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Nearshore Fish and Wildlife Habitat: Human Impacts, Obvious Remedies, Difficult Choices

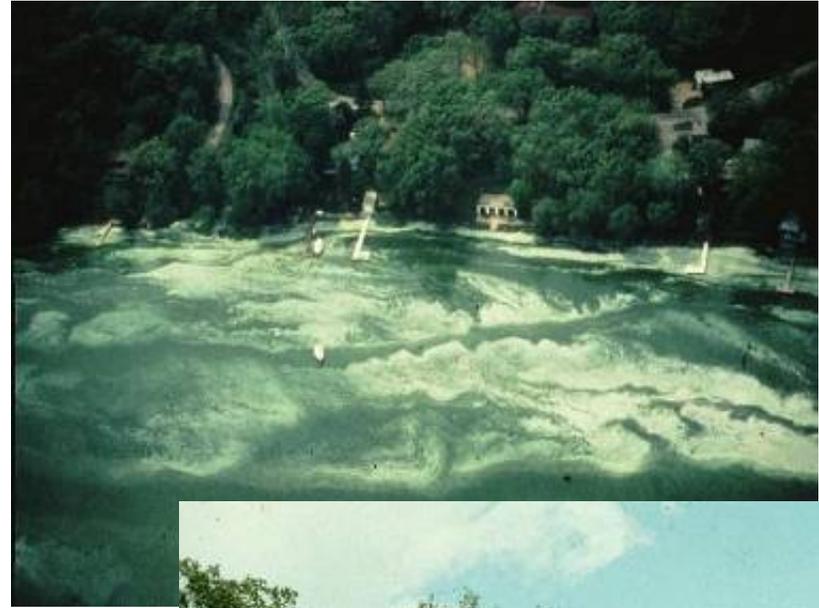


Wisconsin's Lakes are Changing Faster than Ever:

**Algae blooms
(phosphorus pollution)**

**Destruction of
shoreline habitat**

Invading plants and animals





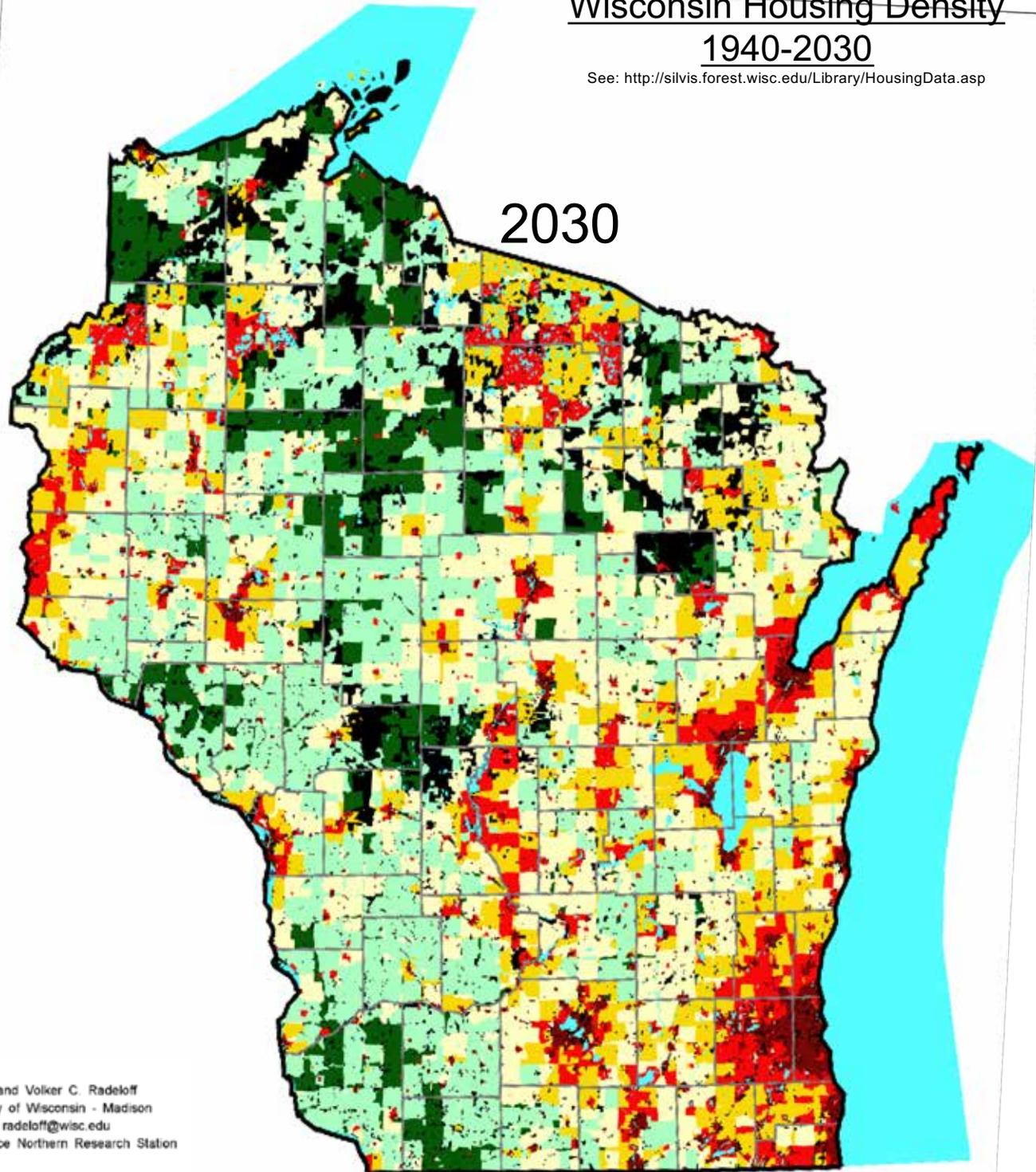
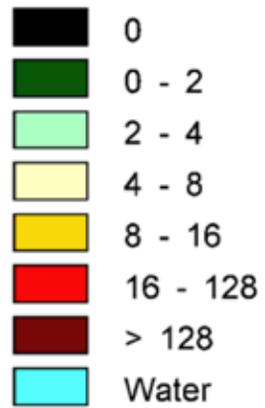
Domestication of Wisconsin Lakes

Courtesy of MN DNR

Wisconsin Housing Density 1940-2030

See: <http://silvis.forest.wisc.edu/Library/HousingData.asp>

Housing units / km²



Lakeshore

Riparian Zone (Top of Bank – 10 meters)

Bank Zone (Waterline – Top of bank)

Littoral Zone (15 meters – Waterline)

Essential Habitat

- Littoral zone
- Tributary areas
- Adjacent shoreland



Features of Littoral Zone Habitat

- Vegetation
- Substrate
- Woody Cover
- Overhanging Bank Cover
- Depth and Depth Gradients



Improve Water Clarity

Fish and Wildlife

Habitat

Hold Sediments

Nutrient Cycling

Invertebrates

Aesthetics



Consequences of Lakeshore Development on Emergent and Floating-Leaf Vegetation Abundance



Radomski and Goeman, 2001

 Minnesota Department of Natural Resources

Consequences of Lakeshore Development on Emergent and Floating-Leaf Vegetation Abundance

- Developed shores had less aquatic vegetation
- For each lake lot, 2/3rds of the emergent and floating-leaf vegetation was lost
- Minnesota has lost 20-28% of

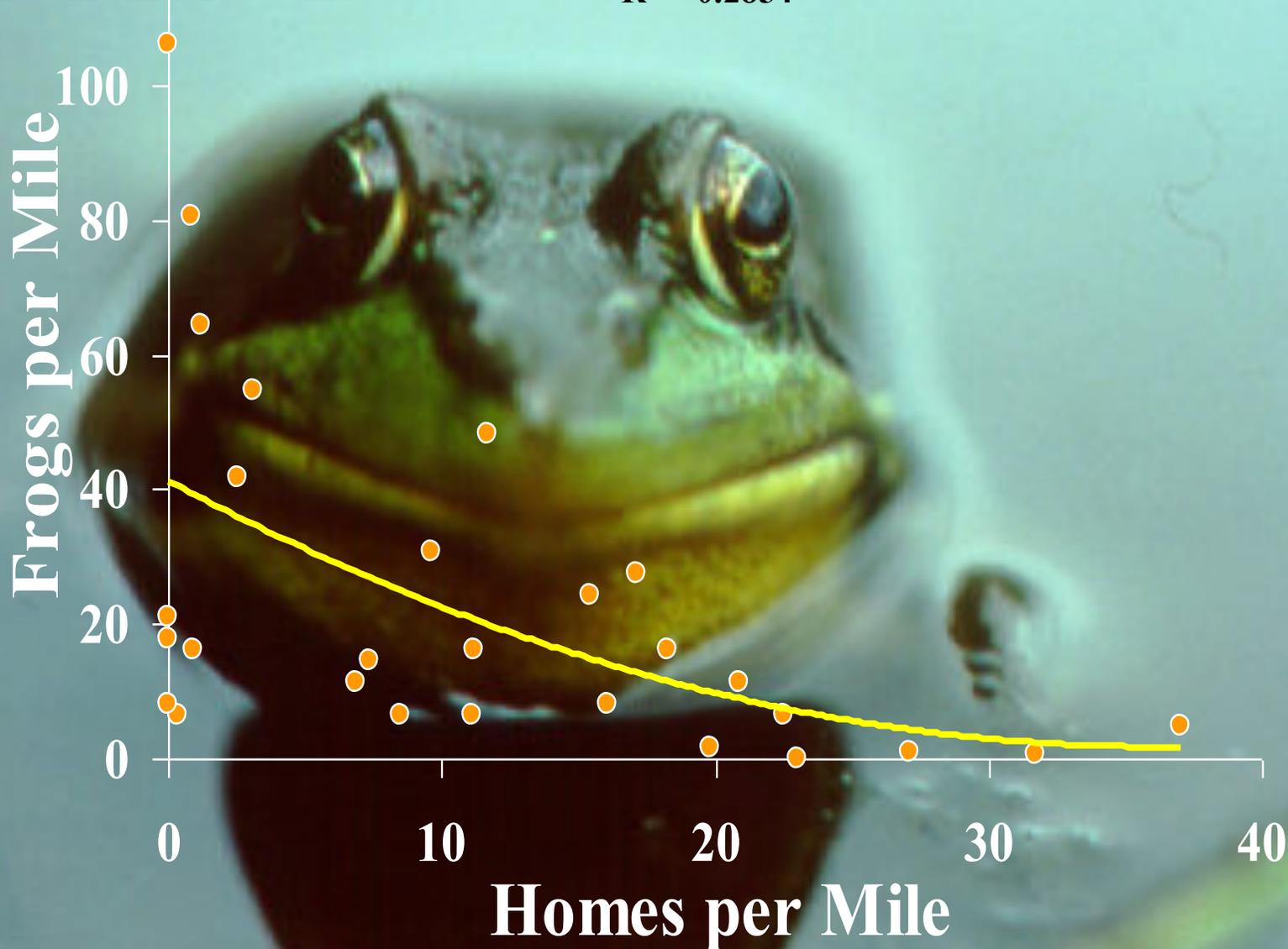
Radomski and Goeman, 2001

What's Happened to Green Frogs

○ Frogs/mile
— Poly. (Frogs/mile)

$$y = 0.0298x^2 - 2.1712x + 41.227$$
$$R^2 = 0.2854$$

(Woodford and Meyer)



