Natural Shoreline Landscapes on Michigan Inland Lakes

Workshop for Property Owners

Introduction

MICHIGAN NATURAL SHORELINE PARTNERSHIP

Promoting Natural Shoreline Landscaping to Protect Michigan's Inland Lakes

MICHIGAN NATURAL SHORELINE PARTNERSHIP

Photo by Jane Herbert

MSU is an affirmative action, equal-opportunity employer. Michigan State University Extension programs and materials are open to all without regard to race, color, national origin, gender, gender identity, religion, age, height, weight, disability, political beliefs, sexual orientation, marital status, family status or veteran status.

MICHIGAN STATE UNIVERSITY | Extension

Workshop Partners:

- **Michigan State University Extension** (MSUE)
- **Wild Ones, North Oakland Chapter**
- **Tipp of the Mitt Watershed Council**
- **Antrim Conservation District**
- **Michigan Department of Environmental Quality** (MDEQ)*

Workshop Hopes and Dreams:

- Discuss importance of natural shorelines; options for achieving this
- Introduce Michigan Natural Shoreline Partnership (MNSP) and its resources (training programs, educational workshops, materials to share key messages)
- ***HELP***, *NOT* Overwhelm

Michigan Natural Shoreline Partnership Members

DEQ

MICHIGAN STATE UNIVERSITY | Extension

MICHIGAN LAKE AND STREAM ASSOCIATIONS

MNPPA
MICHIGAN NATIVE PLANT PRODUCERS ASSOCIATION

Cardno JFNew

MNLA

Institute of Water Research
Michigan State University

McNALMS
Michigan Chapter of the North American Lake Management Society

MICHIGAN NATURAL SHORELINE PARTNERSHIP

Huron Pines
www.huronpines.org

Department of Horticulture
MICHIGAN STATE UNIVERSITY

DEPARTMENT OF NATURAL RESOURCES
DNR
MICHIGAN

ftch
fishbeck, thompson, carr & huber
engineers • scientists • architects • constructors
www.ftch.com

MICHIGAN CONSERVATION DISTRICTS

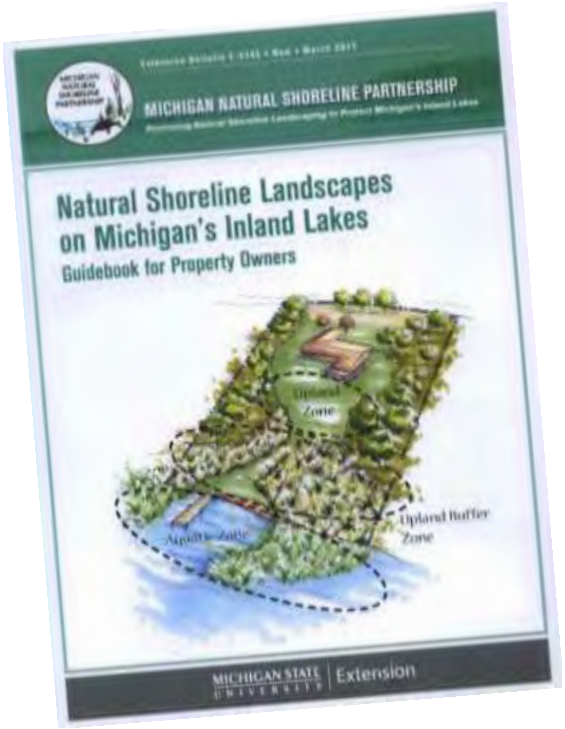
TRIDENT
Dock and Dredge

MNSP Mission:

Promote natural shorelines through use of green landscaping technologies and bioengineered erosion control for the protection of Michigan inland lakes

- **This workshop is based on:**

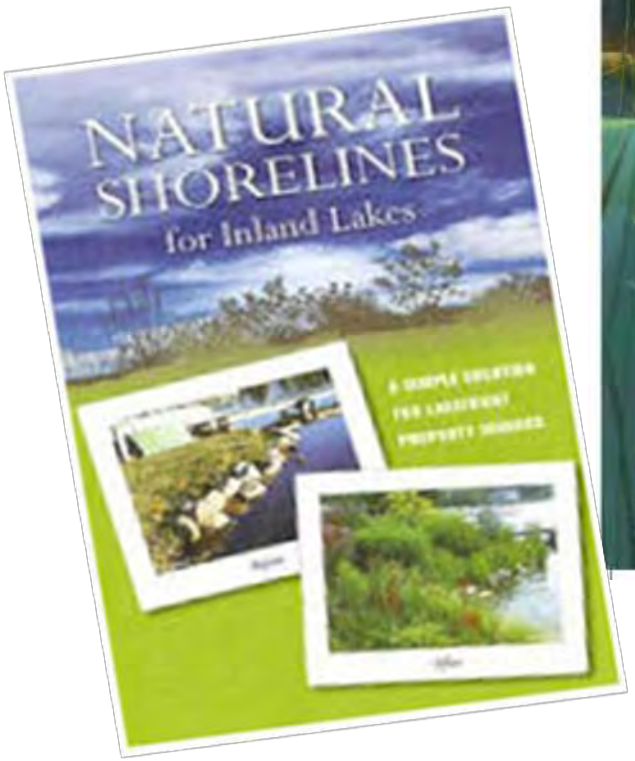
Natural Shoreline Landscapes on Michigan's Inland Lakes: A Guidebook for Property Owners

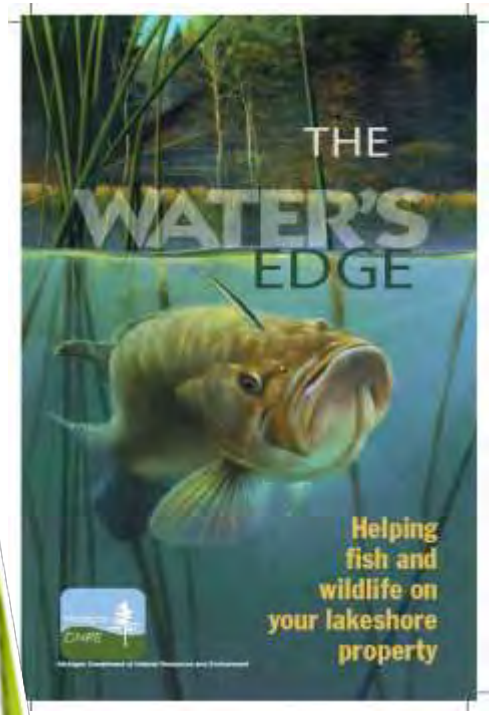


- **Purchase <u>today</u> or go to:**

http://bookstore.msue.msu.edu

Other Resources for Lakefront Property Owners





Firefox | Restore Your Shore: Minnesota DNR

www.dnr.state.mn.us/restoreyourshore/index.html

Restore Your Shore

Minnesota Department of Natural Resources

search

events | a-z list | newsroom | about DNR | contact us

Recreation | Destinations | Nature | Education / safety | Licenses / permits / regs.

SHARE

Home > Assistance > Nurture nature > Shoreland management >

Introduction | Shore Lore | Steps & Techniques | Plant Guide | References & Resources

***Restore Your Shore* is a powerful tool for shoreland owners and professionals to use in implementing shoreland restoration and protection projects.**

Restore Your Shore will enable you to:

- Develop a deeper understanding of shoreland ecosystems and natural shoreland management.
- In **Shore Lore**, discover how lakeshore problems similar to your own have been resolved through innovative approaches.

Background

The very popular book *Lakescaping for Wildlife and Water Quality* was a catalyst for this website. Numerous lakeshore restoration **demonstration sites** and a series of workshops followed the publication of the book. *Restore your Shore* was produced to offer a user-friendly, powerful tool for protecting native shorelines and implementing natural shoreland projects.

12:56 PM
4/30/2014

Typical Shoreline Practices in Michigan

Thank you for your <u>interest</u> in natural shorelines and <u>participation</u> in today's Workshop!

Natural Shoreline Landscapes on Michigan Inland Lakes

A Workshop for Property Owners

Chapter 1
Healthy Lake Ecosystem

MICHIGAN NATURAL SHORELINE PARTNERSHIP

Promoting Natural Shoreline Landscaping to Protect Michigan's Inland Lakes

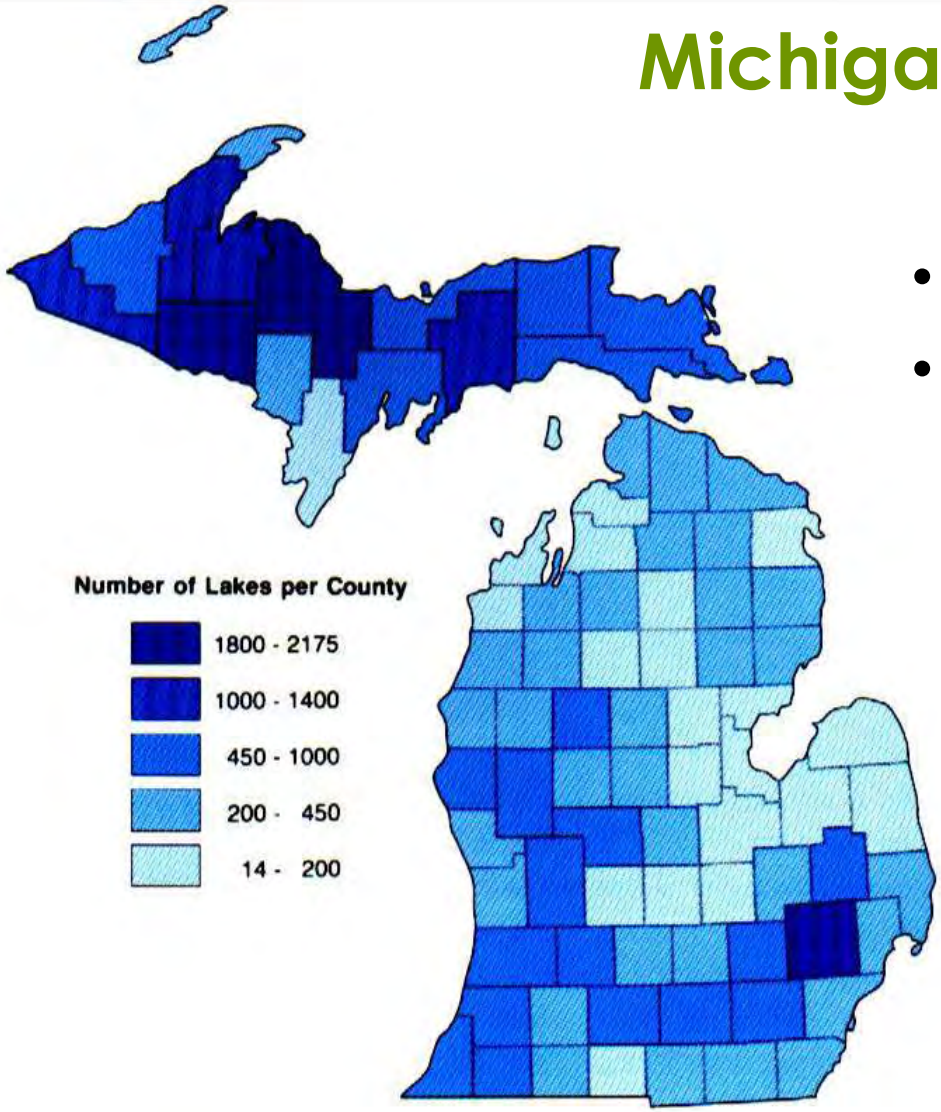
MICHIGAN NATURAL SHORELINE PARTNERSHIP

Photo by Jane Herbert

Chapter Discussion

- General health status of MI's Inland Lakes
- The biggest problem with the nation's lakes
- Lake zones and habitats
- Important functions of plants

