

A scenic view of a lake with autumn foliage on the left and a distant shoreline. The sky is a clear, pale blue. The water is calm and reflects the surrounding environment. On the left, there are trees with vibrant autumn leaves in shades of orange, red, and yellow, interspersed with evergreen trees. In the distance, a low, hazy shoreline is visible across the water.

Shoreland and Shallows Habitat Monitoring Protocol

Katie Hein & Scott Van Egeren

Team: Paul Cunningham, Kevin
Gauthier, Patrick Goggin, Ted Johnson,
Jodi Lepsch, Dan McFarlane, Kevin
Olson, Alex Smith, Buzz Sorge, Shelly
Thomsen, Pamela Toshner



Purpose

Develop a consistent statewide method for monitoring habitat along entire lake shorelines

Process

Spring 2015: team developed protocol

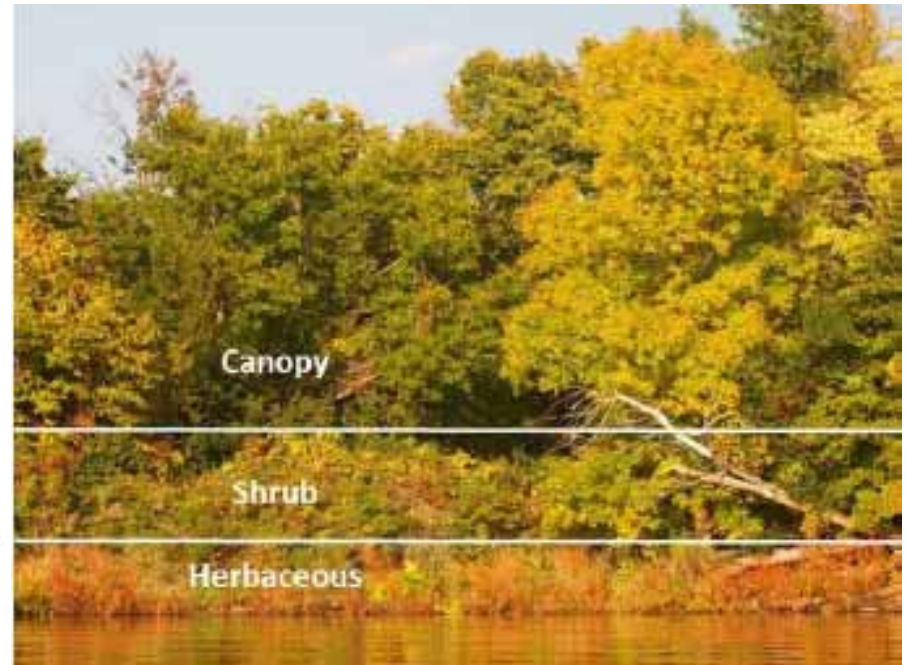
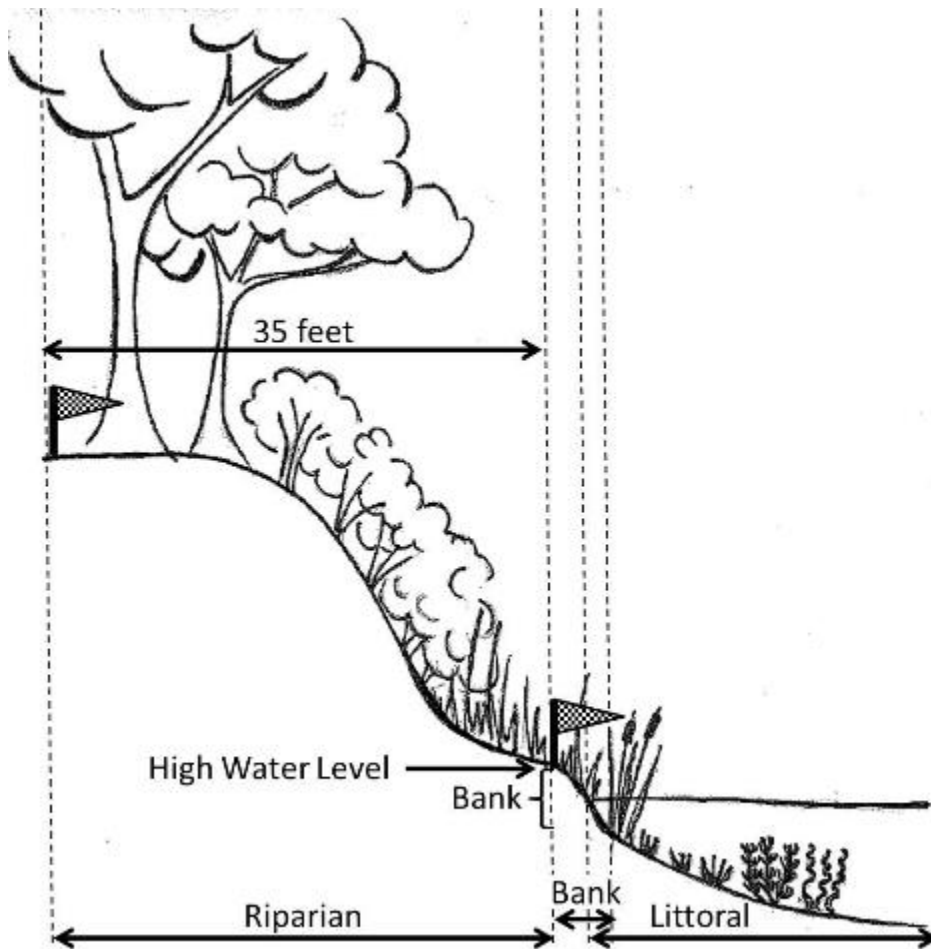
Summer 2015: field testing

- 9 lakes in Green County (2000+ parcels!)
- Rock Lake in Jefferson County
- Mineral Lake in Ashland County
- Buffalo Lake in Oneida County
- 3 lakes in Waupaca County