Impacts of Lakeshore Development on Tree-falls in North Temperate Lakes

Christensen et al. 1996

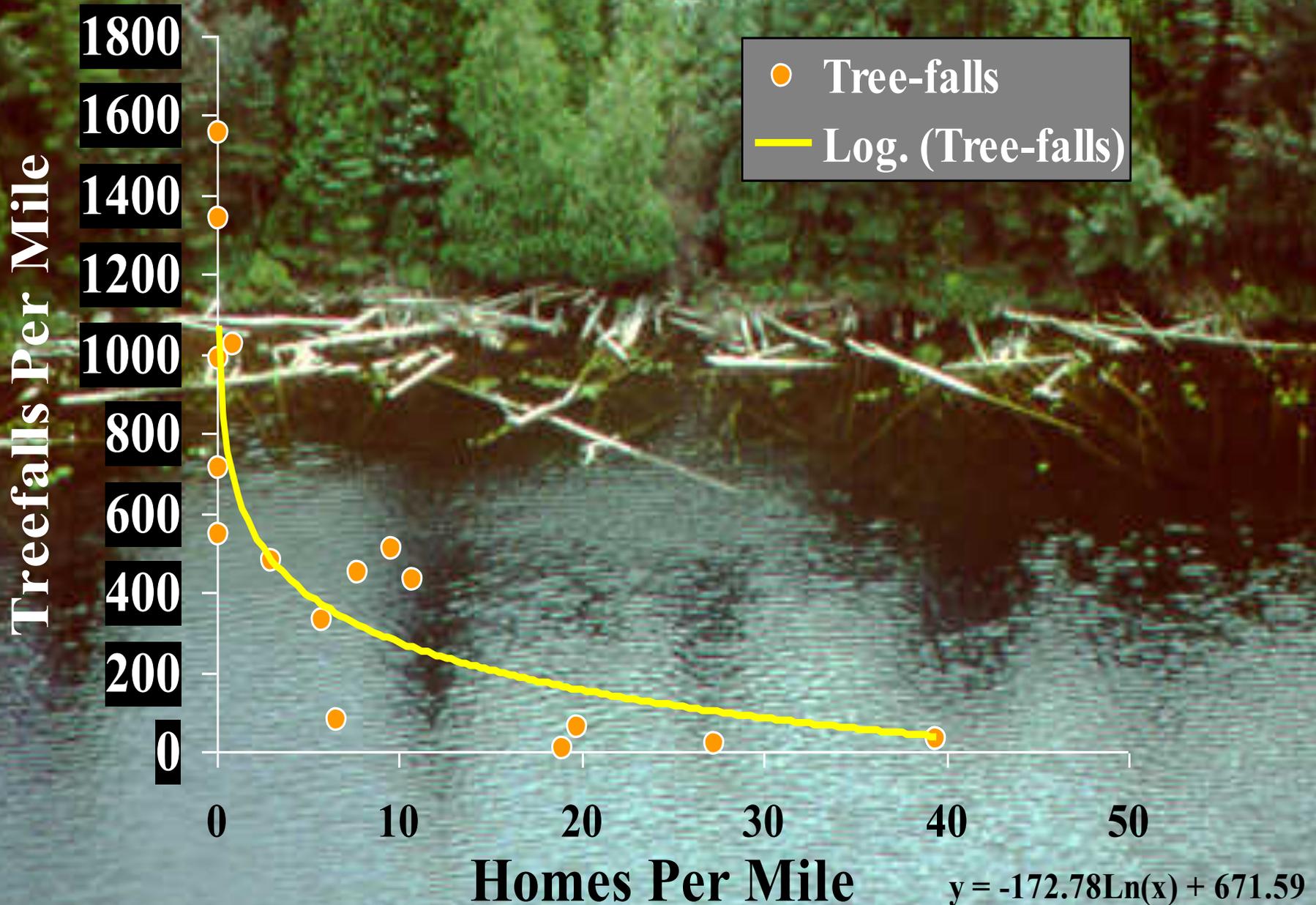


University of Wisconsin

Center for Limnology



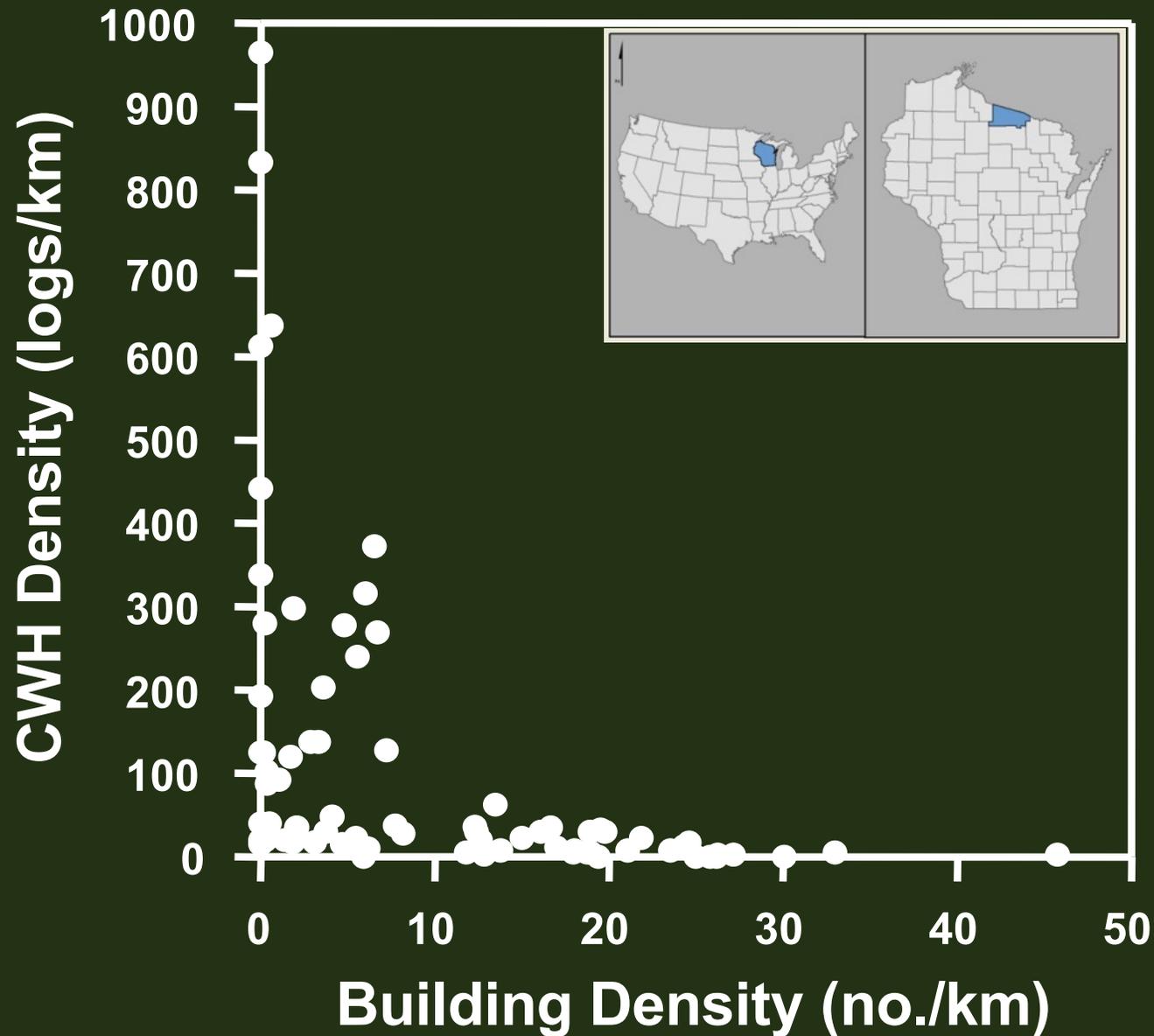
Impacts of Development on Tree-falls

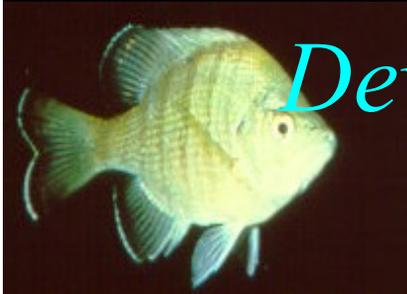


Christensen et al. 1996

