# Mitigation Options
# For Shoreland Property Owners

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## Outline for this session

1. Shoreland zoning overview
2. What is shoreland mitigation?
3. When is shoreland mitigation required?
4. What are some shoreland mitigation options?
5. Shoreland mitigation implementation approaches
6. Real-world shoreland mitigation examples

# Shoreland Zoning Overview

- Grounded in the "Public Trust Doctrine"
  - Article IX, Section 1 of the Wisconsin Constitution
  - Came from the governing of the Northwest Territory well before Statehood
  - Establishes "navigable waters" – defined in Chapter 30, Wisconsin Statute
- Shoreland zoning established under S. 281.31, s. 59.692, 62.231, 61.351, Wisconsin Statute
- Shoreland zoning applies to areas adjacent to and along navigable waters

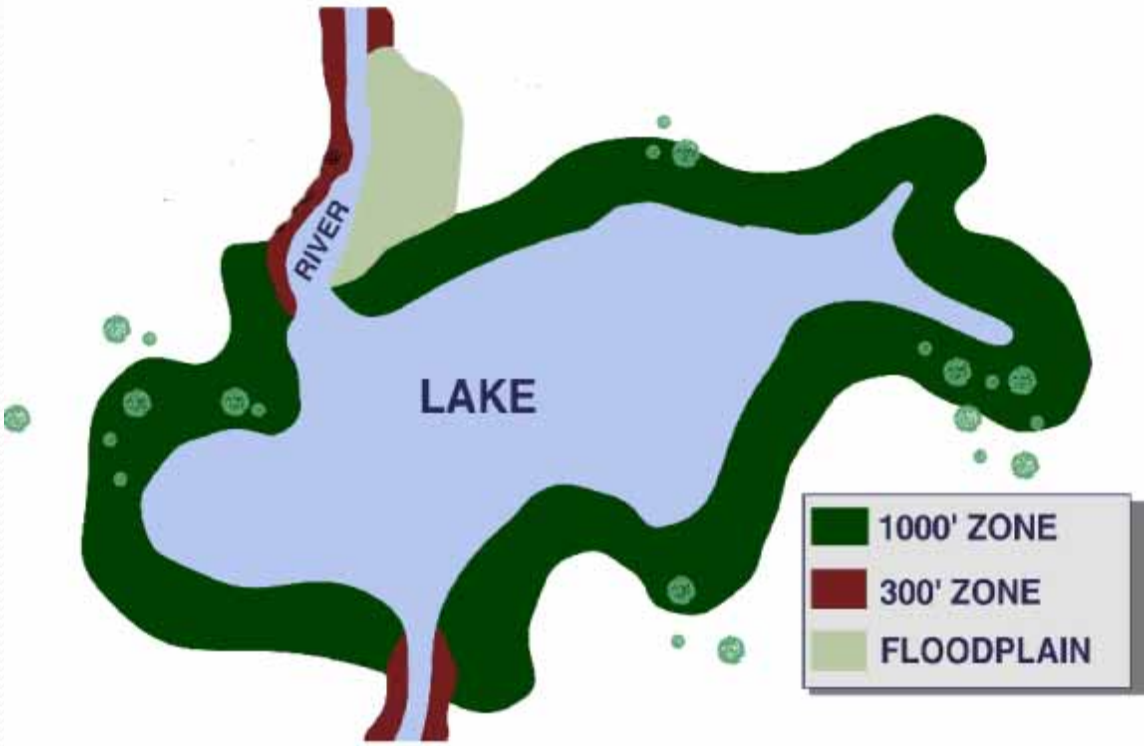
# Shoreland Zoning Overview

- Goal of shoreland zoning is to limit direct <u>and</u> cumulative impacts of shoreland development on:
  - Water quality
  - Near-shore aquatic, wetland, and upland wildlife habitat
  - Natural scenic beauty

# Shoreland Zone

## What is it?

## Where is It?




- The areas that shoreland zoning applies to
- Established June 1966, Water Resources Act (now NR 115)
- Applies statewide to all unincorporated areas
- Applies to areas annexed after May 7, 1982 or incorporated after April 30, 1994
- Different rules pertain to shoreland zoning in cities and villages (NR 117) AND the Lower St. Croix Riverway (NR 118)

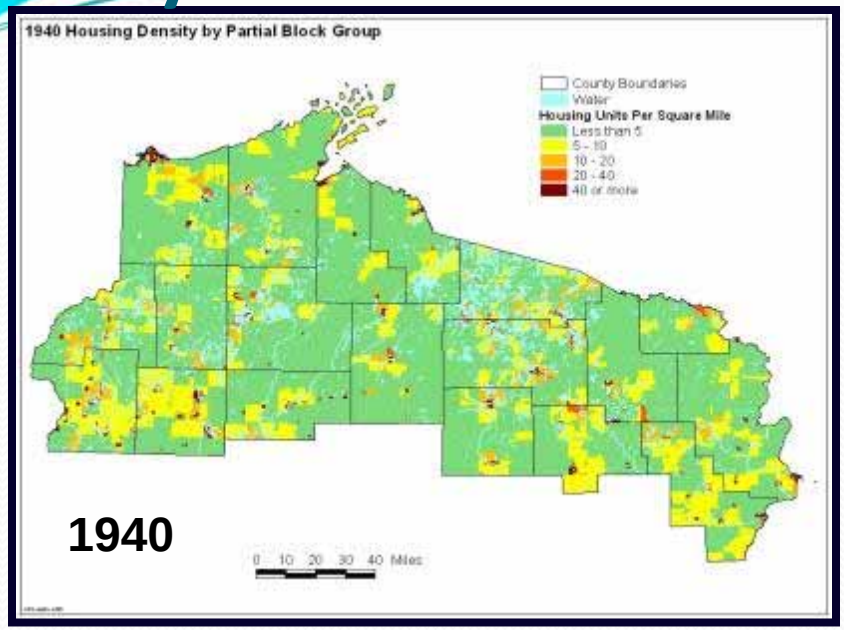
# Why Care About Shoreland Zoning?

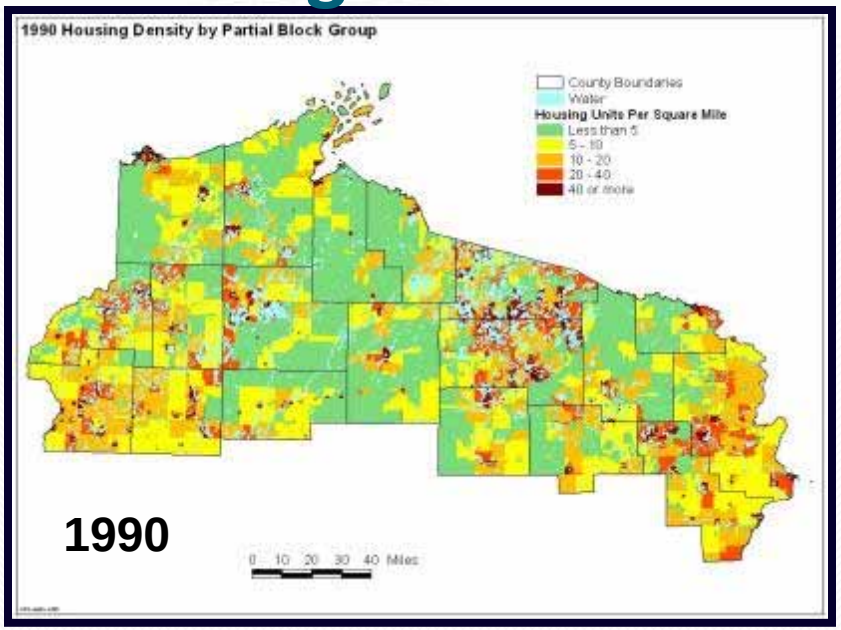
## Enjoying healthy lakes & rivers:  Part of who we are in WI

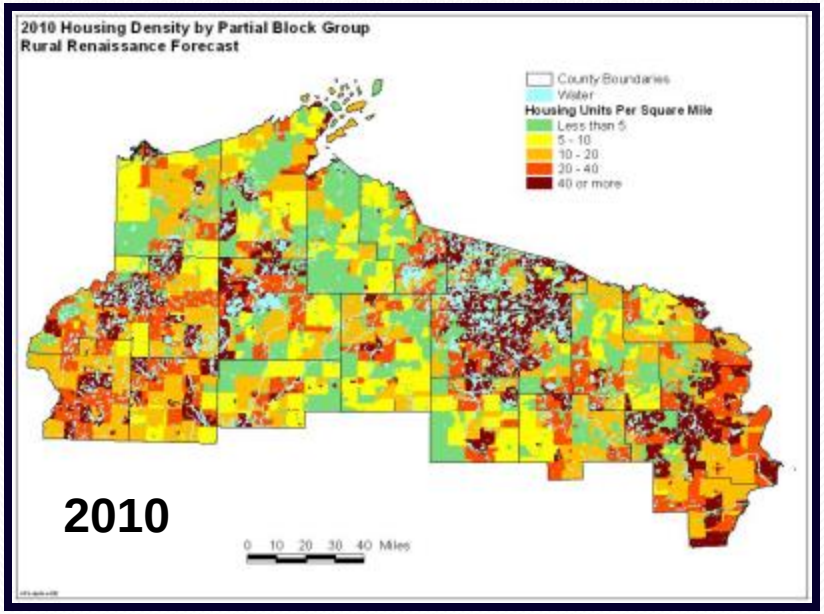
# Why Care About Shoreland Zoning?

VS

# Why Care About Shoreland Zoning?



# Shoreland Mitigation – What is it?

- One portion of shoreland zoning
- Definition - General
  - "**balancing measures** that are designed, implemented and function to restore natural functions and values that are otherwise lost through development and human activities"
  - Natural Functions = Water quality, near-shore aquatic habitat, upland wildlife habitat, and natural scenic beauty

# Shoreland Mitigation – What is it?

- Definition – Legal in Code (NR 115.05(1)(e) and (g))
  - "**enforceable obligations** of the property owner to establish or maintain measures that" are determined to adequately "**offset** the impacts of the permitted action on water quality, near-shore aquatic habitat, upland wildlife habitat, and natural scenic beauty"
  - "shall be **proportional** to the amount and impacts of" the permitted action

# Shoreland Mitigation – When is it Required?

- Under current NR 115 mitigation is triggered by:
  - Increasing impervious surfaces over 15%
  - Vertical expansion of nonconforming structures
  - Replacement or Relocation of nonconforming structures
- Mitigation may also be triggered by:
  - BOA variance approval condition
  - Other miscellaneous regulations

# Shoreland Mitigation Options

- Vegetative Shoreland Buffers
- Shoreland Stabilization and Revegetation
- Rain Gardens and Bioretention Systems
- Infiltration Systems
- Structure Removal
  - Nonconforming Structures
  - Sea Walls / Rip Rap
  - Outhouse / Privy
- Use of Natural Colors
- Softer Shoreland Lighting
- Narrower Access Corridors
- Pervious Pavers / Permeable Concrete

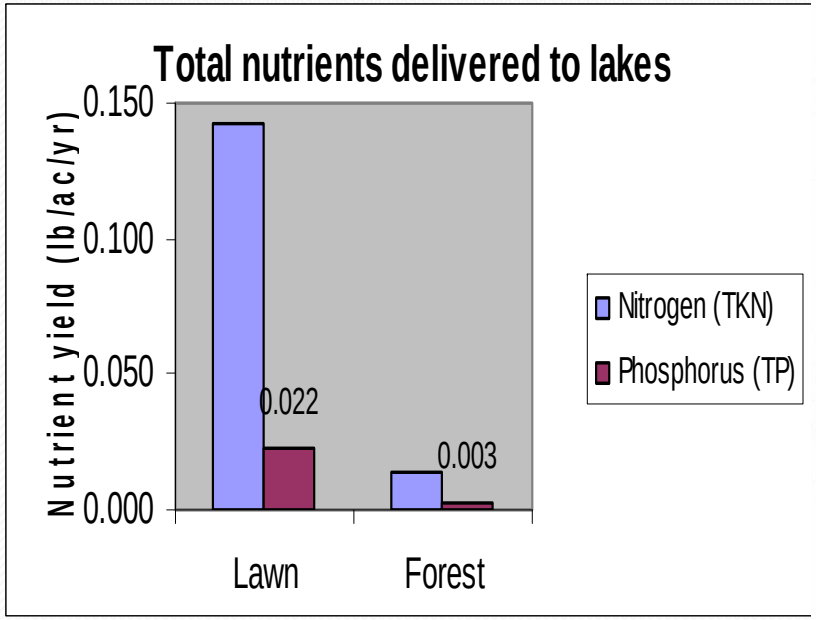
# Shoreland Mitigation Options – Vegetative Buffer

