



North American Lake Management Society (NALMS)

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*Concurrent Session G-5: Riparian and Lakeshore Assessment and Management*

*Measuring the value of wildlife habitat restoration on northern Wisconsin lakes—the Wisconsin Lakeshore Restoration Project*

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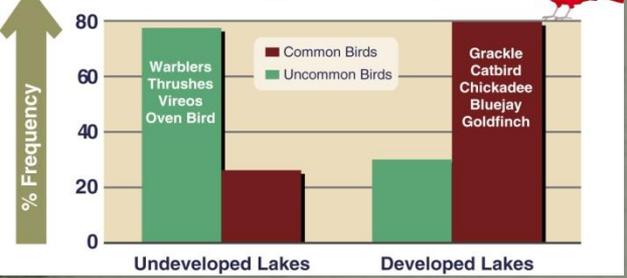
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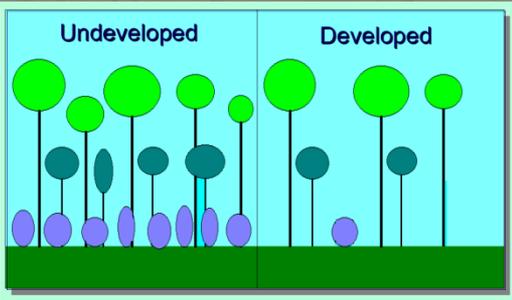


# Various research over the last decade has helped illuminate the impacts of development

What has Happened to Songbirds?

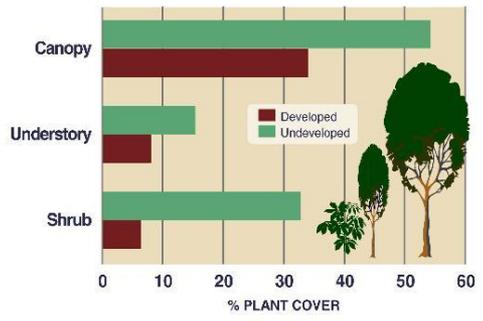


(Lindsay et al. 2003)



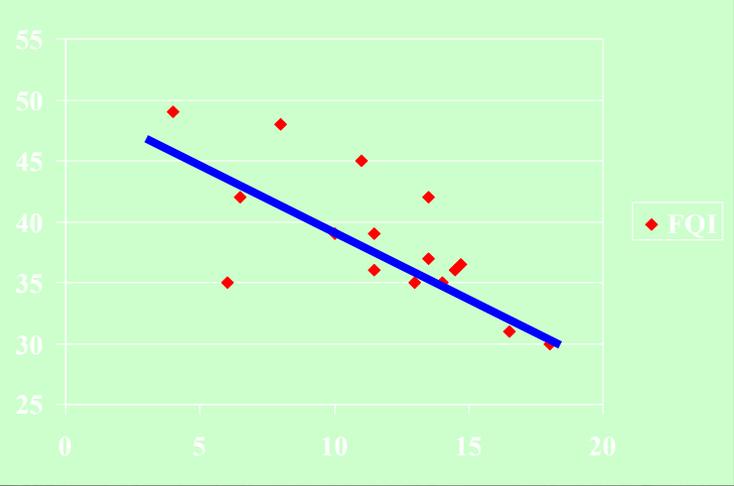
Shoreland plants trends

What has Happened to Shoreland Plants?



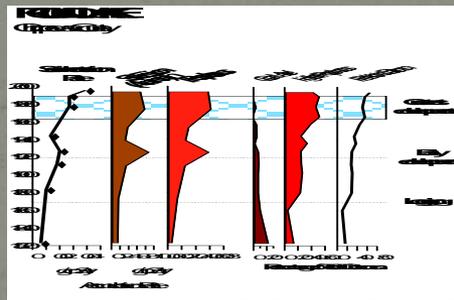
Source: Wisconsin Dept. of Natural Resources The Wisconsin Lakes Partnership

(Elias et al. 2003)



Dwellings/km shoreline

Hatzenbeler et al.(2004)



Shoreland green frog trends

What has Happened to Green Frogs?