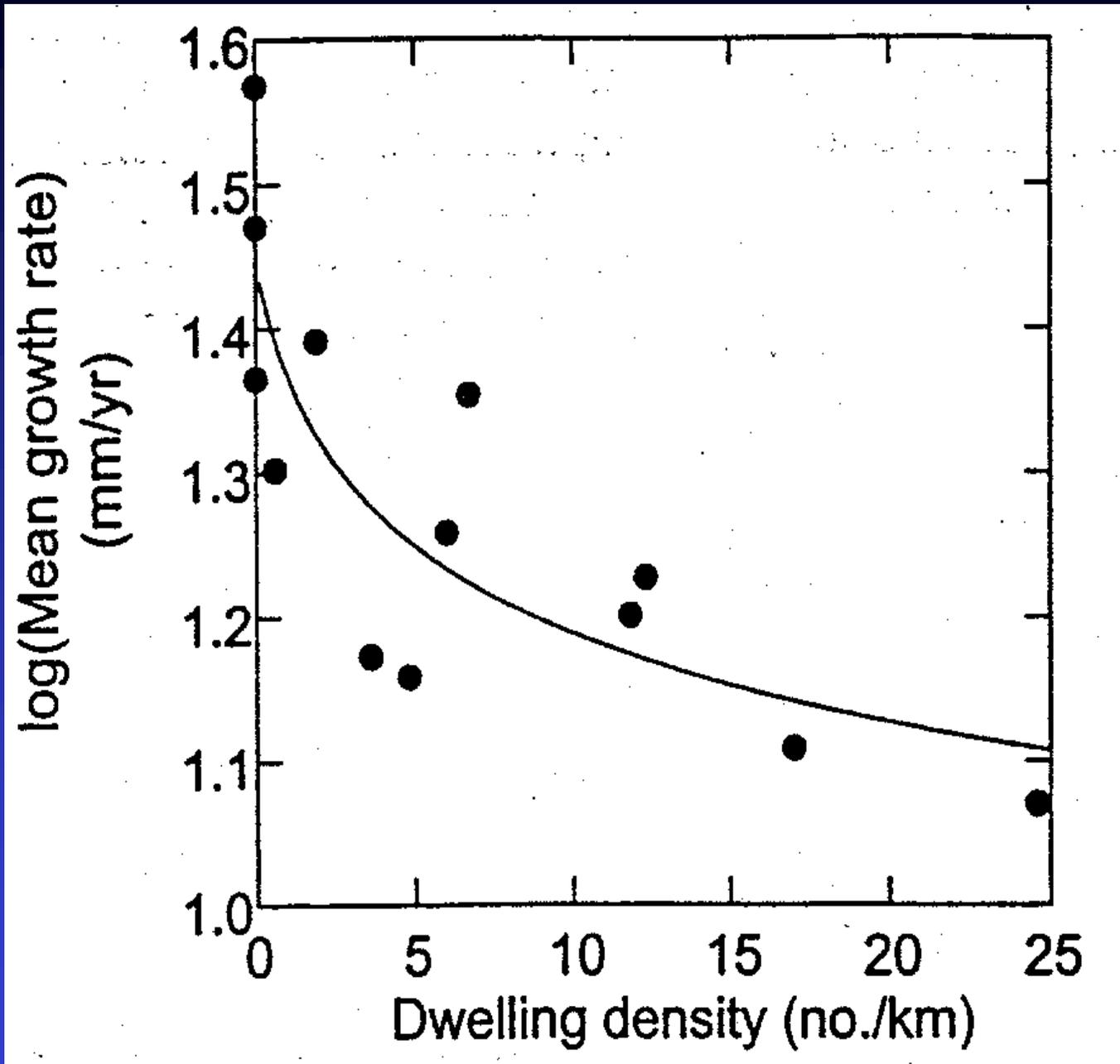
$R^2 = 0.7164$

CWH and Lakeshore Residential Development



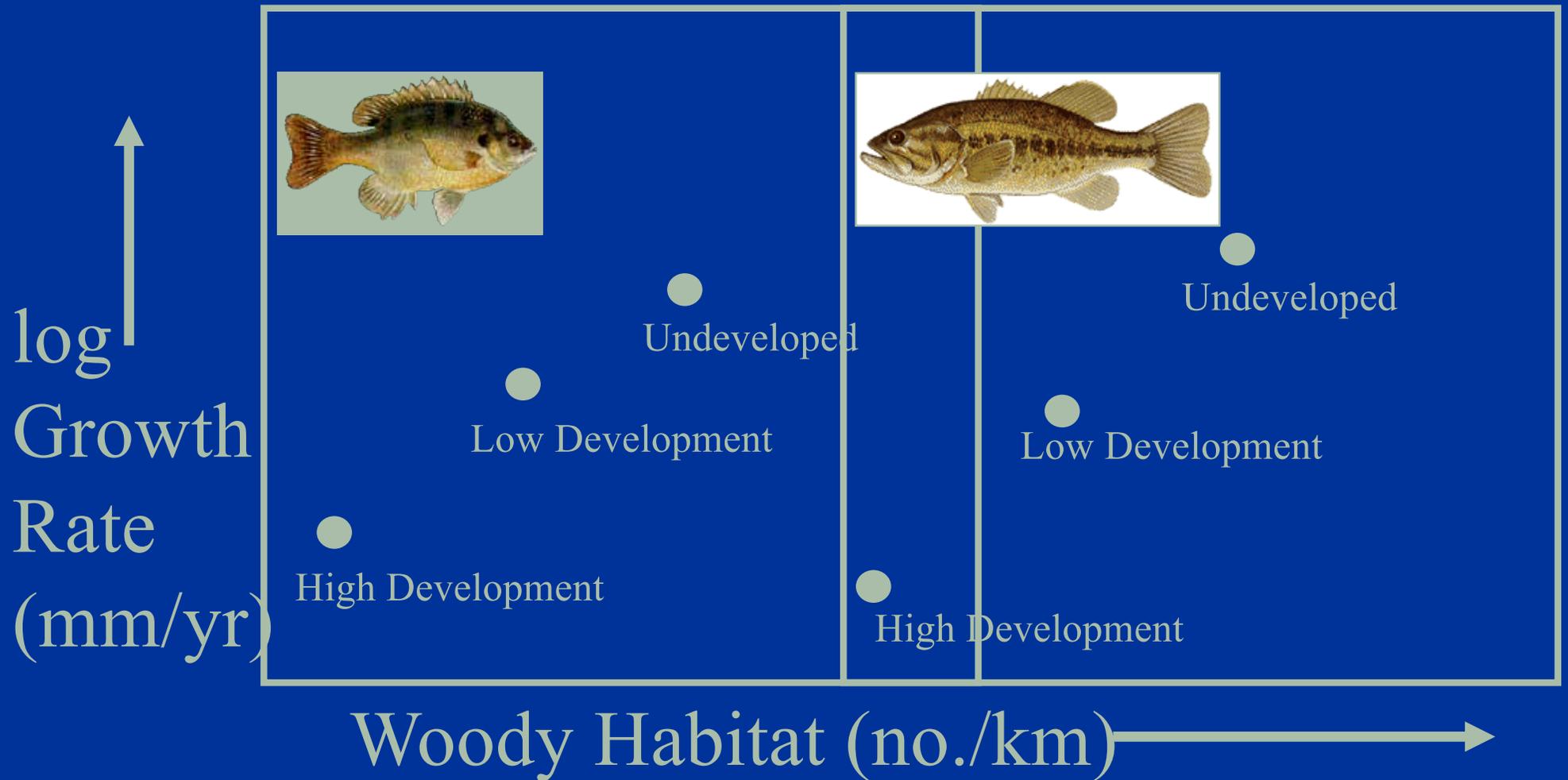


Development Impacts on Bluegill Growth



**Schindler
et al. 2000**

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



From Schindler et al. 2000



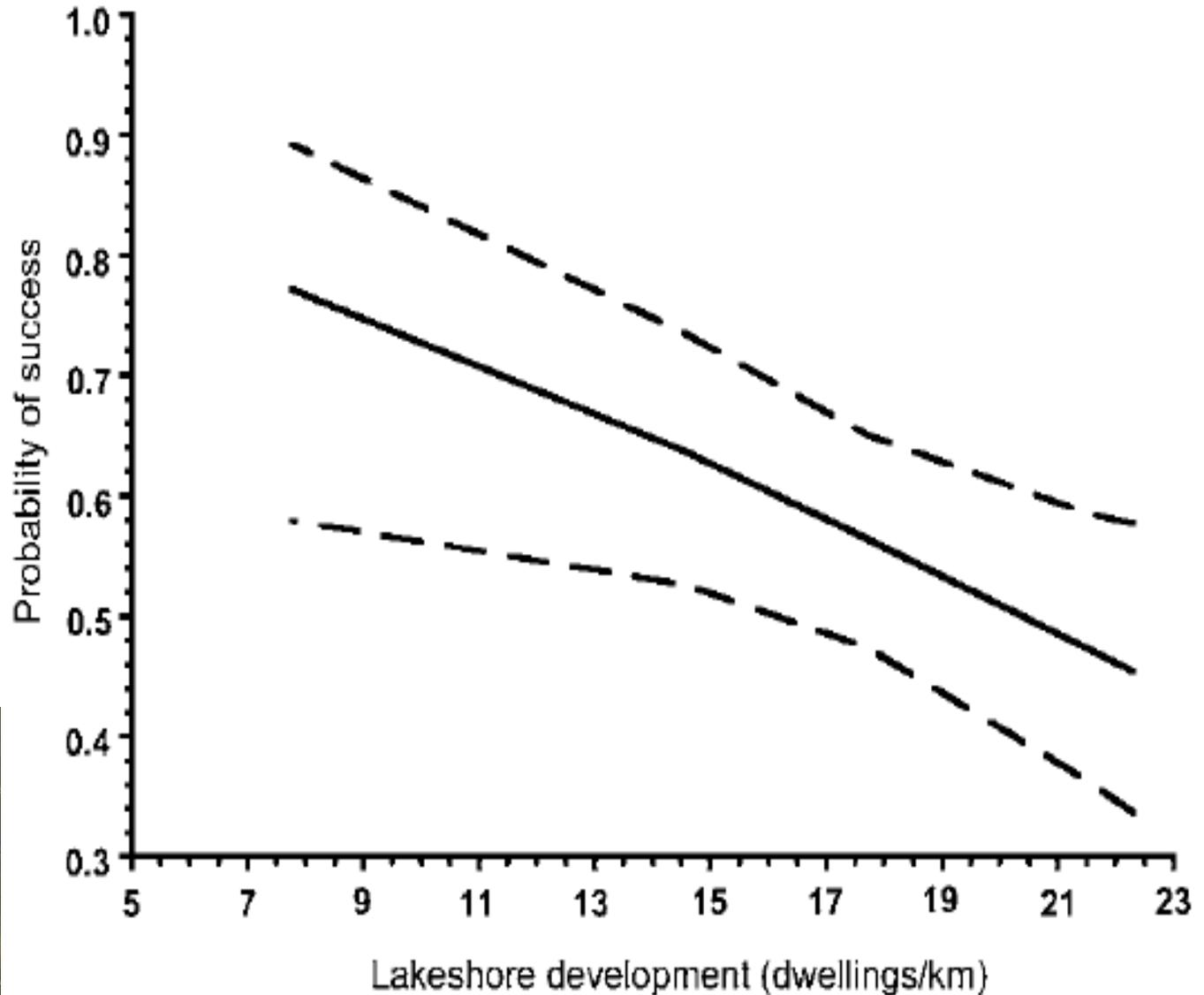