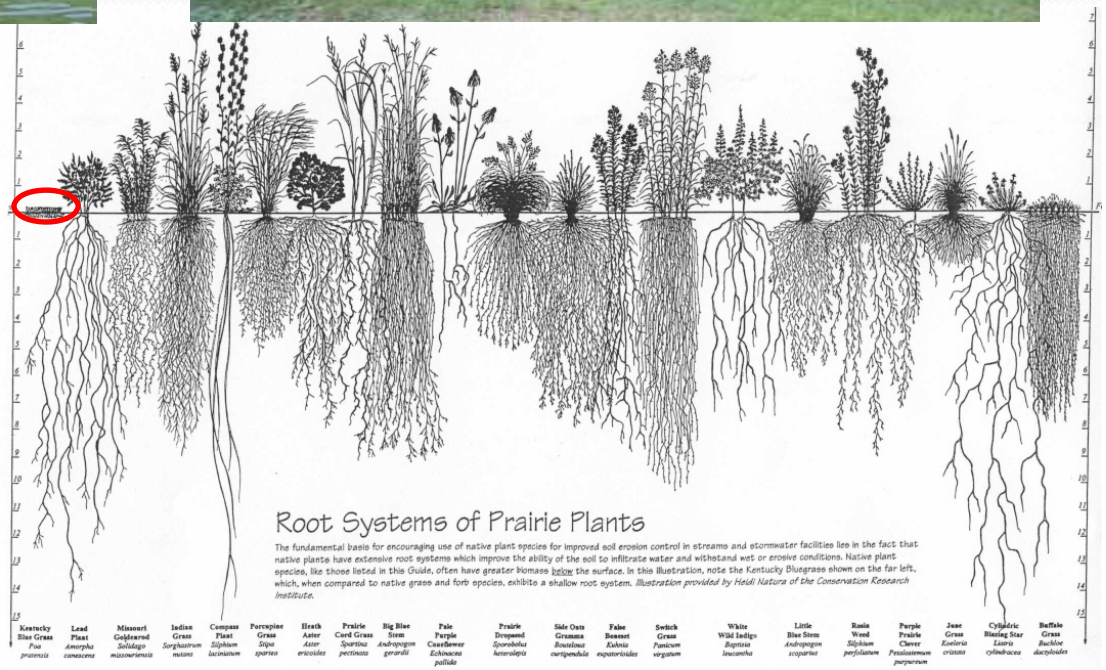
# Shoreland Mitigation Options – Vegetative Buffer

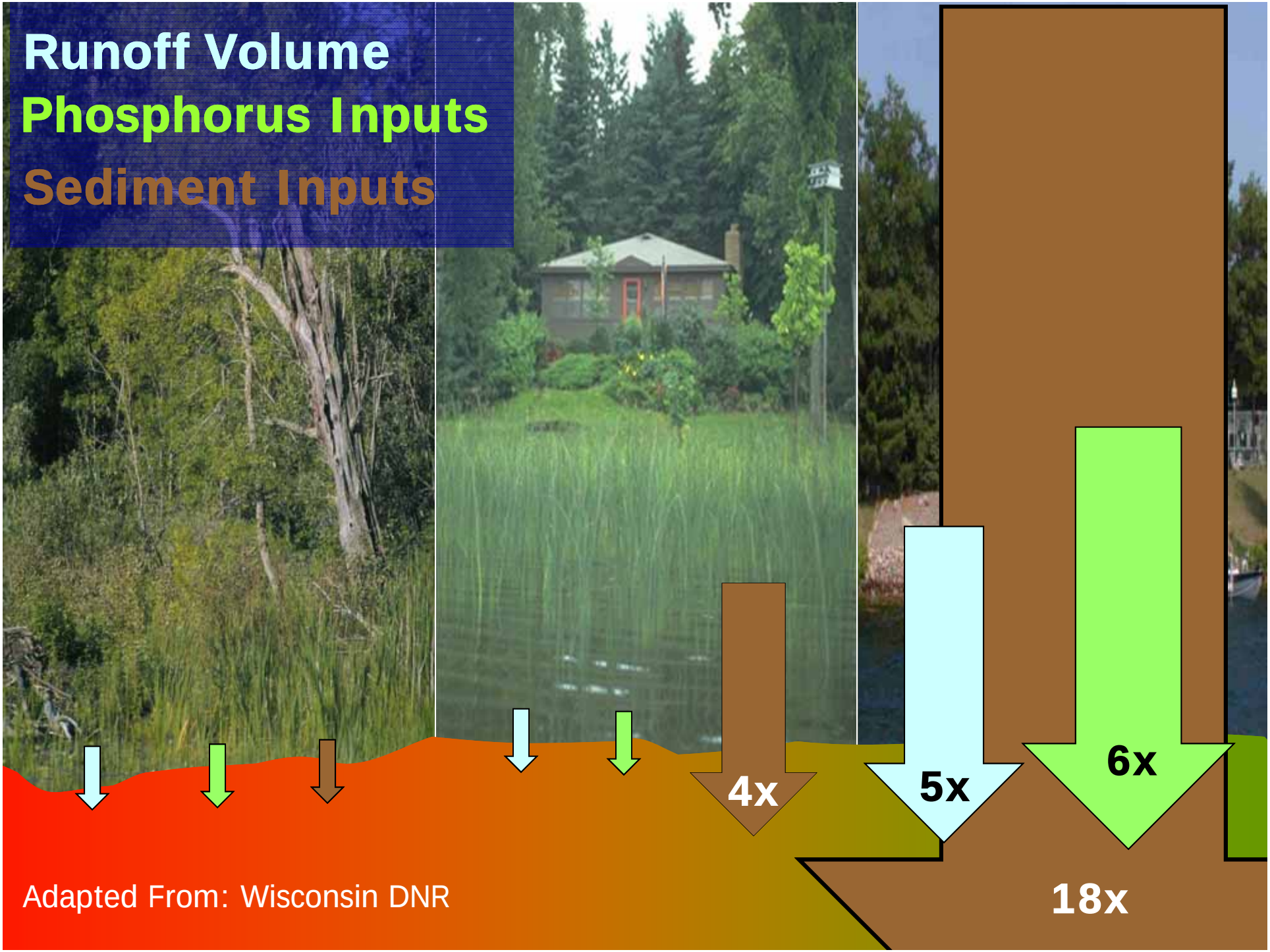
- Install New Vegetative Buffer
  - Full Buffer - 35 foot width up from the OHWM
  - Partial Buffer - adjacent to shore or to side lot lines
- Widen / Increase Existing Vegetative Buffer

# Shoreland Mitigation Options – Vegetative Buffer

# Shoreland Vegetative Buffers – Use Native Species

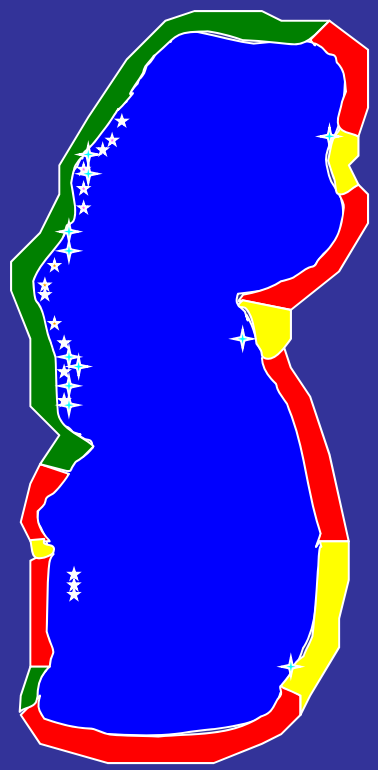


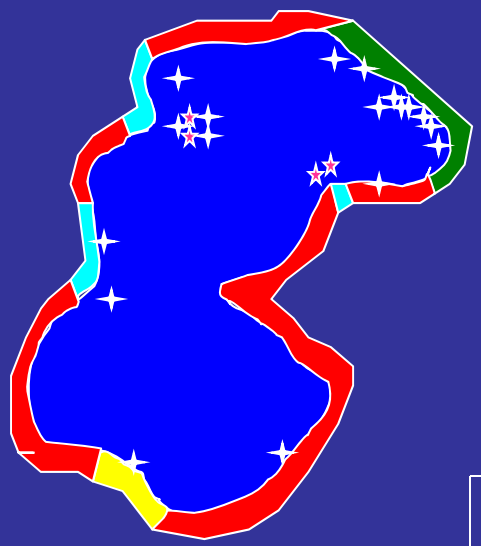

Runoff Volume
Phosphorus Inputs
Sediment Inputs
4x
5x
6x
18x
Adapted From: Wisconsin DNR

# Largemouth bass & black crappie nests

Jeffrey Reed, MN DNR, 2001



Bergen Lake



Cowdry Lake

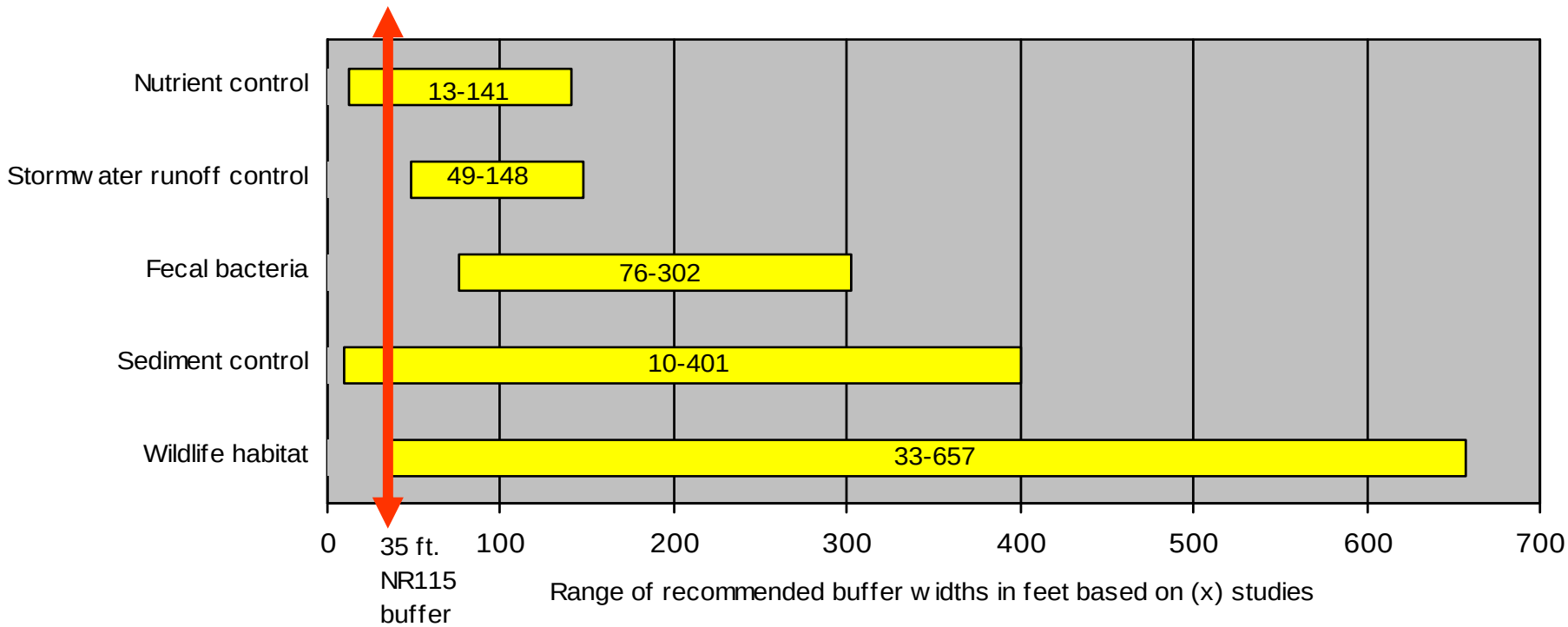
Crooked Lake

- Highly Developed Shoreline
- Developed Shoreline with Dwelling
- Developed Shoreline w/out Dwelling
- Undeveloped Shoreline
- Represents 5 Black Crappie Nests
- Represents 1 Largemouth Bass Nest