Fall 2015: review and revise protocol

Winter 2015: legal review, public comment, data management and reporting

Measuring Elements of a Healthy Lakeshore Survey Scope



Parcel Assessment: Riparian, Bank, Littoral

Date _____ Lake name _____ WBIC _____
 Parcel ID _____ Observers _____

RIPARIAN ZONE

Percent Cover in Riparian

Canopy (0-100) Percent

Shrub Herbaceous

Shrub/Herbaceous

Impervious surface

Manicured lawn

Agriculture

Other (e.g. duff, soil, mulch)

description: _____

sum=100

Human Structures in Riparian

Buildings

Boats on shore

Fire pits

Other

description: _____

Runoff Concerns

in Riparian or Entire Parcel	Present in Riparian	Present out of Riparian
Point source	<input type="checkbox"/>	<input type="checkbox"/>
Channelized water flow/gully	<input type="checkbox"/>	<input type="checkbox"/>
Stair/trail/road to lake	<input type="checkbox"/>	<input type="checkbox"/>
Lawn/soil sloping to lake	<input type="checkbox"/>	<input type="checkbox"/>
Bare soil	<input type="checkbox"/>	<input type="checkbox"/>
Sand/silt deposits	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>

description: _____

Notes:

BANK ZONE

	Length (ft)
Vertical sea wall	<input type="text"/>
Rip rap	<input type="text"/>
Other erosion control structures	<input type="text"/>
Artificial beach	<input type="text"/>
Bank erosion > 1 ft face	<input type="text"/>
Bank erosion < 1 ft face	<input type="text"/>

LITTORAL ZONE

Human Structures

	Number
Piers	<input type="text"/>
Boat lifts	<input type="text"/>
Boat shelters	<input type="text"/>
Swim rafts/water trampolines	<input type="text"/>
Boathouses (over water)	<input type="text"/>
Marinas	<input type="text"/>
Other	<input type="text"/>

description: _____

Aquatic Plants

	Present
Emergents	<input type="checkbox"/>
Floating	<input type="checkbox"/>
Plant Removal	<input type="checkbox"/>

If Applicable (low water level):

EXPOSED LAKE BED ZONE

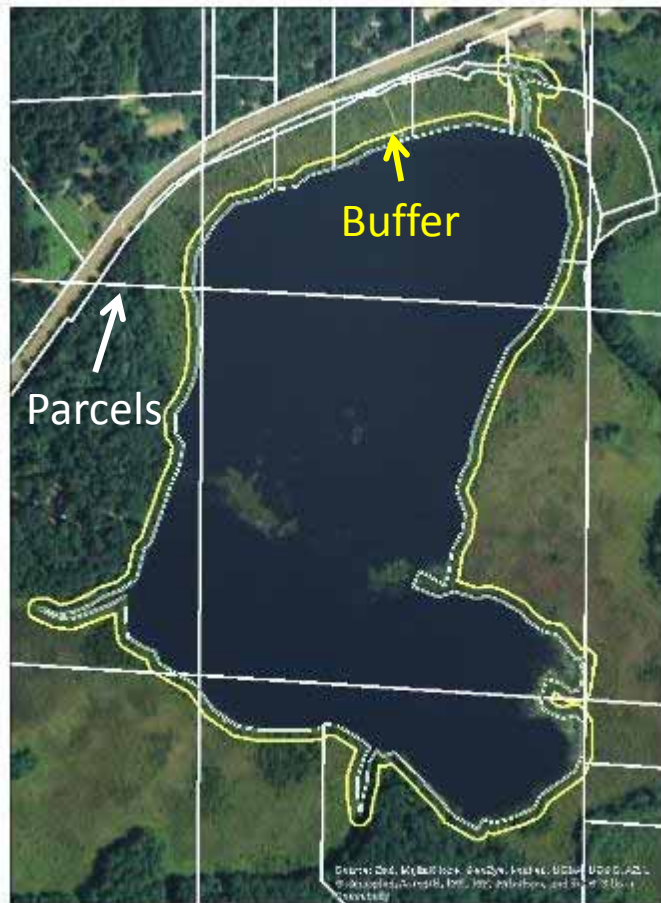
Plants

	Present
Canopy	<input type="checkbox"/>
Shrubs	<input type="checkbox"/>
Herbaceous	<input type="checkbox"/>

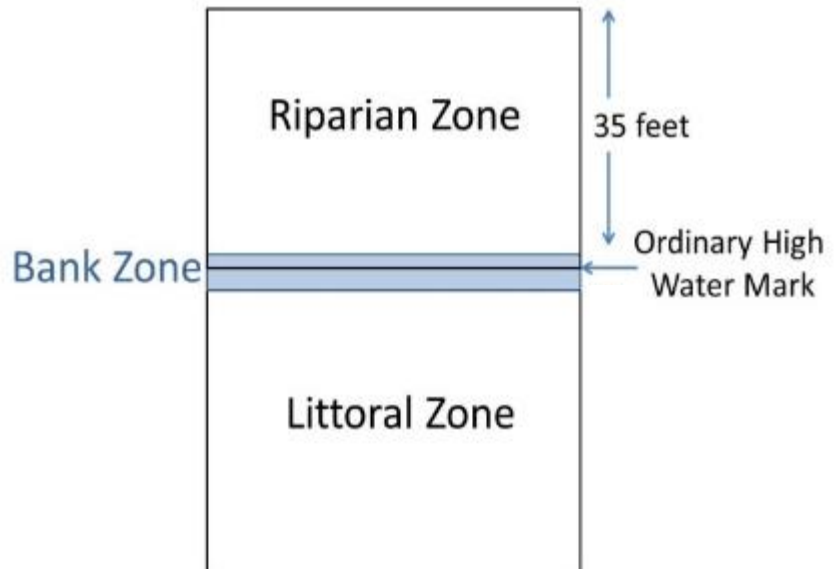
Disturbed

Plants (mowed or removed)	<input type="checkbox"/>
Sediment (tilled or dug)	<input type="checkbox"/>