Department of Fisheries and Wildlife

Preserving our past...Creating our future

MICHIGAN STATE
UNIVERSITY

TYLER WAGNER, JUBAR, AND BREMIGAN

Can Habitat Alteration and Spring Angling Explain Largemouth Bass Nest Success?

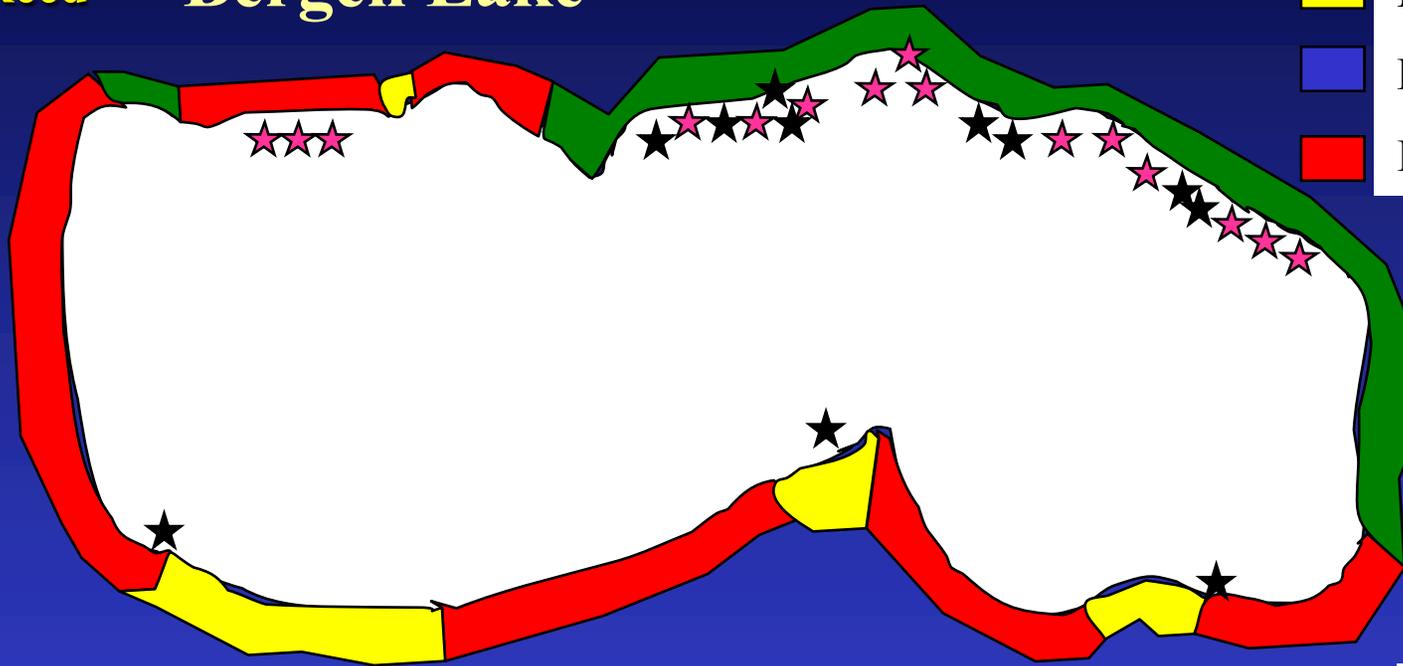
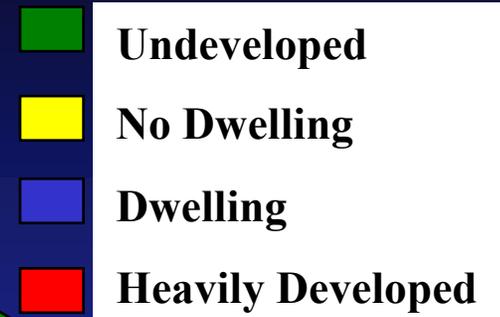




