



## Shoreland Zoning

Protecting lakes through a partnership between citizens, county zoning staff, county boards, DNR, UW-Extension and more

## Wisconsin Lakes Convention

April 23, 2015

Co-presented by:

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Center for Land Use Education,  
UWEX

Kay Lutze  
Shoreland Policy Coordinator,  
DNR

# Outline

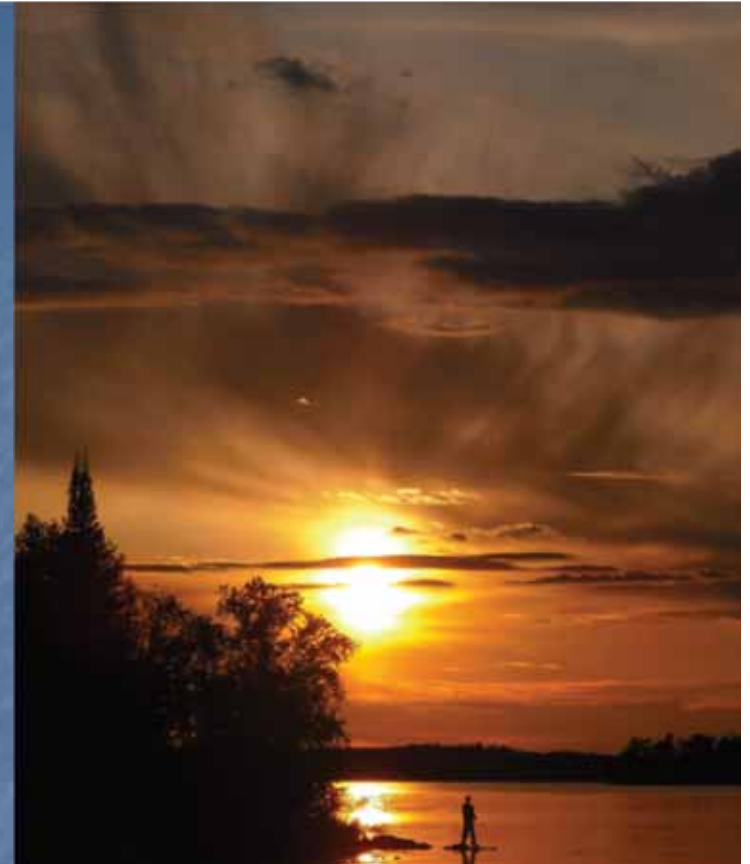
1. Brief history of shoreland zoning & the public trust doctrine
2. What are we trying to accomplish with shoreland zoning?
3. Science upon which shoreland zoning is based
4. Recent changes to state shoreland zoning that counties need to adopt by October 2016
5. Does shoreland zoning work?
6. Educational resources

# Introductions

- Why are lakes and rivers important to you?
- Favorite lakes and rivers?
- Why do you want to learn more about shoreland zoning?

Healthy lakes and rivers are the basis for creating fond memories of time spent near the water

Healthy fish, abundant wildlife and clear water all depend on how waterfront properties are developed



# The Public Trust Doctrine

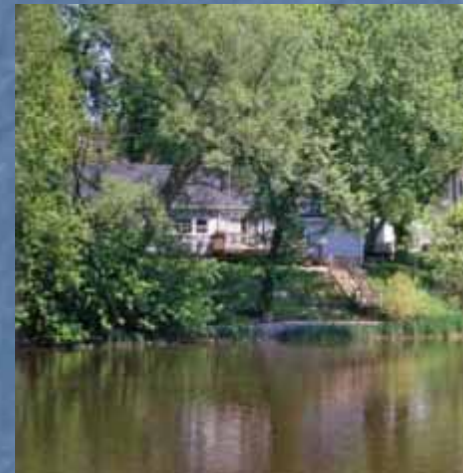
- Wisconsin's waters belong to everyone
- State has obligation to protect public rights in all navigable waters
  - Derived from clause in Northwest Ordinance (1787) and in WI Constitution (1848)
  - Wisconsin's navigable waters are "common highways and forever free" and are held in trust by the Department of Natural Resource
  - **Public rights:** navigation, boating, fishing, swimming, hunting and scenic beauty
    - Rights include protecting spawning grounds, wildlife, and vegetation
    - State shall intervene to protect these public rights



Held in trust?  
Property is held by  
one party for the  
benefit of another

# The Public Trust Doctrine

- Riparian owners hold rights in the water adjacent to their property
  - Use of the shoreline
  - Right to access the water
  - Reasonable use of the water
- WI Supreme Court has ruled that when conflicts between riparian rights and public rights exist, the public's rights are primary, and riparian rights are secondary, **again confirming that the waters belong to all of us**
- The purposes of shoreland zoning stems from this doctrine established under Wis. Stats. ss. 281.31, 59.692, 62.231, 61.351
- **"Champions of the Public Trust" videos**



# Purposes of shoreland zoning include...

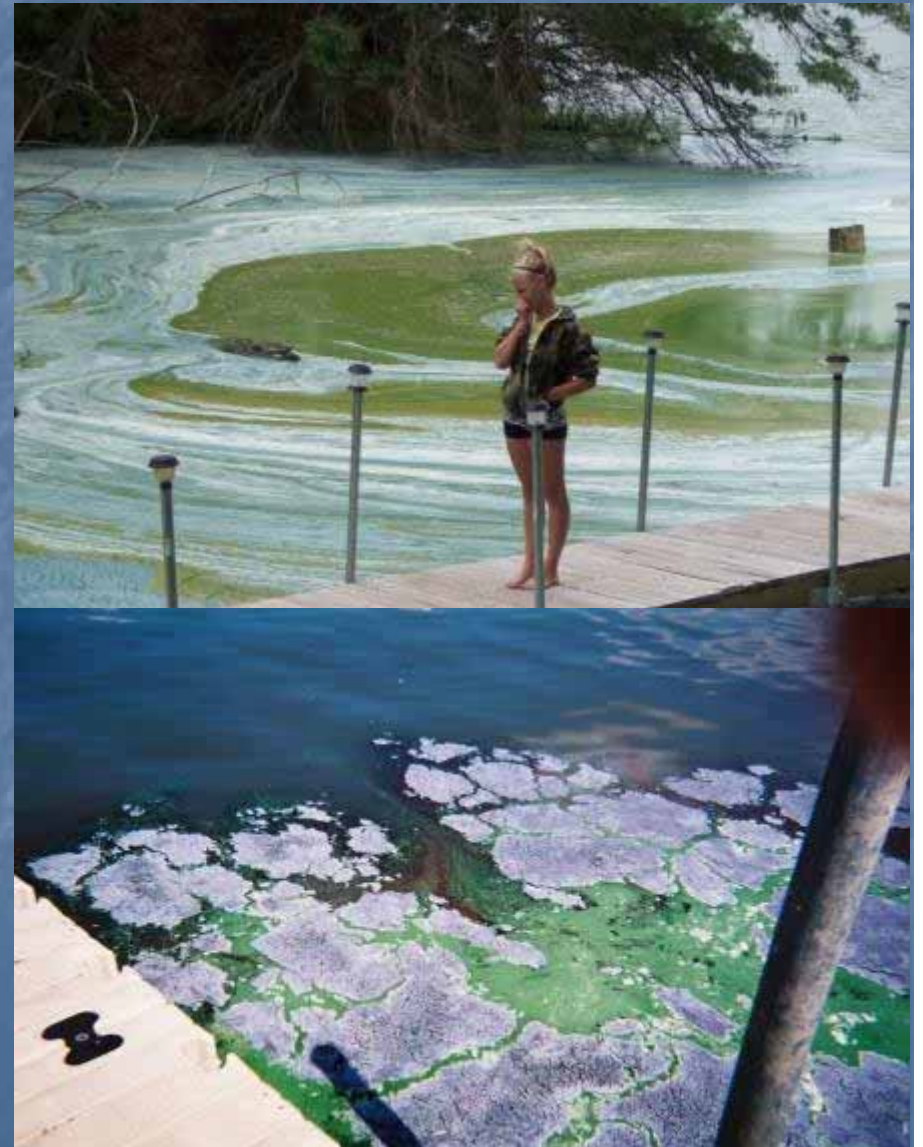
- Prevent and control water pollution
- Protect spawning grounds, fish and aquatic life
- Reserve shore cover and natural beauty



s. 281.31 Wis. Stats.