Pre-Fieldwork Mapping



- Parcel ID number
- Shoreline Length
- 35 foot buffer

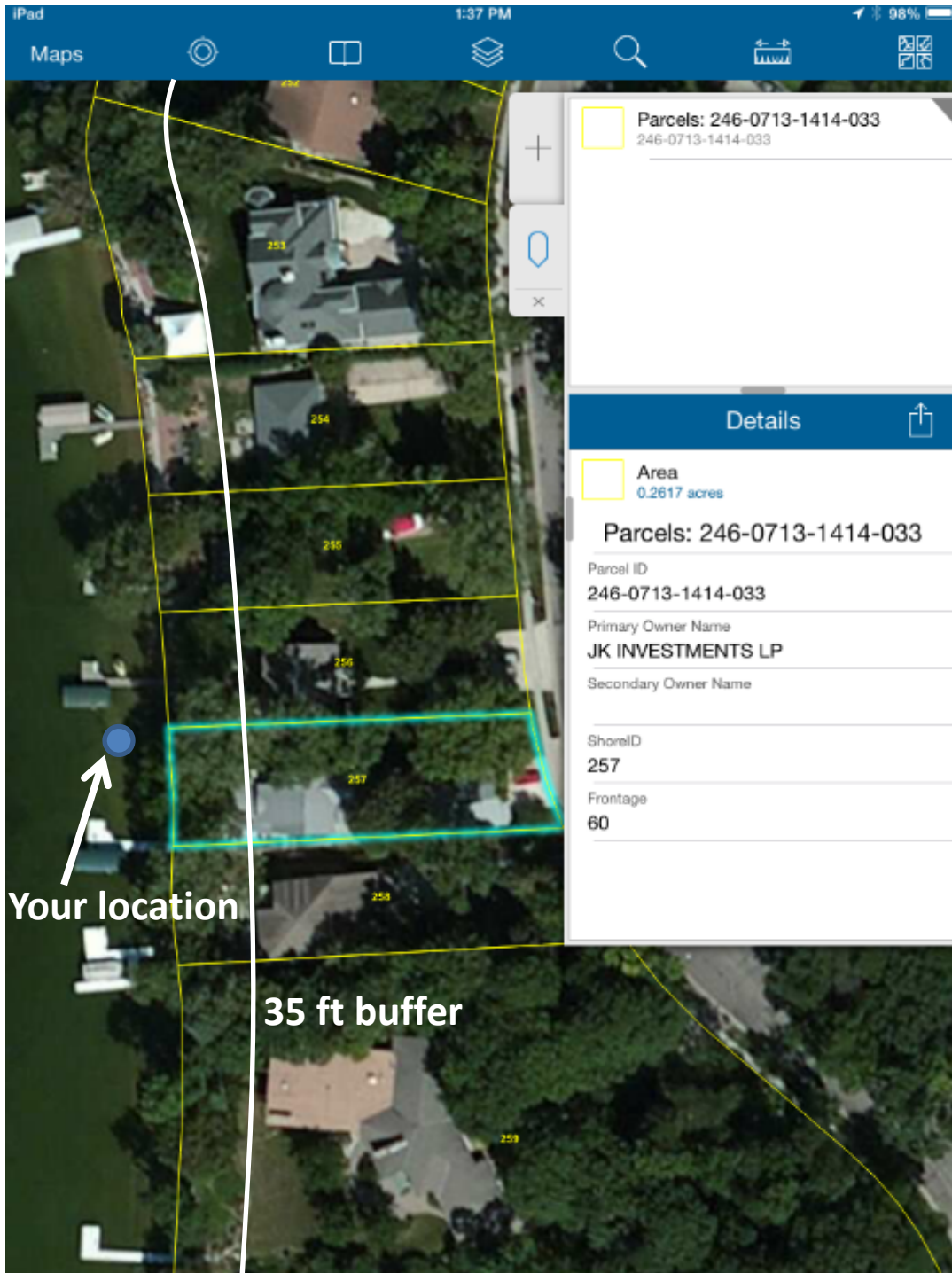


Loop 1: Photos of Entire Shoreline

- X,Y coordinates for each photo
- Overlapping images
- Publicly available data
- Check with your lake association before doing