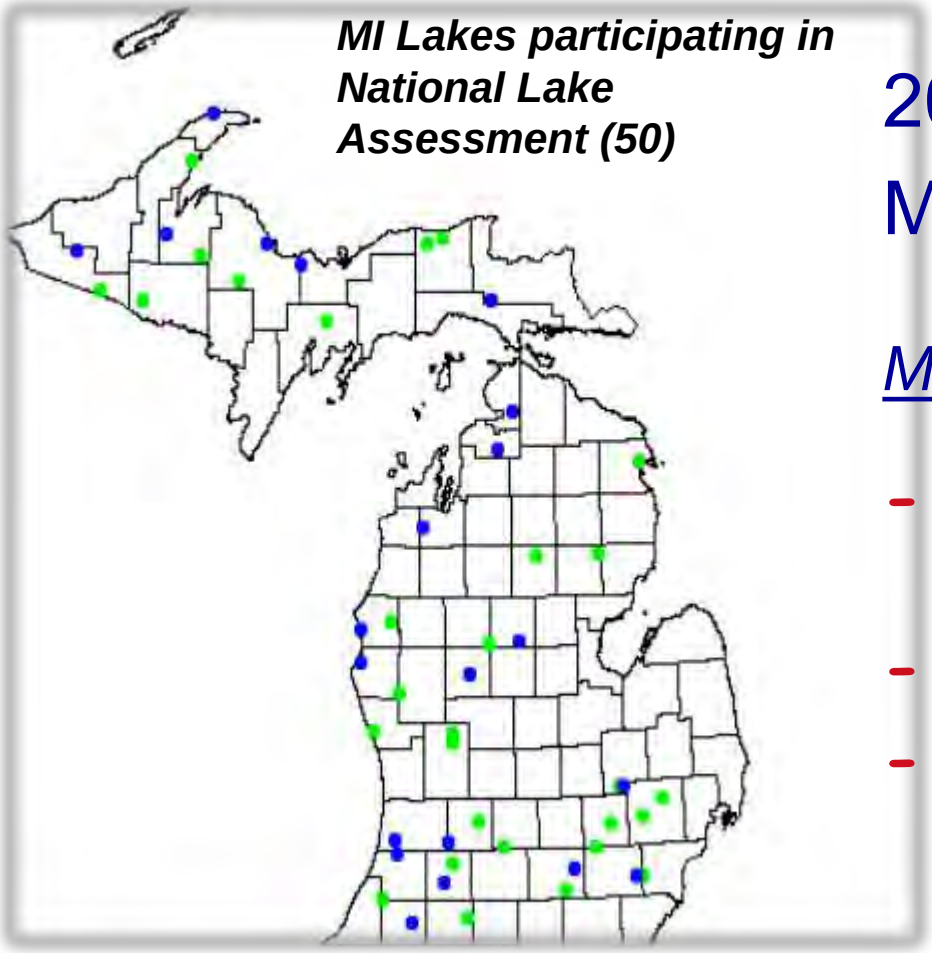
Michigan's Inland Lakes



- 11,000 inland lakes
- 1973 DNR sampled 730 public access sites-- showed generally good to excellent water quality

Image source:
MSU Institute of Water Research

National Lake Assessment - *Michigan*



2007 NLA Findings on Michigan's Lakes:

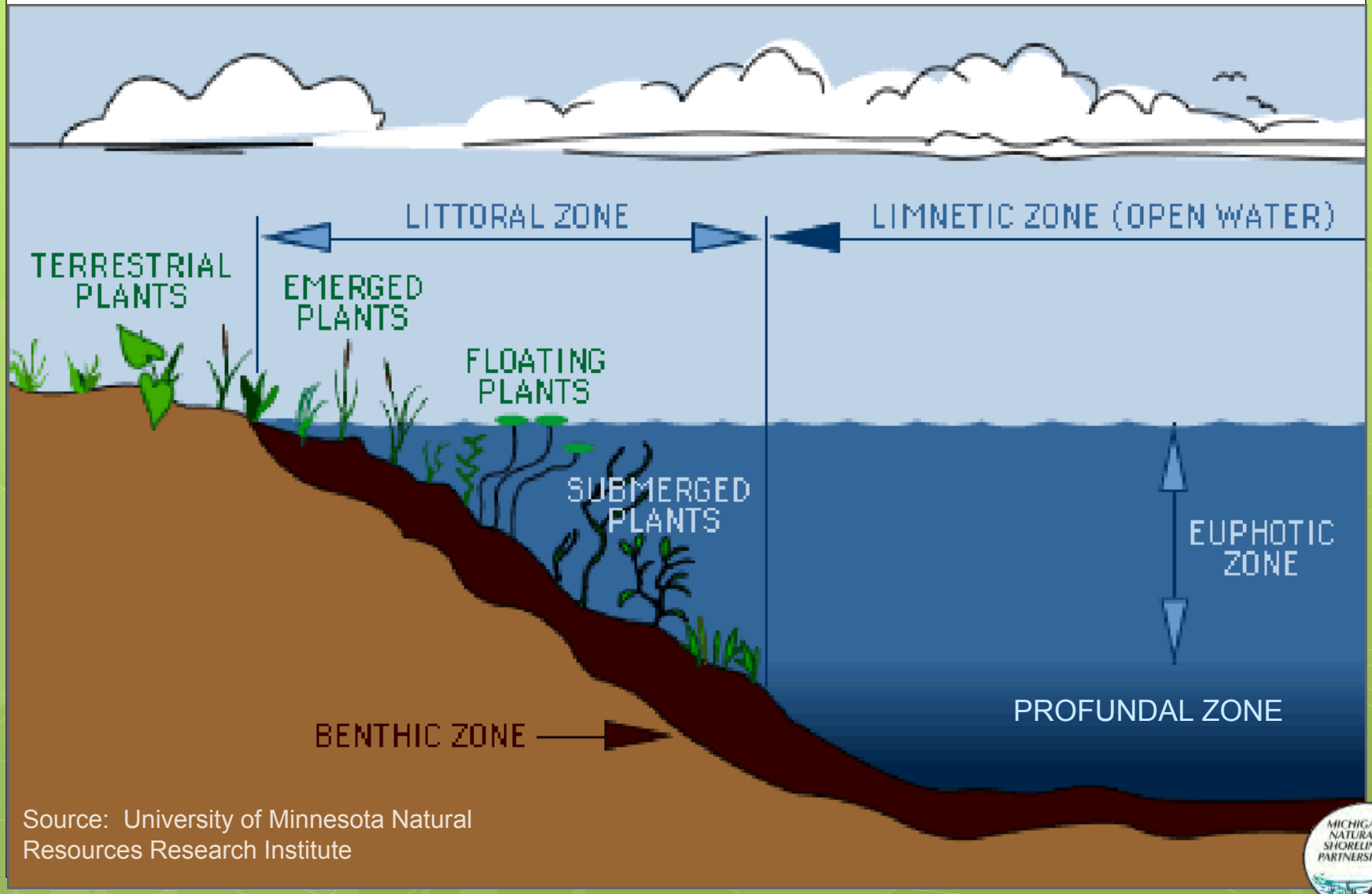
Major Stressors

- Lakeshore habitat alteration
- Lakeshore disturbance
- Shallow water habitat loss

- MI Enhancement Lakes (+21)
- EPA Target Lakes (29)