# Preventing and controlling water pollution

- Protects the public's rights in waters for
  - Fishing
  - Swimming
  - Boating
- Protects private benefits
  - Higher property values
  - Tourism income
  - Cost avoidance for lake rehabs





# Shoreland Management Program History

- In June 1966, the Wisconsin Legislature passed Water Resources Act
  - Included provisions for a statewide shoreland zoning program for all unincorporated areas
- Water Resources Act directed DNR to develop minimum statewide shoreland standards (NR 115)
  - Deadline for county adoption of an appropriate ordinance was January 1, 1968
  - By 1971, all counties had adopted and were administering a shoreland ordinance

# A partnership between state and local government

- Effective shoreland ordinance administration requires a **working partnership** between WI DNR & local governments
- **Local government** is responsible for administration and enforcement
- To protect the public's rights in navigable waters, **DNR may**
  - provide education and technical assistance for local decision makers
  - veto noncompliant text and map amendments by adoption of a superseding ordinance
  - appeal shoreland zoning board decisions to circuit court (e.g. variance on a shoreland lot)

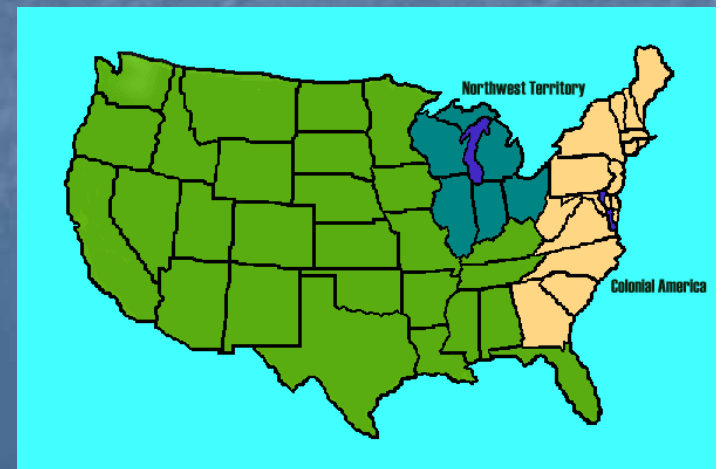
# Win a book!



- When did the Public Trust Doctrine that says navigable waters belong to everyone first apply to what is now WI?
  - 1492
  - 1787
  - 1848
  - 1998

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- By what year did all Wisconsin counties have a shoreland ordinance in place?
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  - 1971
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# Win a book!

- The purposes of shoreland zoning include
  - A. Protect lakes and rivers
  - B. Prevent and control water pollution
  - C. Protect spawning grounds, fish and aquatic life
  - D. Reserve shore cover and natural beauty
  - E. All of the above

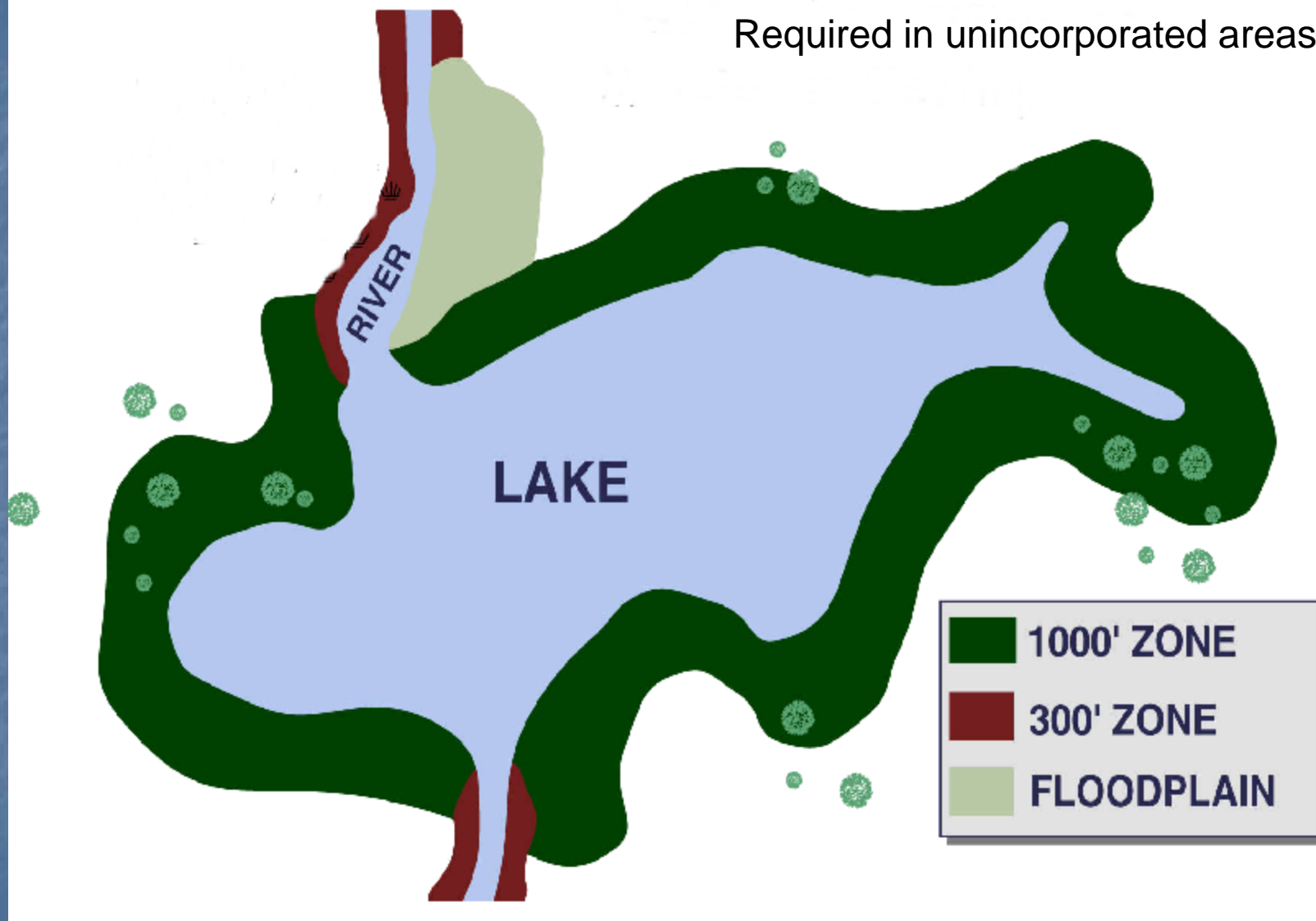
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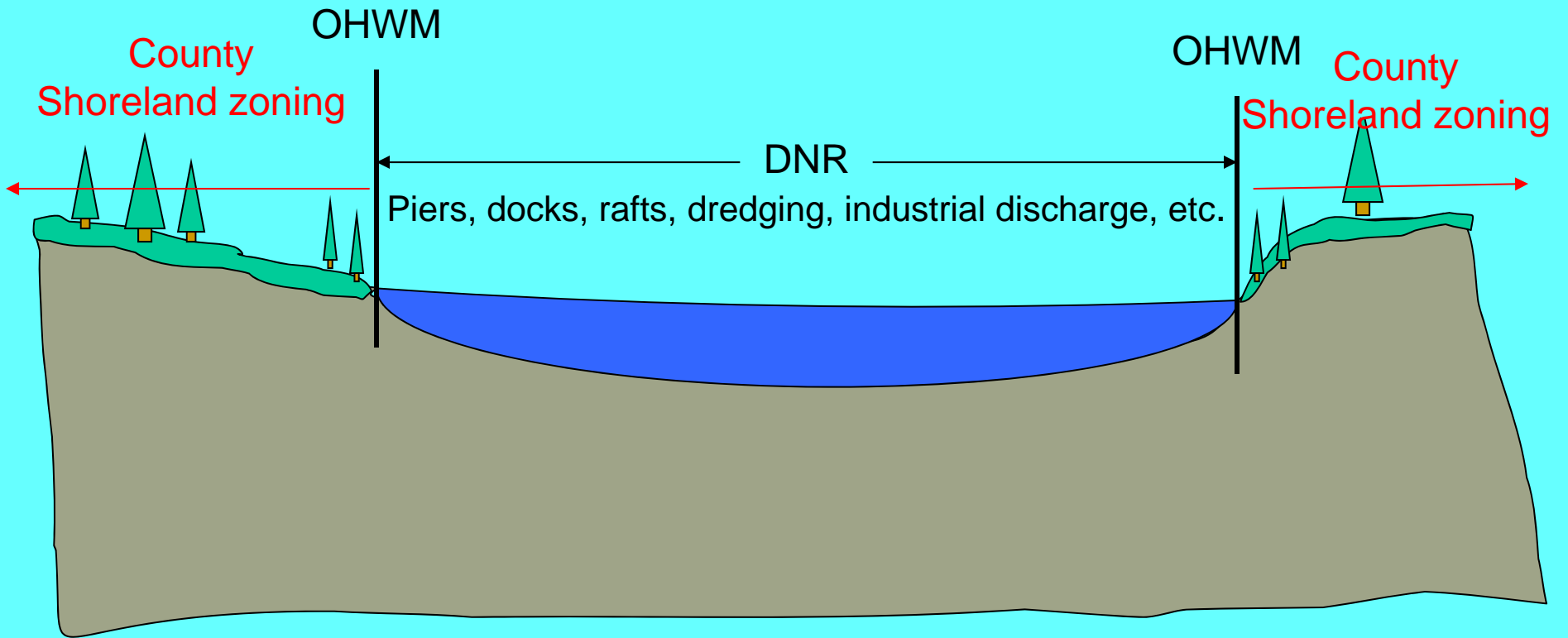