Development Effects on Nest Site Selection by Largemouth Bass and Black Crappie

Jeffrey Reed

Bergen Lake



★ LMB Nest

★ BLC Nest



Available Habitat

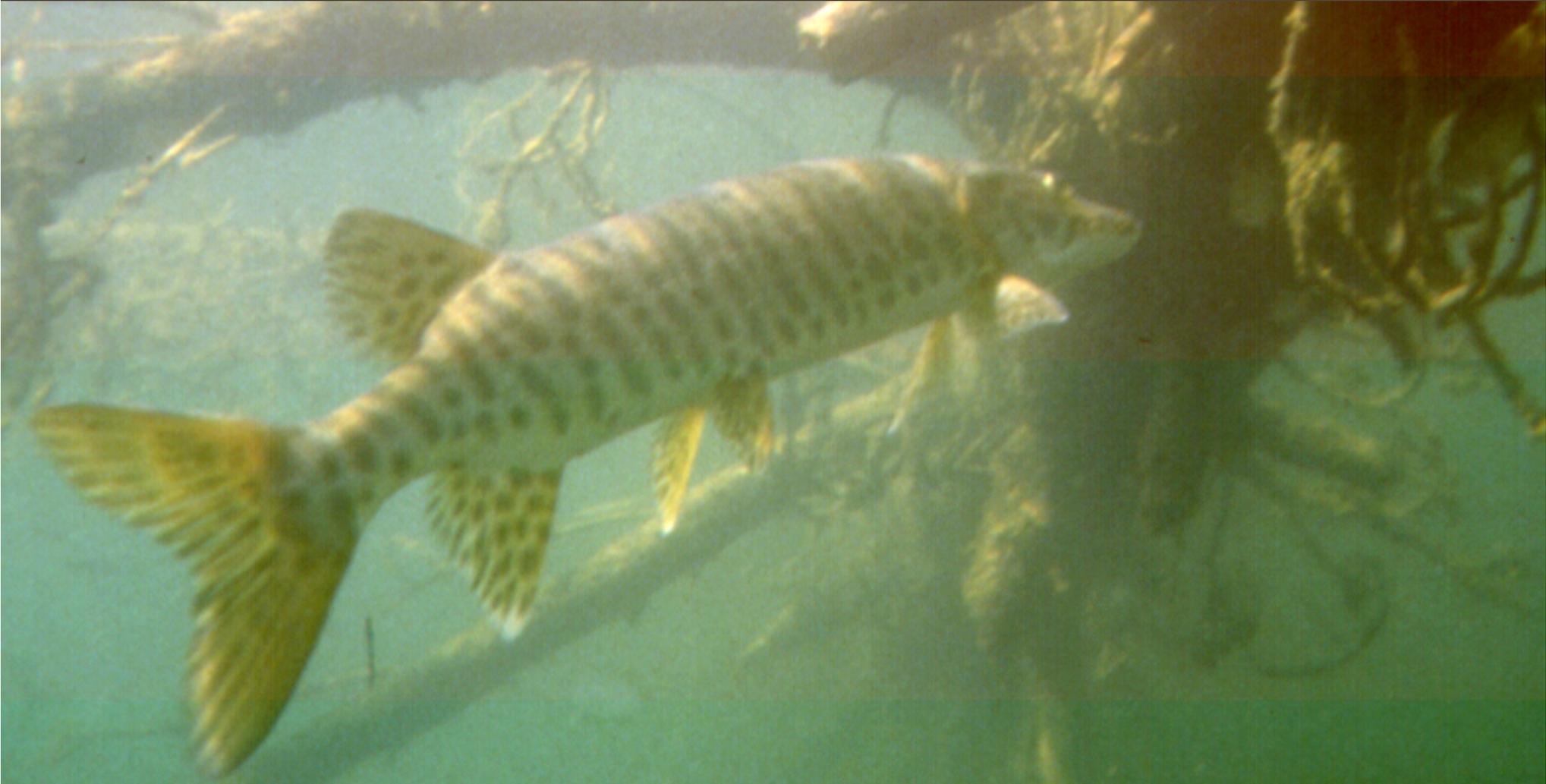


Largemouth Bass Habitat Selection



Black Crappie Habitat Selection

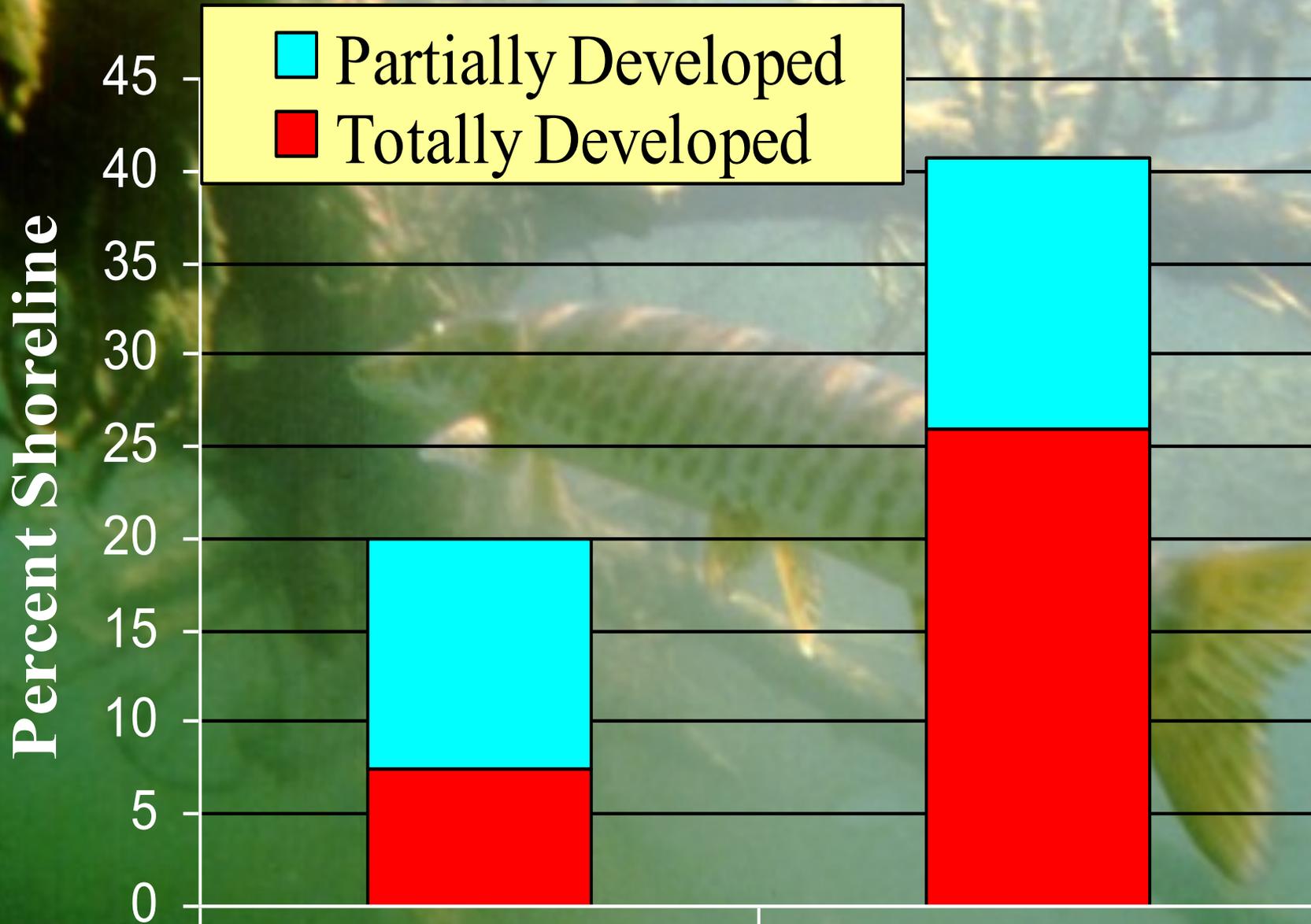
Lake Characteristics Influencing Spawning Success of Muskellunge



Rust et al.,

University of
MICHIGAN

Lake Characteristics Influencing Muskellunge Reproduction



Good Reproductive

Poor Reproductive

Little Rock Lake, WI

Pre-manipulation
2001 - early 2002

Treatment Basin
475 logs/km

Curtain

Reference Basin
344 logs/km



Little Rock Lake, WI

Post-manipulation
Late 2002 - present

Treatment Basin
128 logs/km



Curtain

Reference Basin
344 logs/km



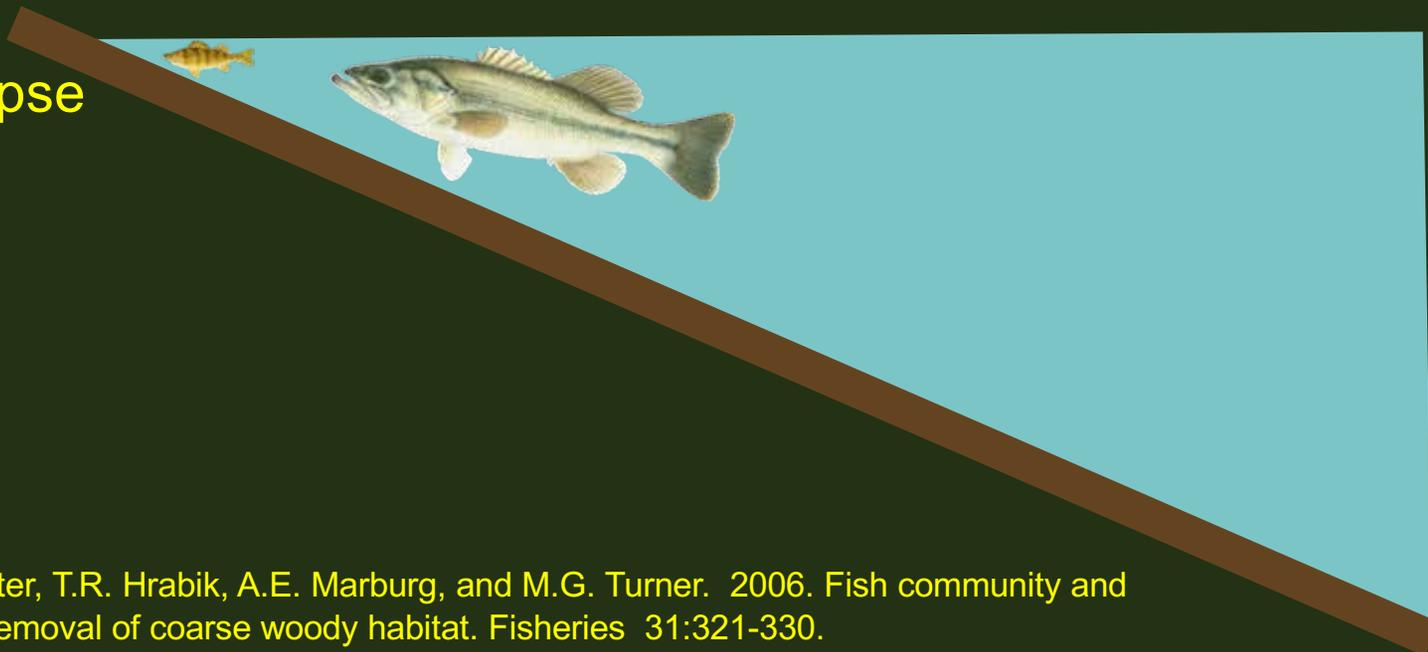
Little Rock Lake CWH Removal

1. Fish growth and food web responses to CWH removal?

- decreased LMBS growth rates, increased reliance on terrestrial food sources, cannibalism, adherence to optimal foraging tenets