Source: Wisconsin Dept. of Natural Resources The Wisconsin Lakes Partnership

(Woodford et al. 2002)

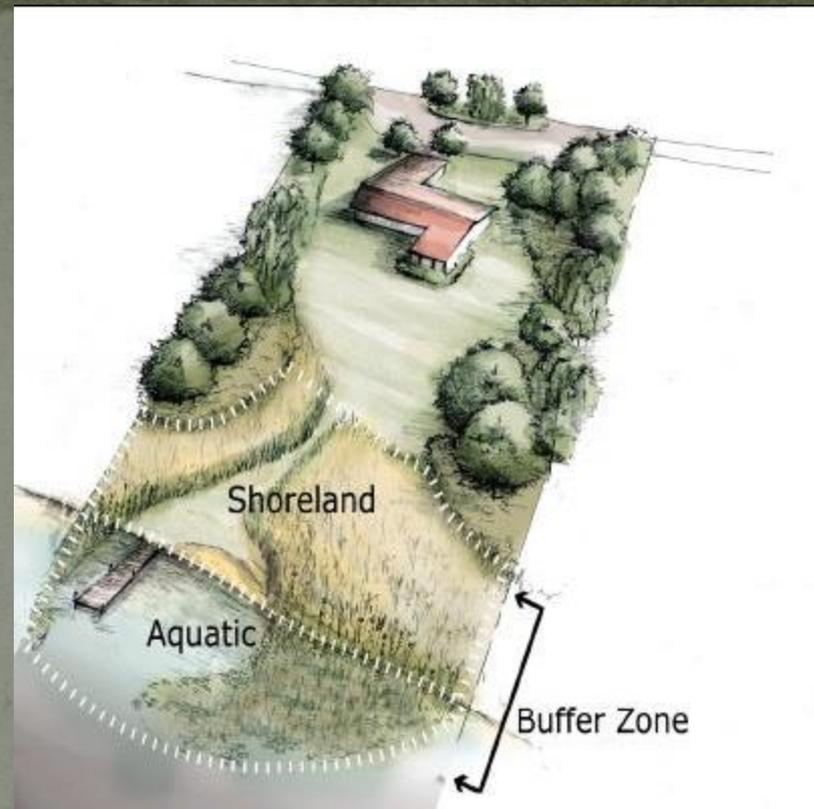
# Motivation of this study

- In many places, people were loving their lakes to death with development—*“death by a thousand cuts”*
- Research findings got people and lake groups around Wisconsin rethinking what is best for lakes?
- Lake residents and organizations, natural resource agencies, tribal entities, energy companies, and businesses like resorts and restaurants all have embraced the idea of restoring shoreland buffers
- **Can shoreland restoration mitigate the environmental impacts of development by revitalizing wildlife habitat and enhancing water quality?**



# Shoreland buffer restoration— is it helping?

- Interface between land and water -- area adjacent to lakes/streams.
- Links together the world of water with the terrestrial uplands--corridor between uplands and lowlands as well as between habitats along the shore.





# Defining shoreland buffer restoration

Practice that uses native trees, shrubs, and groundcover, along with natural and biodegradable materials (biologs, delta-lock bags, sediment logs, soil lifts, woody material), to reduce lakeshore erosion and improve aquatic and wildlife habitat quality.



**The Wisconsin Lakes Partnership**



# Research project—multiple partners

- Shoreland property owners
- Local elected officials ( Land and Water Conservation Committee)
- Wisconsin Departments of Natural Resources (DNR) and Agriculture, Trade and Consumer Protection (DATCP)
- County staff — Land and Water Conservation Department
- Local lake groups — Found, Moon and Lost lakes / Vilas County Lakes Association
- Area media outlets — Vilas County News-Review; Living on the Lake magazine
- Local contractors and nurseries — Hanson's Garden Village; Northern Landscaping
- Universities — Michigan Technical University; UWSP College of Natural Resources UW-EX Lakes; Kemp Station research facility



# Measuring the value of fish and wildlife habitat restoration on northern Wisconsin lakes

- Biotic surveys including baseline inventories pre- and post-restoration
- Relative abundance and the diversity of native vegetation
- Surveys for herptiles, breeding birds, small mammals, and furbearers both initially and then repeated annually over the ten-year period of the study
- Shrub comparison > bare root gravel culture plants versus potted 3 to 5 gallon container plants
- Woody habitat augmentation > 10 X 10' plots with no cover, 25% cover, and 50 % cover
- Native plant “*work horses*’ planting success also in 10 X 10’ plots > 2 shrubs, 1 grass, and 4 wildflowers