# Shoreland zoning applies near lakes & rivers

Required in unincorporated areas



# Who regulates what?



**SHORELAND ZONING** is in place to protect our lakes and rivers

- Wisconsin Administrative Code **NR 115** provides mainly minimum standards for shoreland zoning

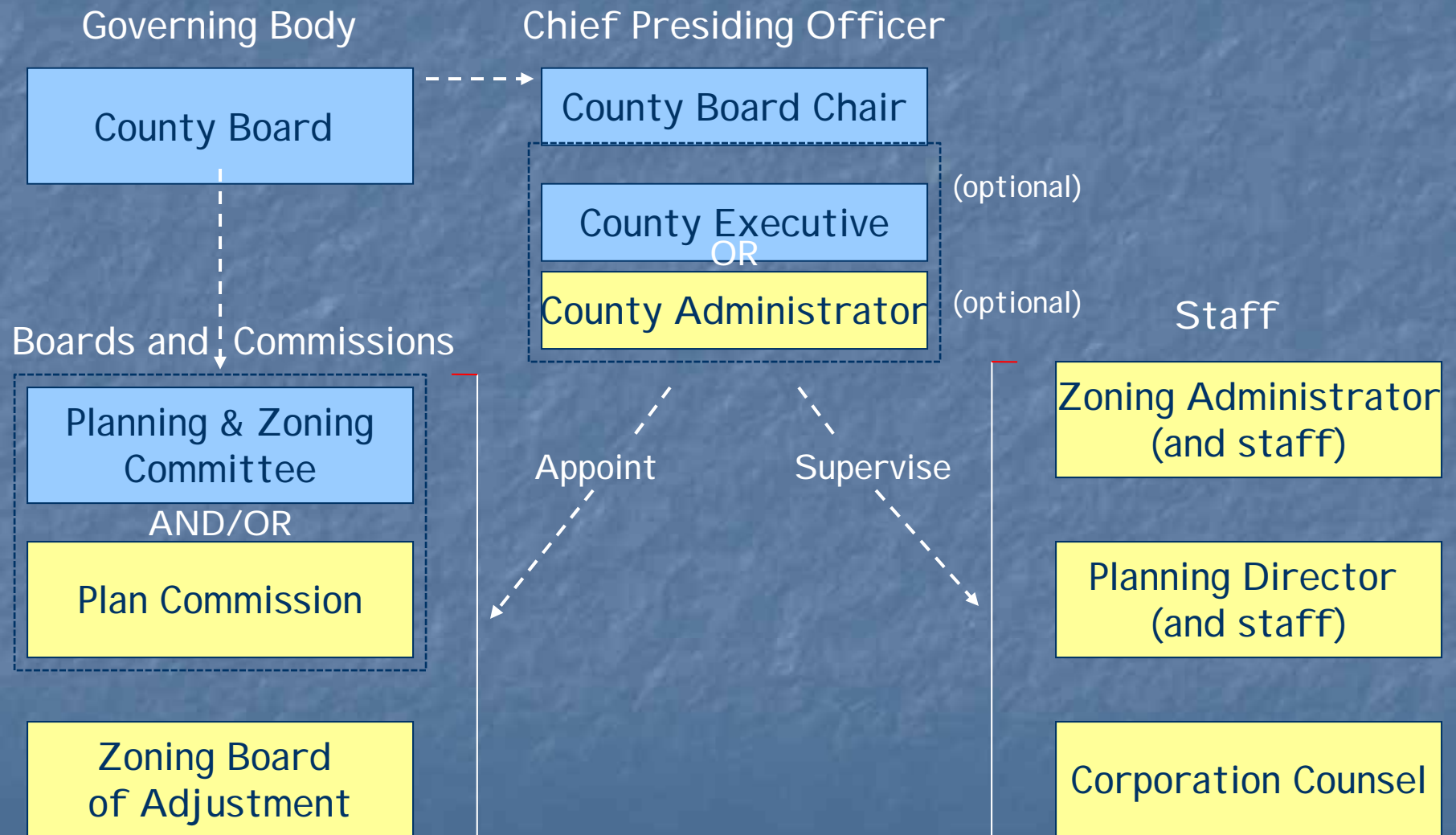


With shoreland zoning



Without shoreland zoning

# Local Government Structure



# Local Government Structure

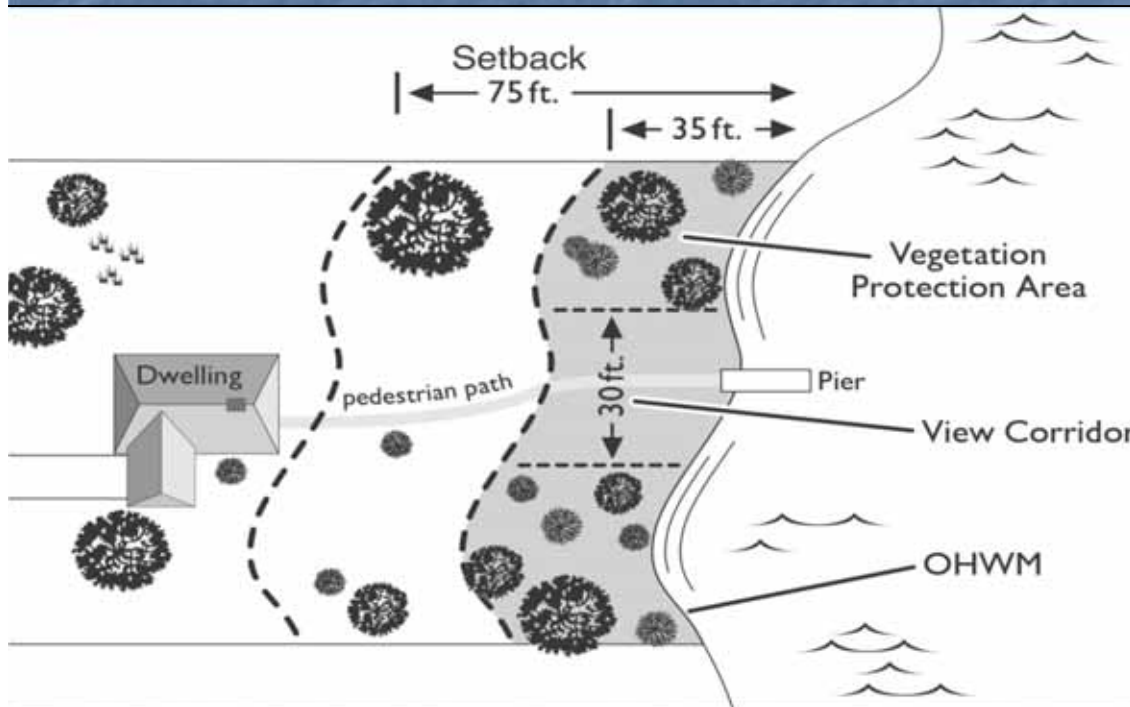


# Leaky bucket



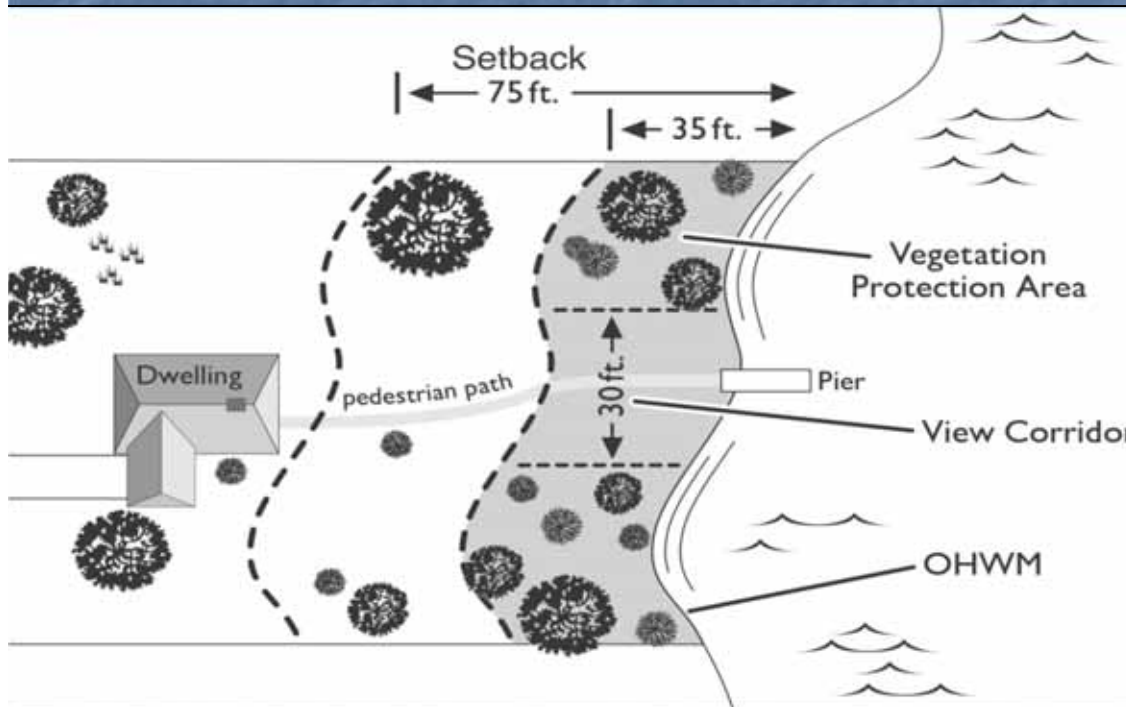
If the purposes of a zoning ordinance are held in a bucket, variances (**which allow a property owner to do something prohibited by the ordinance**) may jeopardize the purposes of the ordinance

# Minimum WI shoreland standards (NR 115)



- Adopted in 1966
- Lot size
- Vegetation protection area (buffer) (30% of shoreline frontage, not more than 200')
- Shoreline setback

# How do shoreland standards prevent and control water pollution?



1. Curb pollutants at their source such as eroding soils
2. Cut runoff that carries pollutants to the waterway by minimizing impervious surfaces
3. Capture and cleanse pollutant-carrying runoff with shoreland buffers or rain gardens

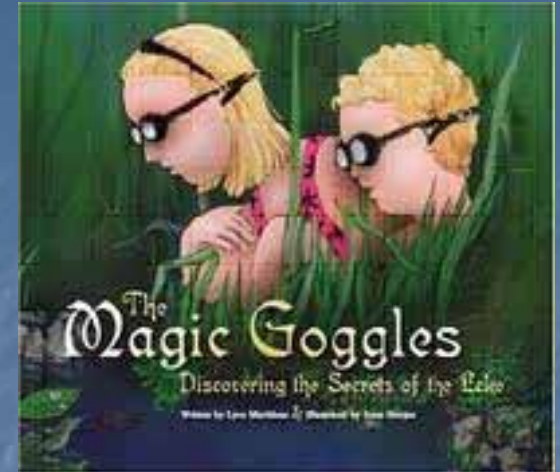


# Win a book!



- Who regulates piers?
  - County zoning
  - DNR
  - Land and water conservation department

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  - County zoning