2. Yellow perch abundance responses to CWH removal?

- functional collapse



Little Rock Lake, WI – Reference Basin - 2007

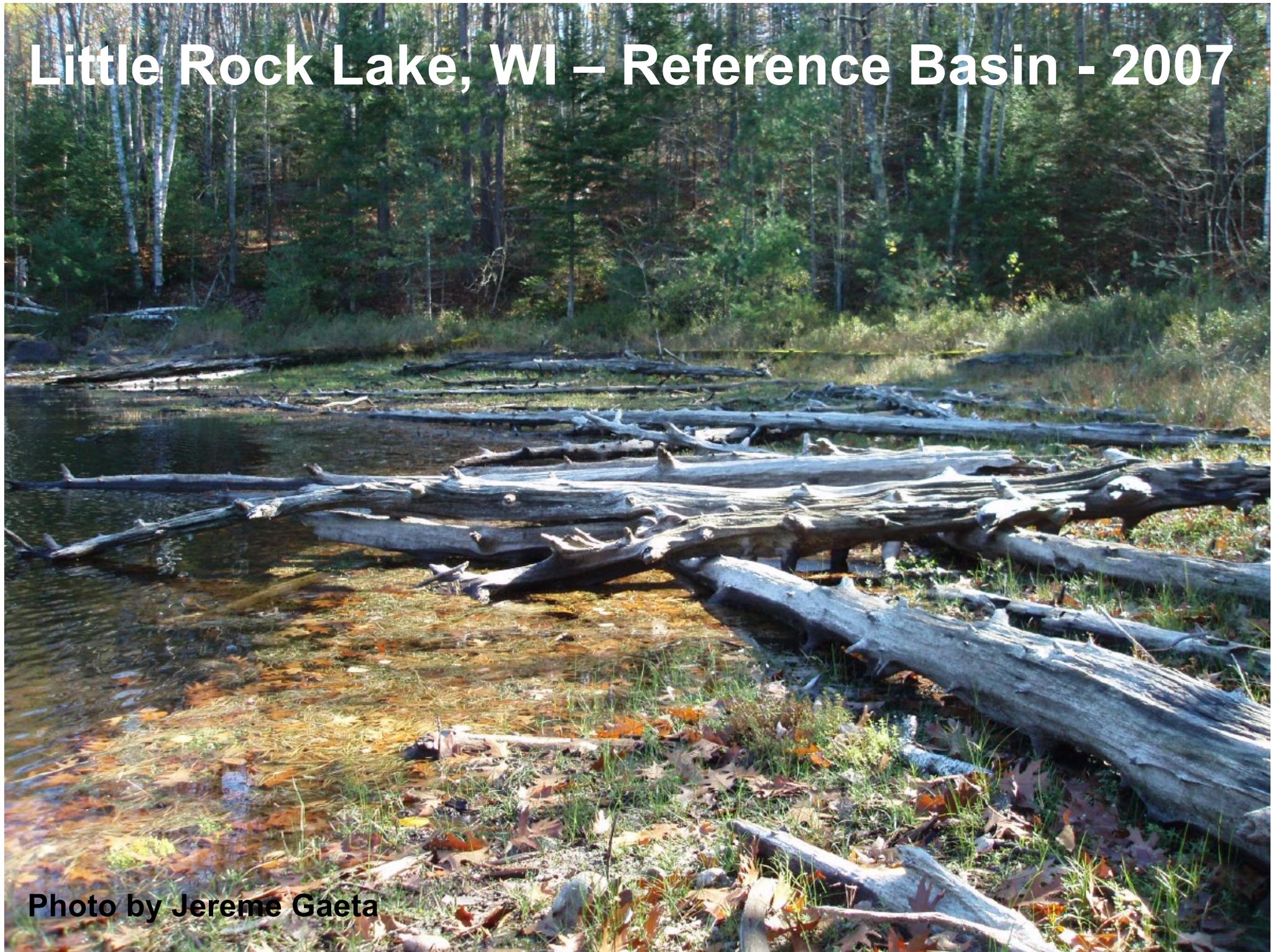
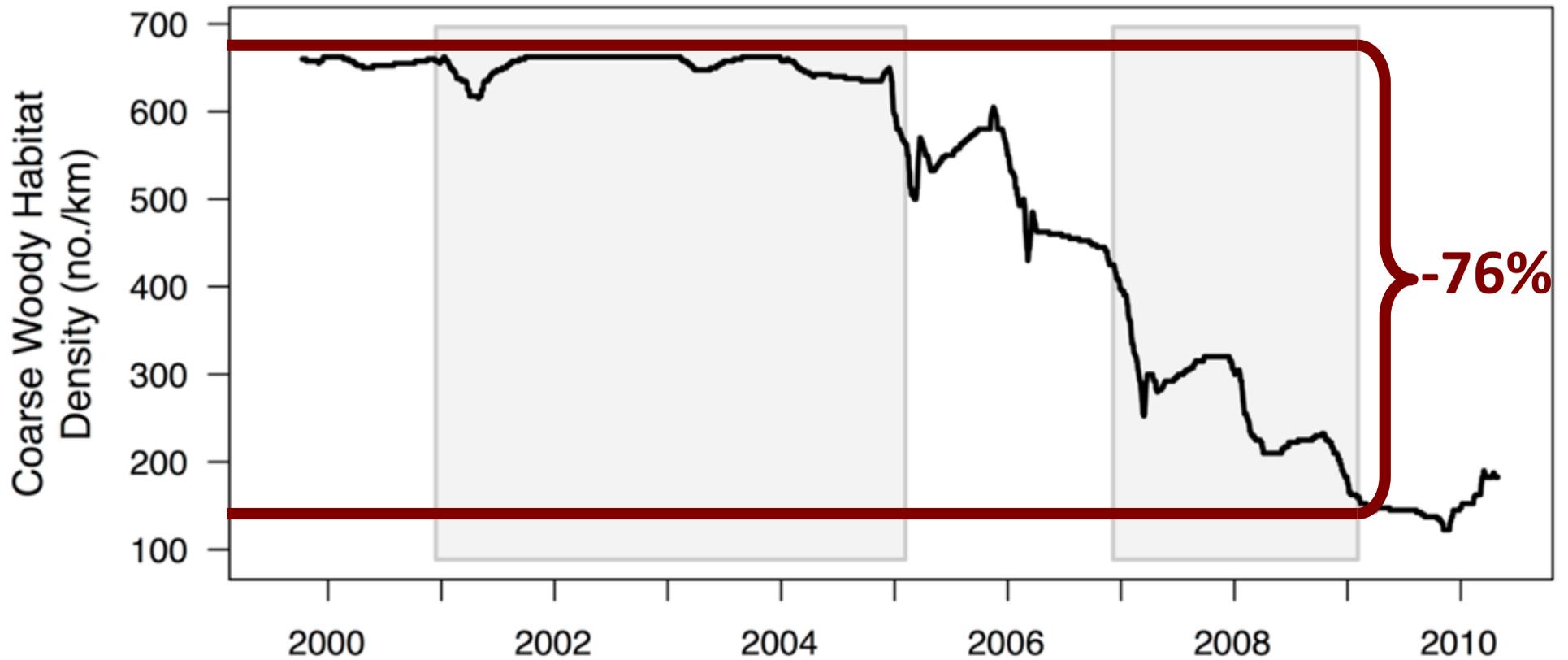
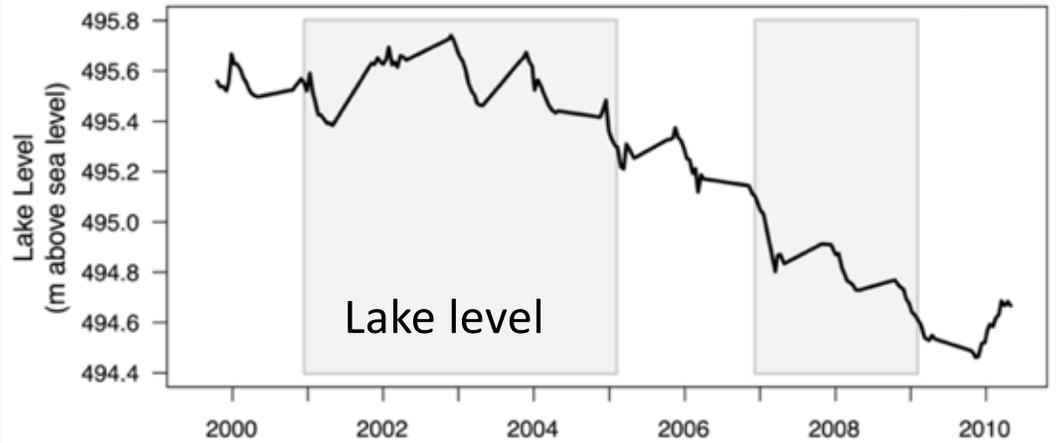


Photo by Jereme Gaeta

Corresponding change in CWH

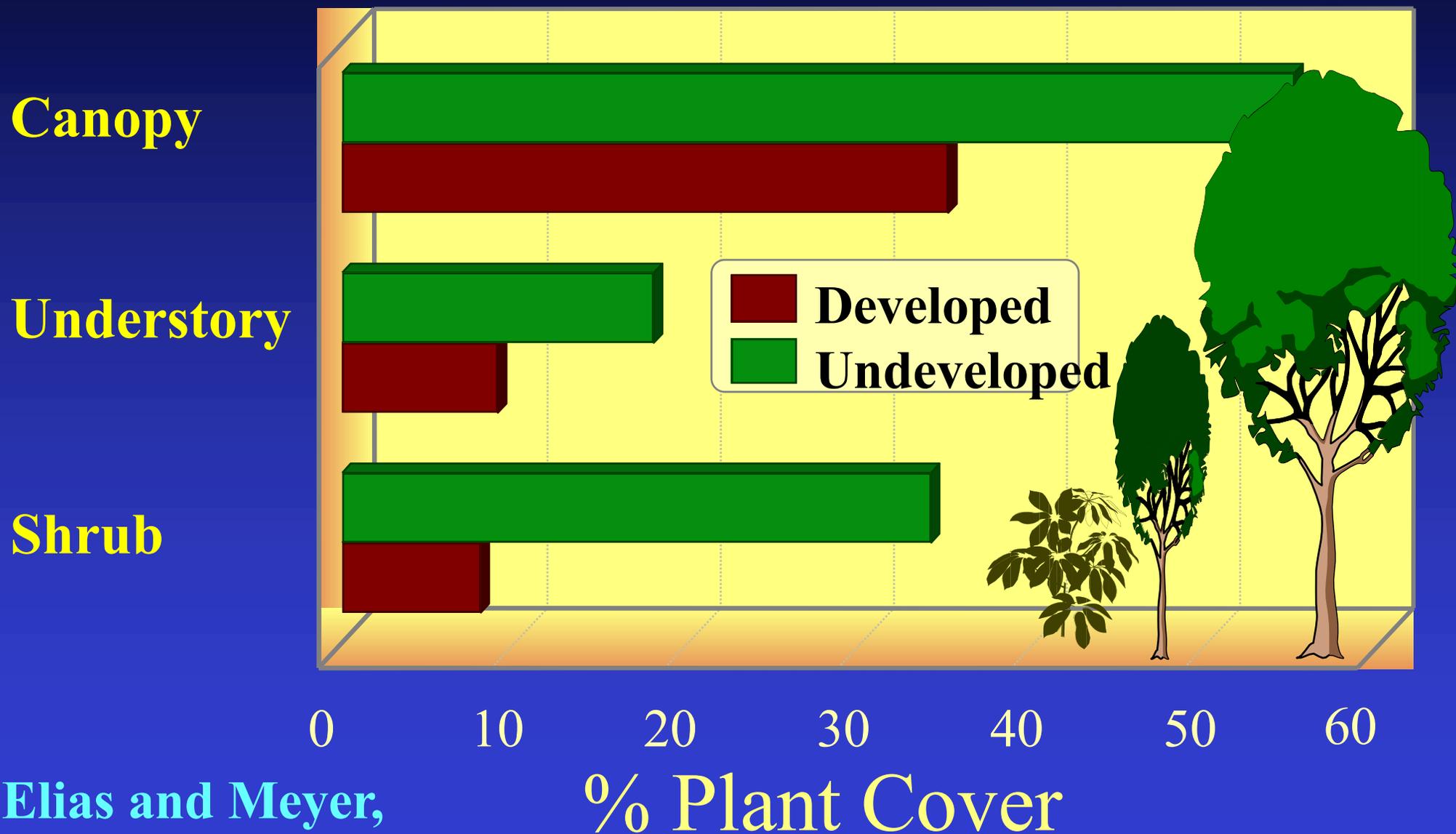


Lessons Learned

- Lake level loss decreased CWH and was associated with a major decline in the yellow perch population at the expense of largemouth bass growth

Gaeta, J.W., G.G. Sass, and S.R. Carpenter. 2014. Drought-driven lake level decline: effects on coarse woody habitat and fishes. *Canadian Journal of Fisheries and Aquatic Sciences* 71:315-325.