# Shoreland Mitigation Options – Vegetative Buffer

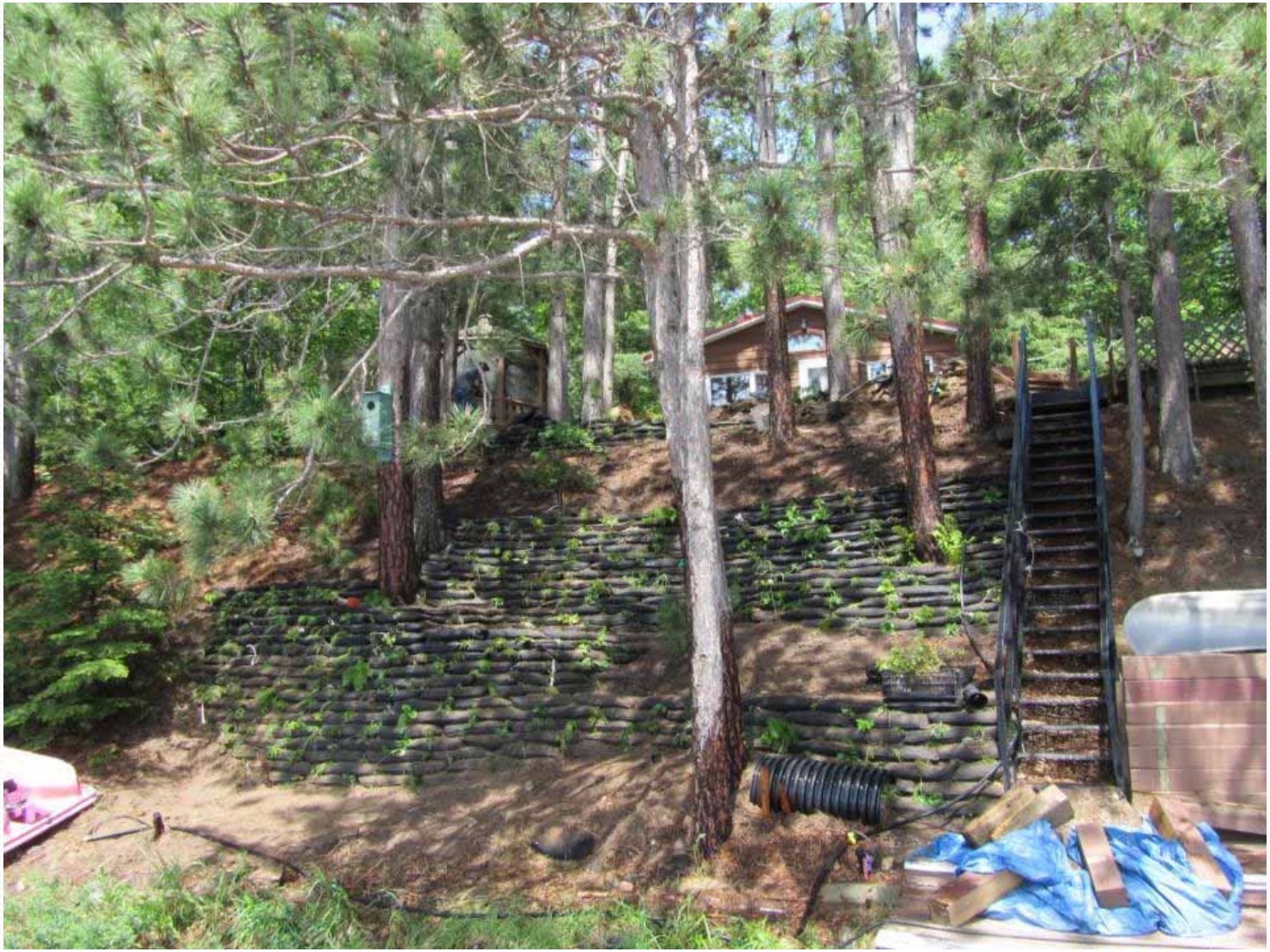
# Shoreland Vegetative Buffer Research

## Recommended Shoreline Buffer Widths
## A Research Summary




Review of 52 U.S. studies by Aquatic Resource Consultants, Seattle WA

# Shoreland Mitigation Options – Shoreland Stabilization and Revegetation



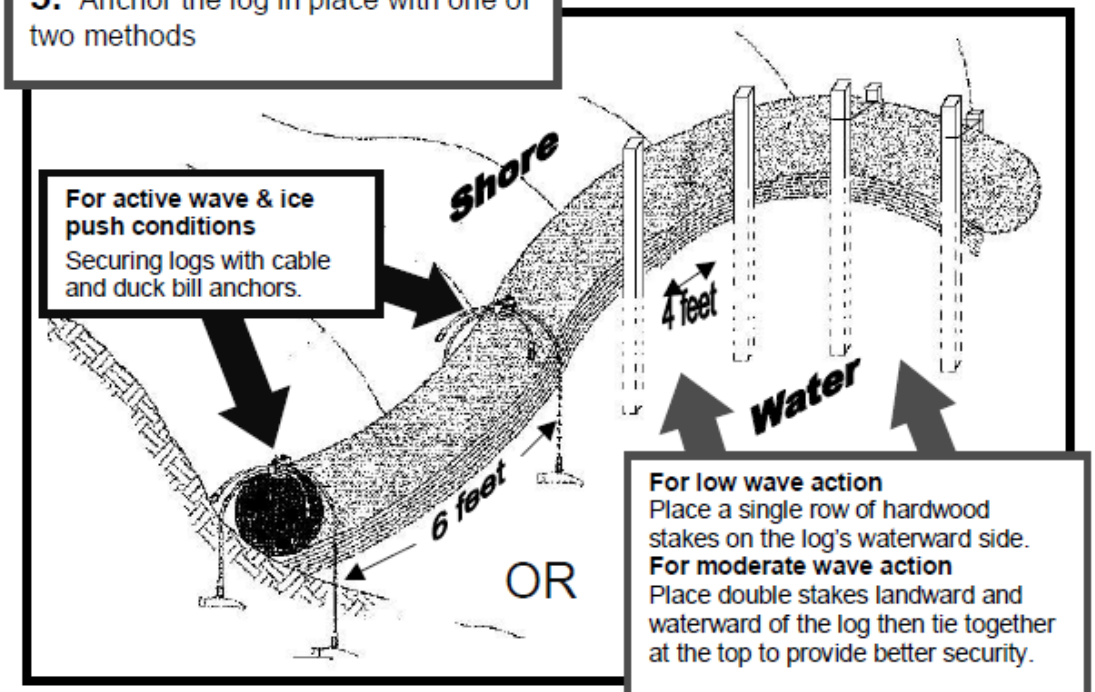
# Shoreland Mitigation Options – Shoreland Stabilization and Revegetation

**Installation Steps:**

**1.** Remove only enough wood debris so the log will fit tightly to the bank. Stabilize undercut banks when necessary (ask your local staff for recommendations)

**2.** Place log along the contour of the shoreline at the toe of the bank. Submerge the log to 1/2 to 2/3 of its height.

**3.** Anchor the log in place with one of two methods




**For active wave & ice push conditions**
Securing logs with cable and duck bill anchors.

**For low wave action**
Place a single row of hardwood stakes on the log's waterward side.
**For moderate wave action**
Place double stakes landward and waterward of the log then tie together at the top to provide better security.

**4.** Planting is important to the success of the fiber log. Plant native vegetation along the length of the log every 6-12 inches. Cut out an area only large enough to accept the plant plug. Be careful not to cut the log netting.

From a Fiber Log brochure

# Shoreland Mitigation Options – Rain Garden

# Shoreland Mitigation Options – Rain Garden

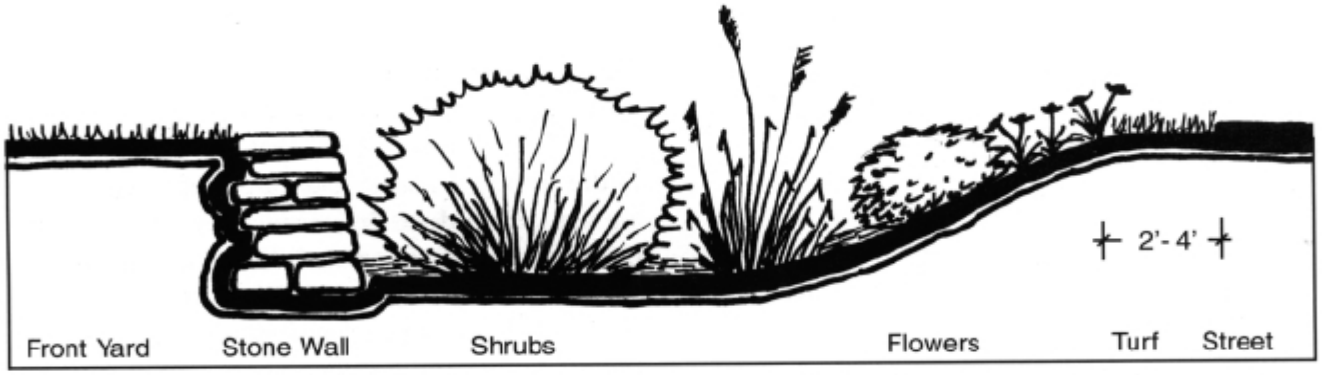



**Figure 9: High-Volume, Asymmetrical Rainwater Garden with Masonry Wall**

Source: Adapted from Nassauer et al., 1997.

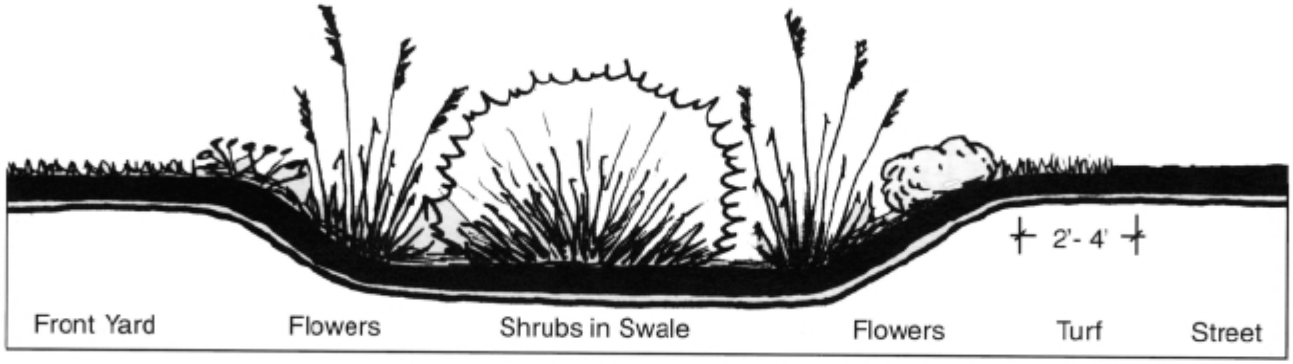



**Figure 10: High-Volume, Symmetrical Rainwater Garden**

Source: Adapted from Nassauer et al., 1997.