# Found Lake, Vilas County, Wisconsin, U.S.A.



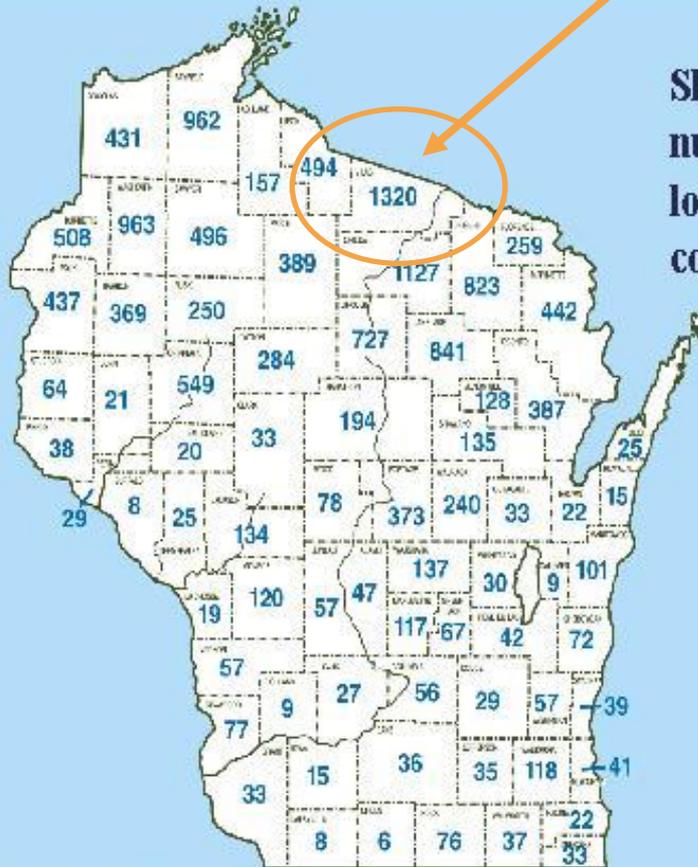
FOUND LAKE

50 0 50 Meters  




# Vilas County

## Wisconsin lakes by county



Shown are the number of lakes located in each county.





# Just finishing year 2 of the 10 year study

- Fourteen shoreland property owners on Found Lake have signed contracts and received conservation plans
- Over 1,400 feet of continuous shoreline buffer restored to date with over 10,000 native trees, shrubs, grasses, sedges, and wildflowers
- Continue to collect data at control and developed lake sites as well as at undeveloped reference lakes
- Setting up landowners, contracts, and conservation plans for two more lakes nearby: Moon and Lost Lakes, Vilas County, Wisconsin, U.S.A.
- Working towards implementing water quality monitoring portion to the study—before and after
- Getting the word out about the project to interested partners around the world
- Receiving good attention from department secretaries, area elected officials, and our Natural Resources Board
- We'd also like to add another dimension to the study looking at socio-economic questions related to shoreland property owner behavior change



# 14 landowners / properties > work to address landowner concerns in conservation plans

- View corridor (30 ft. viewshed)
- Access points along shoreline including docks, walkways, beach area, storage, etc.
- Wildlife impacts (muskrats; deer; etc.)
- Enhance existing native plants at the site / no mow areas
- Aesthetics
- What the neighbors will think? Talk w/ them @ the project
- Exotic species control
- Attaining proper WDNR / county zoning permits



## Typical questions to ask:

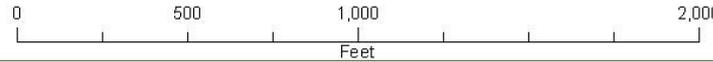
- What end product does each family member envision for the shoreline?
- What is the property's drainage pattern?
- Where are the areas of heaviest use?
- Recreation (types; # of people) etc.
- Pet and children areas?
- Where is the viewing corridor?
- Structures near the water?