What's Happened To Shoreland Plants?



Habitat Changes With Lakeshore Development

Shrub layer at lake-forest edge

Bank cover

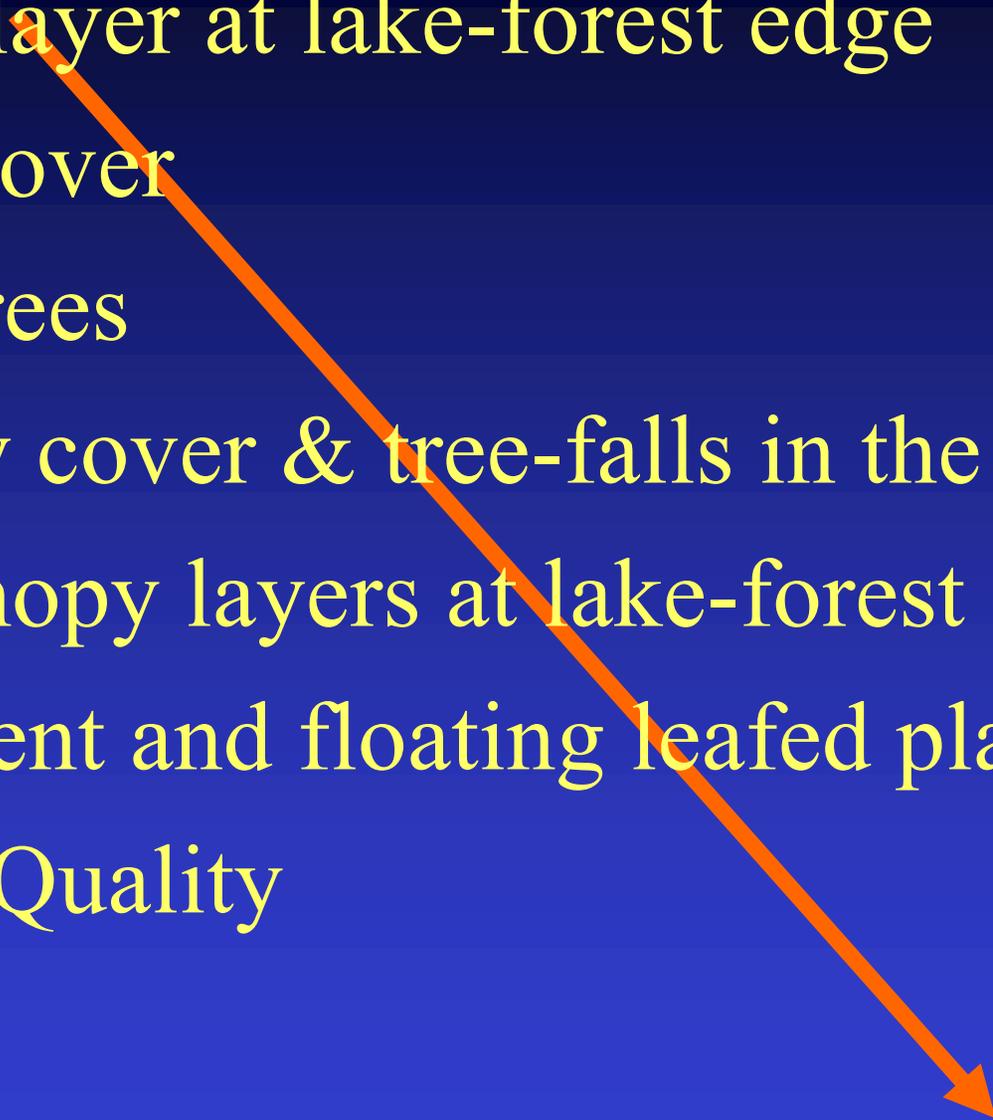
Snag trees

Woody cover & tree-falls in the nearshore

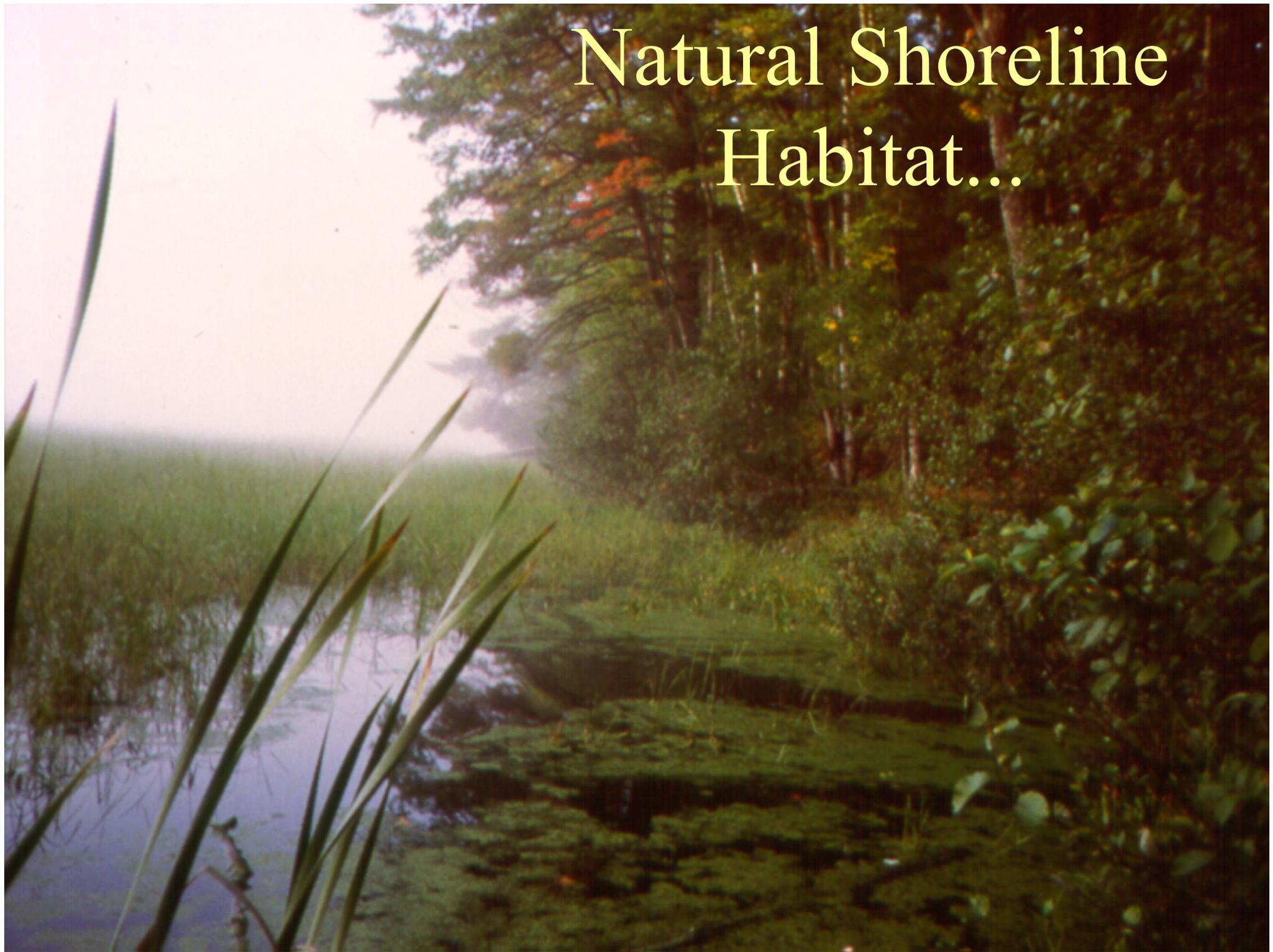
Subcanopy layers at lake-forest edge

Emergent and floating leafed plants

Water Quality



Natural Shoreline Habitat...





Going, ...

A scenic view of a lake with reeds in the foreground, a stone wall, and a large house in the background under a cloudy sky. The house is a two-story structure with a red exterior and stone accents. The sky is blue with scattered white clouds. The water is calm, reflecting the sky and the surrounding greenery.

Going, ...



Going, ...

Gone..... >



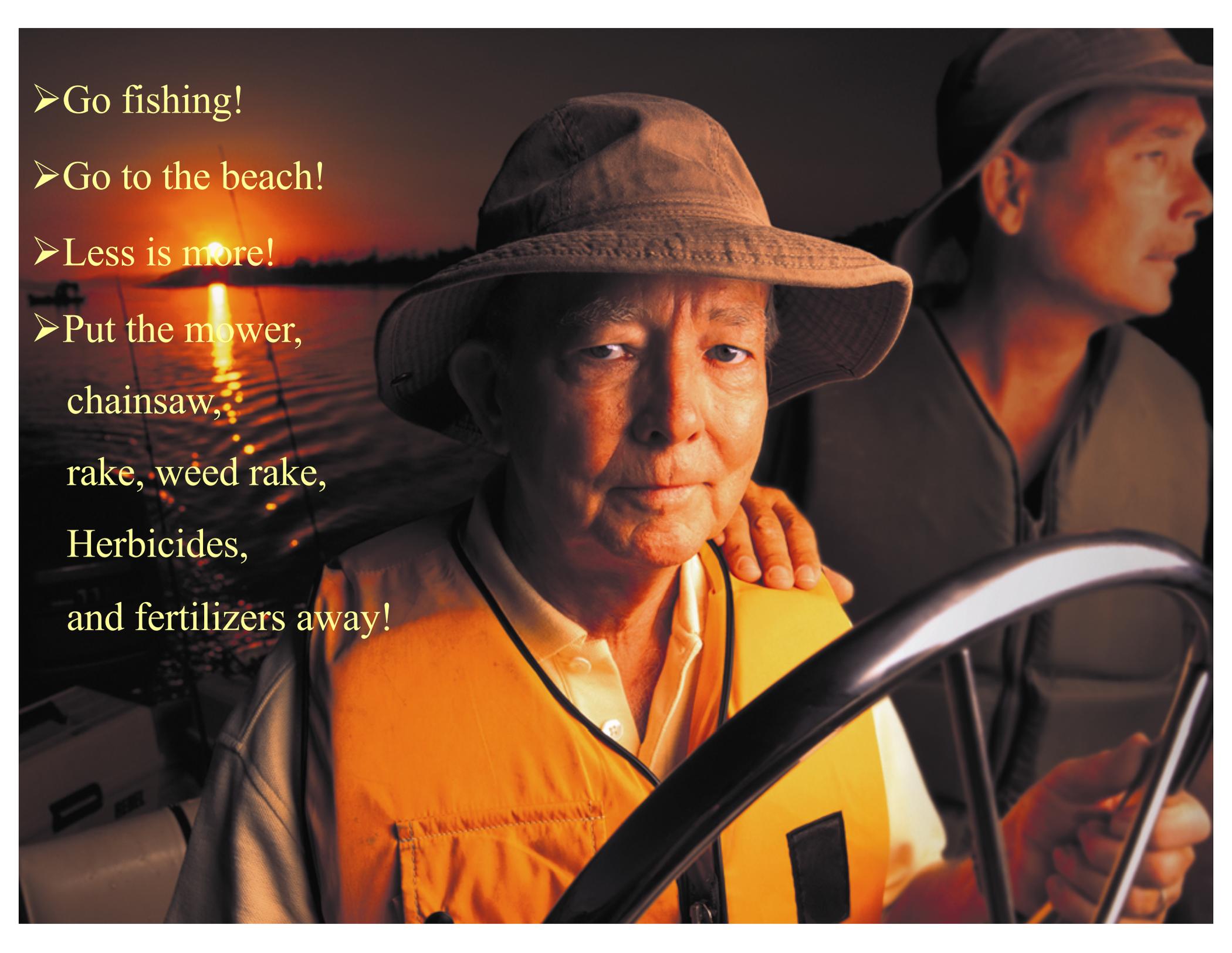
Well it Doesn't Have
to Be That Way!