From: Minnesota Urban Small Sites BMP Manual, Infiltration Systems – On-Lot Infiltration, page 3-151

# Shoreland Mitigation Options – Rain Garden

# Shoreland Mitigation Options – Infiltration System

# Shoreland Mitigation Options – Infiltration System

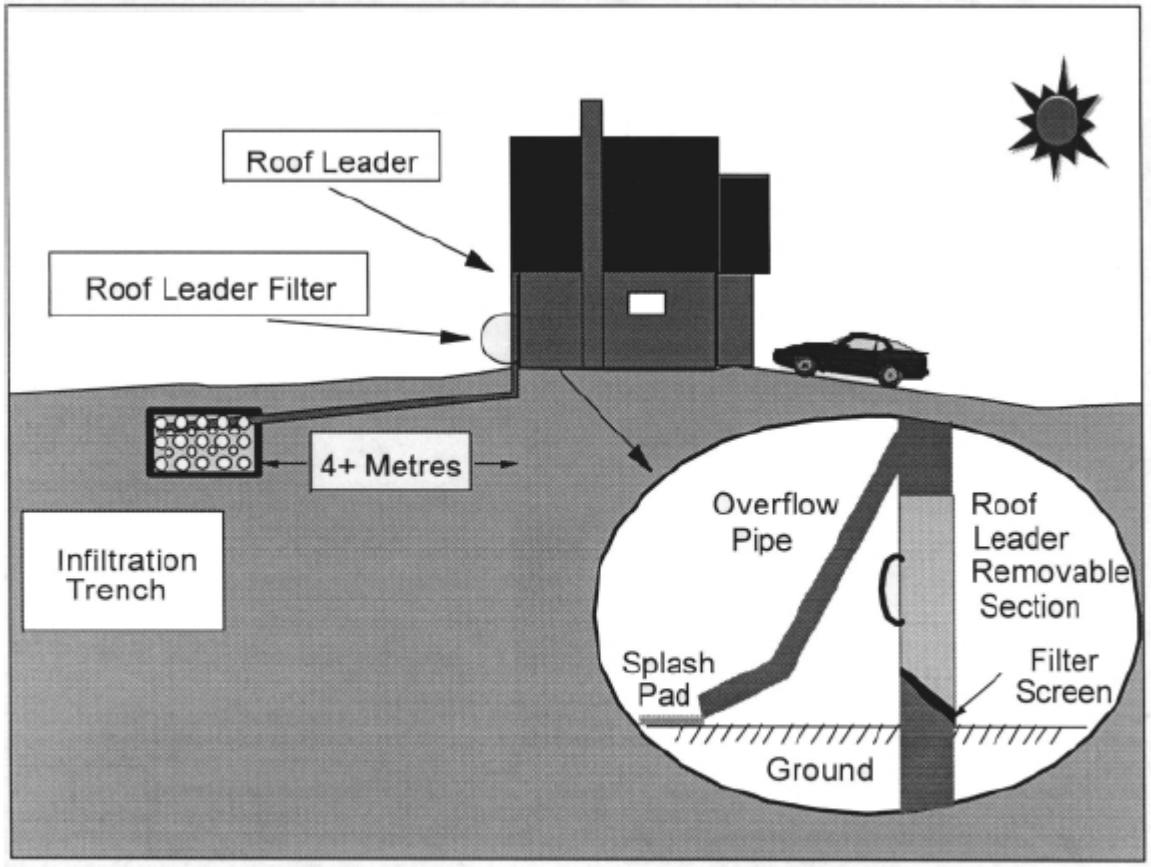



**Figure 2: Roof Leader Discharge to Soakaway Pit**

Source: Ontario Ministry of the Environment, 1999

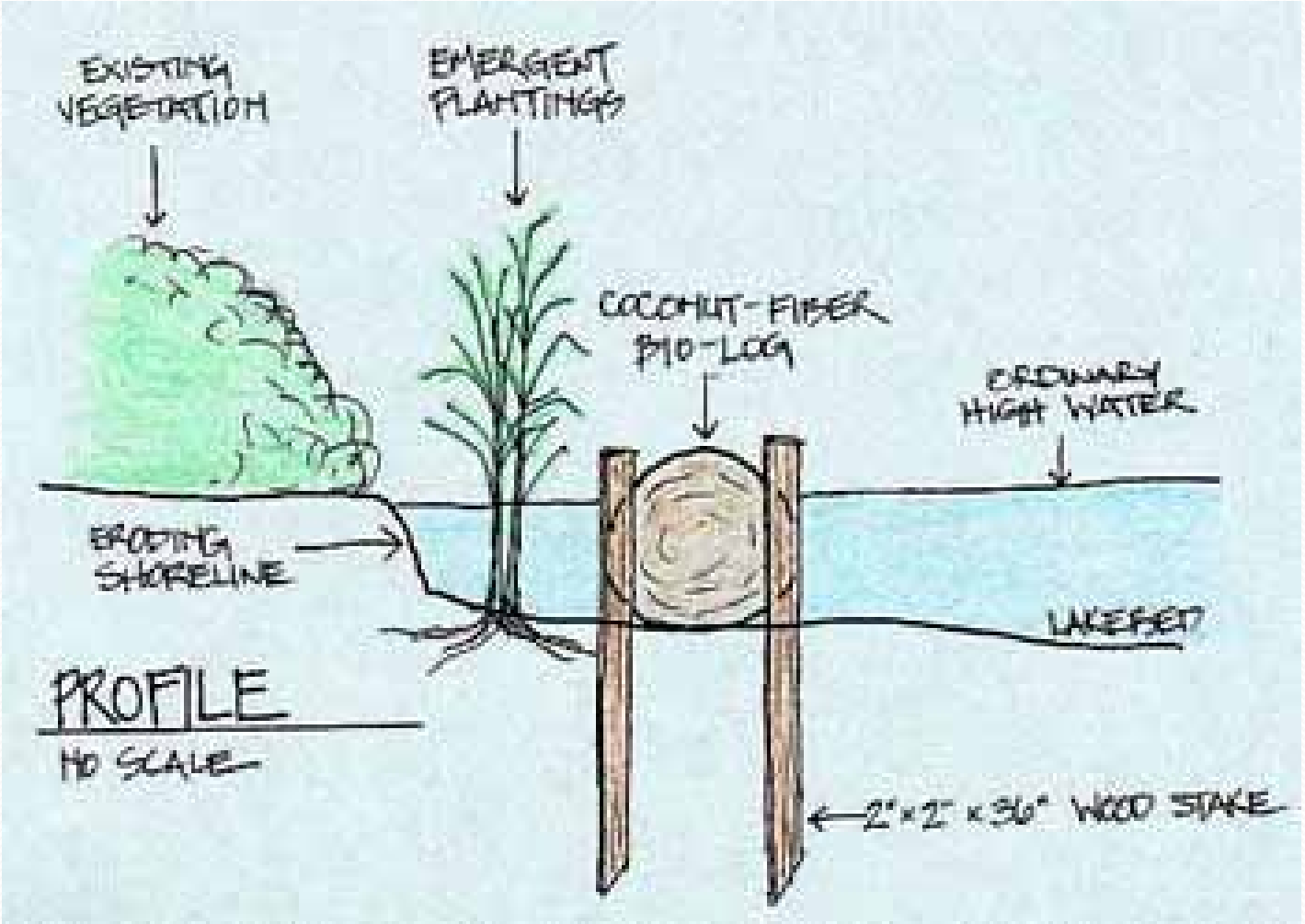
From: Minnesota Urban Small Sites BMP Manual, Infiltration Systems – On-Lot Infiltration, page 3-145

# Shoreland Mitigation Options – Infiltration System

# Shoreland Mitigation Options – Structure Removal

- Nonconforming Accessory Structure:
  - Boathouse
  - Shed
  - Patio
  - Deck
  - Unnecessary Retaining Wall
  - Guest cabin
- Seawall
- Rip-Rap
- Outhouse / Privy

# Shoreland Mitigation Options – Bio or Fiber Logs Replace Rip Rap




From Anoka Natural Resources website, Ham Lake, MN

# Shoreland Mitigation Options – Structure Removal

# Shoreland Mitigation Options – Natural Colors

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# Shoreland Mitigation Options – Softer Lighting

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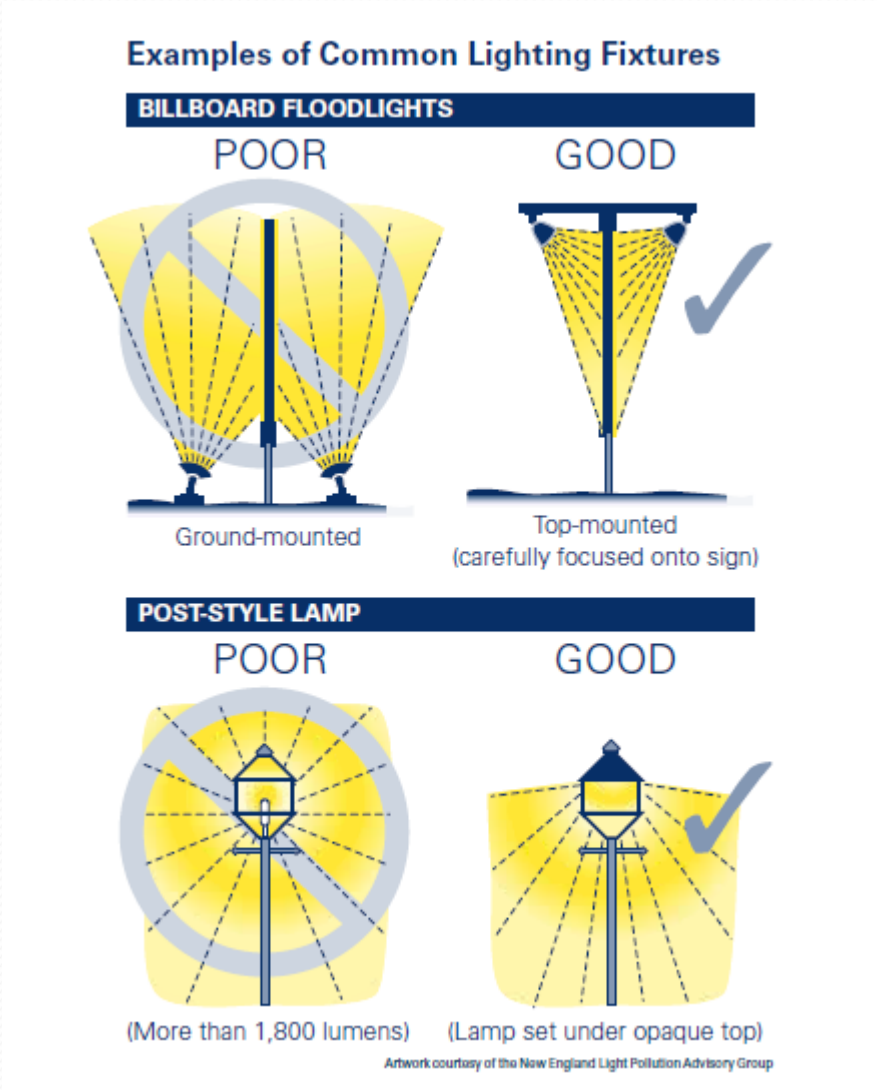



From: Sensible Shoreland Lighting: Preserving the Beauty of the Night, UW-Extension, Liebl and Korth, 2000

# Shoreland Mitigation Options – Narrower Access

# Shoreland Mitigation Options – Pervious Pavers

# Shoreland Mitigation Options – Permeable Concrete

From the National Ready Mixed Concrete Association Pervious Pavement website

# Shoreland Mitigation Implementation Approaches

- Case-By-Case Determinations
- Full Vegetative Buffer Installation
- List of Required Actions
  - Shoreland Buffer Maintenance or Restoration
  - Stormwater Management
  - Compliant Septic System, Composting Toilets, etc.
  - Removal of Pre-existing Accessory Structures
- Menu and Point System
  - Good Examples: Green Lake, Lincoln, Marquette, Monroe, etc.
- Other Approaches
  - Land Use Runoff Rating (Polk County)
  - BOA Decision Conditions

# Shoreland Mitigation Implementation Approaches

- Menu and Point System Approach Example – Part 1

| Mitigation Practice | Points |
|---|---|
| Buffer restoration 35 feet from OHWM | 3 points |
| Each additional 10 feet of buffer restoration | 1 point |
| Rain garden to capture runoff | 2 points |
| Removing accessory structures less than 75' from OHWM | 1-3 points |
| Narrowing viewing corridor | 1 point |
| Reducing shoreland lighting | 1 point |
| Engineered system to capture all runoff | 3 points |
| Other practices agreed to by zoning administrator | Up to 2 points |

# Shoreland Mitigation Implementation Approaches

- Menu and Point System Approach Example – Part 2

| Development Requiring Mitigation | Points |
|---|---|
| Additional Impervious Surface (15-25%) | 4 points |
| Additional Impervious Surface (25-30%) | 5 points |
| Vertical expansion of NC principal structure | 2 points |
| Replacement of NC principal structure | 3 points |
| Relocation of NC principal structure (same setback) | 4 points |
| Relocation of NC principal structure (further from OHWM) | 3 points |