Lake Watershed

Inland Lake Zones

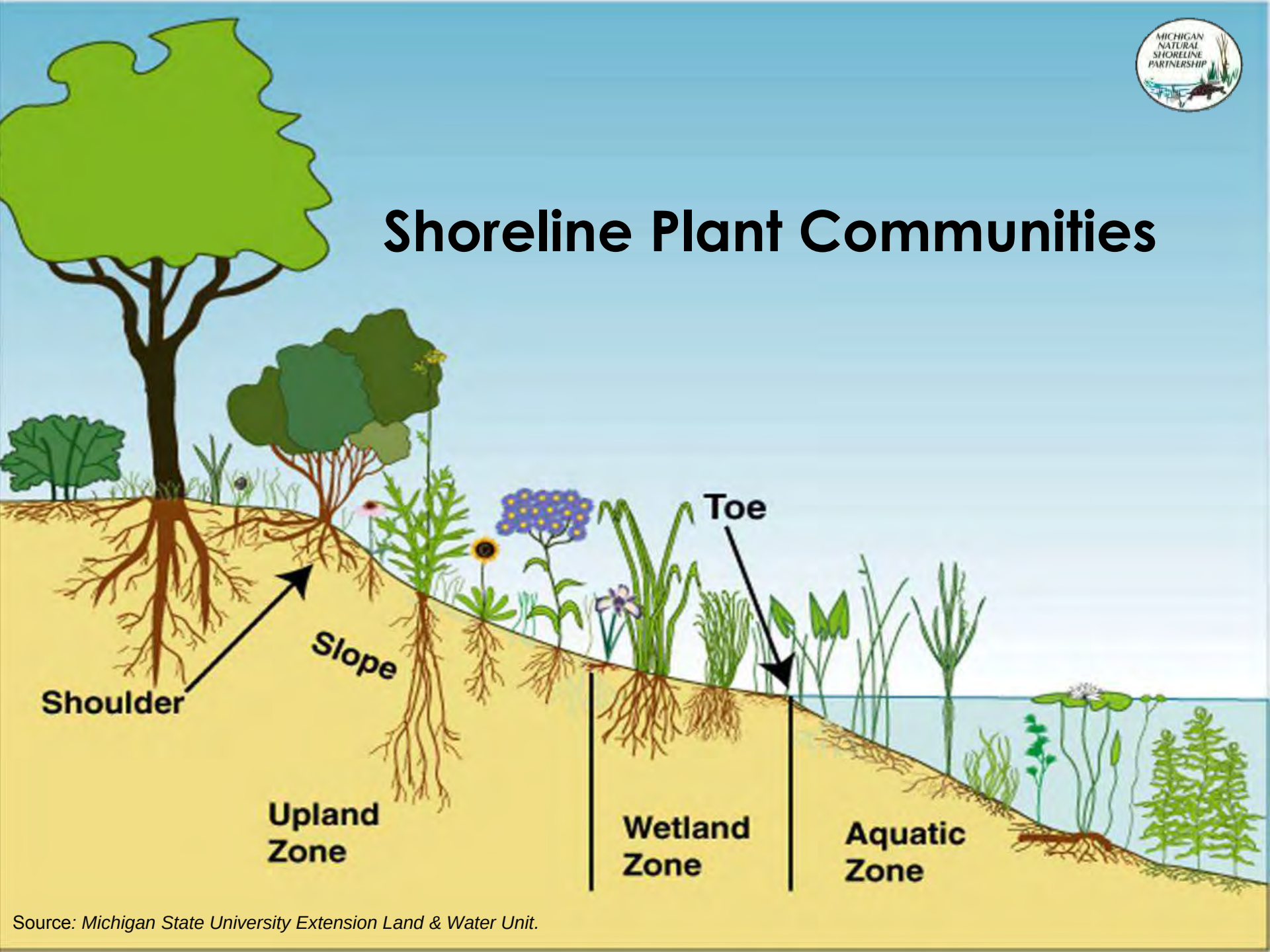


Source: University of Minnesota Natural Resources Research Institute

Littoral Zone

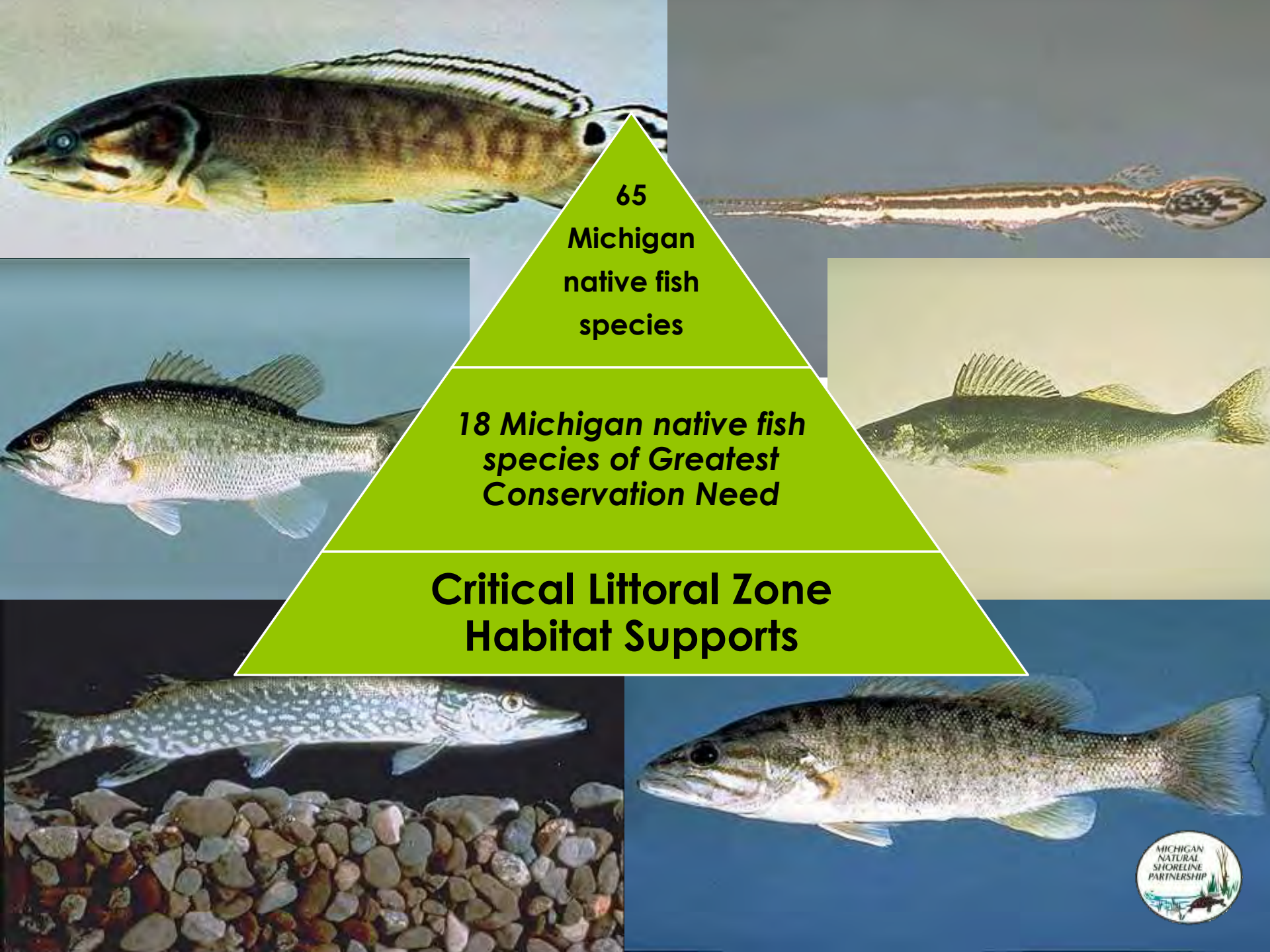
Photo: Amy Peterson

Shoreline Plant Communities

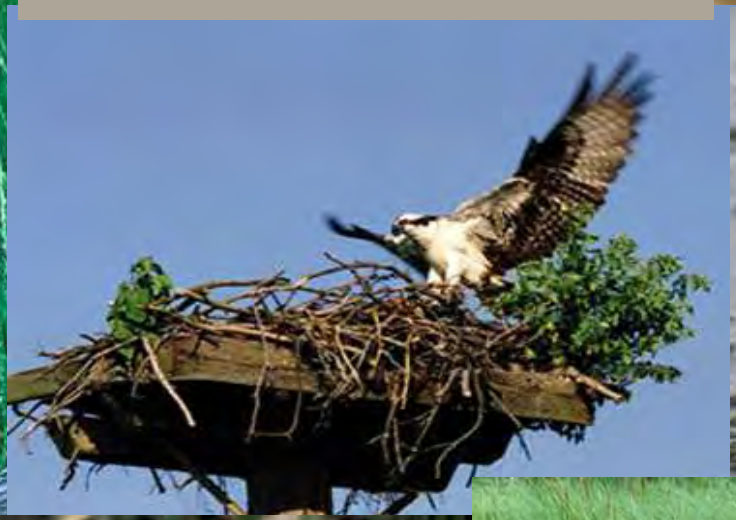


Source*: Michigan State University Extension Land & Water Unit.*

Fish and Wildlife Habitat


65
Michigan
native fish
species
18 Michigan native fish species of Greatest Conservation Need
Critical Littoral Zone Habitat Supports
MICHIGAN NATURAL SHORELINE PARTNERSHIP

24 amphibian species
25 reptile species
87 bird species
19 mammal species
Supported by Michigan Inland Lakes



MICHIGAN NATURAL SHORELINE PARTNERSHIP

Photo: Amy Peterson

Natural Shoreline Landscapes on Michigan Inland Lakes

Workshop for Property Owners

Chapter 2
Understanding the Shoreline

Photo by Jane Herbert

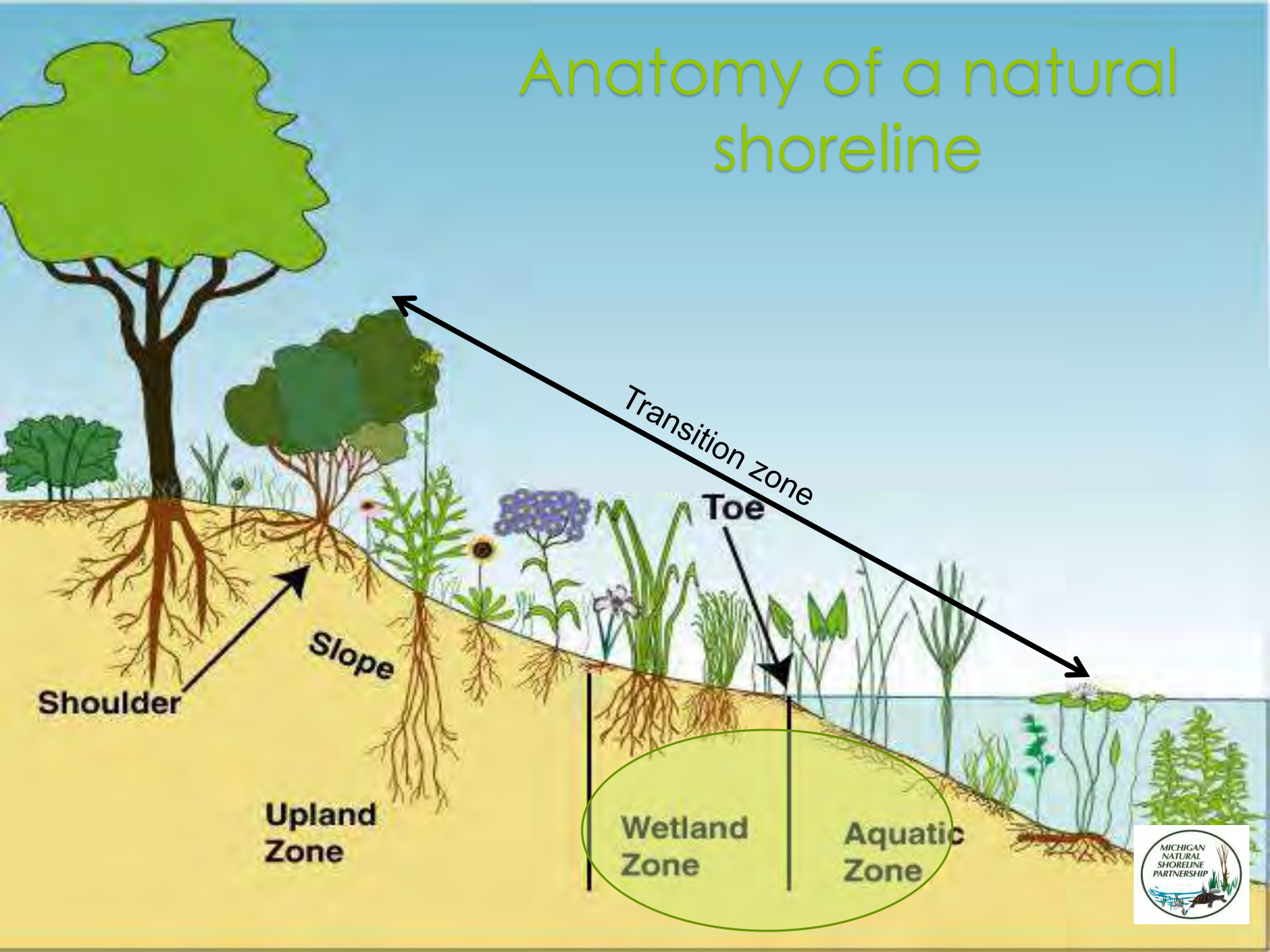
MICHIGAN NATURAL SHORELINE PARTNERSHIP

Promoting Natural Shoreline Landscaping to Protect Michigan's Inland Lakes

Chapter discussion

- Anatomy of a natural shoreline
- Negative effects of high-impact development
- Negative effects of hard shoreline structures
- Potential causes of erosion
- The importance of wave energy

Anatomy of a natural shoreline



Natural shorelines are stable shorelines

- Three 'tiers' of vegetation
  - Tree canopy
  - Shrub understory
  - Herbaceous plants
    - Aquatic, wetland and upland

Natural shorelines provide downed wood

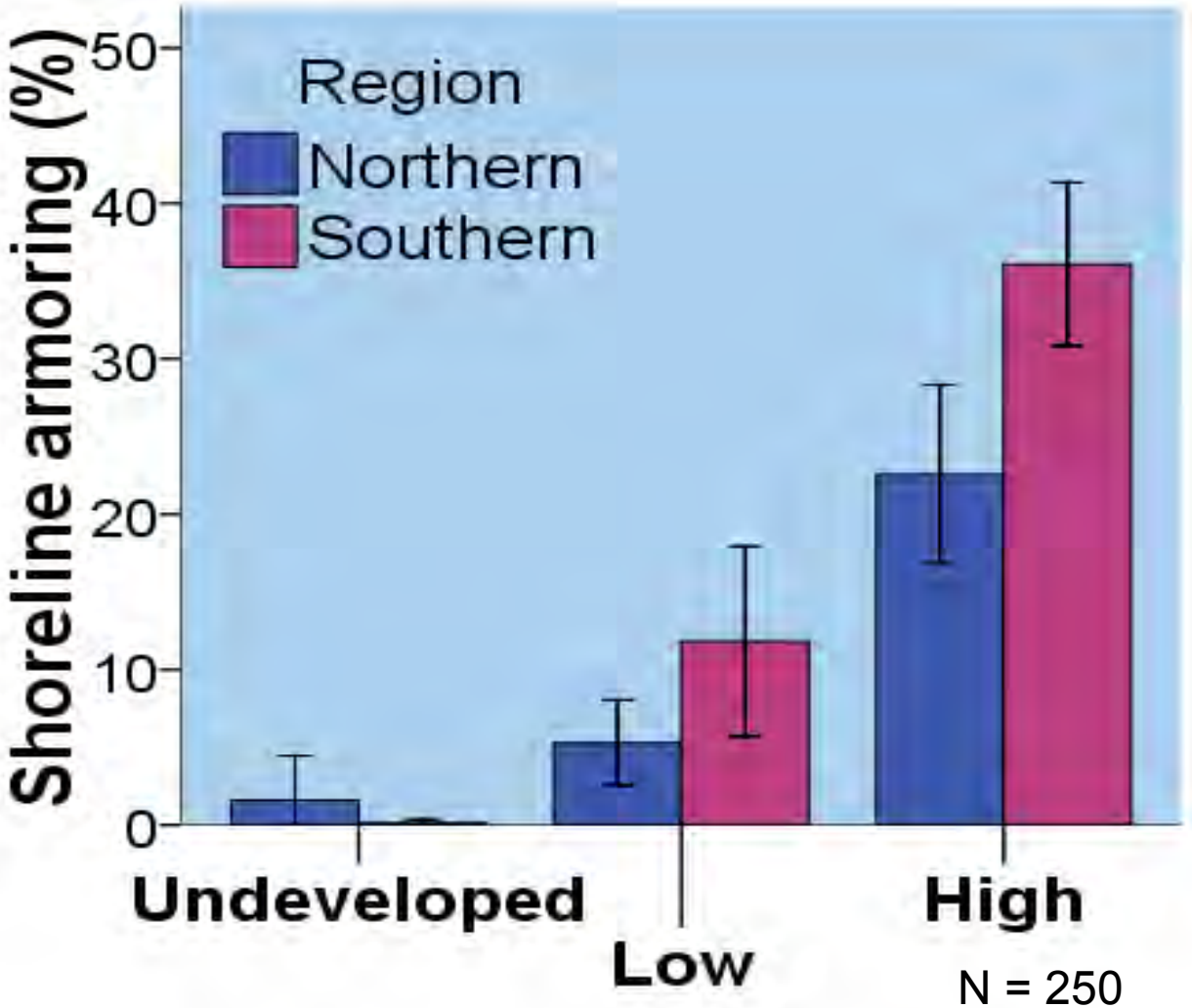
(course woody habitat)


MICHIGAN
NATURAL
SHORELINE
PARTNERSHIP
High Impact Development
Removing Natural Shorelines?
Yes – there are consequences
Photo: Scott Brown

The practice of **hardening shorelines** with rock rip rap and vertical sea walls has resulted in the cumulative loss of shoreline and littoral zone habitat on MI inland lakes.