The Remedies seem obvious and the stakes are great



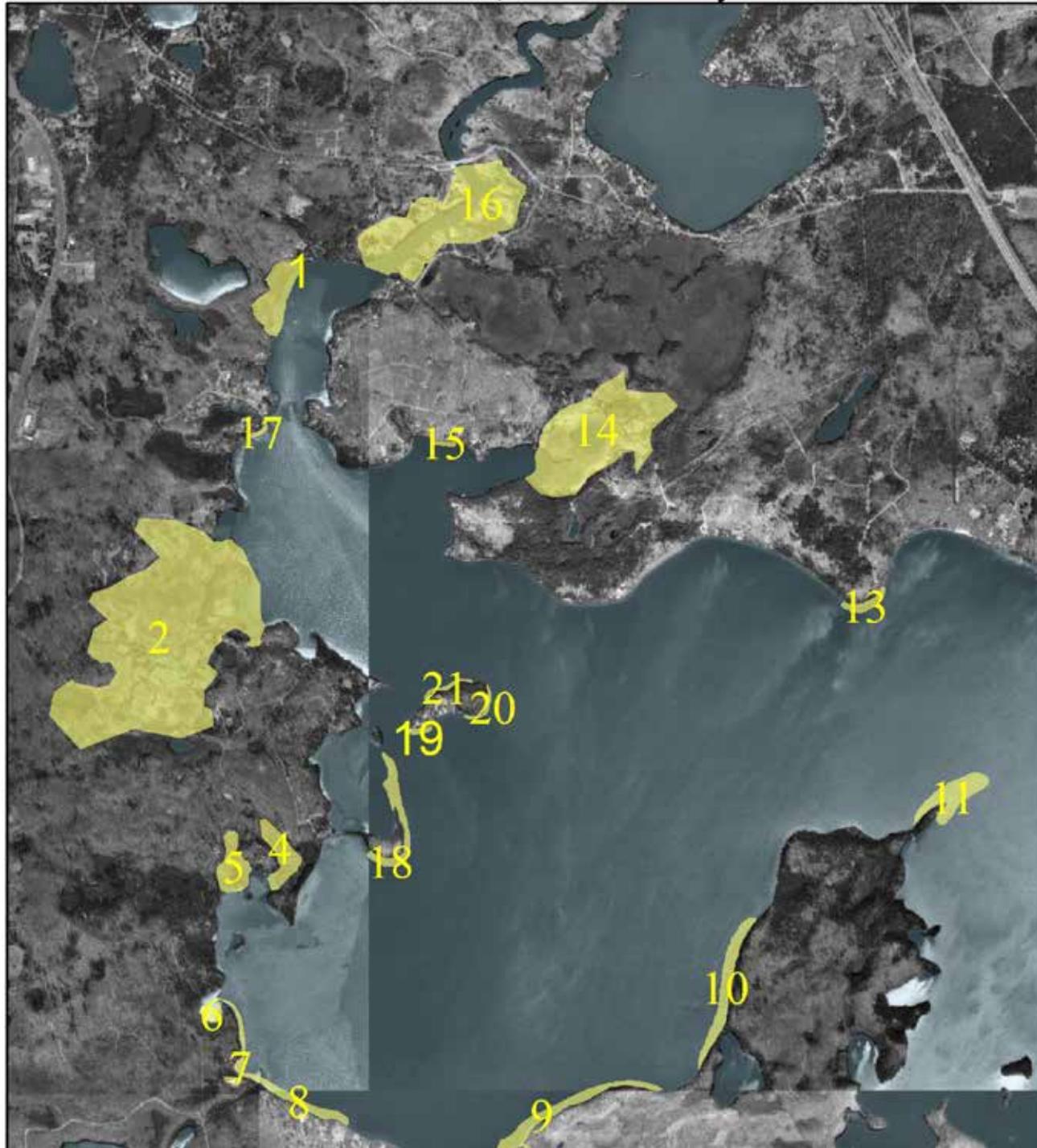
➤ Go fishing!

➤ Go to the beach!

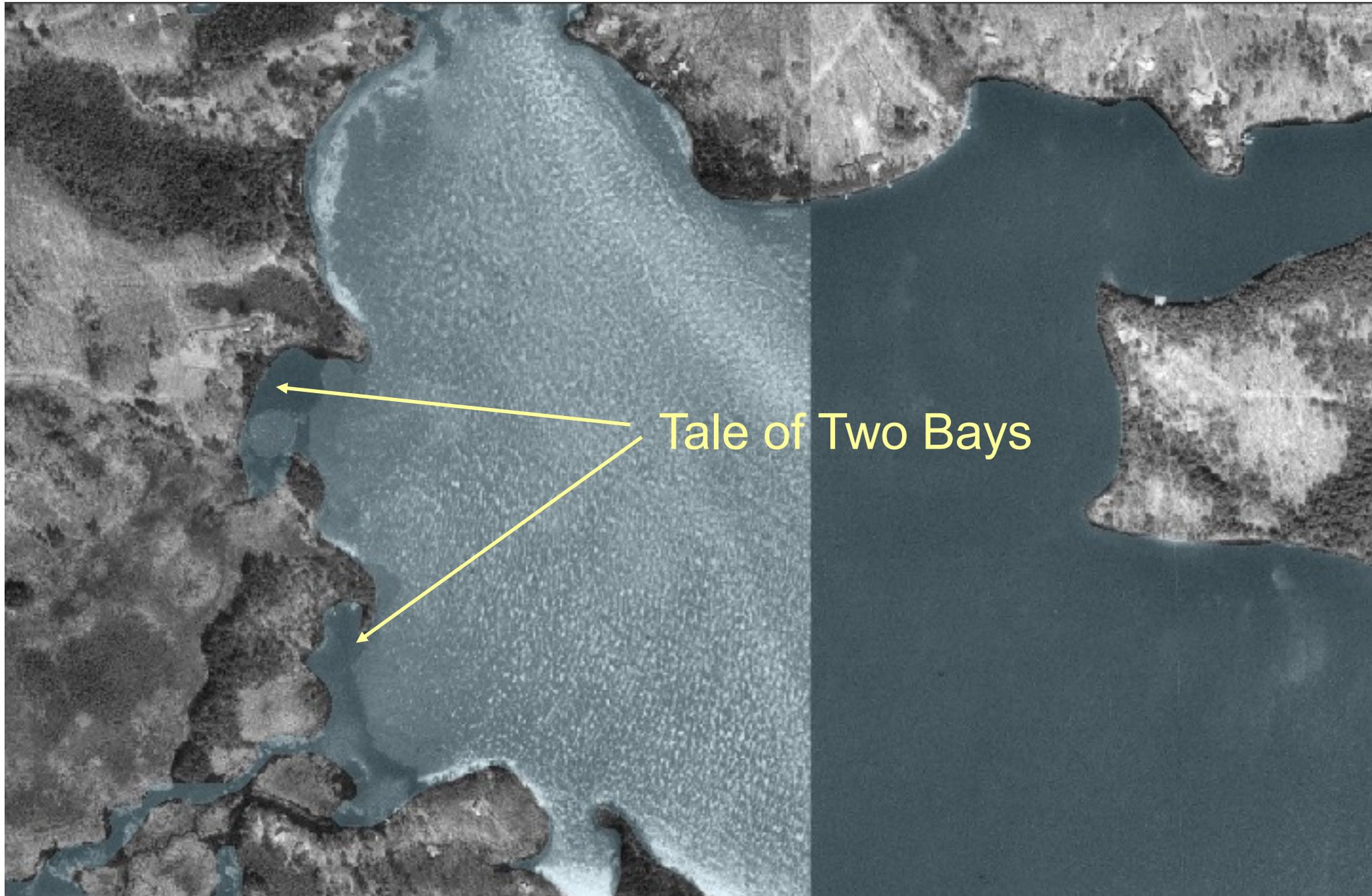
➤ Less is more!

➤ Put the mower,
chainsaw,
rake, weed rake,
Herbicides,
and fertilizers away!

Proposed Critical Habitat Areas
Lake Tomahawk, Oneida County



Lake Tomahawk, Oneida County



Tale of Two Bays

Discuss & Lunch!