# Real-World Shoreland Mitigation Example 1

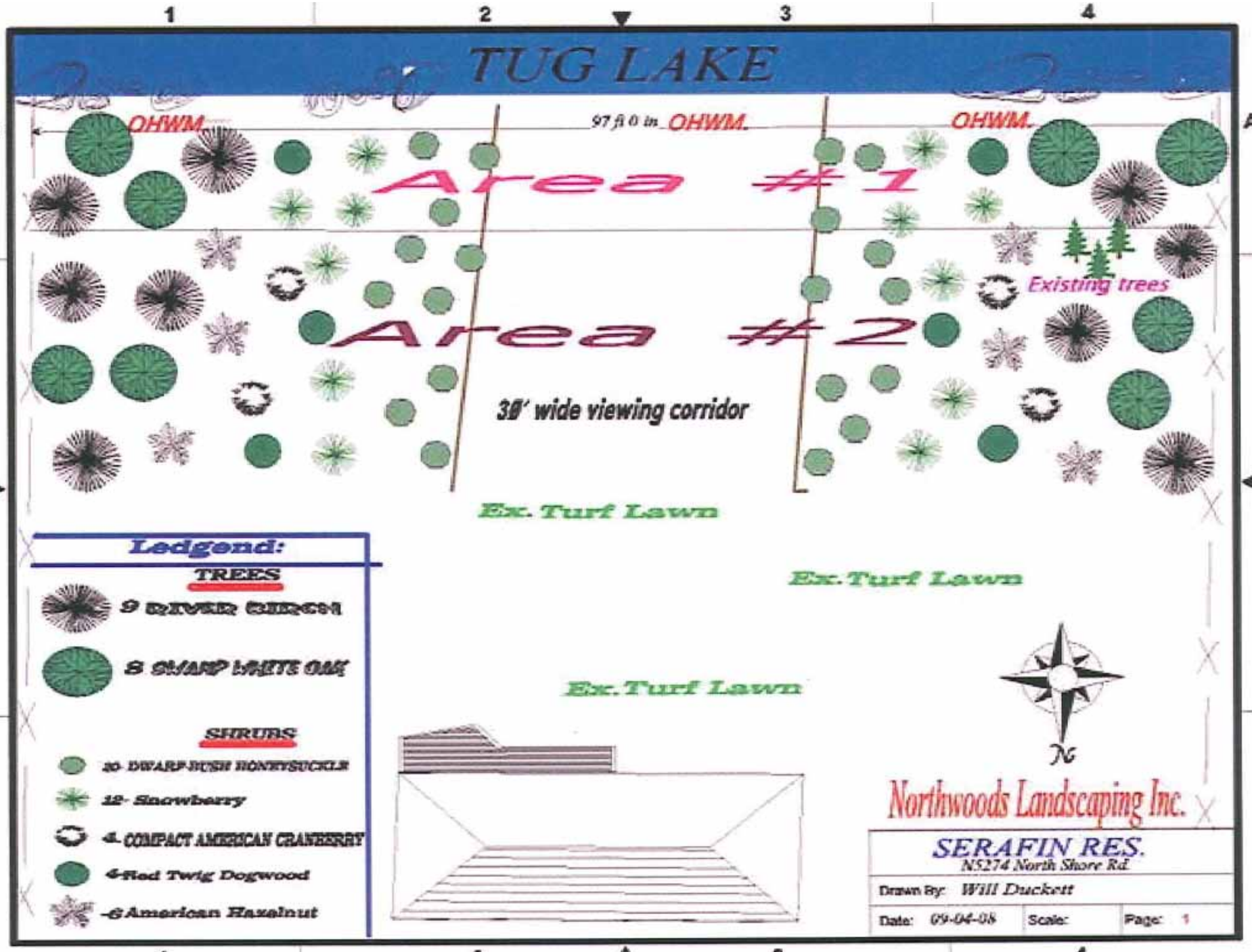
On August 13, 2004 the Lincoln County Planning and Zoning Committee held a Public Hearing to hear your application #23-04 for a CONDITIONAL USE PERMIT to:

tear down 2 cabins and rebuild a home less than 75 feet from the OHWM of Tug Lake.

On the basis of the evidence presented at the hearing, your request for a CONDITIONAL USE PERMIT has been:

GRANTED ON CONDITION

Conditions: 1.The home maintaining a 50 foot setback from the foundation and an eve setback of 45 feet to the Ordinary High Water Mark of Tug Lake. 2. The home does not exceed a net livable area of 1500 square feet in size. 3. The impervious surfaces do not exceed 3,000 square feet in area on the property. 4. The applicant completes the proposed mitigation as indicated above. 5 An affidavit identifying these conditions of approval is recorded with the deed to the property as notice to future owners of their obligation to maintain them in perpetuity.


TUG LAKE
OHWM.
97 ft 0 in.
OHWM.
OHWM.
Area #1
Area #2
Existing trees
30' wide viewing corridor
Ex. Turf Lawn
Ex. Turf Lawn
Ex. Turf Lawn
Ledgend:
TREES
9 RIVER BIRCH
8 SWAMP WHITE OAK
SHRUBS
20- DWARF BUSH HONEYSUCKLE
12- Snowberry
4- COMPACT AMERICAN CRANBERRY
4-Red Twig Dogwood
-6 American Hazelnut
N
Northwoods Landscaping Inc.
SERAFIN RES.
N5274 North Shore Rd.
Drawn By: Will Duckett
Date: 09-04-08
Scale:
Page: 1

# Before

# After

# Real-World Shoreland Mitigation Example 2

- Not technically mitigation, the project was voluntary and cost-shared. But this could be a mitigation option.
- Lower Post Lake in Langlade County
- A geotextile bag wall was used to stop erosion on the steep slope.
- Watering has taken place ever since installation in 2011.
- The pictures are from April 2010, April 2011, June 2012.
- The cabin was remodeled and remained a neutral brown color.


2010


2011


06/27/2012 13:44
2012

# Real-World Shoreland Mitigation Example 3

- Step-down/bi-level rain garden installation at top of slope.
- Lower Post Lake in Langlade County
- Stormwater was washing from the cabin and driveway, creating a "gully".
- There is a watering system.
- All of the plantings on the site have compost soil mixed in to assist growing.
- The pictures are from May 2011 (before) and June 2012 (after).


05/03/2011 11:25


06/27/2012 13:42

# Real-World Shoreland Mitigation Example 4

- Mitigation required as part of home remodeling.
- Lake Dubay in Marathon County
- Overall goals:
  - Stop erosion at the shoreline
  - Home remodeling
- The pictures are from prior to work, 2004, and 2005.


2004


2004


09/12/2005 12:26:40 PM


09/12/2005 12:26:24 PM


09/12/2005 12:27:43 PM

# Real-World Shoreland Mitigation Example 5

- Not technically mitigation, the project was voluntary. But this could be a mitigation option.
- Lower Post Lake in Langlade County
- Reduced access corridor.
- The pictures are from 2005 (before) and 2012 (after).


