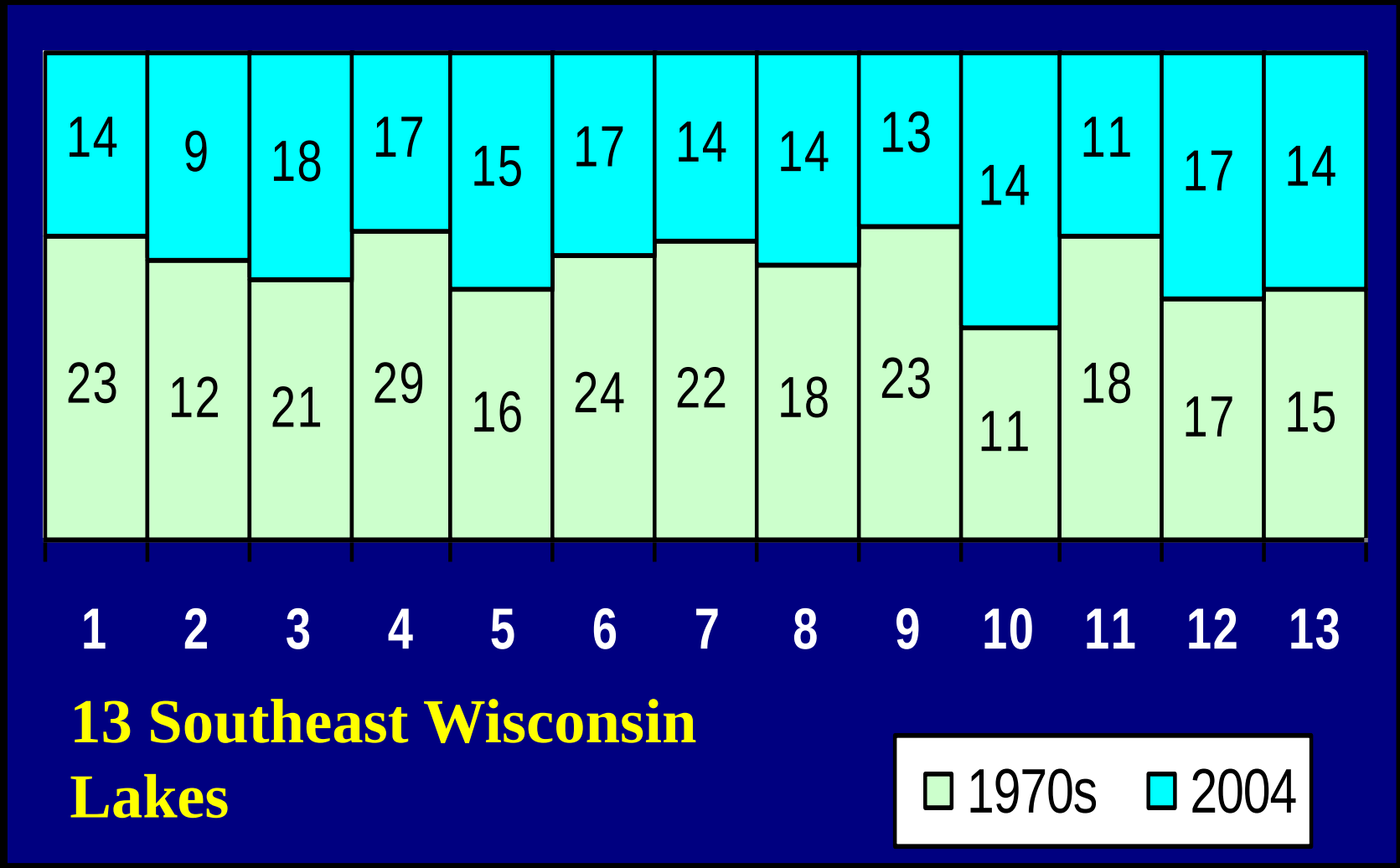
From Schindler et al. 2000

RECENT NEARSHORE FISH DECLINES IN