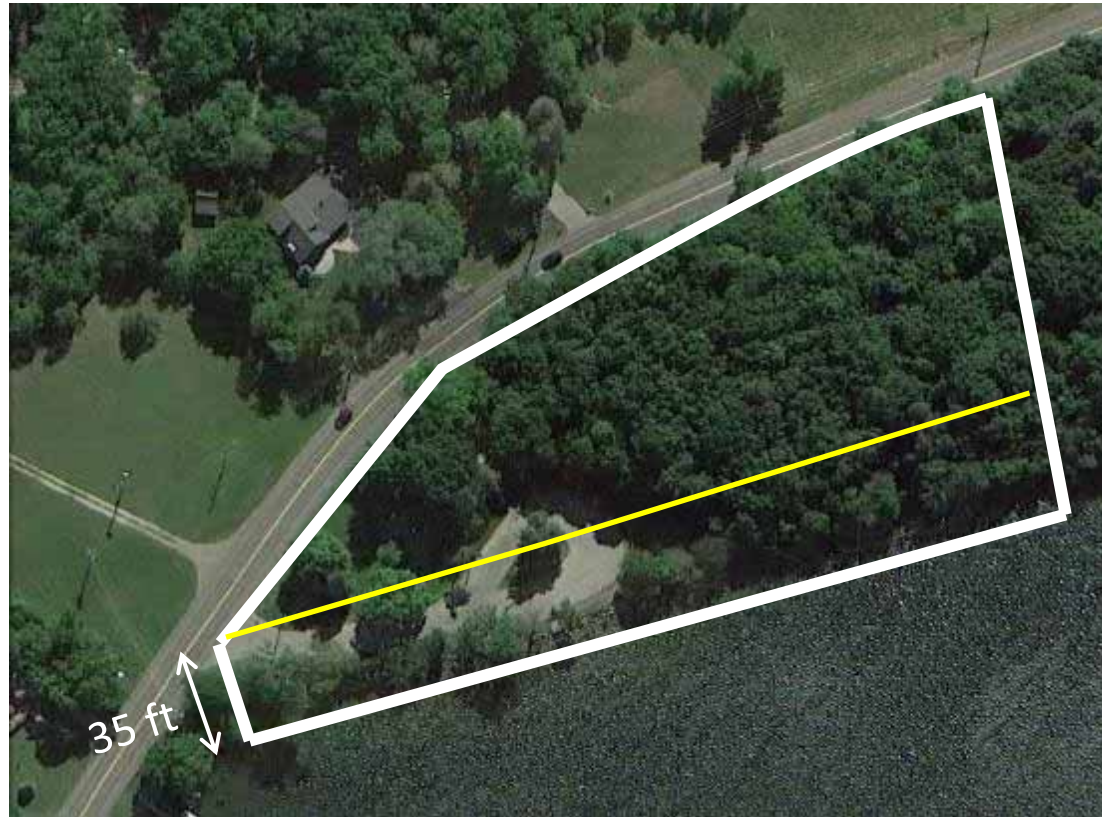
Photos: Jodi Lepsch



Tablet Computer in Field

- ArcGIS Collector
 - Google Maps
 - Need 3G/4G signal
- OR
- ArcPad

Loop 2: Riparian Assessment of Parcel



1. Find parcel boundaries
2. Determine 35 ft buffer

Loop 2: Riparian Assessment of Parcel

Estimate Percent Cover

- Canopy 0-100
 - Note if shrub, herbaceous or both are present
 - Shrub/Herbaceous
 - Impervious surface
 - Lawn
 - Agriculture
 - Other (mulch, sand)
- Sum = 100



Loop 2: Count Human Structures in Riparian

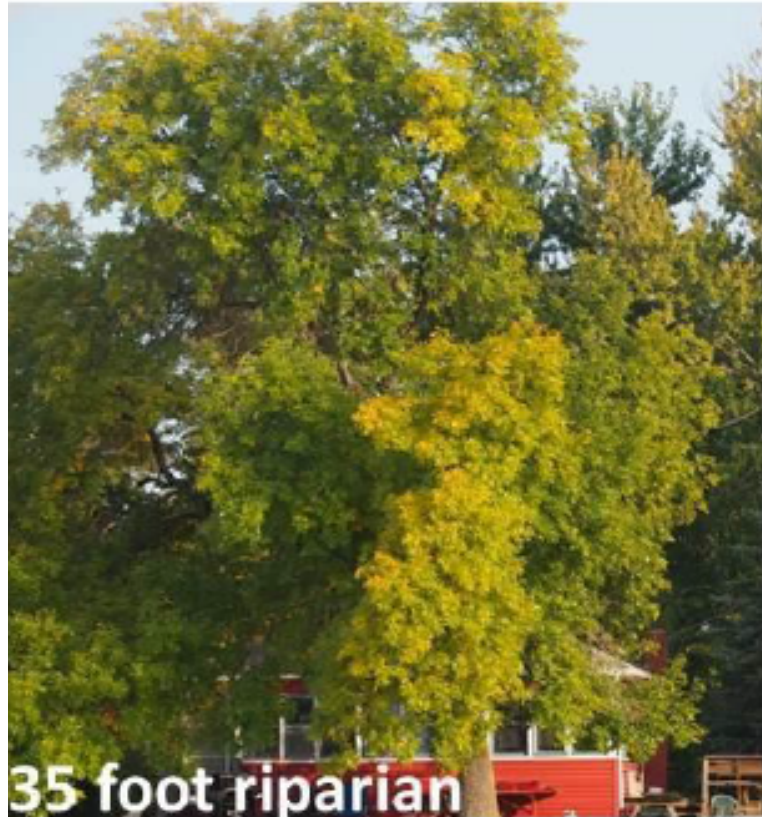
- Buildings
- Boats on shore
- Fire pits
- Other



Loop 2: Riparian Assessment of Parcel

Parcel A

Parcel B



Loop 2: Hydrologic Modifications

- Point source
- Channelized flow
- Straight path to lake
- Sloped lawn/soil
- Bare soil
- Slumping banks
- Sand/silt deposits
- Other



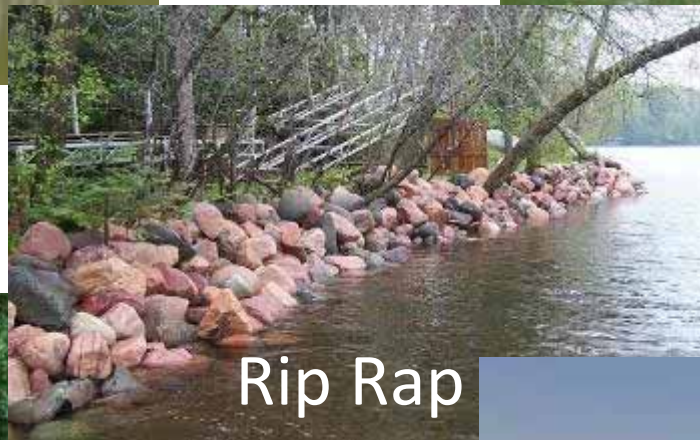
Loop 2: Length of Modified Banks



Sea Wall



Other Erosion Control Structures

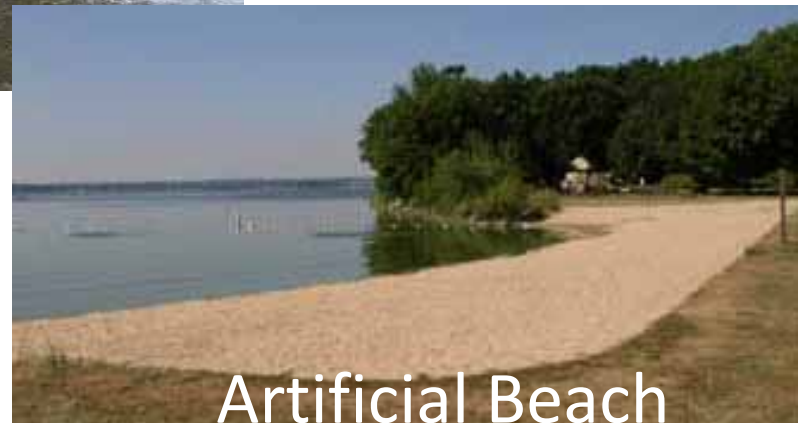


Rip Rap



Bank Erosion

>1 ft Face
<1 ft Face



Artificial Beach

Loop 2: Count Structures in Littoral Zone

- Piers
- Boat Lifts
- Boat Shelters
- Swim rafts/trampolines
- Boathouses
- Marinas
- Other