2005

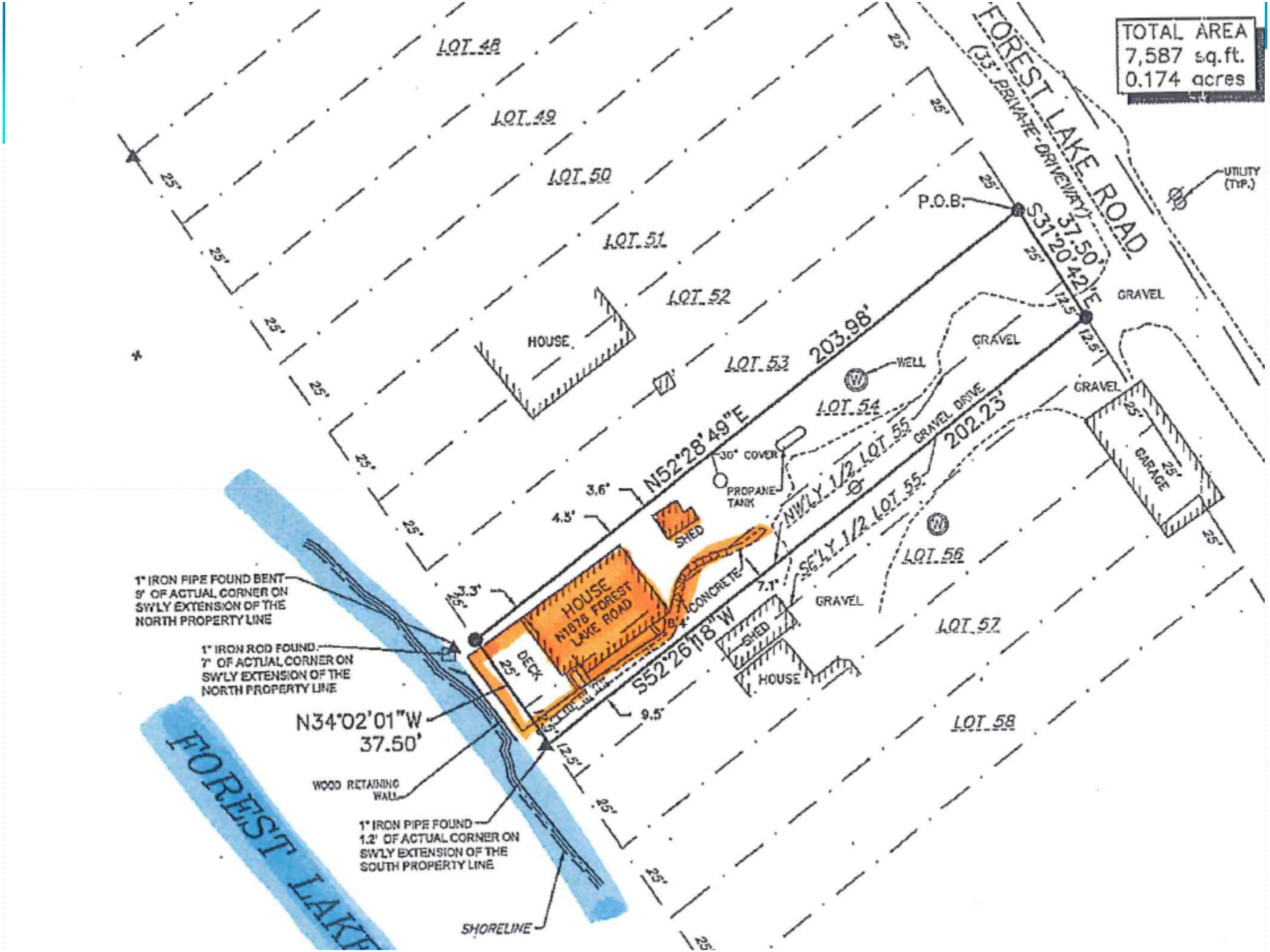

2012

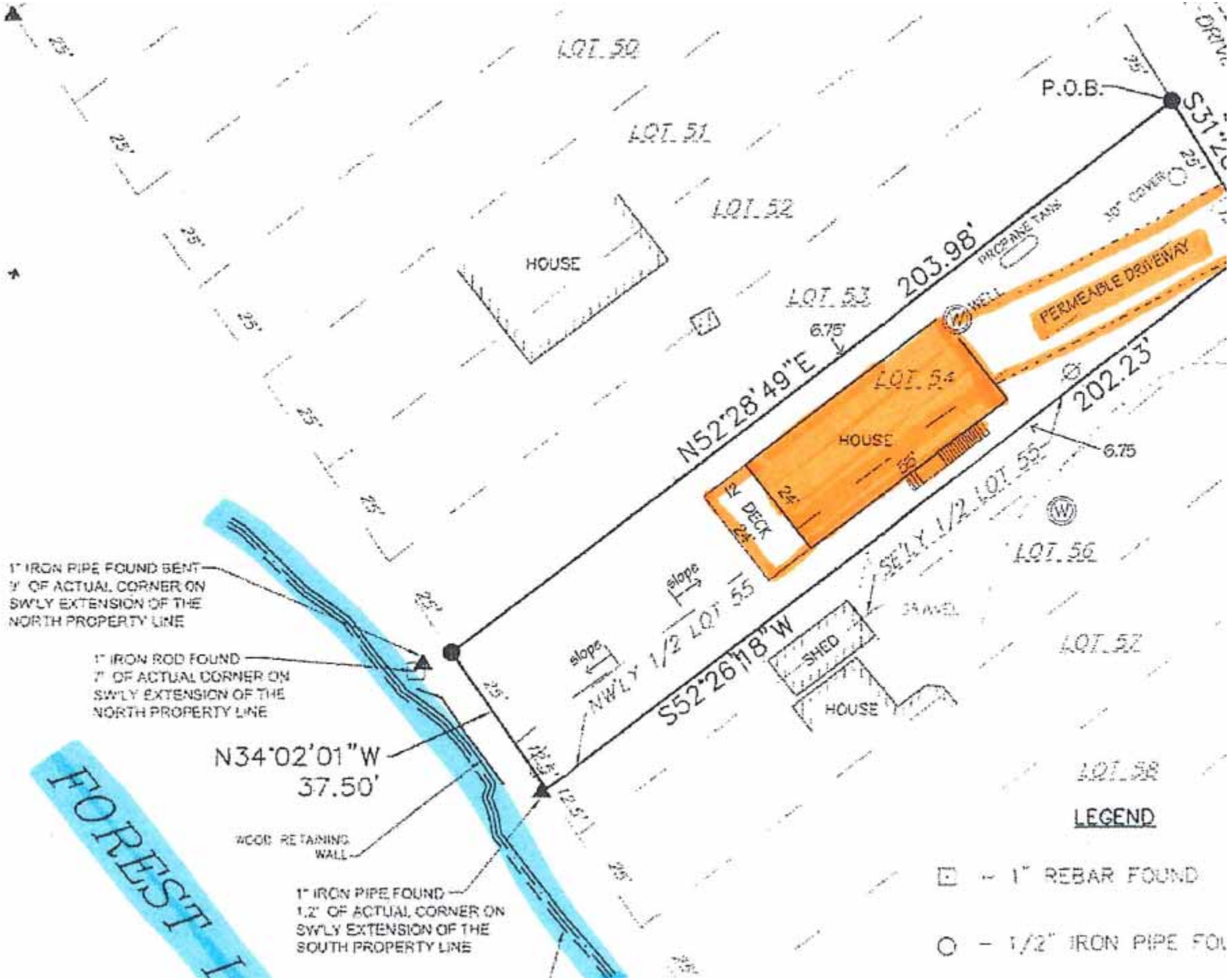

2012

# Real-World Shoreland Mitigation Example 6

At the June 15, 2011, meeting of the Sanitation, Shoreland and Floodplain Zoning Board of Adjustment, your request for a variance was considered. On the basis of the evidence presented at the hearing on this case, the Board of Adjustment voted to grant your request for the variance as follows:

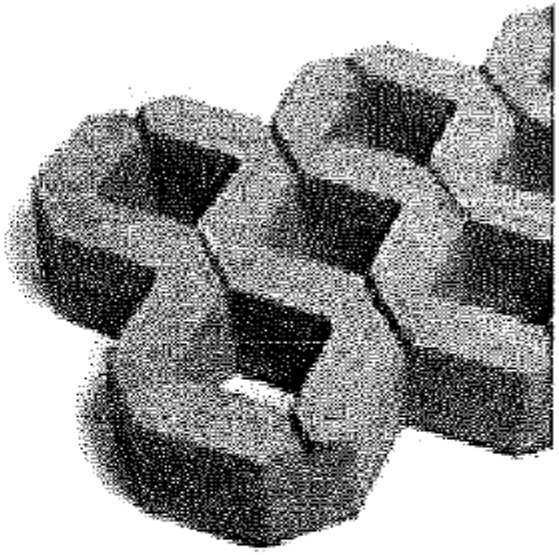
1. Allow the replacement of the existing 27'x55' house and deck with the construction of a 24'x55' two story house and garage with a four foot (4') wide stairs and walkway along the south side of the house and a 12'x24' raised wooden deck on the southwesterly side of the house per plan submitted to the board of Adjustment.
2. Surface water drainage plan is required before land use permit can be issued.
3. Issuance of a sanitary permit for the relocation of the holding tank or reconnection must be issued before a land use permit can be issued.
4. Maintenance protocol of the permeable driveway will be required to issue the land use permit.
5. Removal of the existing house, shed and concrete walkway.
6. Proper abandonment of the existing well and installation of a new well.


TOTAL AREA
7,587 sq.ft.
0.174 acres
FOREST LAKE ROAD
(33' PRIVATE DRIVEWAY)
LOT 48
LOT 49
LOT 50
LOT 51
LOT 52
LOT 53
LOT 54
LOT 55
LOT 56
LOT 57
LOT 58
P.O.B.
S31°20'42"E
37.50'
203.98'
N52°28'49"E
202.23'
S52°26'18"W
N34°02'01"W
37.50'
HOUSE
HOUSE
N1878 FOREST
LAKE ROAD
SHED
SHED
DECK
CONCRETE
GRAVEL
GRAVEL
GRAVEL
GRAVEL
GRAVEL DRIVE
WELL
30" COVER
PROPANE TANK
GARAGE
UTILITY (TYP.)
NWLY 1/2 LOT 55
SELY 1/2 LOT 55
1" IRON PIPE FOUND BENT 9' OF ACTUAL CORNER ON SWLY EXTENSION OF THE NORTH PROPERTY LINE
1" IRON ROD FOUND 7' OF ACTUAL CORNER ON SWLY EXTENSION OF THE NORTH PROPERTY LINE
WOOD RETAINING WALL
1" IRON PIPE FOUND 1.2' OF ACTUAL CORNER ON SWLY EXTENSION OF THE SOUTH PROPERTY LINE
SHORELINE
FOREST LAKE
3.6'
4.5'
3.3'
7.1'
9.5'
12.5'
25'


LOT 50
LOT 51
LOT 52
HOUSE
LOT 53
203.98'
P.O.B.
S31°
PROPANE TANK
30' COMMON
PERMEABLE DRIVEWAY
WELL
6.75'
N52°28'49"E
LOT 54
HOUSE
202.23'
6.75
12
DECK
24
24
SE'LY 1/2 LOT 55
LOT 56
slope
NW'LY 1/2 LOT 55
S52°26'18"W
SHED
GRAVEL
LOT 57
HOUSE
LOT 58
1" IRON PIPE FOUND BENT
9' OF ACTUAL CORNER ON
SW'LY EXTENSION OF THE
NORTH PROPERTY LINE
1" IRON ROD FOUND
7' OF ACTUAL CORNER ON
SW'LY EXTENSION OF THE
NORTH PROPERTY LINE
N34°02'01"W
37.50'
WOOD RETAINING
WALL
1" IRON PIPE FOUND
1.2' OF ACTUAL CORNER ON
SW'LY EXTENSION OF THE
SOUTH PROPERTY LINE
FOREST
LEGEND
- 1" REBAR FOUND
- 1/2" IRON PIPE FOU

# Turfstone

**Item Number:** Turfstone



Turfstone is a natural for erosion control, while also preventing compaction damage to grassy areas. The open area of the Turfstone can be filled with either a stone material or grass to create a stable area for vehicle traffic.

Our concrete pavers are a leader in the industry featuring the following advantages:

* Two-part mix design allows quality control of overall product
* More pigment added to the top and bottom layer
* A longer lasting color
* A smoother surface by tighter control of size
* High compression strengths at 7,000 psi minimum
* No use of soft aggregate such as limestone

15 3/4" x 23 3/4" x 3 1/4"
Pcs./Sq.Ft. 1 pc = 2 1/2 s.f.
Pcs./Pallet = 28
Sq.Ft./Pallet = 72
Weight/Pallet = 1850 lbs.

# Real-World Shoreland Mitigation Example 7

- Variance request granted.
- Waushara County
- Conditions:
  - Remove old cottage near the OHWM
  - Remove retaining wall near the OHWM
  - Shoreland restoration

# Summary

- Impacts from each shoreland property is often considered insignificant, but over time the sum of all riparian land uses and pollution sources is the main cause of today's water quality problems and lack of habitat.
- The rapid increase in riparian development has led to numerous negative shoreland impacts.
- Shoreland zoning is grounded in the long-standing Public Trust Doctrine, and has the goal of limiting direct <u>and</u> cumulative impacts of shoreland development on water quality, habitat, and natural scenic beauty.

# Summary

- Shoreland mitigation is enforceable actions designed to proportionally balance and offset the impacts of a permitted action on water quality, habitat, and natural scenic beauty.
- There are many different mitigation options.
- Counties can implement shoreland mitigation under one of several different approaches.
- Learn from the many existing examples of shoreland mitigation – and more to come.

# Comments, Questions??

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# Why Care About Shoreland Zoning?
# Lake Quality & Economics: Is there a connection?

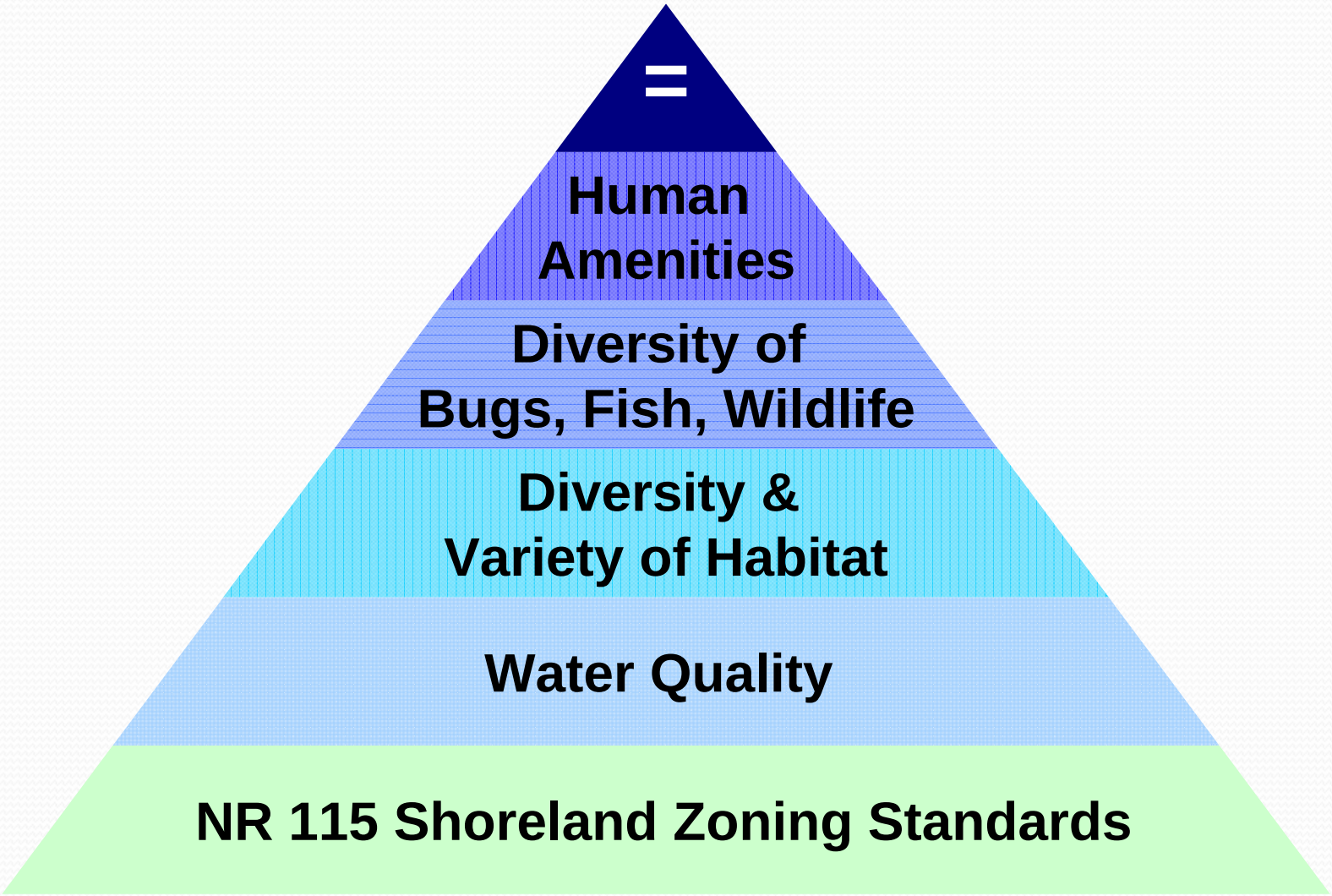
- "More polluted lakes have less valuable property than do cleaner lakes."