SOUTHEAST WISCONSIN LAKES

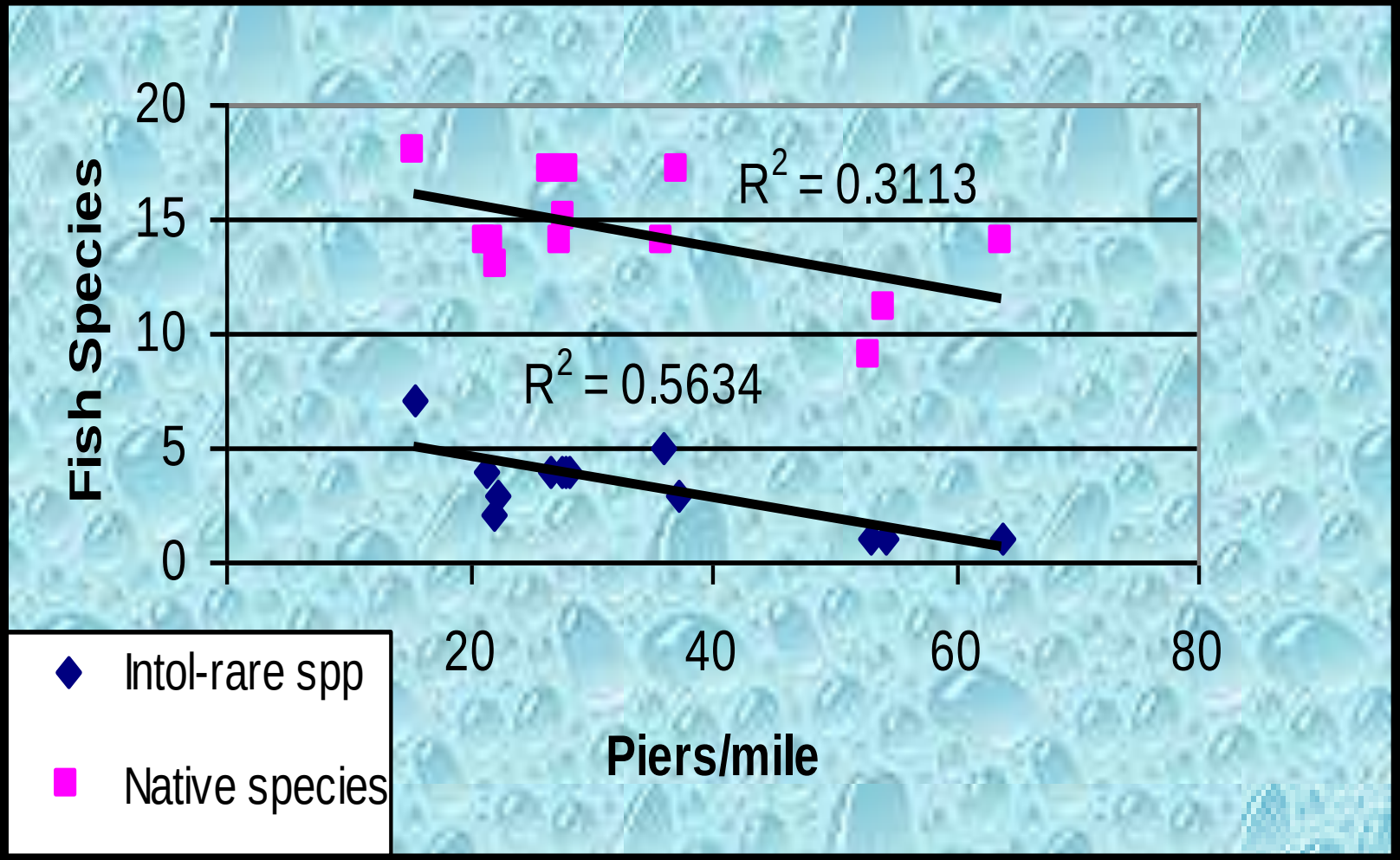
Tadpole madtom (*Noturus notatus*) - ~ 4”