  - **DNR**
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# Win a book!



- Which local government bodies work together to develop, adopt and administer shoreland zoning?
  - A. County zoning staff
  - B. County planning and zoning committee
  - C. County board
  - D. Board of Adjustment
  - E. Corporation counsel
  - F. All of the above

# Win a book!



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# Win a book!



- What components of shoreland zoning prevent and control water pollution?
  - A. Shoreland buffers
  - B. Limiting impervious surfaces
  - C. Limiting fertilizer application
  - D. Limiting erosion by limiting grading

# Win a book!



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  - B. **Limiting impervious surfaces**
  - C. Limiting fertilizer application
  - D. **Limiting erosion by limiting grading**

What have we learned from  
science and economics?

In the last 50 years since WI shoreland  
zoning was first adopted

# Waterfront property values & water quality

## Is there a connection?



“More polluted lakes have less valuable property than do cleaner lakes.”

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



# Water quality & economics

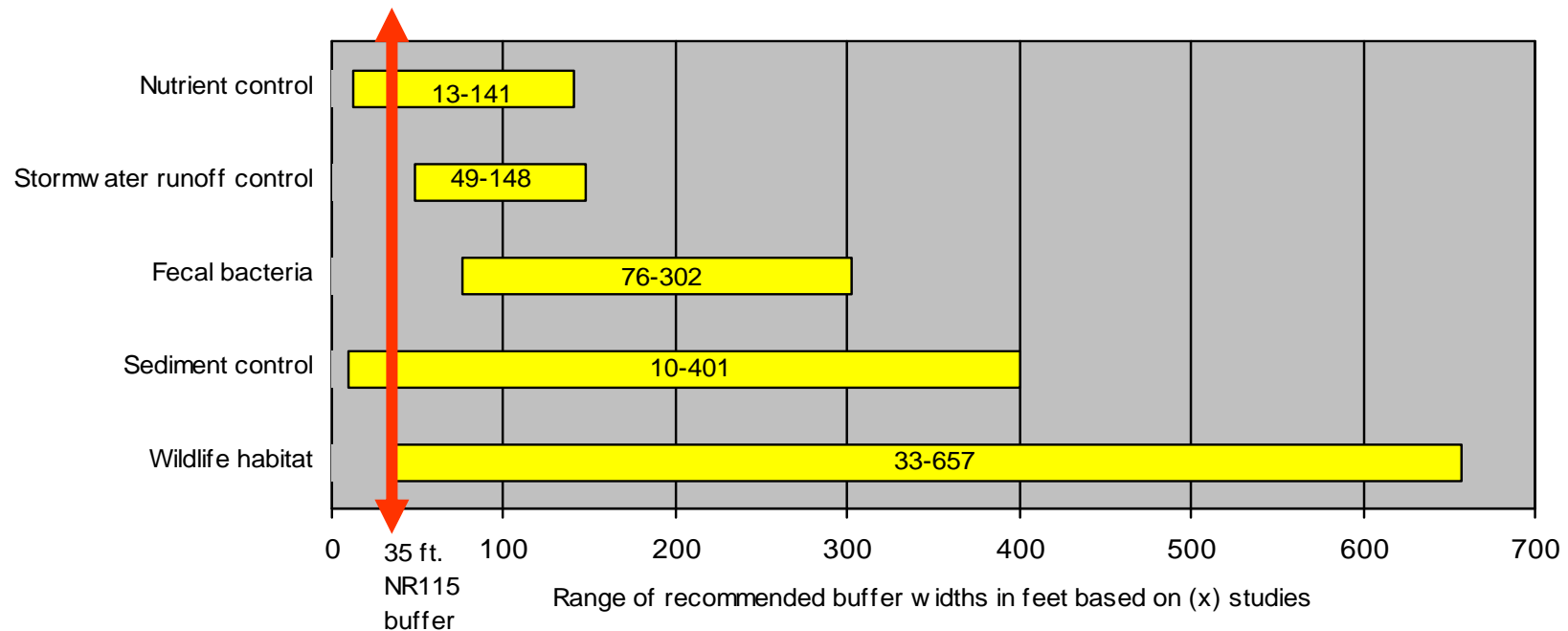
- A study of over 1200 waterfront properties in Minnesota found when water clarity changed by 3 feet changes in property prices for these lakes are tens of thousands to millions of dollars