# Found Lake restoration sites as of November 2008 through the Wisconsin Lakeshore Restoration Project

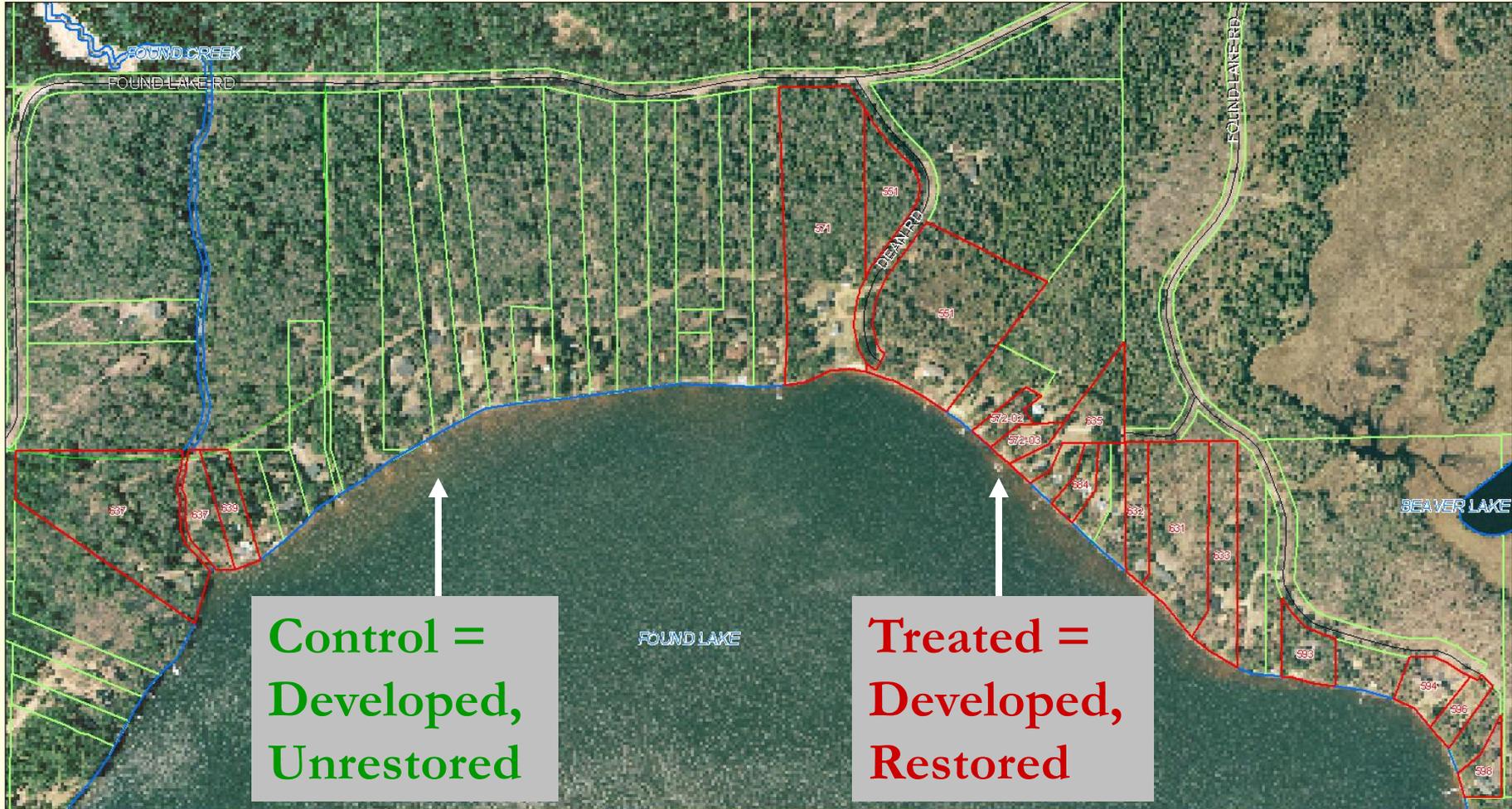
## FOUND LAKE SHORELAND RESTORATION PROJECT 2007

THIS MAP IS PROVIDED COURTESY OF VILAS COUNTY AND IS TO BE USED FOR REFERENCE PURPOSES ONLY. VILAS COUNTY MAKES EVERY EFFORT TO PRODUCE AND PUBLISH THE MOST ACCURATE AND CURRENT INFORMATION POSSIBLE. NO WARRANTIES, EXPRESS OR IMPLIED, ARE PROVIDED FOR THE DATA PROVIDED. IT IS THE USER'S RESPONSIBILITY TO VERIFY THE ACCURACY OF THE MATERIAL CONTAINED HEREIN AND IS NOT RESPONSIBLE FOR ANY USES OR REPERCUSSIONS OF THE INFORMATION OR ITS DERIVATIVES. PARCEL LINES WERE DRAWN BASED ON A GROUND SURVEY AND LOCAL DOCUMENTATION. AERIAL PHOTOGRAPHY TAKEN FROM THE MAY, 2005 FLIGHT. THIS MAP DOES NOT REPRESENT A SURVEY AND PARCEL LINES MAY CHANGE AS MORE DOCUMENTATION BECOMES AVAILABLE.