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

Seining Survey Results: Species Richness

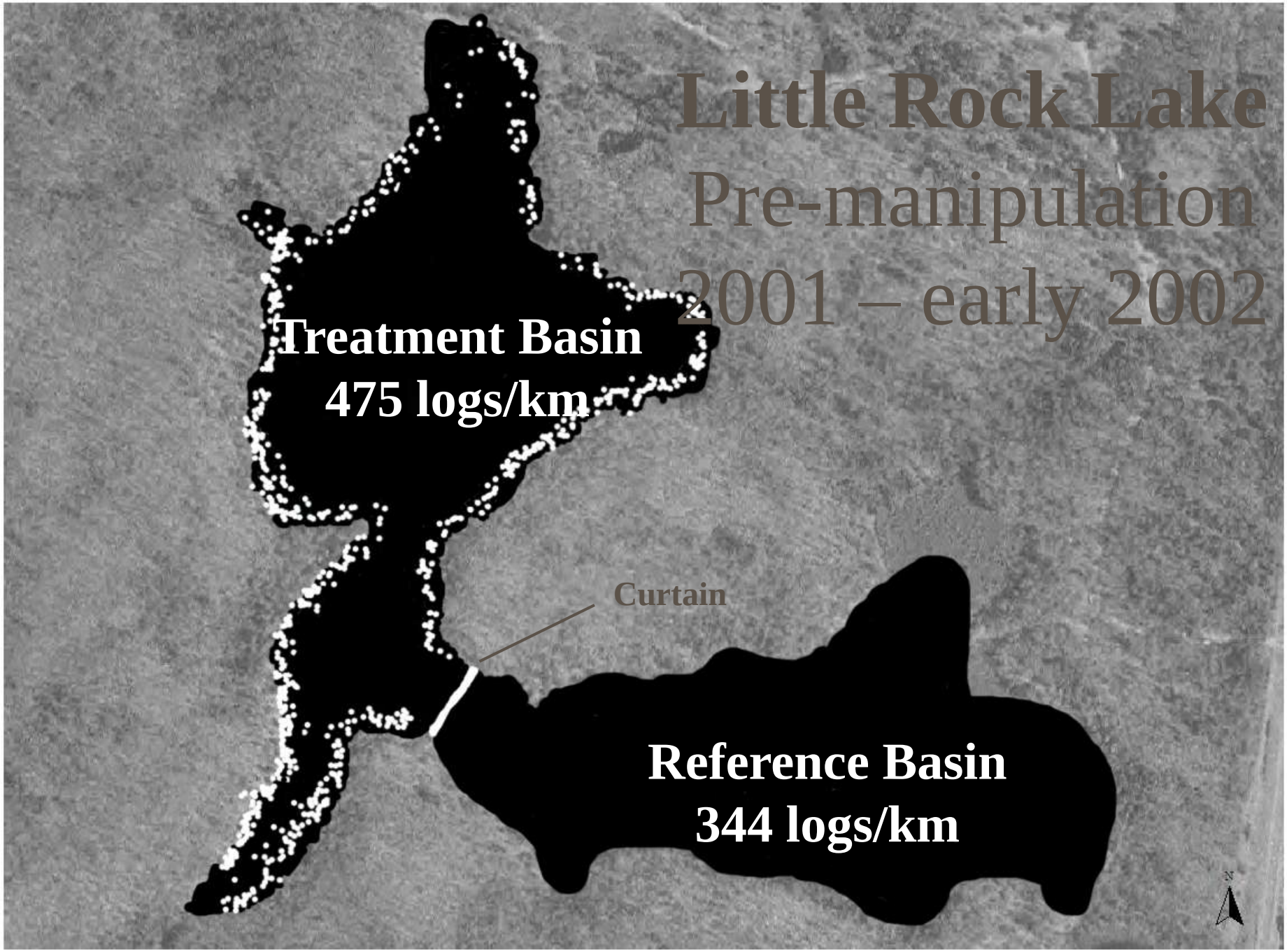


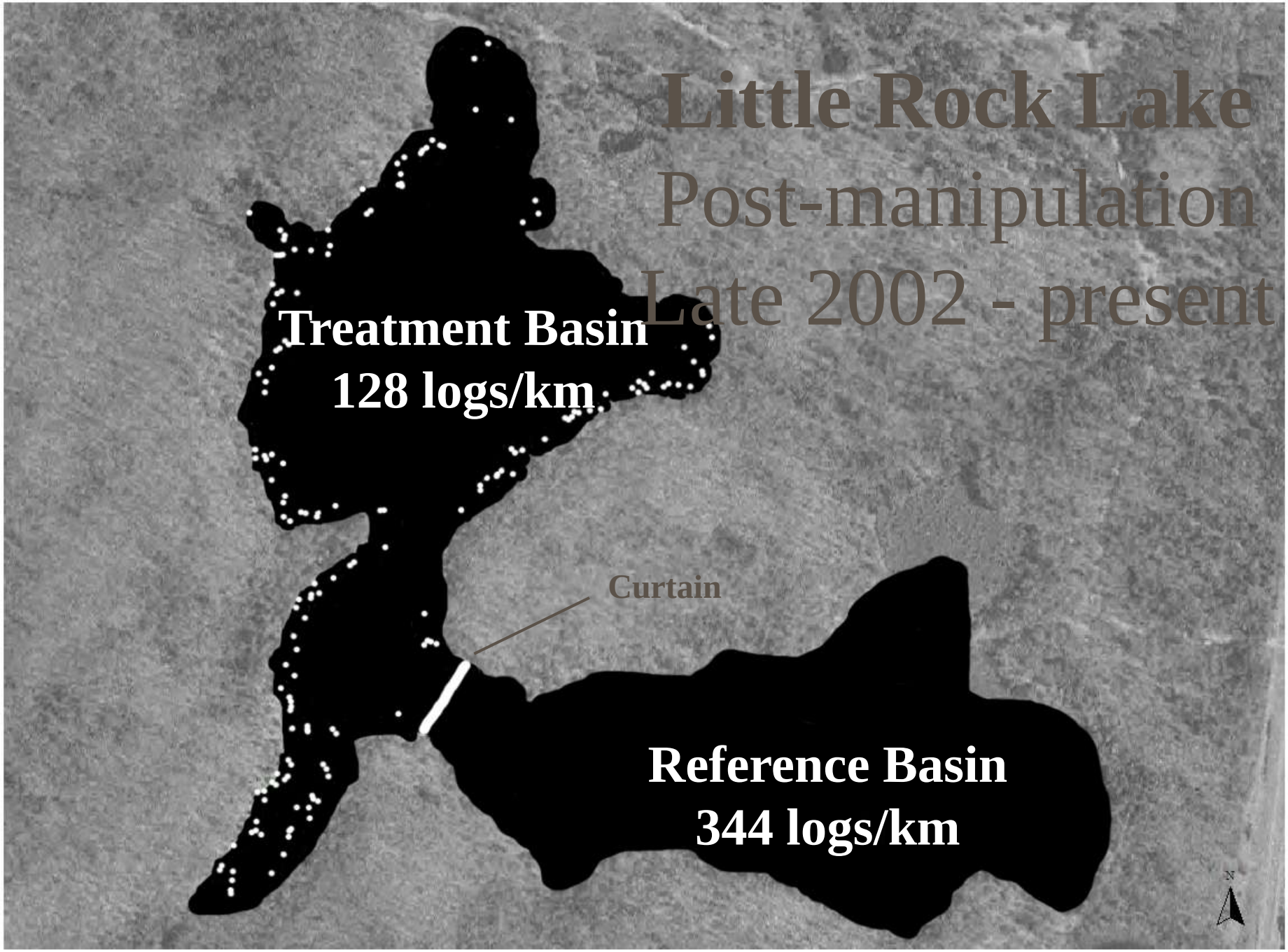
2004 Seining Survey Results from 13 SE Lakes