E.L. David, *Water Resources Research*, 1968

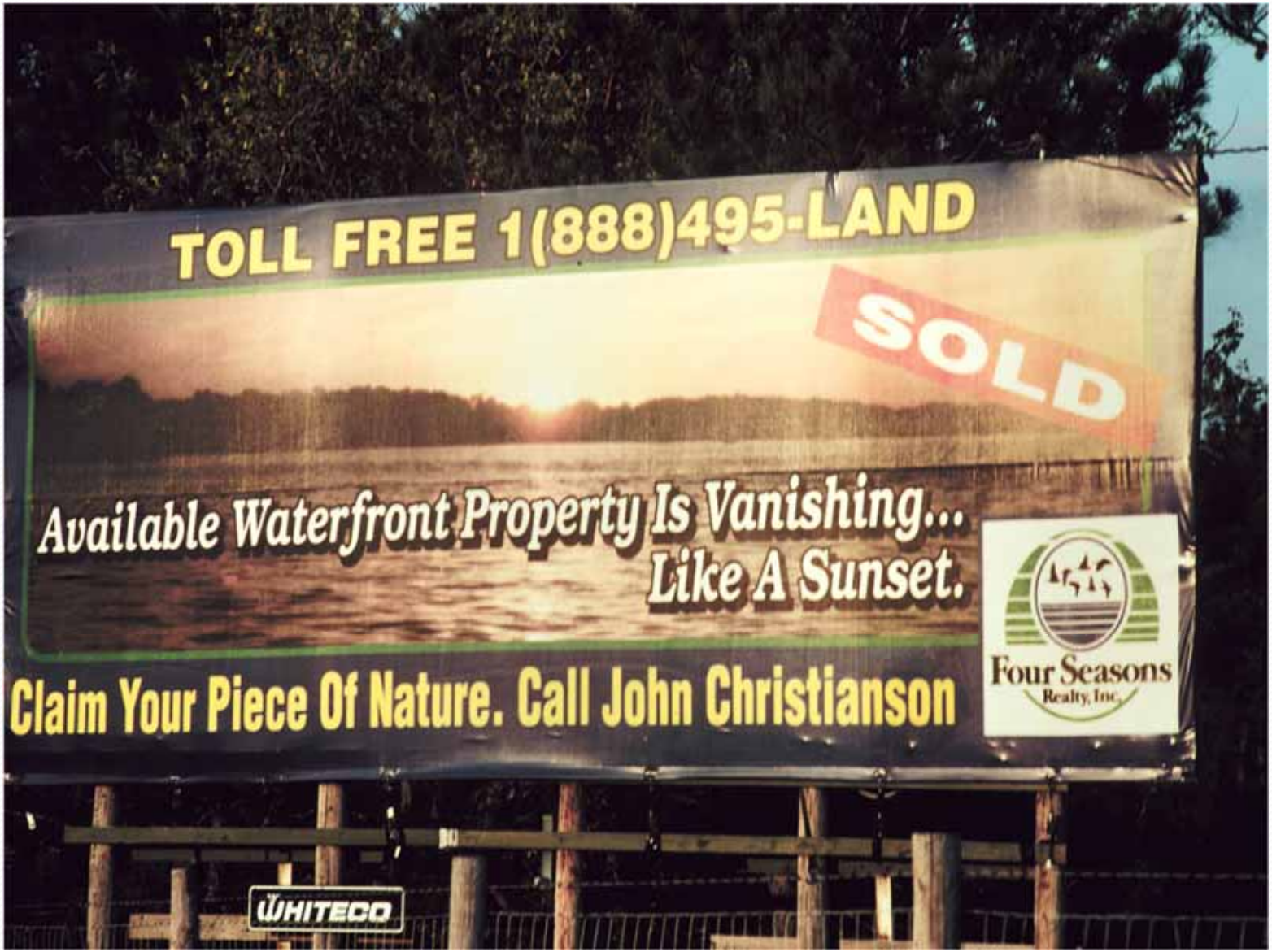
- A study of over 1200 waterfront properties in Minnesota found when water clarity changed by 3 feet changes in property prices for these lakes are in the magnitude of tens of thousands to millions of dollars.

Krysel et al, 2003

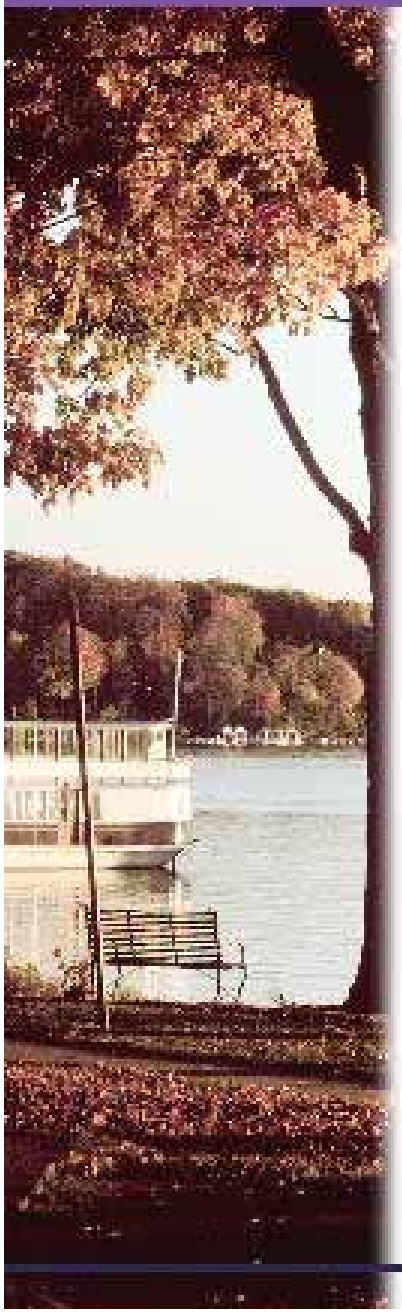
# Higher Property Values

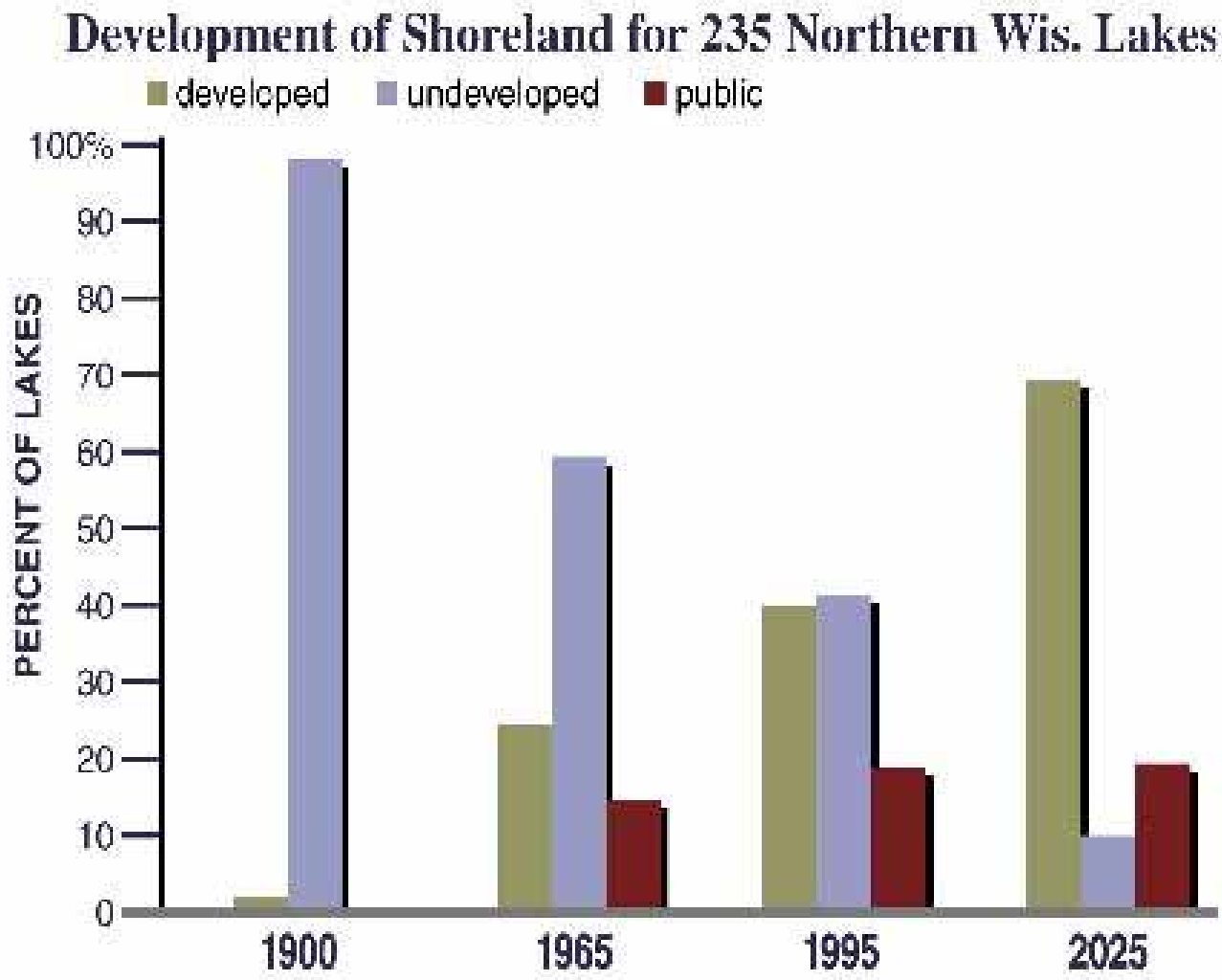


# Why were Shoreland Zoning Rules Revised?



# Shoreland development trends





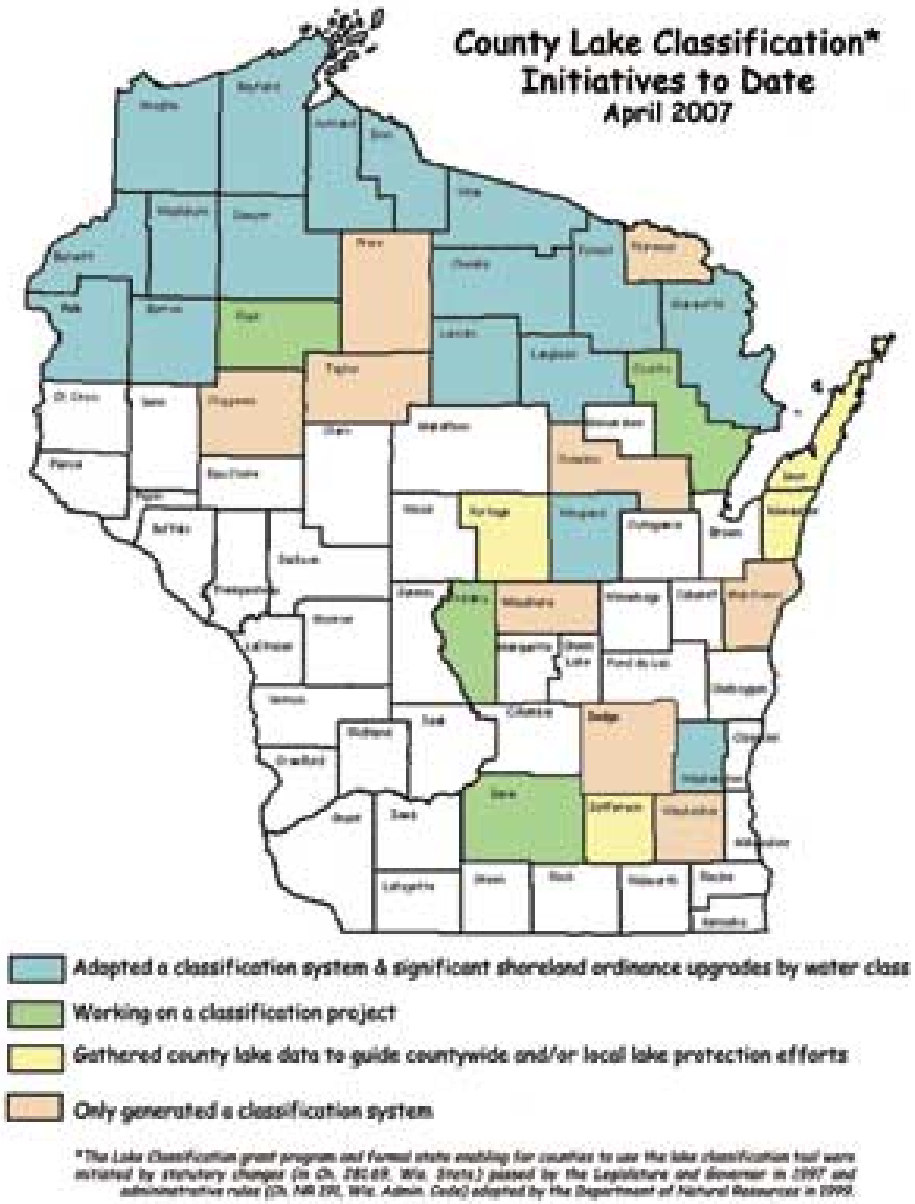

Source: Wisconsin Dept. of Natural Resources

The Wisconsin Lakes Partnership

# Shoreland Zoning
# Counties going beyond 1968 law

- Counties recognized inadequacies
- Adopted higher standards

- "New" ideas
  - 16 counties have impervious surface stnds
  - 27 counties have shoreland mitigation