Loop 2: Aquatic Plants in Littoral Zone of Each Parcel

Aquatic Plants	Present
Emergents	<input checked="" type="checkbox"/>
Floating	<input checked="" type="checkbox"/>
Plant Removal	<input type="checkbox"/>



Loop 3: Map Coarse Woody Habitat



- > 4 inch diameter
- > 5 feet long
- XY coordinates per log
- Branchiness
 - No branches
 - Few branches
 - Full crown
- Connected to Shore
- Out of Water

Low Water Level: Assess Exposed Lake Bed

If Applicable (low water level):

EXPOSED LAKE BED ZONE

Plants

Canopy

Shrubs

Herbaceous

Disturbed

Plants (mowed or removed)

Sediment (tilled or dug)

Present

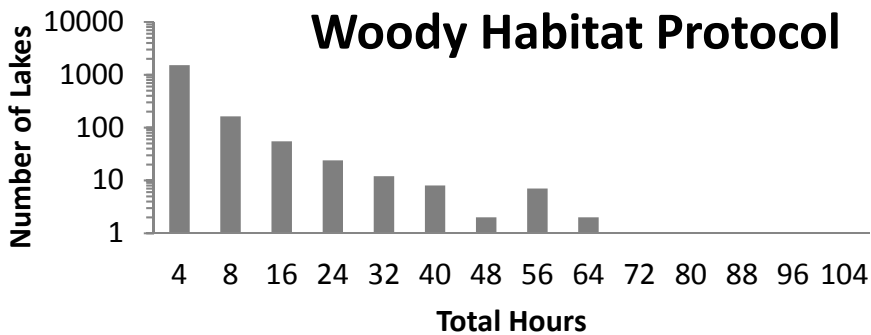
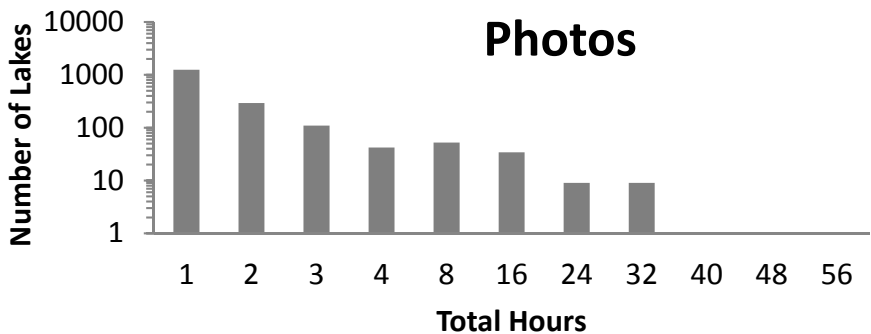
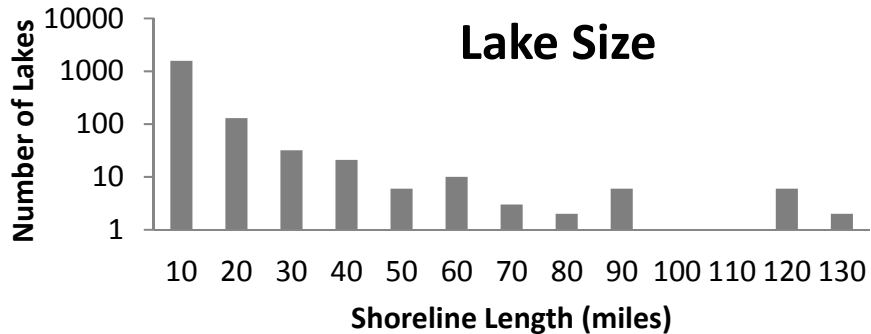


How long does the survey take?

Protocol	Min	Max
Photos (minutes/mile)	14	50
Parcel Assessment (minutes/parcel)	3.5	4
Coarse Woody Habitat (minutes/mile)	29	120

Lake	Area (acre)	Shoreline length (mi)	Parcels	Total Hours – Photos	Total Hours – Parcels	Total Hours – Wood	Total Hours
Green	7433	23.6	~1000	5.5	58.3	11.4	75
Rock	1364	11.2	341	2.6	17.5	5.4	26
Buffalo	105	2.1	26	0.5	1.5	1.0	3

Time Estimates Given Lake Size



Most lakes are small and could be completed in a “reasonable” amount of time

A scenic view of a lake with autumn foliage reflected in the water. The trees on the left are in various shades of orange, red, and yellow, while the water is a calm, light blue. The sky is a clear, pale blue.

How will data be used?