Map Features	
	Parcel Lines as of 1/23/07
	Water Body

400813.TIF (MAY, 2005 FL16-HT)



**Control =  
Developed,  
Unrestored**

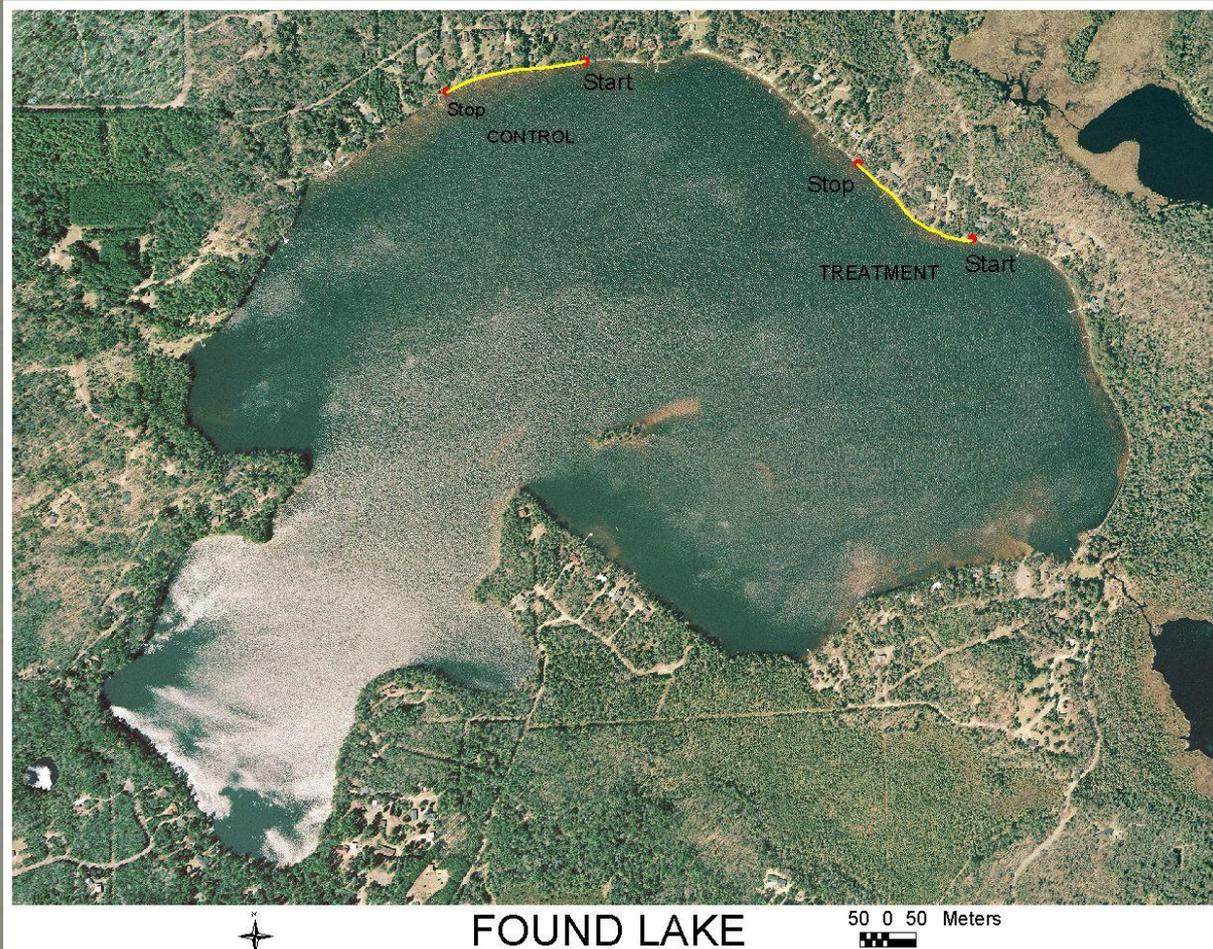
**Treated =  
Developed,  
Restored**

**Reference Lake = Escanaba Lake (Undeveloped)**

# Long-term Vegetation Quadrats (10m<sup>2</sup>)



# 2007 Bird, Amphibian, Small Mammal Transects



# Paired Reference (Undeveloped) Lake – Escanaba Lake NHAL



2007 bird, mammal, amphibian transect

50 0 50 Meters



# Furbearer Camera Surveys



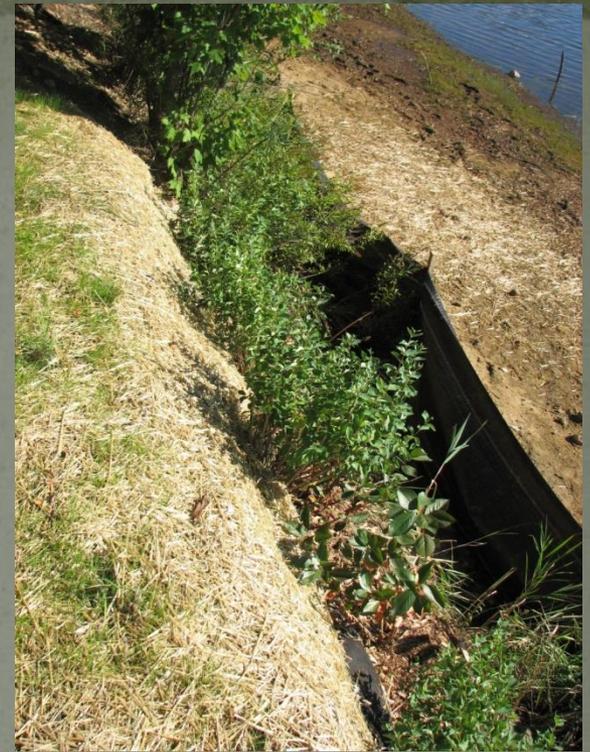
# Erosion control method > straw mats with plantings



# Erosion control method > biologs / Enviro-lok® bags



# Erosion control method > soil lifts



# Erosion