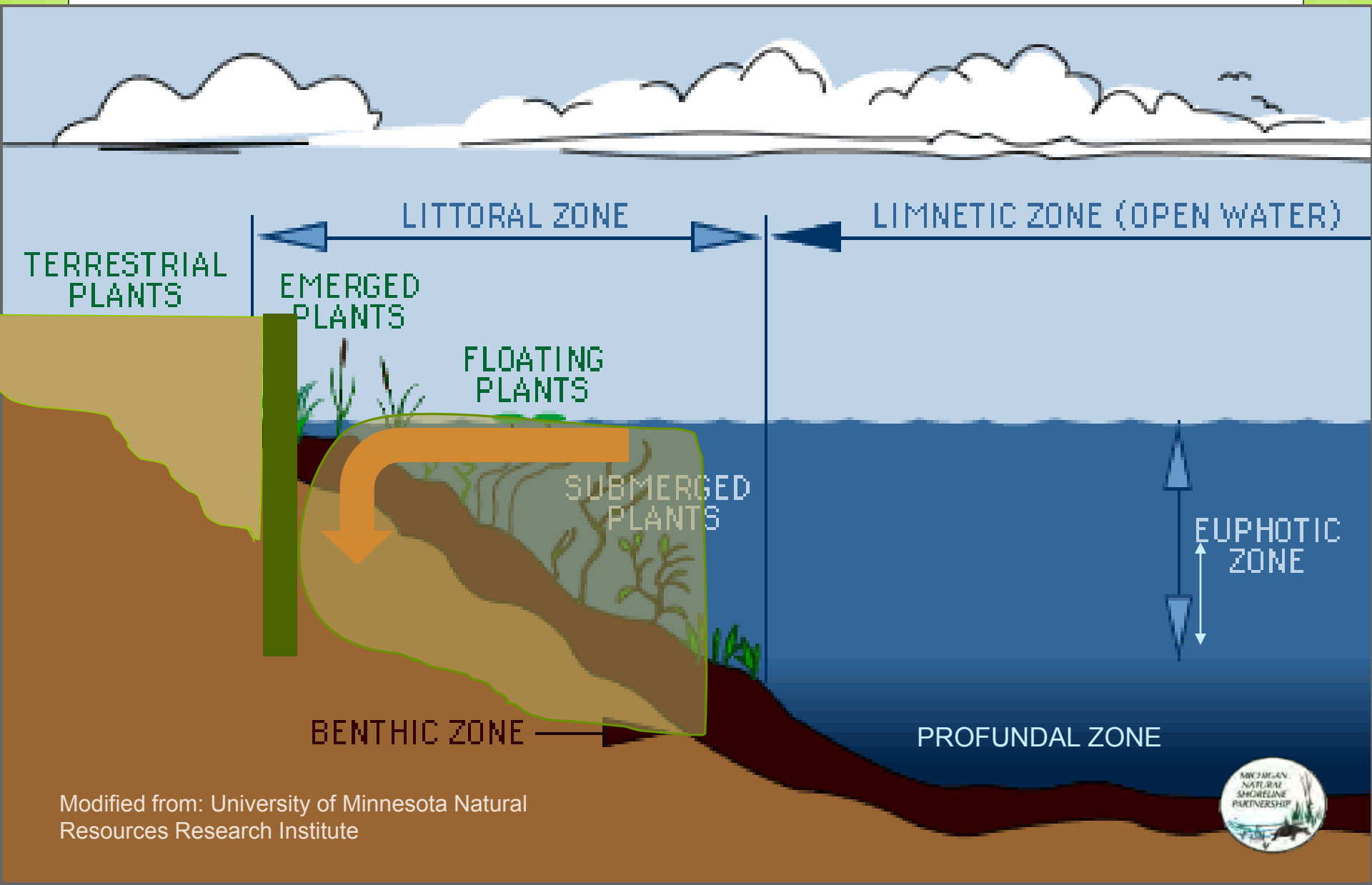
(O'Neal and Soulliere, 2006)

Development Intensity and Shoreline Armoring



N = 250

The system becomes broken



Modified from: University of Minnesota Natural Resources Research Institute

Seawalls =

- Barrier for animal movement
- Creates scouring effect
- Wave flanking

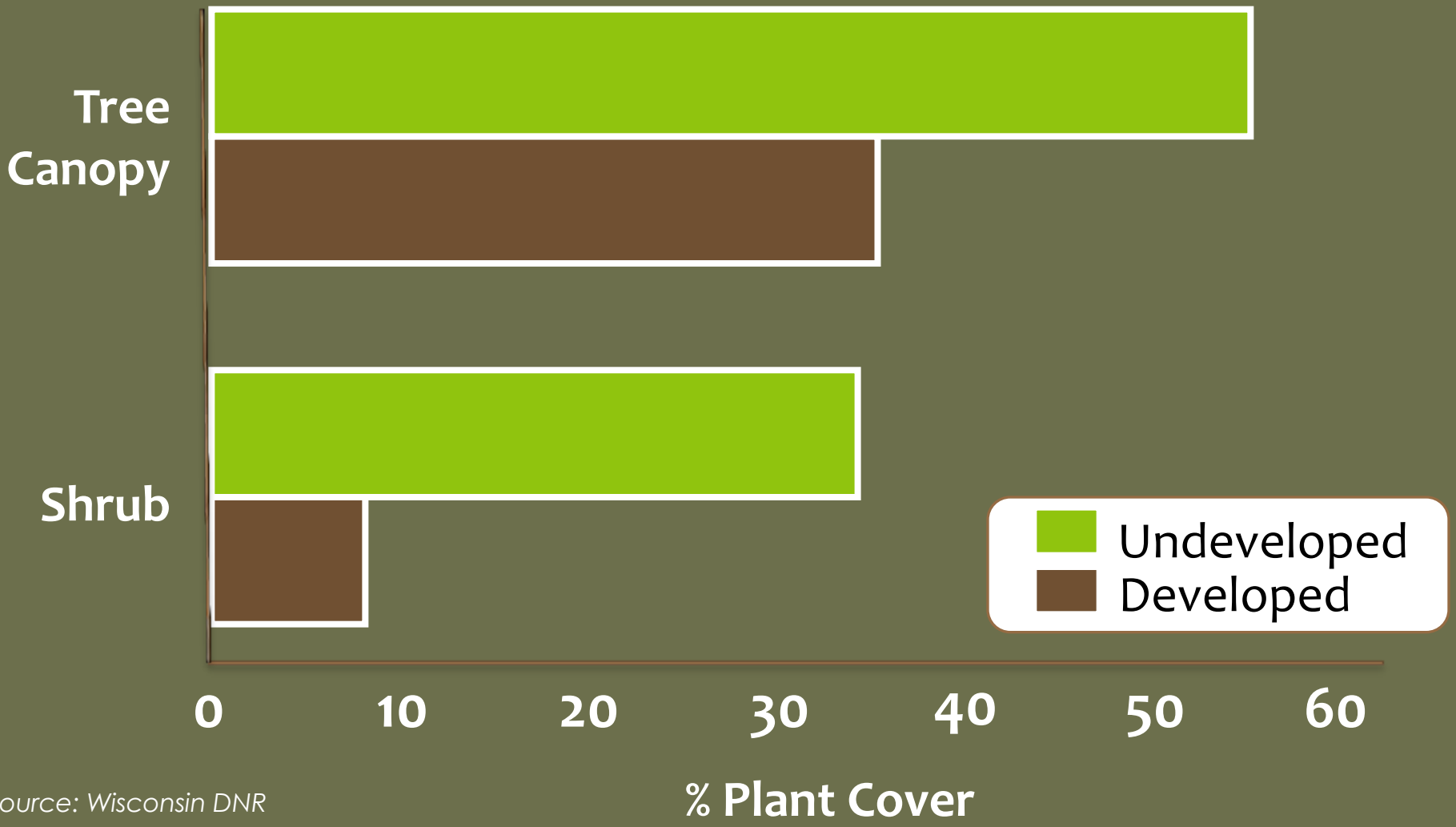
Nuisance animal habitat

Home Sweet Home

Vegetation Removal =

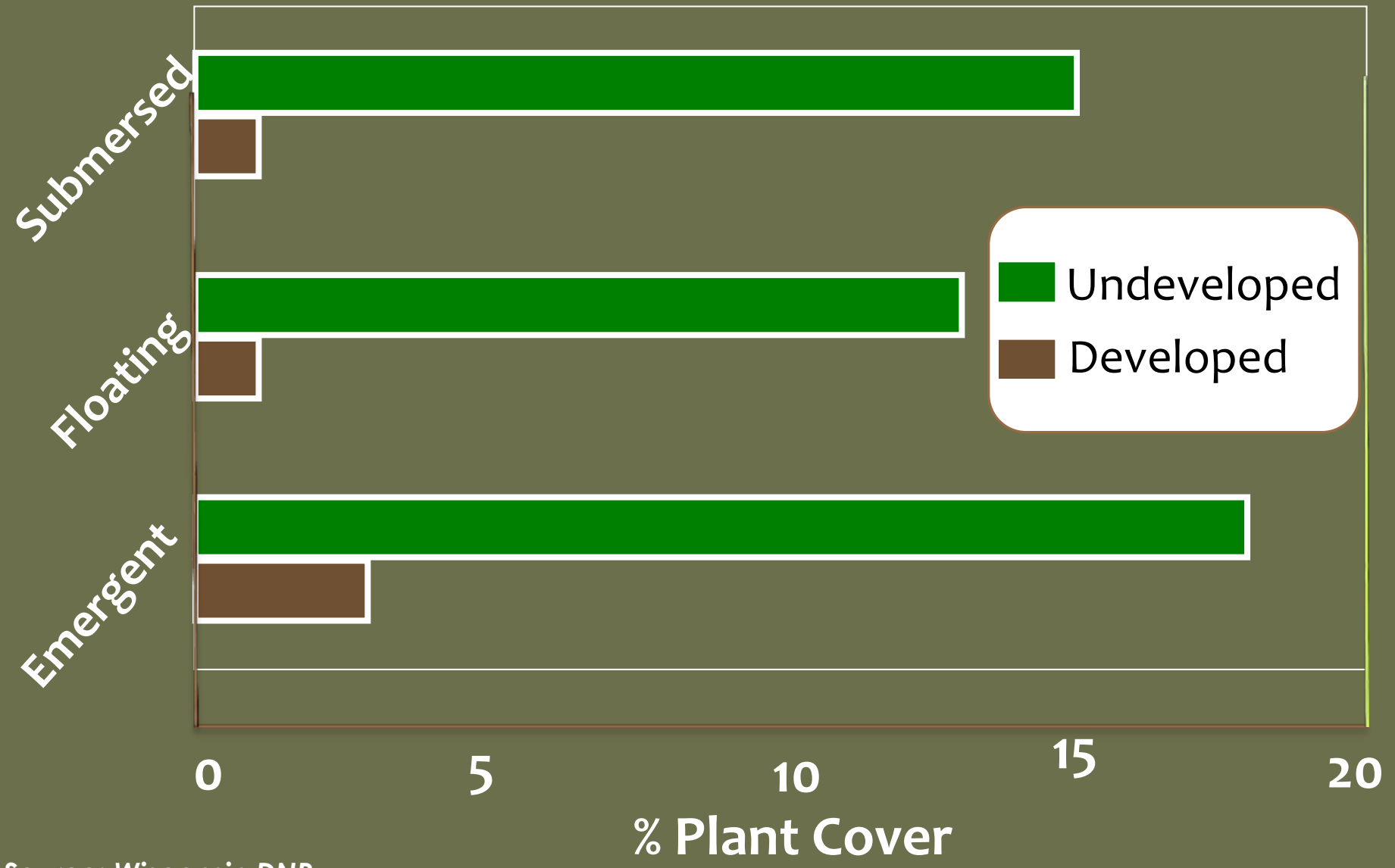
- *Habitat*
- *Shade for cooling*
- *Woody debris*
- *Root Structure*
- *Fish and wildlife*

What's Happened to Shoreland Plants?



Source: Wisconsin DNR

What's Happened to Aquatic Plants?