Krysel et al, 2003

# What can buffers do if they're big enough?

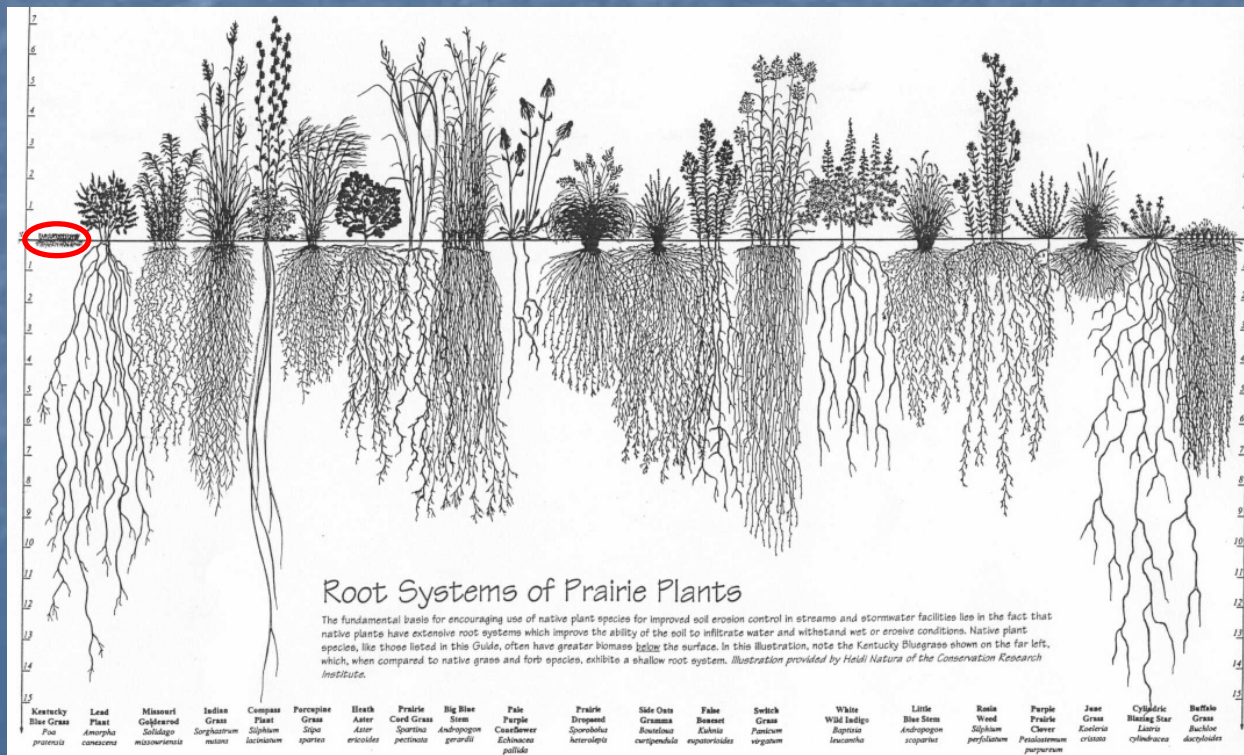
## Recommended Shoreline Buffer Widths A Research Summary



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

# How do buffers work?

- Hold soil in place to prevent erosion
- Slow down runoff and let it soak into the soil
- Provide food and shelter for wildlife



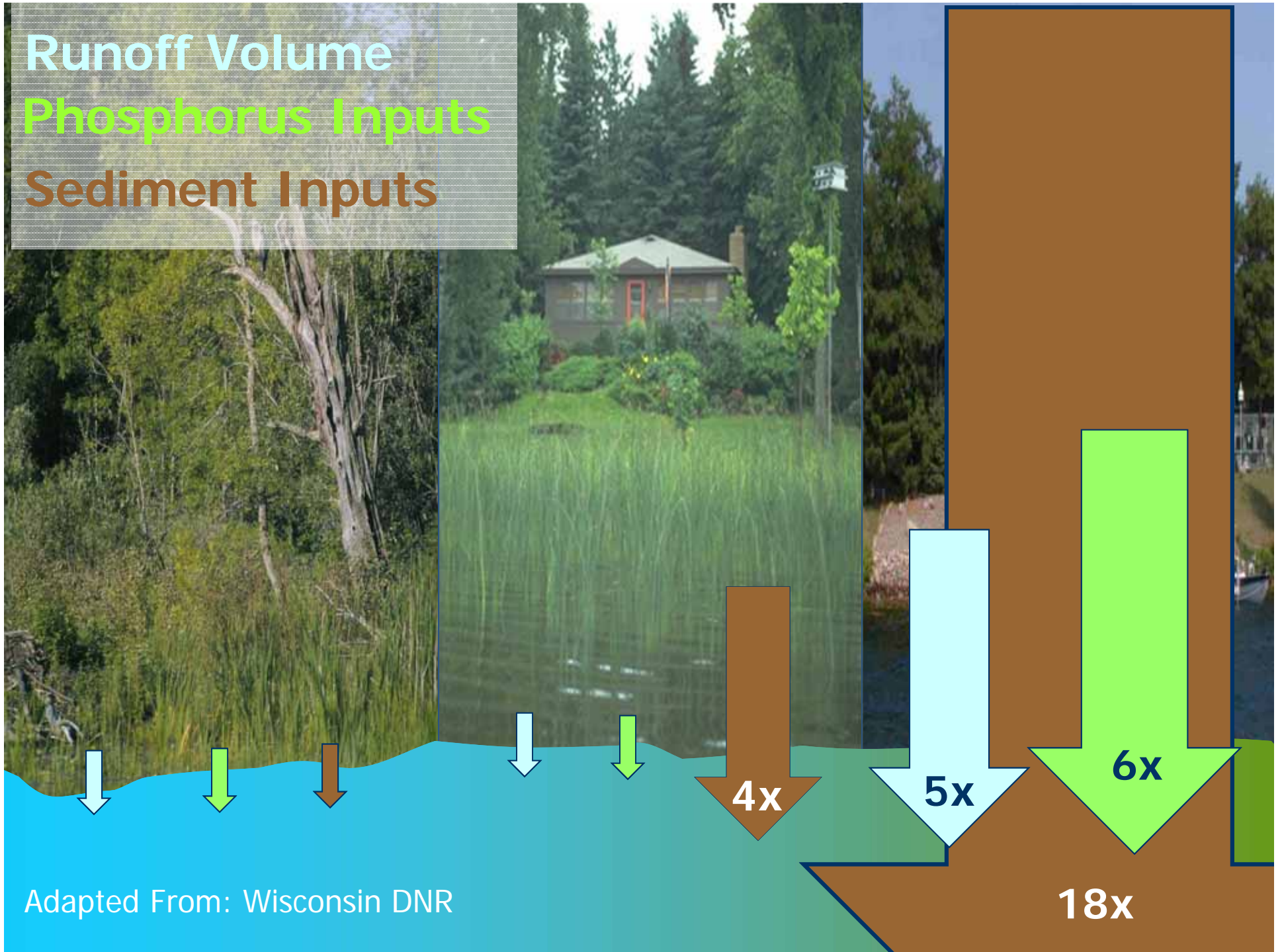


## Effects of impervious surfaces

**(based on the last 20 years of research)**

- IS prevent water from soaking into the ground, which is the cool groundwater that enters lakes and streams during dry periods

**Runoff Volume**  
**Phosphorus Inputs**  
**Sediment Inputs**



Adapted From: Wisconsin DNR

Play IS video

## More Impervious Surface = Less Fish

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

*Less than 8%*

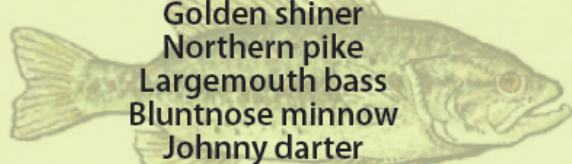
*8 - 12%*

*Greater than 12%*

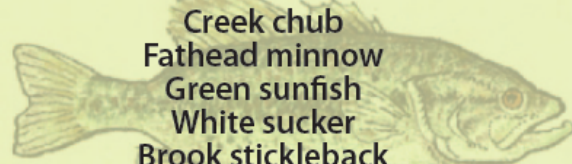
**More Impervious Surfaces in Watershed** 