- Lake management plans
- County comprehensive plans
- Identify areas for protection/restoration
- Evaluate habitat trends over time
- Link habitat data to in-lake data (invasive species, fish, wildlife...)
- County shoreline zoning screening
- Social marketing

Lake-wide Statistics

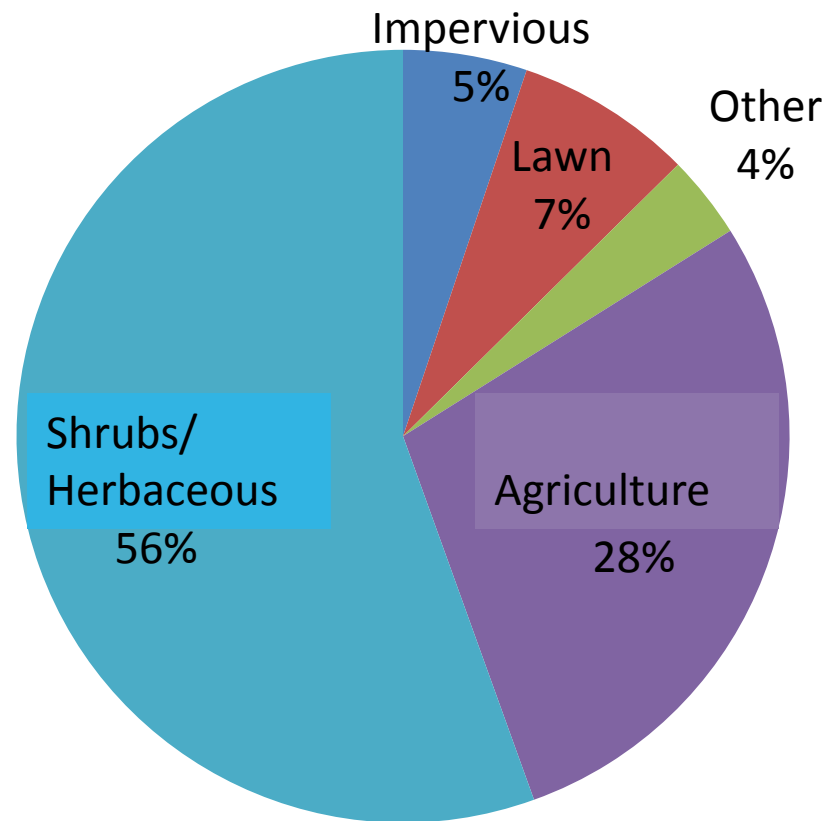


10 parcels

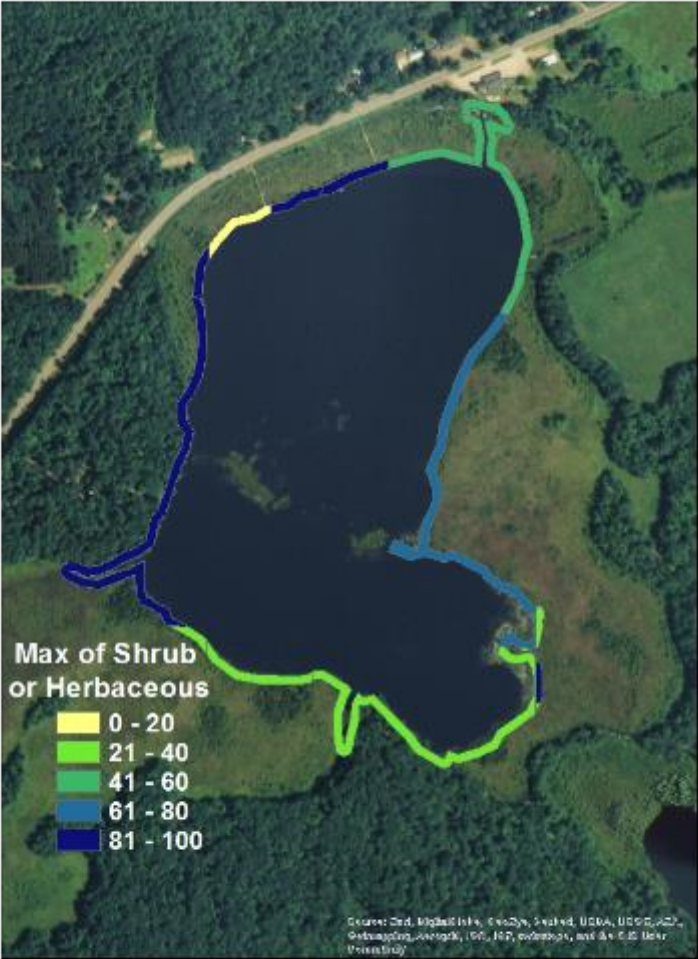
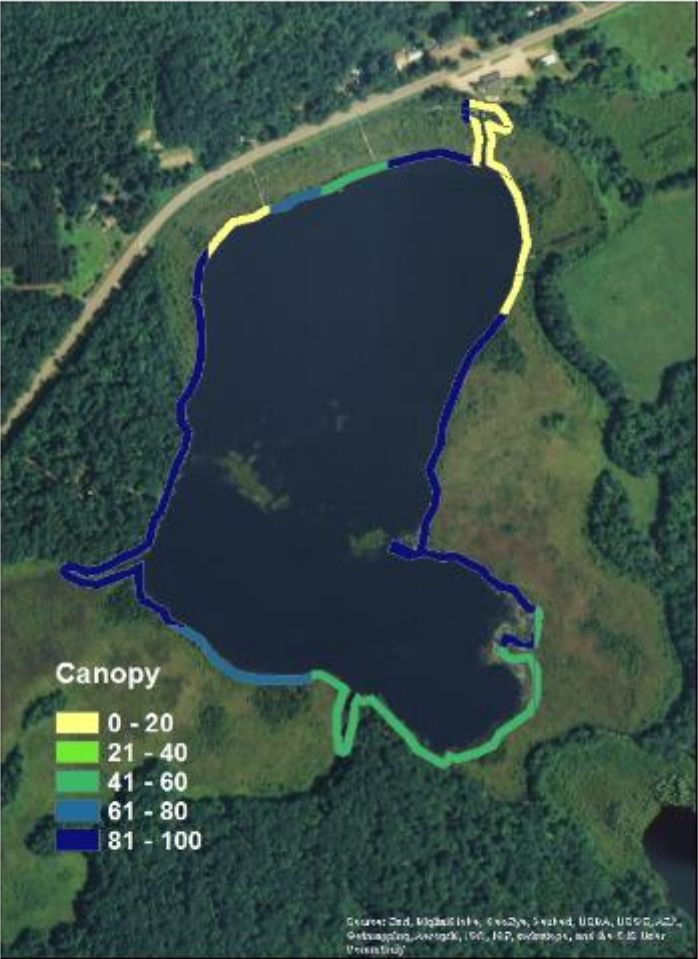
Shoreline Length = 1910 ft