Source: Wisconsin DNR

Fisheries impacts due to shoreline development

Minnesota Lakes Study on 44 Lakes indicates

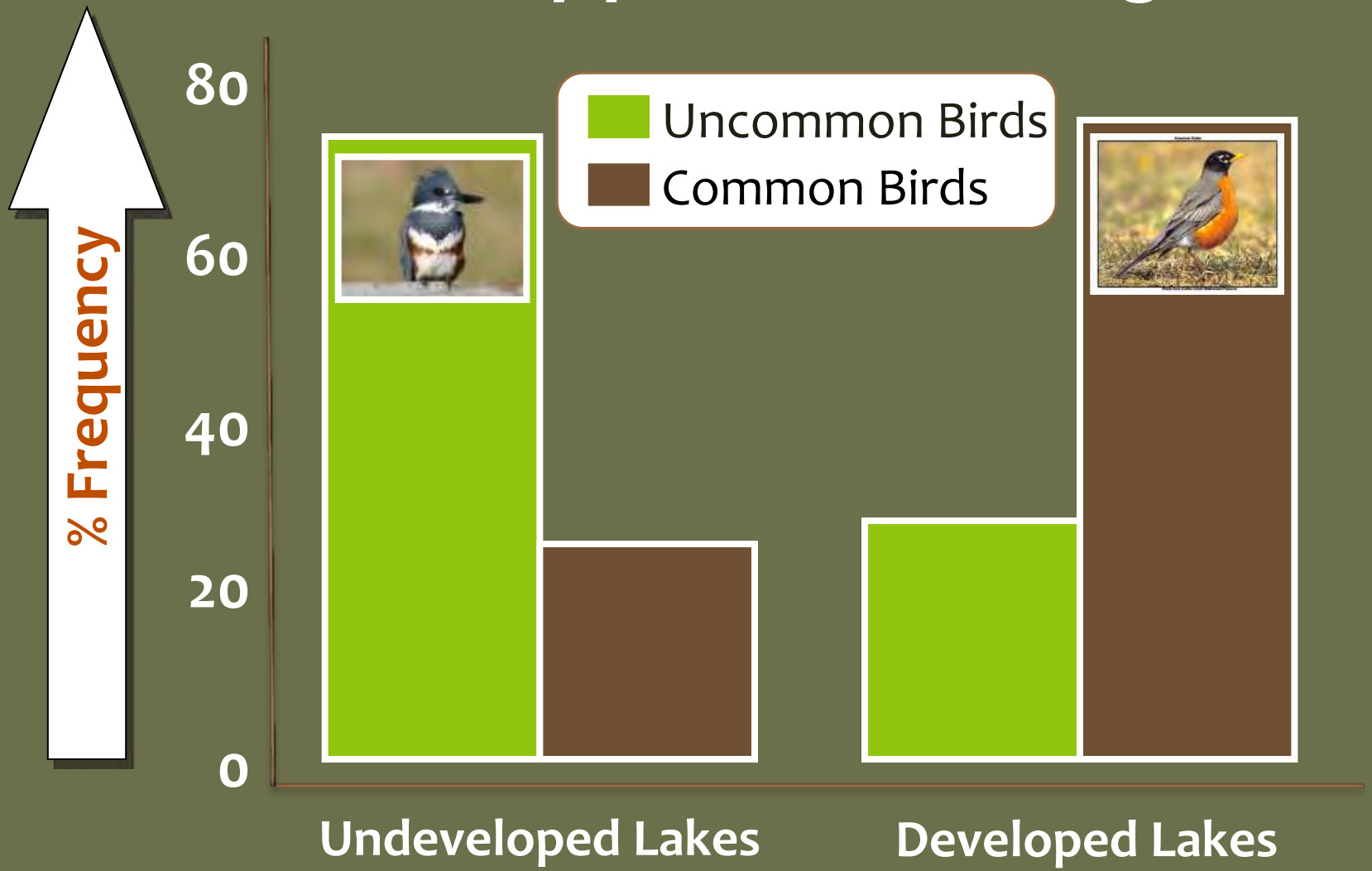
- 66% (on average) ↓ in emergent and floating-leaf vegetation in presence of shoreline development.
- Positive relationship between these plants and the number and size of certain fishes.

More emergent and floating leaf plants =

more Northern Pike Bluegill and Pumpkinseeds and others

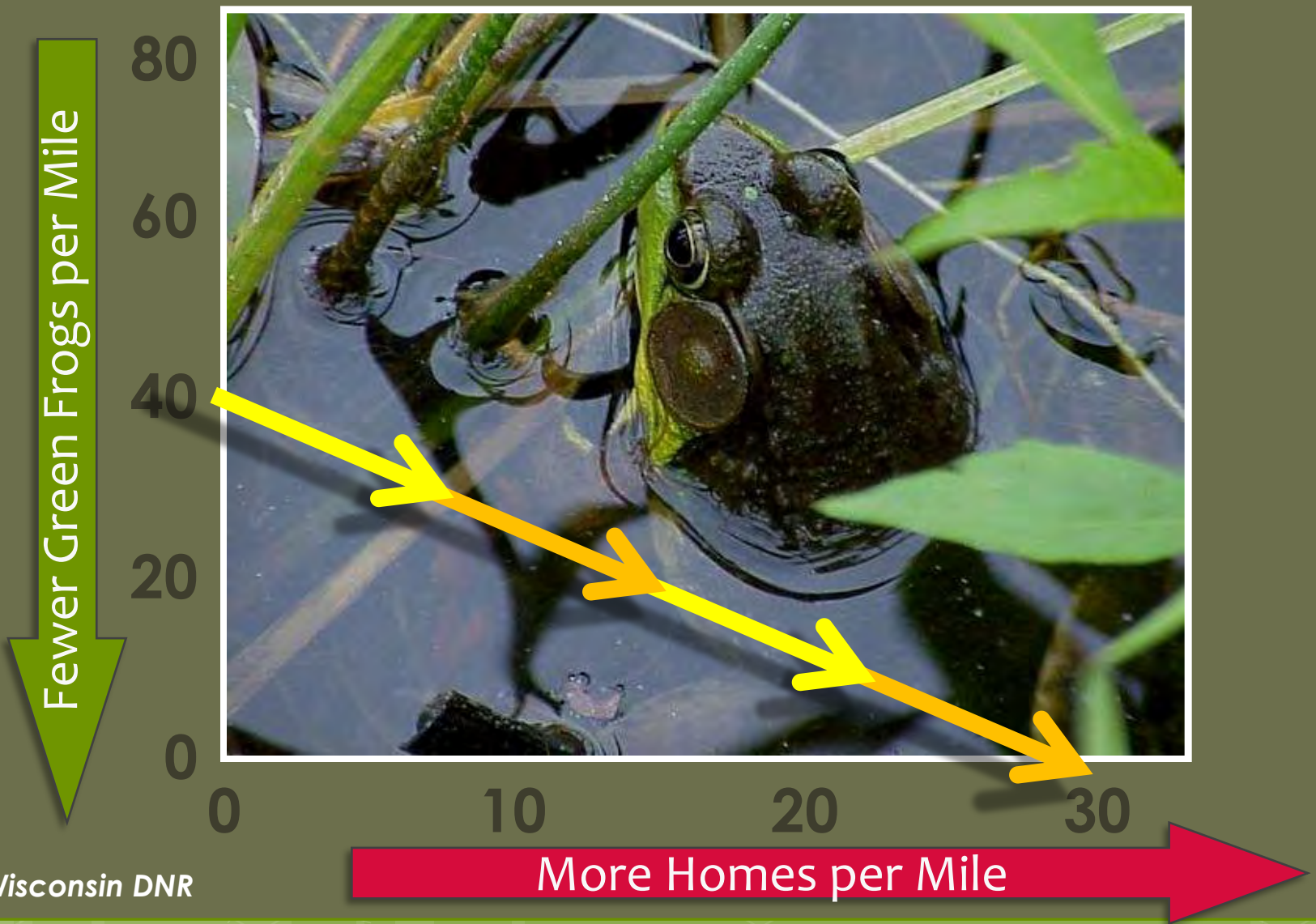
(Radomski and Goeman, 2001)

What's Happened to Songbirds?



Source: Wisconsin DNR

What's Happened to Frogs?



Source: Wisconsin DNR

Chemical impacts of shoreline development

Removal of trees and shrubs

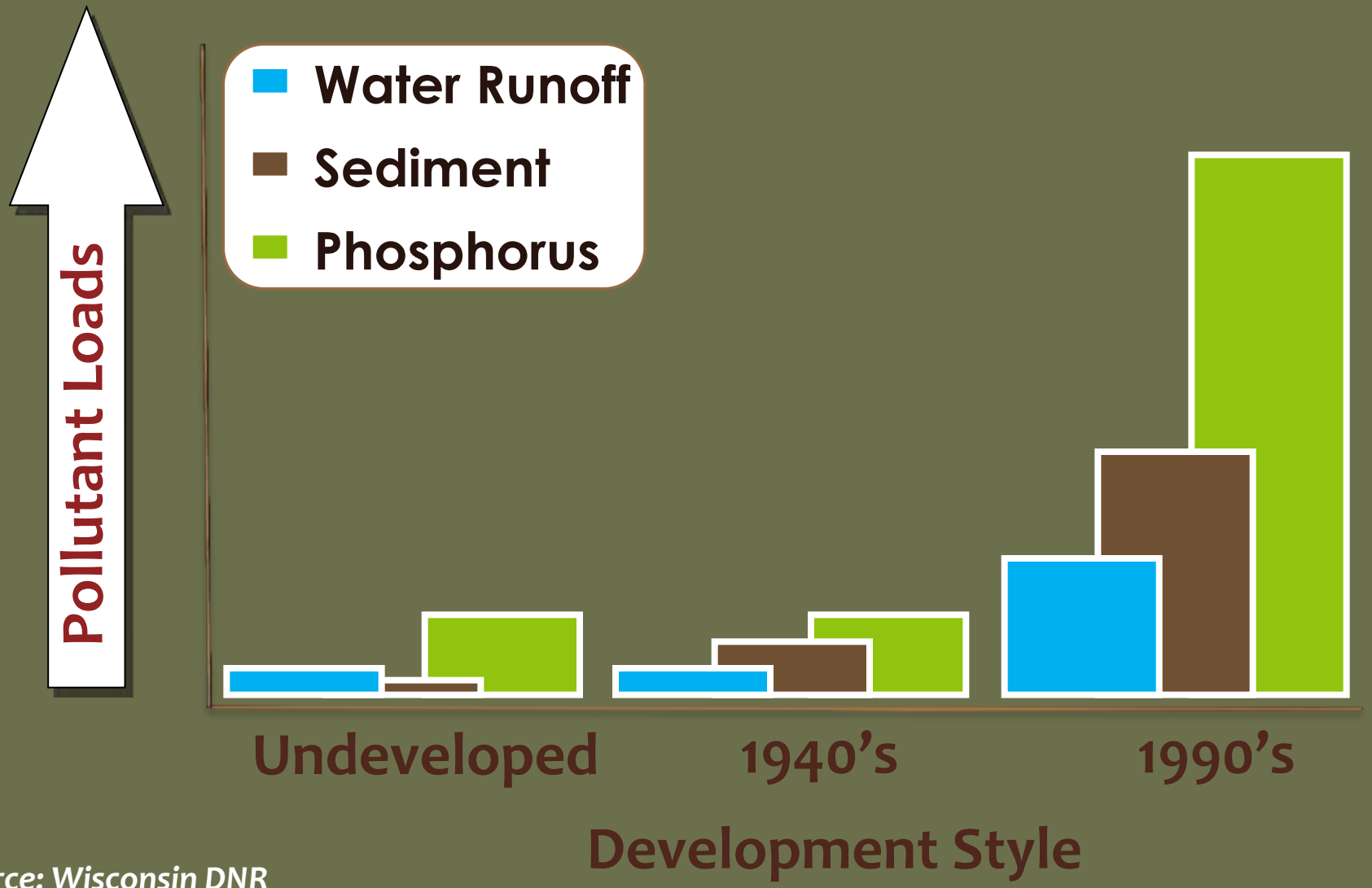
- Increased nearshore water temperatures
- Lower dissolved oxygen concentrations

Reduced water quality

- Pollutant delivery with stormwater
- Runoff from intensively maintained lawns

In freshwater aquatic systems 1 unit of phosphorus can produce 500 times its weight in algae.
(Wetzel, *Limnology*, 2nd Edition

Impacts of Lake Development



Source: Wisconsin DNR

The problem with sandy beaches

- Unnatural soil type
- Loss of sand to wave action = maintenance
- Eroding beach sand covers spawning areas and aquatic plant beds