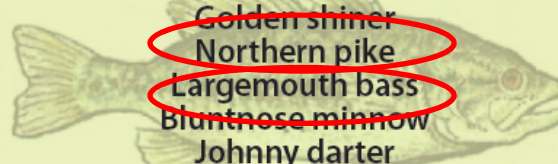
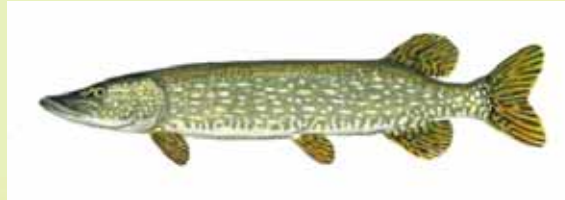
Iowa darter  
Black crappie  
Channel catfish  
Yellow perch  
Rock bass  
Horneyhead chub  
Sand shiner  
Southern redbelly dace



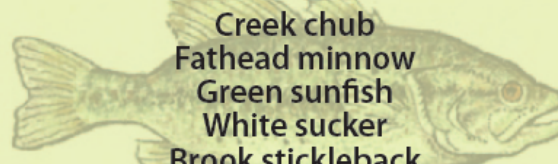
Golden shiner  
Northern pike  
Largemouth bass  
Bluntnose minnow  
Johnny darter  
Common shiner



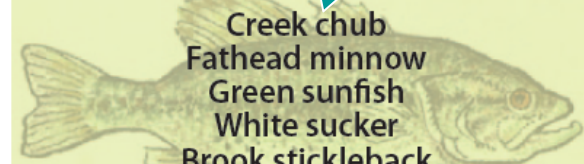
Creek chub  
Fathead minnow  
Green sunfish  
White sucker  
Brook stickleback



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Creek chub  
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White sucker  
Brook stickleback

2008 study  
of 164 WI  
lakes found  
the same  
trend

**Fewer species of fish** 

# More Impervious Surface = Less Fish

More impervious surface causes



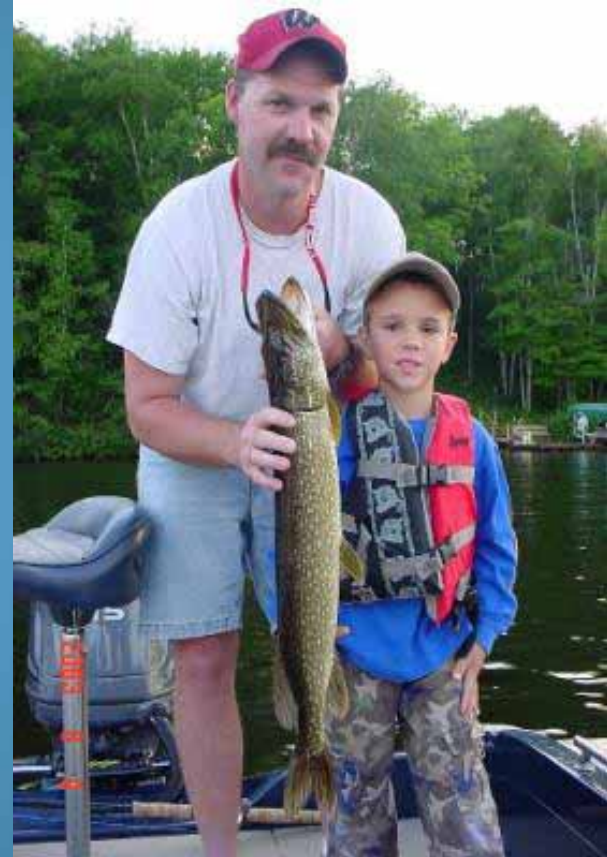
- **Larger and more frequent floods**

- **Less groundwater leads to lower stream flows & warmer water temperatures during dry periods**



# More Impervious Surface = Less Fish

- **More runoff** from hot pavement and shingles makes the water hotter
- **More nutrients** from soil and fertilizers result in less oxygen in the water, which fish need to survive



**Trout are gone above 11% impervious**  
**Northern pike are gone above 12% impervious**

## More Impervious Surface = Less Fish

- **More sediments** and algae growth make it difficult for some predator species that hunt by sight to find their food
- **More sediments** cover spawning beds of fish such as walleye and smallmouth bass, depriving eggs of oxygen



# Brook Trout and Brown Trout

- Require cold, clean, high-oxygen water to survive
- Part of their diet consists of aquatic insects and small fish, whose populations decrease with increased runoff and sedimentation
- When impervious surfaces covered more than 11% of a watershed, trout were eliminated from streams

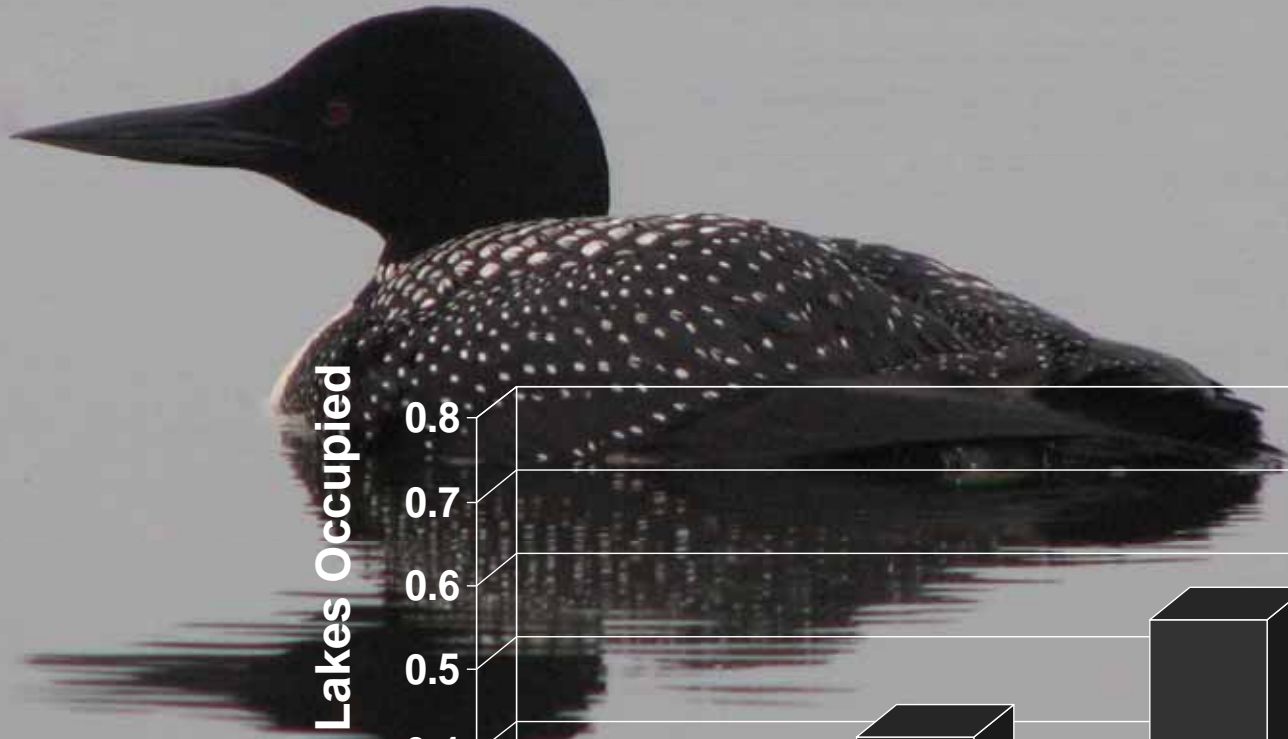


# Walleye

- Walleye prefer to spawn on gravel- and cobble-covered bottoms.
- They typically spawn between mid-April and early May in Wisconsin when spring runoff is highest.
- The runoff from impervious surfaces can cause soil erosion. When the spaces between the rocks and gravel become blanketed with silt, walleye eggs can die quickly due to lack of oxygen.