control method > ShoreSox<sup>®</sup>



# Shrub comparison study > bare root gravel culture plants versus 3-5 gallon containers

The Wisconsin Lakes Partnership



- Bare root is grown in an experimental gravel culture medium that is well-watered
- *Aronia melanocarpa*, *Cornus racemosa*, *Sambucus canadensis*, *Symphoricarpos alba*, *Physocarpus virginianum*, *Viburnum lentago*
- Paired with container stock of same species
- Planted in same shoreland area
- Marked/tagged for long-term monitoring
- Will bare root materials be a more cost effective source for plantings with similar results as containerized plants?

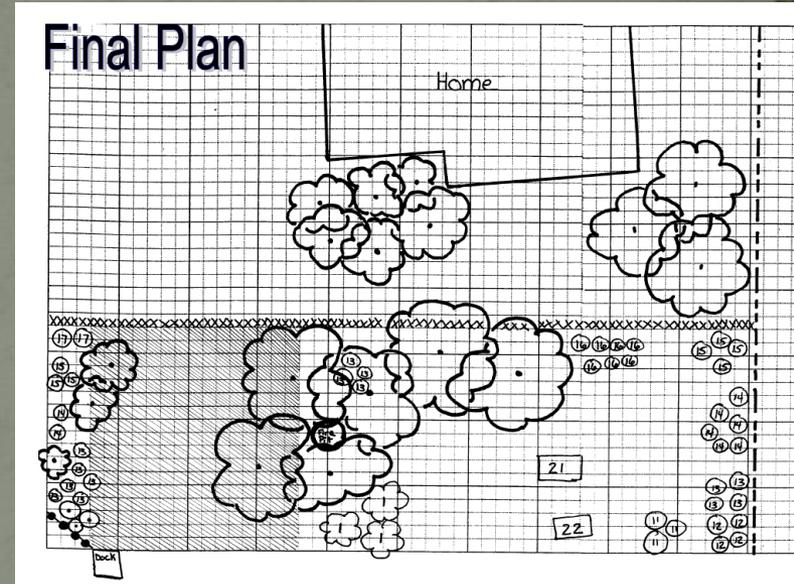
# Woody habitat comparison > 10' X 10' sites