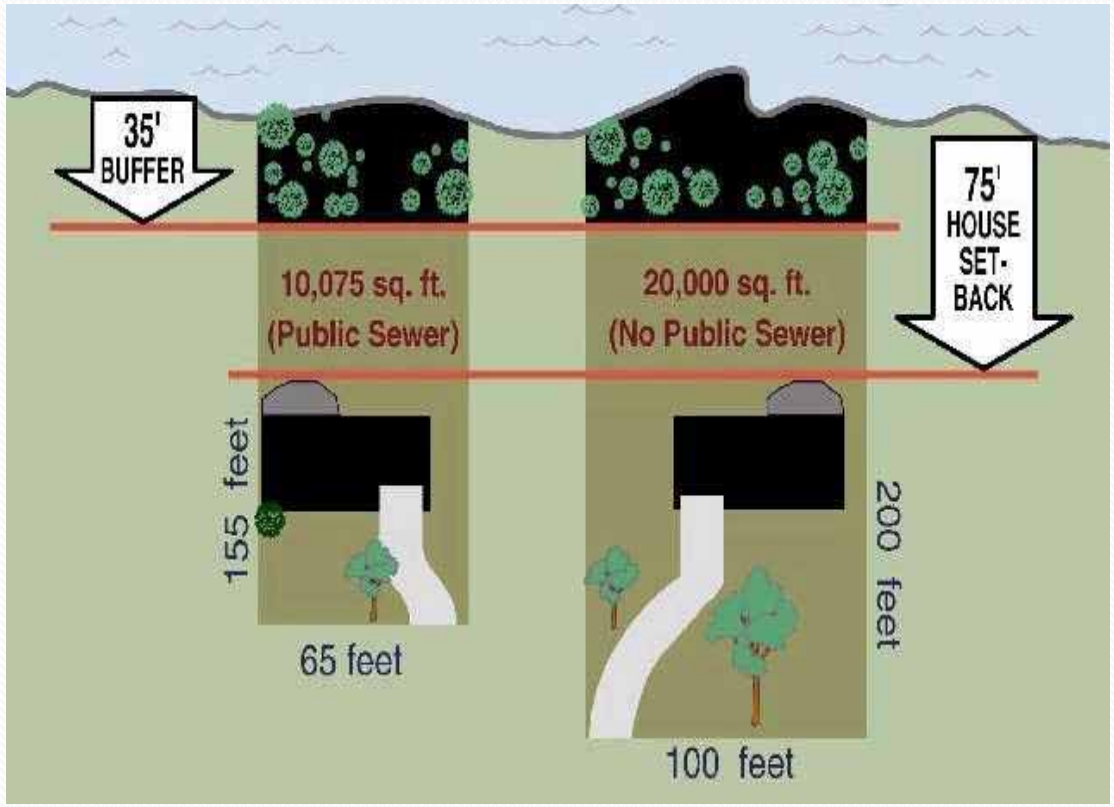



Map by Wisconsin Lakes

# Shoreland Zoning Changes

## What standards have stayed the same?

- Lot sizes
- Shoreland setbacks, including averaged setbacks
- Shoreland buffer sizes
- Standards for land disturbing activities
- Shoreland – Wetland standards
- Structure exemptions



# Shoreland Zoning Changes - Shoreline Buffers

- More clarity and specification than previously

- First 35 feet, no vegetation removal except
  - Access and viewing corridors
  - Shoreline restoration activities & invasive species control
  - Dead, dying or diseased when replaced with native vegetation
  - Sound forestry practices on larger tracts of land
  - Where mowing currently occurs counties may allow "keep what you have"
- Other types of removal allowed with a permit.
  - Vegetation removed with a permit must be replaced.

# Shoreland Zoning Changes - Shoreline Buffers

- There has been general support for the value of buffer strips and the flexibility of their applications
- Current draft ordinance places greater emphasis on buffer strips in all areas of shoreland activity from agricultural practices to resorts and residential development
- Many farmers have voluntarily initiated effective conservation practices on their shoreland agricultural lands
- Many residential lot owners have already installed buffer areas of native vegetation and creative landscaping
- The challenge lies in making this the norm and not the exception

# Shoreland Zoning Changes
# Impervious Surface Standards

- What is an impervious surface?
  - An area that releases <u>all or a majority</u> of the precipitation that falls on it.
  - Includes rooftops, sidewalks, driveways, parking lots, etc.

- What are the Water Quality Impacts of Impervious Surfaces?
  - Erosion
  - More pollutants entering the water
  - Increased algae growth
  - Fewer fish, insect, and other aquatic species

# Shoreland Zoning Changes
# Impervious Surface Standards

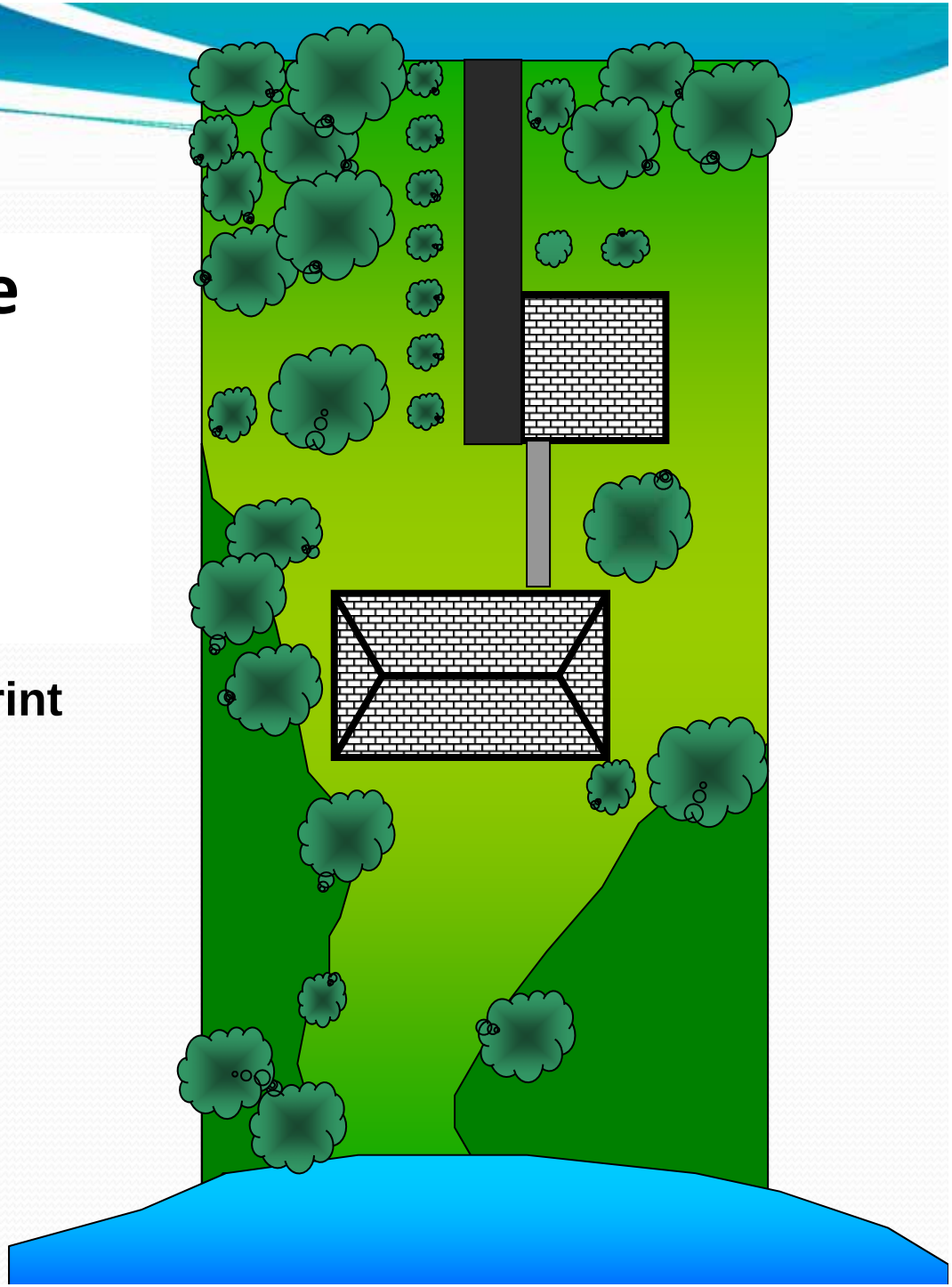
Impervious surfaces that existed prior to revision of the county shoreland zoning ordinance, may be:

- Maintained and repaired
- Replaced with a similar impervious surface within the existing building envelope
- Relocated or modified with a similar or different impervious surface if:
  - No overall increase in % of impervious on the property
  - Impervious surfaces meets the setbacks in NR 115.

# Impervious Surface Example

**15% of 20,000 sq. ft. lot**

**1500 sq. ft. house footprint**
**740 sq. ft. garage**
**660 sq. ft. driveway**
**<u>100 sq. ft. sidewalk</u>**
**3000 sq. ft. total**



Increasing impervious surface in the watershed
Decreasing number of fish & fish species

**Fish found in streams when impervious surface in the watershed was:**

| Less than 8% | 8 - 12% | Greater than 12% |
|---|---|---|
| Iowa darter<br>Black crappie<br>Channel catfish<br>Yellow perch<br>Rock bass<br>Hornyhead chub<br>Sand shiner<br>Southern redbelly dace | | |
| Golden shiner<br>Northern pike<br>Largemouth bass<br>Bluntnose minnow<br>Johnny darter<br>Common shiner | Golden shiner<br>Northern pike<br>Largemouth bass<br>Bluntnose minnow<br>Johnny darter<br>Common shiner | |
| Creek chub<br>Fathead minnow<br>Green sunfish<br>White sucker<br>Brook stickleback | Creek chub<br>Fathead minnow<br>Green sunfish<br>White sucker<br>Brook stickleback | Creek chub<br>Fathead minnow<br>Green sunfish<br>White sucker<br>Brook stickleback |

2008 study of 164 WI lakes found the same trend

Wang et al. 2000

# Shoreland Zoning Changes
# Nonconforming Principal Structures

Nonconforming Structure = pre-existing structure that does not meet current standards

NR 115 now provides options other than a 50% increase in valuation (i.e. 50% Rule)

# Shoreland Zoning Changes
# Nonconforming Principal Structures

- Maintenance
  - unlimited within existing building envelope
- Expansion
  - 0-35 feet from OHWM– prohibited
  - 35-75 feet from OHWM- vertical expansion only
  - 75 feet + from OHWM – vertical or horizontal
- Replacement/Relocation
  - 0-35 feet from OHWM- prohibited
  - Only if no other compliant location available
  - All other non-conforming structures on lot removed

## ***Diagram D:***

Nonconforming Principal Structure Located greater than 35 feet from the OHWM. Horizontal Expansion at a setback greater than 75 feet from the OHWM.


115.05(1)(g)5m

- Use has not been discontinued for a period of 12 months or more
- All other provisions apply

# Shoreland Mitigation Options – Vegetative Buffer