Shoreline erosion: Understanding the problem

Naturally caused

Human caused

Site specific (only on your property)

Widespread

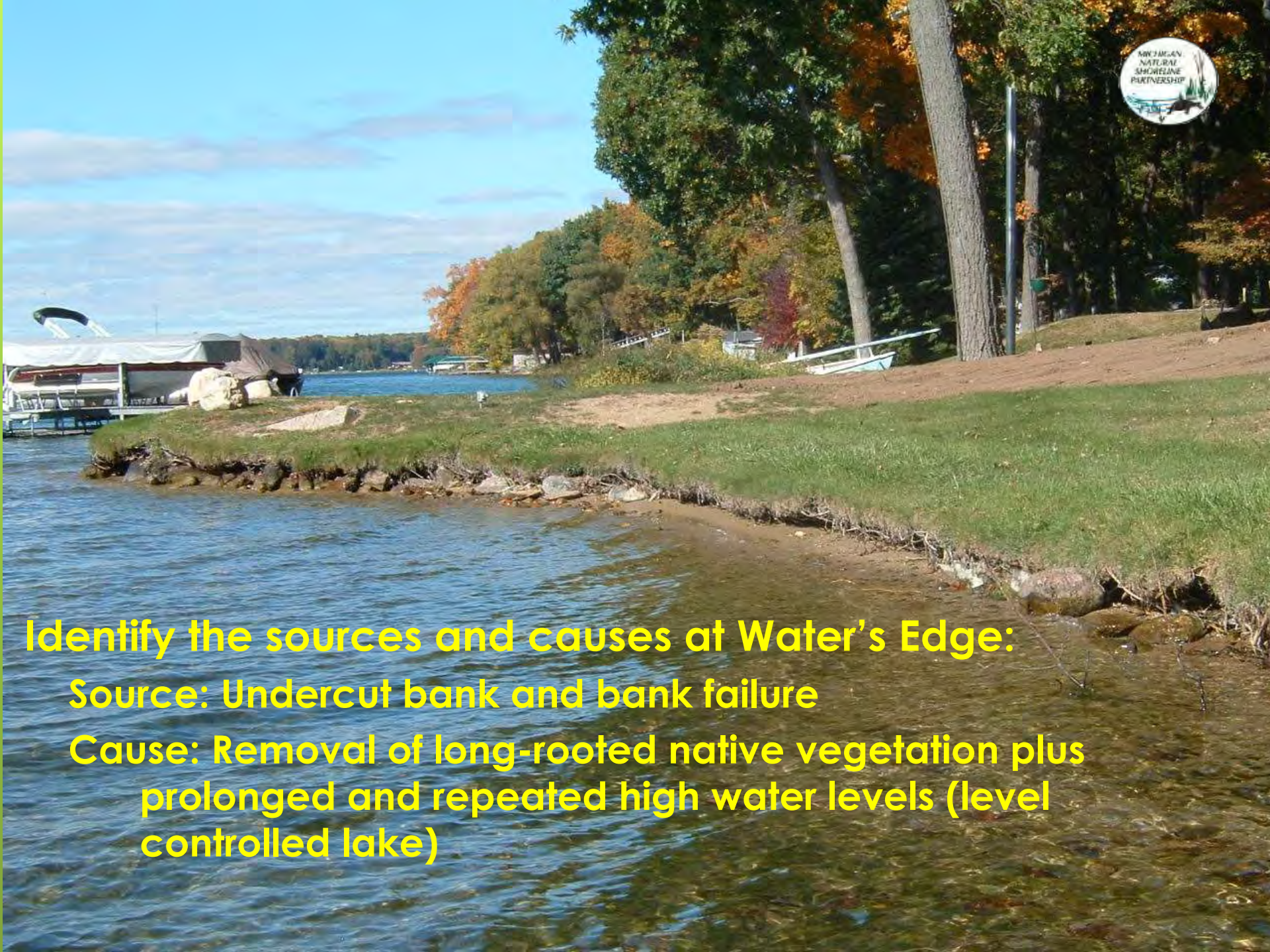
Shoreline Erosion depends on Shoreline Types

- Materials – rock, gravel, sand, silt, clay, organic (muck)
- Formation – height, angle of slope
- Erodibility of a shoreline

Erosive energy v. resistance of shoreline material to erosion

Increasing erodibility
(decreasing resistance to erosive energy)

Rock Gravel Clay [Sand, Silt and Organic(muck)]



Identify the sources and causes at Water's Edge:

- **Source: Undercut bank and bank failure**
- **Cause: Removal of long-rooted native vegetation plus prolonged and repeated high water levels (level controlled lake)**


MICHIGAN
NATURAL
SHORELINE
PARTNERSHIP
Identify Upland source(s) and Cause(s):
Source: overland runoff
Cause: stormwater collecting on impervious surfaces


Source: Wave energy flanking from neighboring sea wall
Cause: Seawall and rip rap and loss of shoreline vegetation.

Aquatic plants protecting the shoreline from the waves

Wave energy at vertical sea wall

Ice action along the shoreline

Intensity and frequency can vary from year to year. Factors include:

- Freeze/thaw expansion and contraction
  - Lack of snow cover

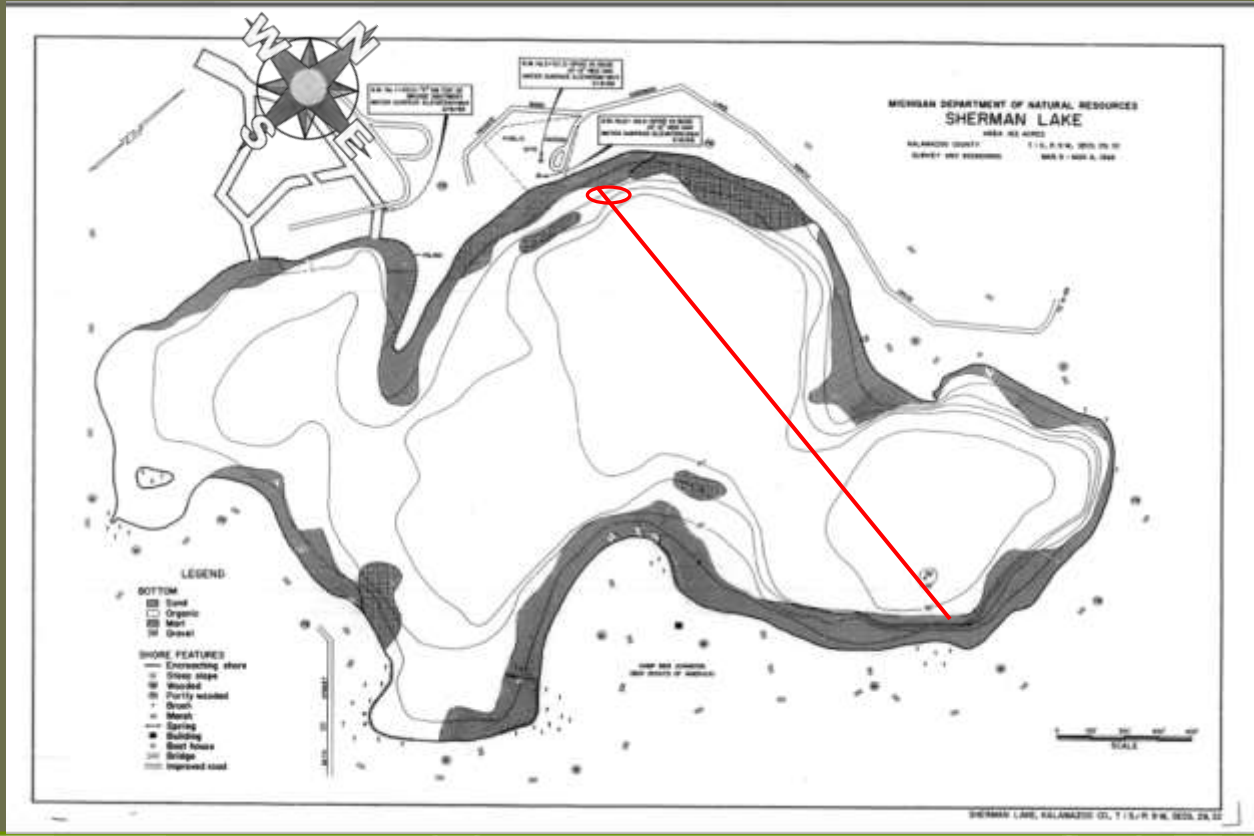
•and/or…

- Spring ice-out (break-up)
  - Rate of warm up
  - Orientation of site to spring winds

Wave Energy at Your Shoreline

Depends on:

- Fetch = Maximum distance across the lake from your location
- Water Depth
- Wind Speeds



Questions?

Natural Shoreline Landscapes on Michigan Inland Lakes

A Workshop for Property Owners

Chapter 3
Planning a Natural Shoreline Landscape

Photo by Jane Herbert

MICHIGAN NATURAL SHORELINE PARTNERSHIP

Promoting Natural Shoreline Landscaping to Protect Michigan's Inland Lakes

Chapter 3 Discussion

- Re-thinking what a shoreline should look like
- Helping a homeowner to identify challenges and develop a plan

Re-think what the shoreline should look like

Can we get from this?

To This?


Naturalize shorelines to restore habitat AND improve 'curb' appeal
MICHIGAN NATURAL SHORELINE PARTNERSHIP

Restore habitat AND fix problem areas

Photo: Jane Herbert

Steps for Planning a Natural Shoreline Landscape

- **Integrate goals**
- **Site inventory**
- **Draw a base plan**
- **Determine needs and wants**

Steps for Success

Property Owner Needs and Wants

- *Personal*
- *Legal and Financial*
- *Priorities and Timeline*

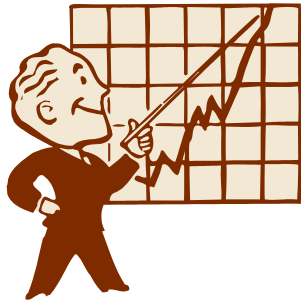
Incorporate “People Habitat” too)

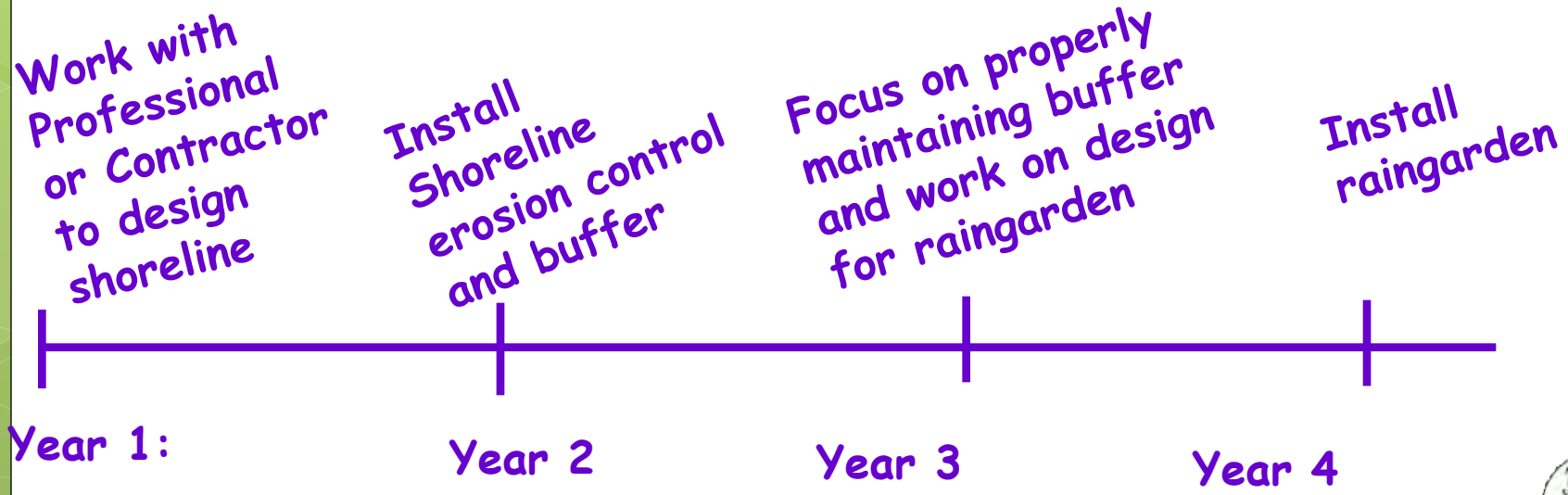
MICHIGAN NATURAL SHORELINE PARTNERSHIP

Steps for Success:
Priorities and Timeline

Example Priorities

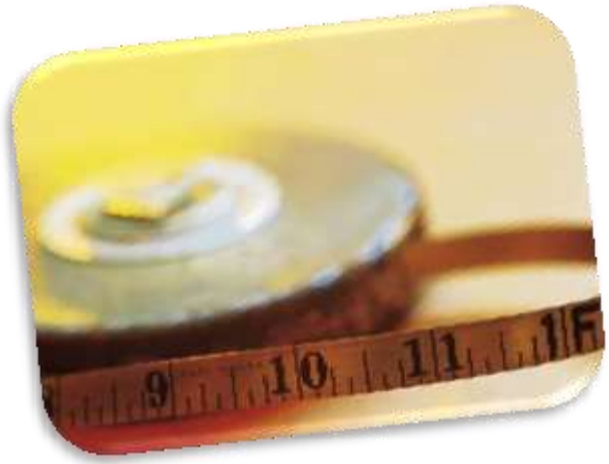
- Establish stable shoreline with a buffer area.
- Rain garden to capture roof runoff
- Create large butterfly garden on south side.