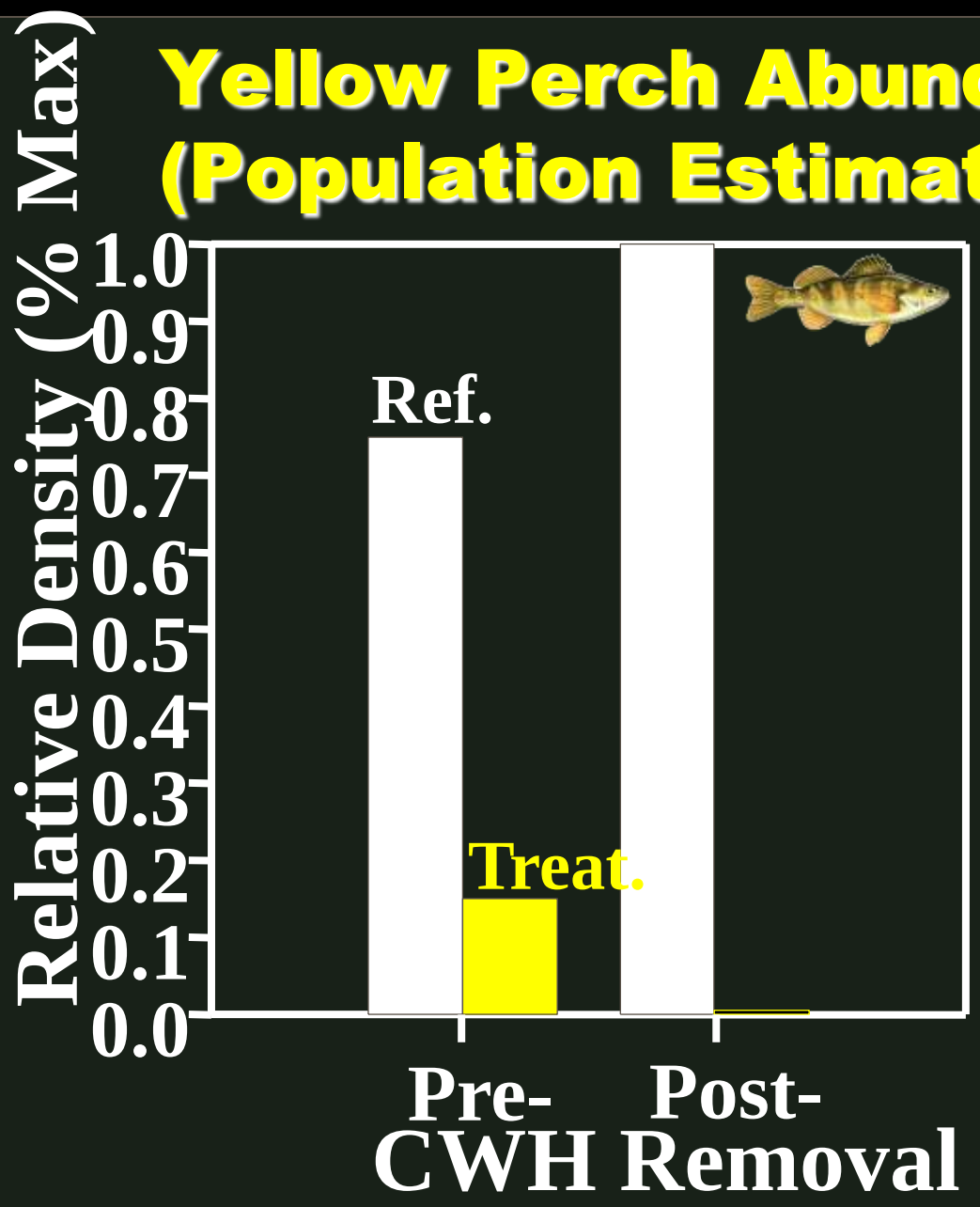
Fish Community Responses to a Whole-lake Removal of Coarse Woody Habitat

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

Yellow Perch Abundance (Population Estimate)



Two Experiments

Wood removal from a divided lake

1. Perch disappeared
2. Bass changed diet – more terrestrial

Wood addition

1. Bass are using the wood for nesting
2. More juvenile bass
3. Bass are eating fish & growing faster
4. “Branchier” trees attract more fish

Use This Information

Help Protect Adams County's…

WATER RESOURCES