# Wisconsin Loons More Likely Found on Lakes with Clearer Water



Proportion of Lakes Occupied

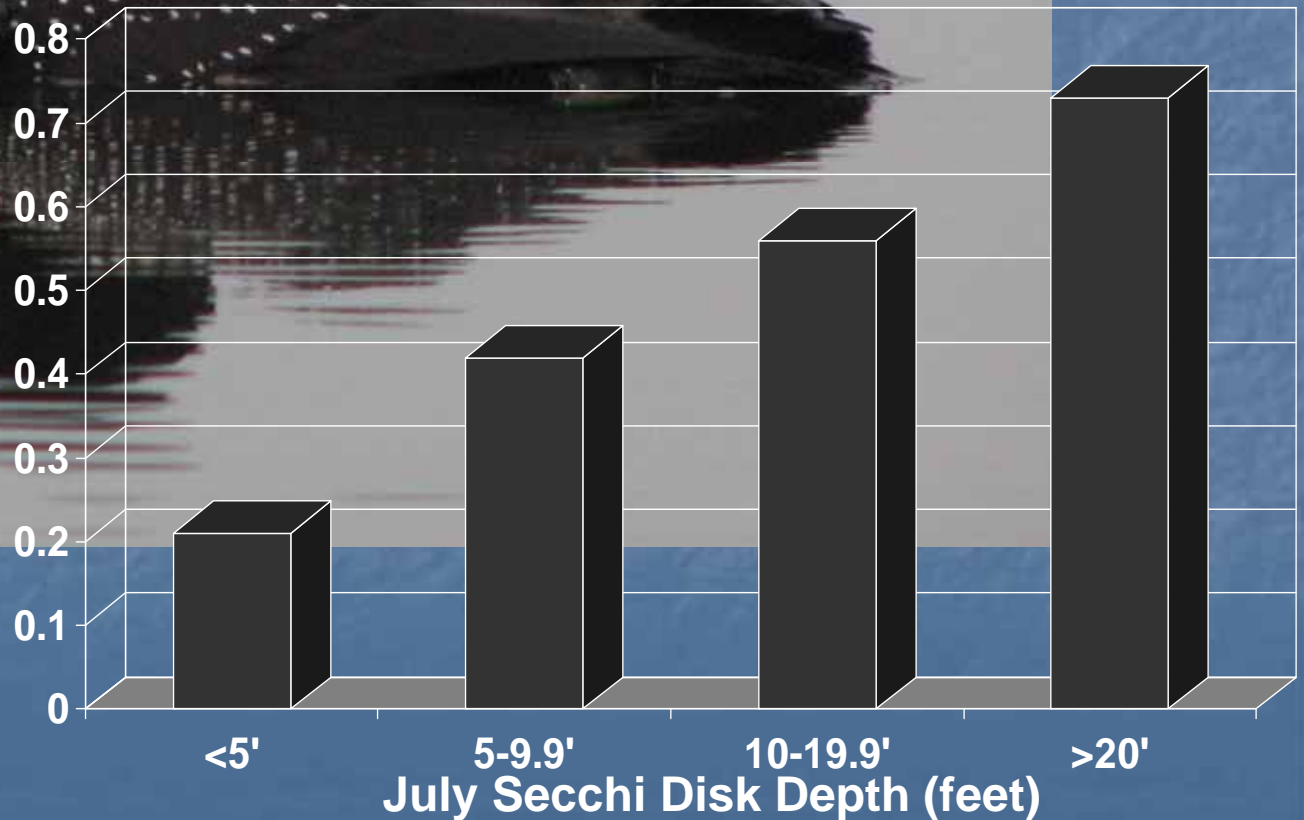


Photo credit  
Doug Killian



12% impervious on a half-acre lot = 2,600 square feet





# Impervious surfaces impact:

## 1. Fish

- When water runs over asphalt or shingles and into a lake or stream, it gets warmer. ISs also prevent the water from becoming cool water that enters lakes and streams during dry periods. Some fish can't take the heat.
- Northern pike are gone above 12% impervious
- Trout are gone above 11% impervious

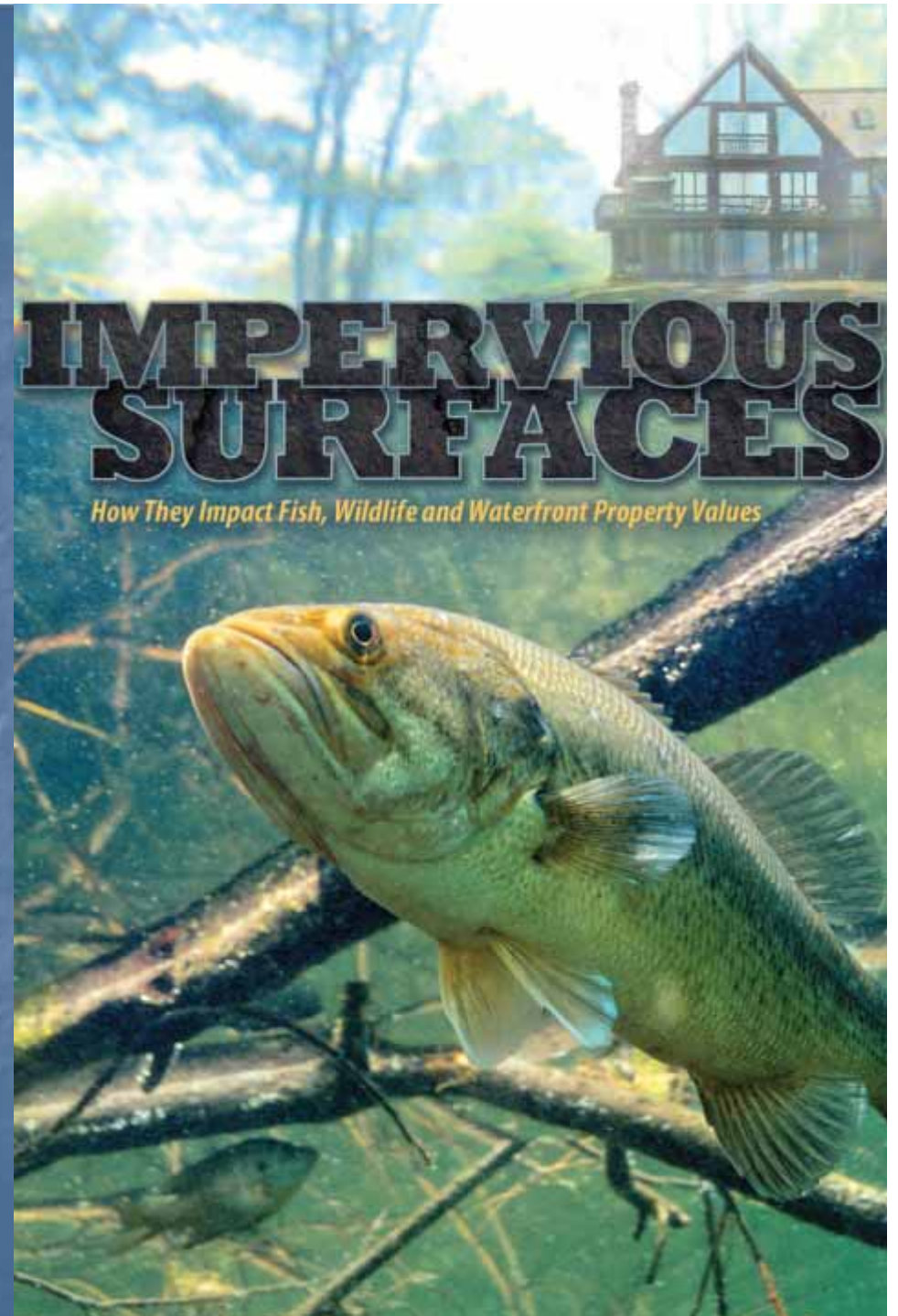
## 2. Wildlife

## 3. Water quality & property values

# Impervious surfaces

How they impact  
fish, wildlife and  
waterfront property  
values

Video: 12 minutes  
[www.youtube.com/watch?v=fJ2JQQ9pVqY](http://www.youtube.com/watch?v=fJ2JQQ9pVqY)