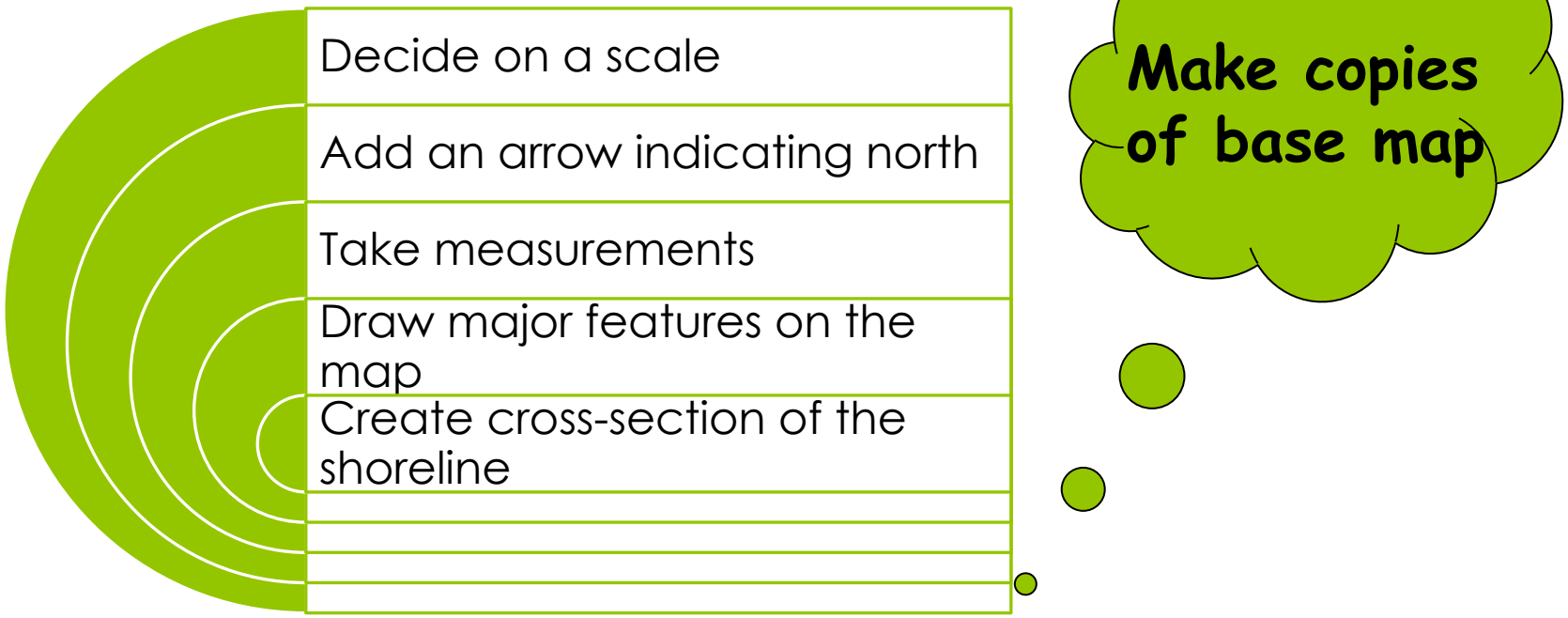


Draw a Base Map:
Materials Needed

- Any existing property maps or surveys
- Pencils and erasers
- Paper
- Measuring tape



Draw a Base Map:
Process



Site Inventory

- Walk your entire property
- Use a checklist
- Take lots of notes
- Take lots of photos during the year

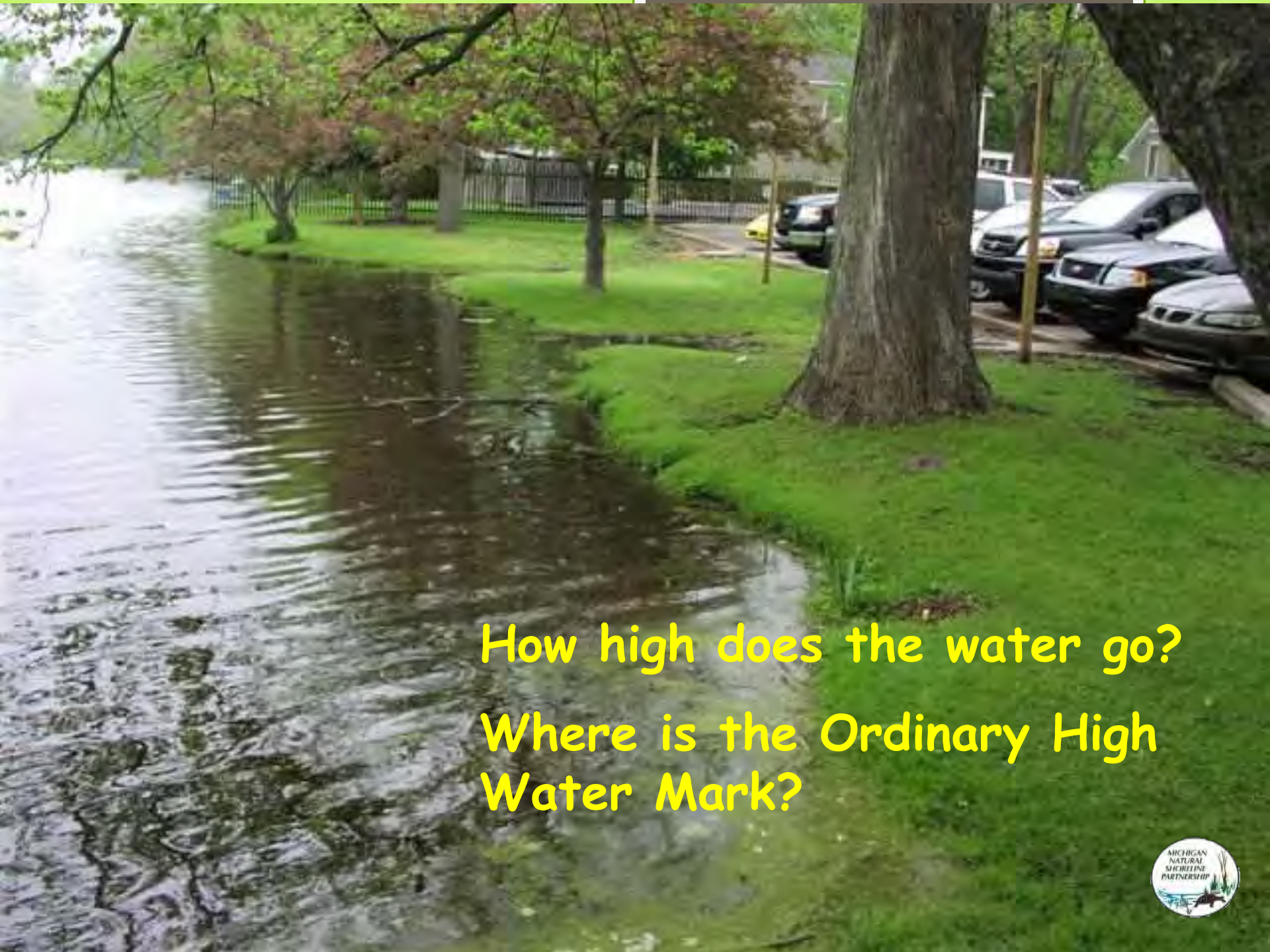
Upland

- ☐ Existing plants: trees, shrubs, flowers, invasive species etc.
  - What are their names?
  - Sizes?
  - Are they intended to stay or be taken out?
- ☐ Existing lawn
  - Where is the lawn areas?
- ☐ Are there any erosion problems?
  - Are there any bare areas?
- ☐ If there is a septic system
  - Where is the septic tank and drain field?
  - Where is the pump out location?
- ☐ Stormwater runoff
  - Where does it come from and where does it go?
  - Are there any prominent pathways that stormwater property? Are these areas eroded?


How well is the slope vegetated?
Is there sediment running off into the lake
MICHIGAN NATURAL SHORELINE PARTNERSHIP


Wave flanking
Rocky and sandy lake bottom
MICHIGAN NATURAL SHORELINE PARTNERSHIP


Are there signs of an ice ridge?
Is there lawn up to the edge of the lake?
MICHIGAN NATURAL SHORELINE PARTNERSHIP


How high does the water go?
Where is the Ordinary High Water Mark?
MICHIGAN NATURAL SHORELINE PARTNERSHIP

Unnatural erosion control materials

Inventory Concern:
What is that Plant?

- Take photos throughout the growing season


Photo: J. Kirkwood


Photo: J. Kirkwood

Inventory Concern:
What is that Plant?

- **Take notes on some key features of the plants**
- **Try to determine what type of plant they are**

A: Emergent

B: Floating aquatic

C: Sub-mergent

What color is the flower?

What is the plant height?

How deep is the water if any?

Is the plant completely underwater?

Does the plant have parts sticking out of the water?

Inventory Concern:
What is that Plant?

A: Shrub

B: Tree

C: Herbaceous Plant

- **Take notes on some key features of the plants**
- **Try to determine what type of plant they are**

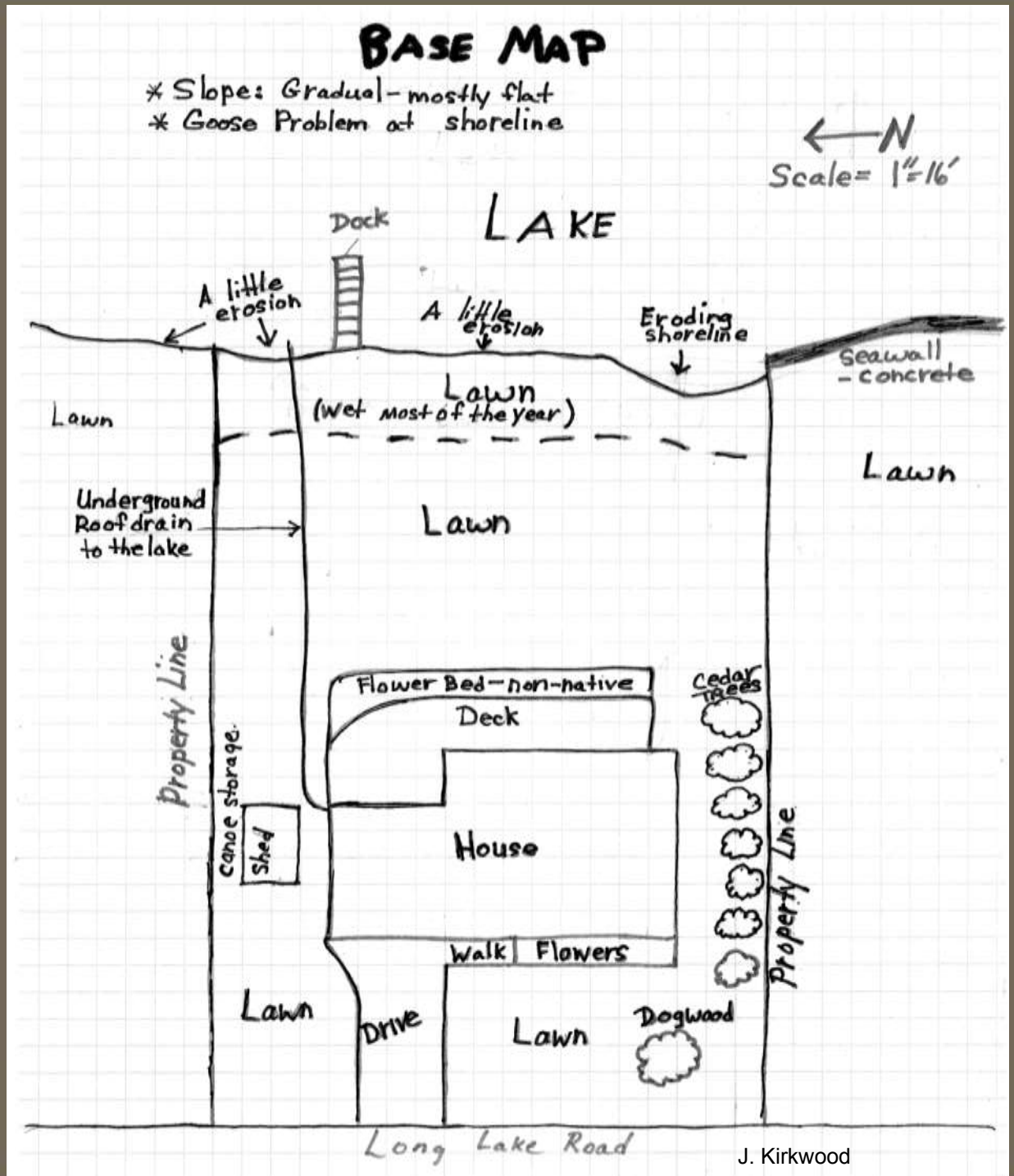
How close to the water is it?