- The project is examining the use of woody habitat on restored plantings
- Monitoring changes in soil temperature and moisture between sites with no wood on the ground, 25% woody cover, and 50% woody cover
- Perhaps woody habitat can lessen plant mortality



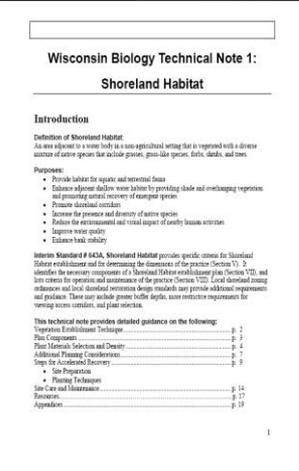
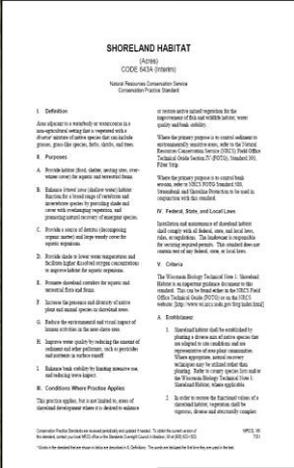
# Shoreland buffer restorations will be considered a successful management practice if they:

- Reduce surface water and nutrient run-off
- Reduce shoreline bank erosion
- Increase native plant abundance and diversity
- Improve wildlife habitat quality
- Increase wildlife abundance and diversity



# Lessons learned > partnership building

- Partners had to come together around a common purpose—a research project that helps us better understand if shoreland restorations improve water quality and wildlife habitat
- Each agency/partner had to think about other partners points of view, including landowners, relating to items like lakeshore access, erosion control techniques, permitting work, plant choices, planting density, contracts, media coverage, etc.
- A holistic partnership involving a myriad of agencies, people, and talents is crucial to this project's success



## Lessons learned > landowners

- Contracts are a key tool for working with landowners on the ten-year study
- Landowners are vital to making this partnership work over the ten-year period of the study
- Finding willing landowners to participate in the lakeshore restoration process is a continuing issue (even though it is free)



# Lessons learned > plantings and watering

- Drought conditions through most of first season and part of the 2<sup>nd</sup> year as well
- Some difficulty with access to water—had to pump from lake which made it more costly and time intensive
- The amount of time and resources needed to have adequate watering take place was underestimated
- Difficult site conditions—harsh exposure, 'sugar' sand soil, steep slopes (up to 45°)



# Lessons learned > deer/rabbit browse protection - fencing & repellents

Protection of plants for 3-5 years with temporary fencing and repellents is essential to establishment of the native plantings





# Lessons learned > costs

- Preliminary cost breakdowns are between ~\$50 and \$100 per linear foot of restored buffer back 35-feet
- Costs in part dependent on the amount of involvement from landowners, staff labor support, who does the design work, erosion control installation, plantings, fence building, and watering regime over time?
- Creating a reliable and consistent funding source for the 10-year duration of the project between multiple agencies continues to be a hurdle to overcome
- Biocontrol and other erosion control techniques can be costly and logistically challenging



# Lessons learned > lot sizes

Developed lakes with little shoreland habitat alteration and lot widths >200' have less impact on wildlife and plant communities



# Lessons learned > working with nurseries & contractors

- Building local expertise with nurseries and contractors for effective shoreland buffer designs and installations will be a continued priority



# Before / after photos > example 1



# Before / after photos > example 2



# Before / after photos > example 3



# Before / after photos > example 4



# Before / after photos > example 5



# Before / after photos > example

6



# Shoreland numbers for Wisconsin

- 47,162,014 meters of shoreline on our inland lakes

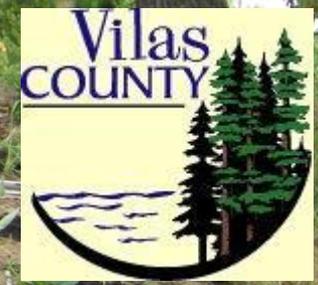
(data from WDNR Hydro IV database on 1:24,000 sources)

- or over 29,304 miles

- Shoreland restoration needs to be an available option for any Wisconsin landowner willing to give it a try



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