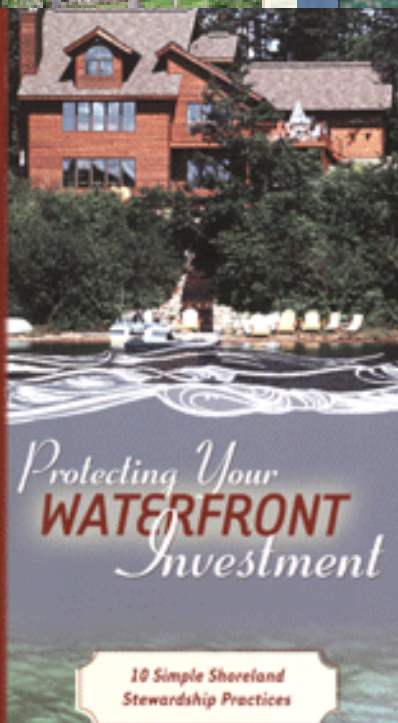
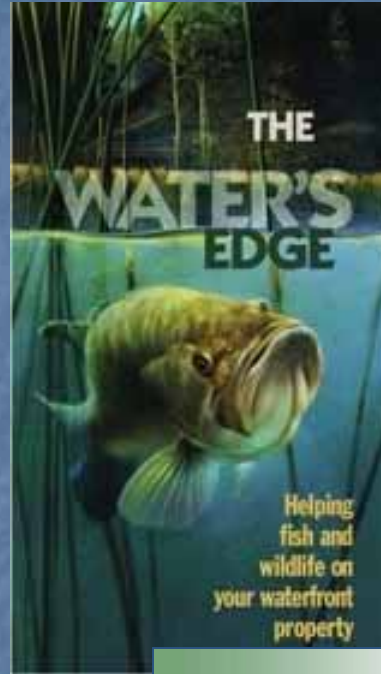
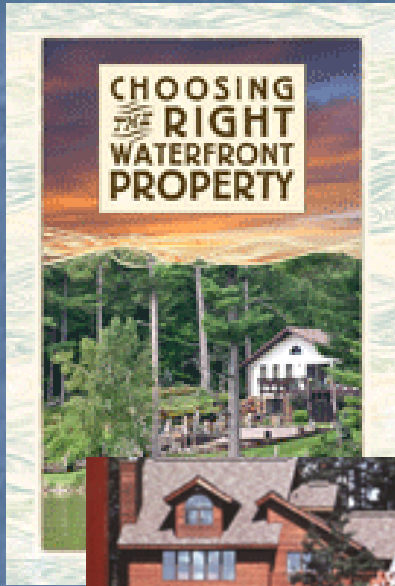


# Conclusions

- The quality of a lake or river depends on what's happening on the land around it
- Shoreland zoning is an effective tool to protect lake health and fisheries
- When impervious surfaces exceed 12% of a river's watershed, northern pike and trout are eliminated
- NR 115 was updated in 2010 and 2014 based on science, public input and politics. Counties have until October 1, 2016 to update their shoreland ordinances.



# Shoreland educational materials



## Does shoreland zoning work?

States have adopted different strategies for protecting their lakes from the negative impacts of lakeshore development. This fact sheet describes two states' approaches to shoreland zoning and whether they've worked to protect lakes.

### Statewide standards (Maine)

Maine requires that towns adopt a shoreland zoning ordinance at least as restrictive as the model ordinance developed by lake scientists with the State of Maine. This model ordinance includes: a 100-foot setback for buildings, and keeping trees and low growing shrubs and shrubs in place between buildings and the lake.



### No statewide standards (Vermont)

Vermont has no minimum shoreland standards, leaving the responsibility to craft an ordinance to town officials. Often all of the trees, shrubs and groundcover is removed near the water's edge, the lot is leveled, and buildings, driveways, and patios are built close to the shoreline. Seawalls are sometimes installed to stabilize the banks that were destabilized by the removal of the natural trees and shrubs.



### How does this study relate to Wisconsin?

Wisconsin has statewide shoreland zoning standards similar to those adopted in Maine. Research has found:

- Removing trees from lakes reduces perch, more impervious (hard) surfaces near the shoreline result in fewer fish.<sup>2</sup>
- Waterfront property values decrease when water is cloudy.<sup>3</sup>

# Wrap up

- What was the most valuable thing you learned in this session?
- What are you thinking of doing related to shoreland zoning when you get home from the lakes convention?


# Collaborators

- WI DNR
- WI County Code Administrators
- WI Land and Water Conservation Assn
- University of Wisconsin Extension
  - UWEX Lakes
  - Natural Resource Educators
  - Environmental Resource Center
  - County educators
- Center for Watershed Science and Education
- Wisconsin Lakes (900+ lake groups)
- River Alliance of WI
- WI Wetlands Association
- Wild Ones
- WI Wildlife Federation



Wisconsin  
County Code  
Administrators





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Kay Lutze  
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[Kay.Lutze@wisconsin.gov](mailto:Kay.Lutze@wisconsin.gov)  
920.662.5159

# Shoreland management tools...



- 1) Provide shoreline setbacks & buffers
- 2) Limit development density
- 3) Limit impervious surfaces
- 4) Control erosion
- 5) Limit expansion of substandard development
- 6) Follow forestry & agriculture guidelines



... protect our waters!

# Resources about shoreland zoning

- Does shoreland zoning work?
- 12-minute video and poster about the impacts of impervious surfaces (some counties play this video on the screen in the county courthouse)
- Benefits of leaving fallen trees in the water
  1. Google "CLUE UWSP"
  2. On left side choose "publications"
  3. Then choose "water"
  4. My email and phone number are on the last slide of today's presentation. Feel free to give me a call.

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Developed site in Maine

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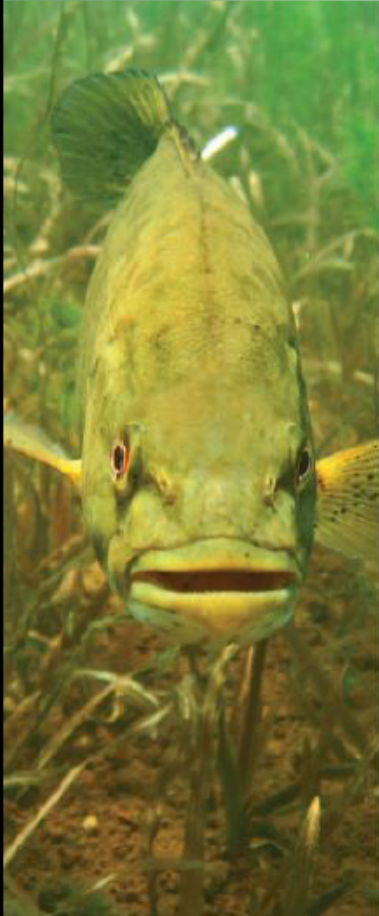
Developed site in Vermont



# Does shoreland zoning work?

- From 2005 – 2008 in Vermont studied
  - 234 undeveloped reference sites
  - 151 unbuffered developed lakeshore sites
- In 2011 in Maine studied
  - 13 undeveloped reference sites
  - 36 developed sites that met shoreland zoning standards

# Can we develop a lakeshore and protect the lake?



9 measures of lake health	Statewide shoreland zoning standards (Maine)	No statewide shoreland zoning standards (Vermont)	Why are these measures important?
Shoreline trees	✓		Trees, shrubs and ground cover near the shoreline provide: <ul style="list-style-type: none"> <li>• Erosion control</li> <li>• Shade in water near shore</li> <li>• Food for deer and other wildlife</li> </ul>
Large woody structure	✓		Fallen trees in the water (woody structure) provide: <ul style="list-style-type: none"> <li>• Cover for fish to hide from birds and bigger fish</li> <li>• Places for turtles to bask in the sun to digest their food</li> <li>• Structure where frogs attach their eggs</li> </ul>
Medium woody structure	✓		
Small woody structure	✓		
Leaves in the water	✓		Leaves in the water feed water insects (fish food)
Variety of lake bottom types, not covered in sand	✓		Lake bottoms not covered in sand & sediment provide: <ul style="list-style-type: none"> <li>• Valuable nesting sites for fish, where their eggs aren't buried</li> <li>• Habitat for water insects (fish food)</li> </ul>
Structure not covered in sediment	✓		
Small animals and plants growing on structures	✓		Small animals and plants growing on rocks and other structure provide food for fish, snails and other animals
Dragonflies & damselflies			Dragonflies & damselflies rely on healthy shorelines & lakes and are voracious predators of mosquitoes

Full report: Determining if Maine's Mandatory Shoreland Zoning Act Standards are Effective at Protecting Aquatic Habitat, March 14, 2013 by the Vermont Department of Environmental Conservation. [www.anr.state.vt.us/dec/waterq/lakes/docs/lp\\_mainezoning.pdf](http://www.anr.state.vt.us/dec/waterq/lakes/docs/lp_mainezoning.pdf)

\*In the table, a checked box means there was no significant difference ( $\alpha = 0.05$ ) between the developed and reference (undeveloped) lake sites, while an unchecked box means there was a significant difference between the developed and reference (undeveloped) lake sites.

# Can we develop a lakeshore and protect the lake?

- In Vermont, lakefront sites developed without statewide shoreland zoning standards harmed the lakes in nine ways, as shown in the table
- In Maine, statewide shoreland standards make it possible to both develop a lakeshore and protect the lake