What color are the branches?

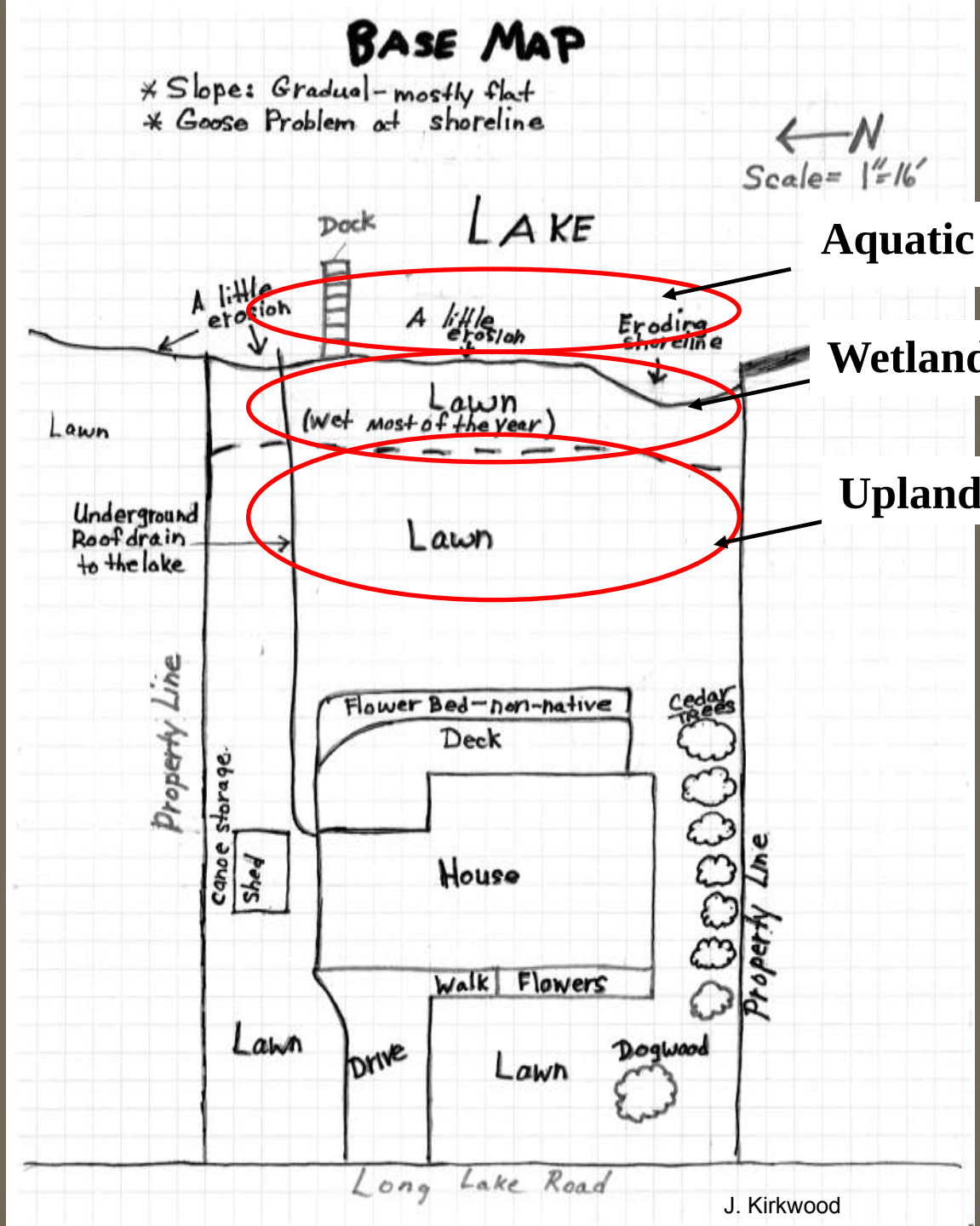
Photo: J.F. New

BASE MAP

* Slope: Gradual - mostly flat
* Goose Problem at shoreline



J. Kirkwood


BASE MAP
* Slope: Gradual - mostly flat
* Goose Problem at shoreline
N
Scale= 1"=16'
LAKE
Dock
A little erosion
A little erosion
Eroding shoreline
Lawn
(wet most of the year)
Lawn
Lawn
Underground Roof drain to the lake
Property Line
Flower Bed - non-native
Deck
Cedar trees
canoe storage
Shed
House
Walk
Flowers
Lawn
Drive
Lawn
Dogwood
Property Line
Long Lake Road
Aquatic Zone
Wetland Zone
Upland Zone

J. Kirkwood

Landowner and Lake Goal Integration

What does the lake need?

Water Quality

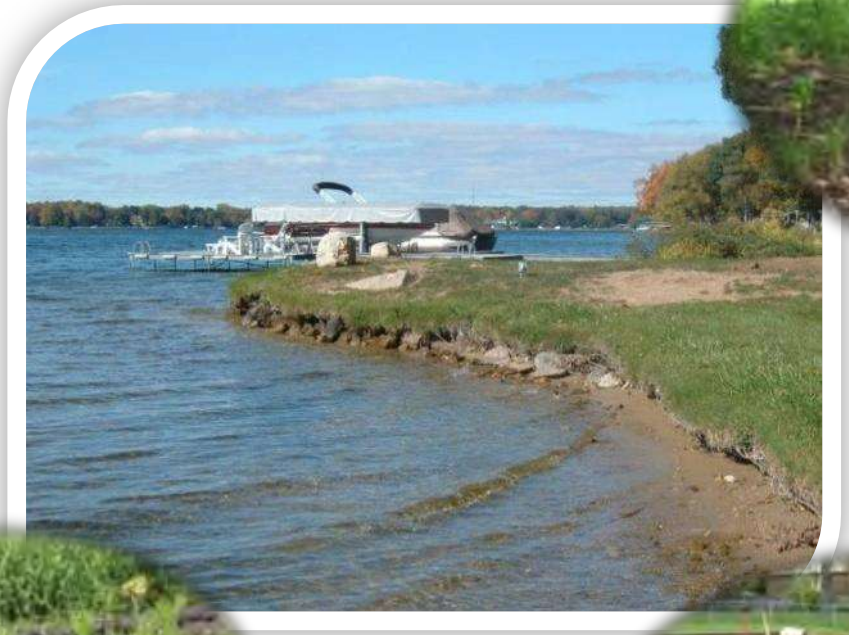
Stormwater Controls

- Buffer strips
- Rain gardens/bio-filtration
- Less impervious surface
- Wetlands
- Invasive Plant removal?

Landowner and Lake Goal Integration

What does the lake need?

Erosion Control

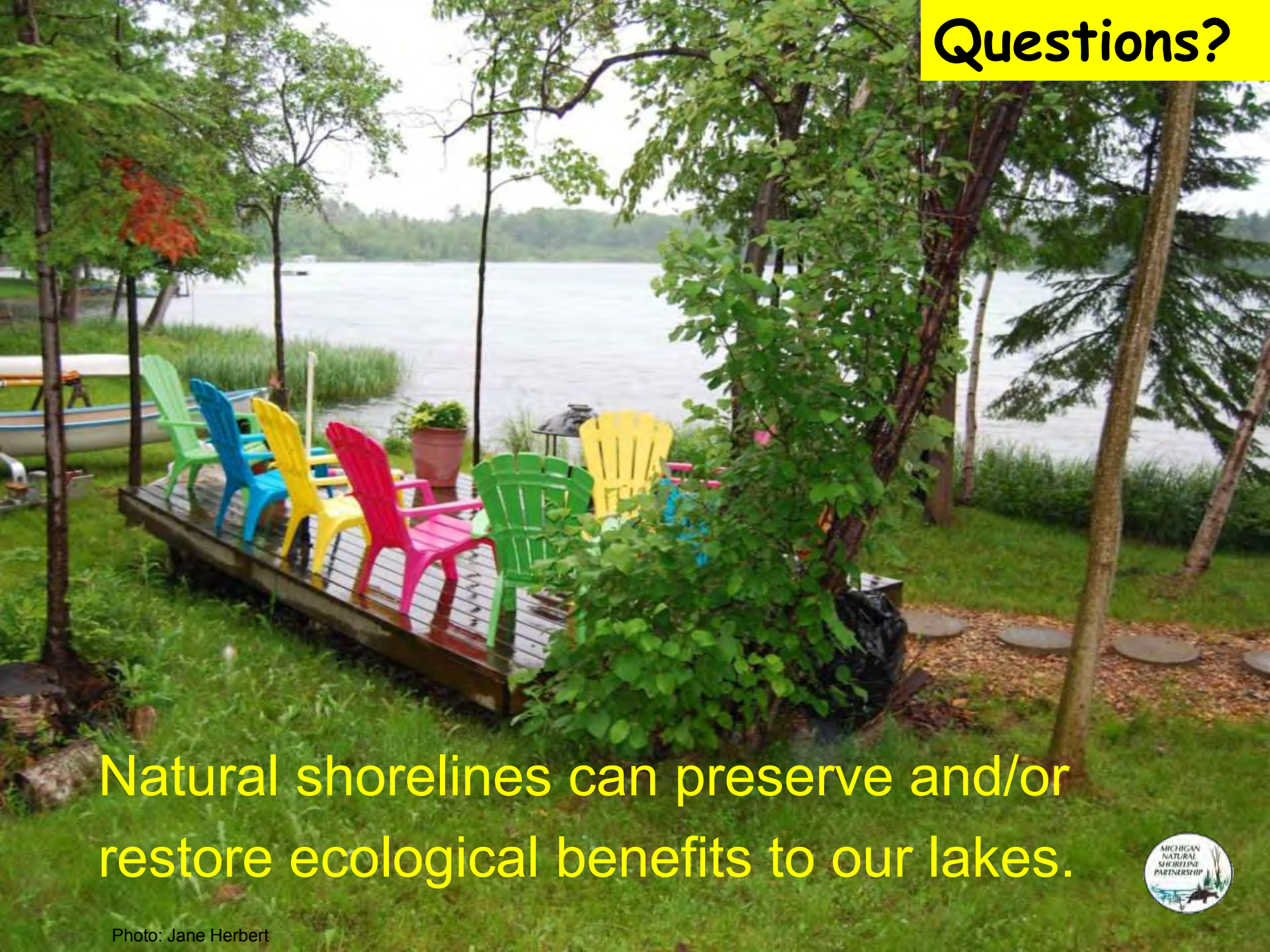


Landowner and Lake Goal Integration

What does the lake need?

Habitat

- Terrestrial
- Aquatic



Questions?

Natural shorelines can preserve and/or restore ecological benefits to our lakes.

Photo: Jane Herbert