Riparian Area = 1.5 acres

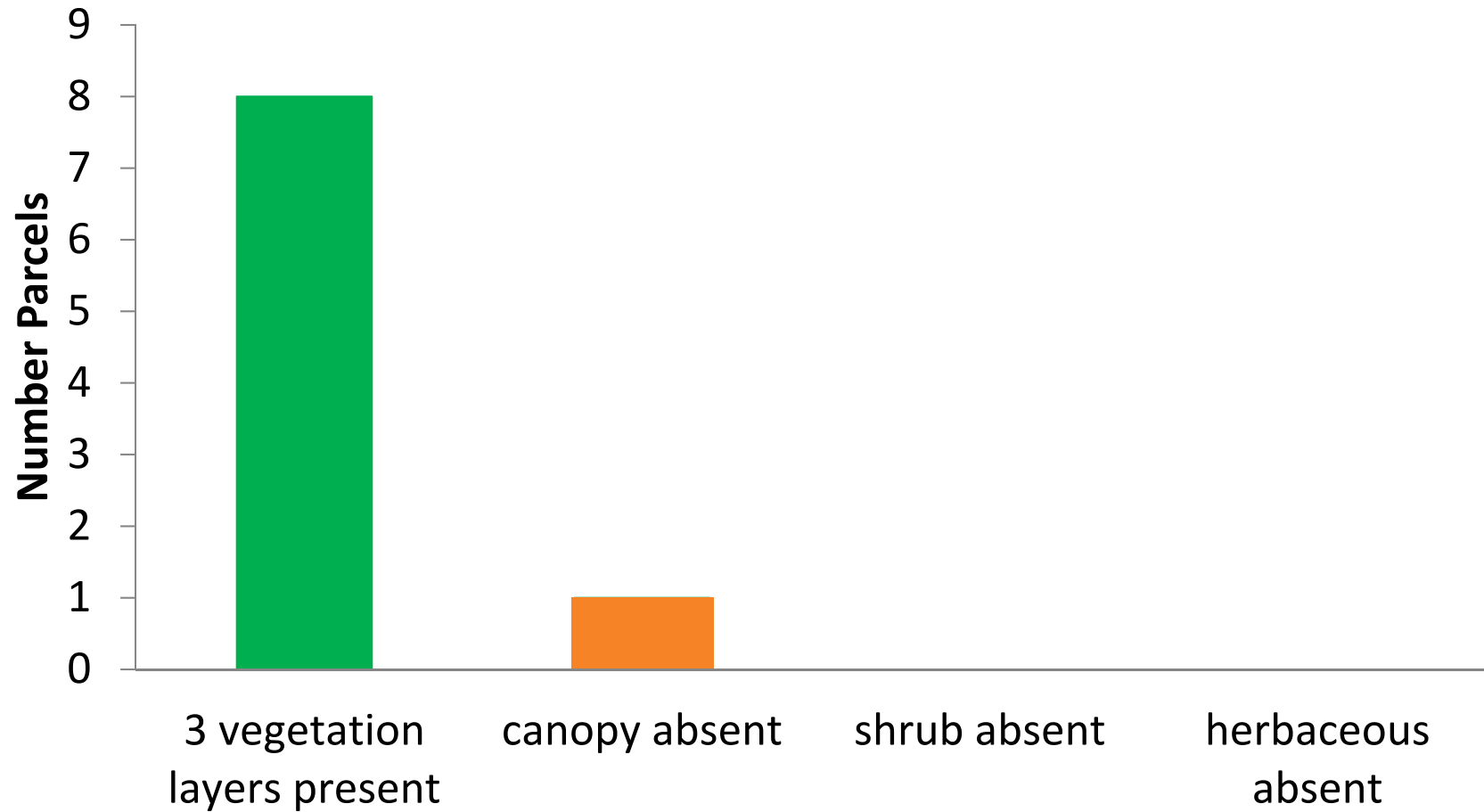
Percent Land Cover in Riparian Zone



Percent Cover: Natural Vegetation

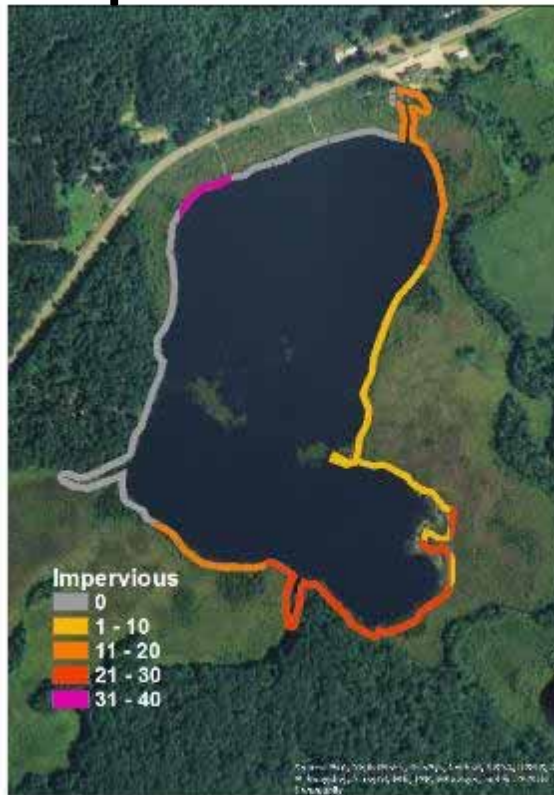


Natural Vegetation in Parcels



Percent cover: impervious surface, lawn, and total disturbed land covers

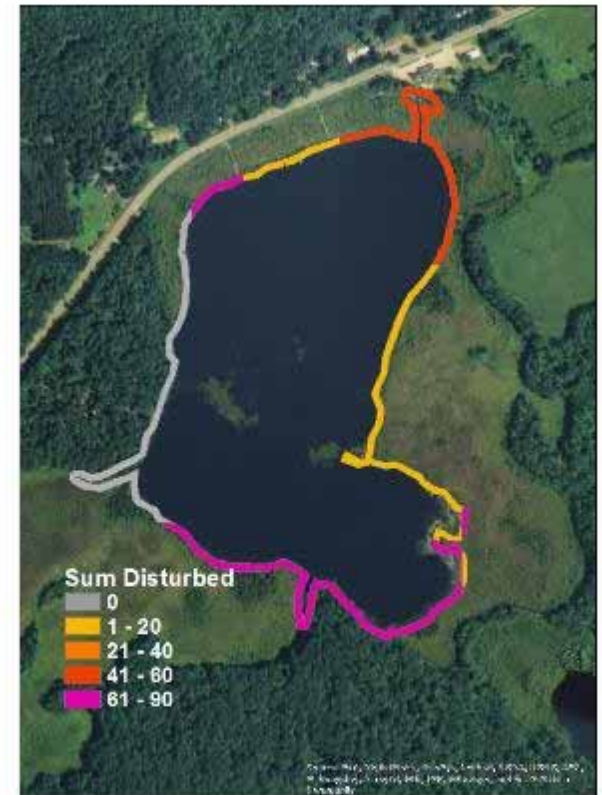
Impervious surface



Lawn



Sum Disturbed



Total Surface Area:

Impervious surface = 0.08 acres

Lawn = 0.11 acres

Impervious + Lawn +
Crops + Pasture + Other

Total Length of Modified Banks



20% of shoreline is modified



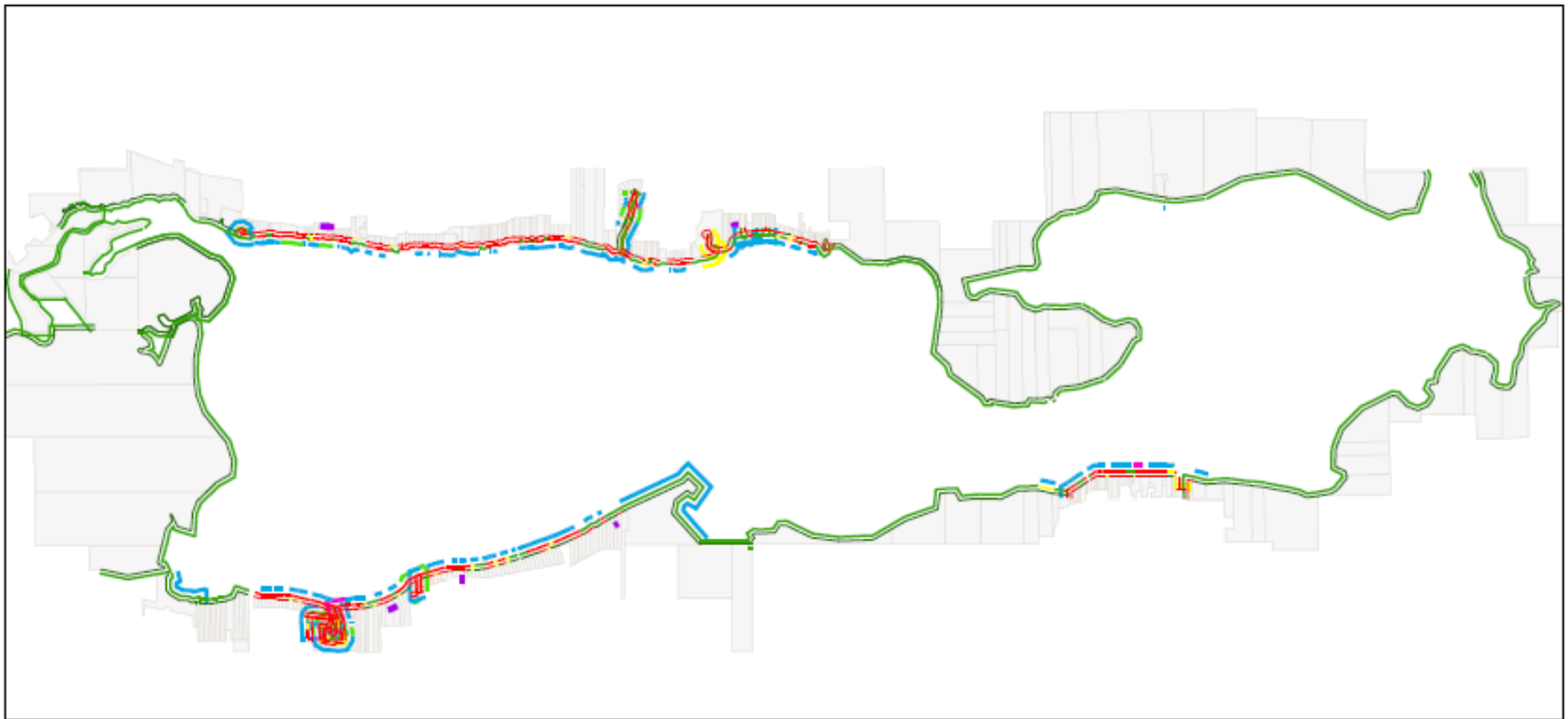
Density of Human Structures

Riparian Structures	Number per Mile	Littoral Structures	Number per Mile
Residences	3	Piers	40
Out Buildings	7	Boat Lifts	25
Commercial	0	Swim Rafts	3
Stairways	31	Boathouses	1
Fire Pits	3	Mooring buoys	0
		Dredge channels	0
		Marinas	0
		Bridges	0
		Public Beaches	0.5

Total Signs of Erosion

Erosion concern	Number within riparian	Number in parcel but out of riparian
Point Source	0	1
Channelized flow	1	0
Straight path to lake	3	NA
Sloped lawn/soil	2	3
Bare soil	1	0
Slumping banks	1	NA
Sand/silt deposits	0	1
Total	8	5

Lake Puckaway Shoreline Survey



Legend

Natural Riparian

- 0%-10% Natural
- <50% Natural
- >51% Natural

Docks

- None
- 1
- 2
- 3
- More than 3

Bank Zone Modifications

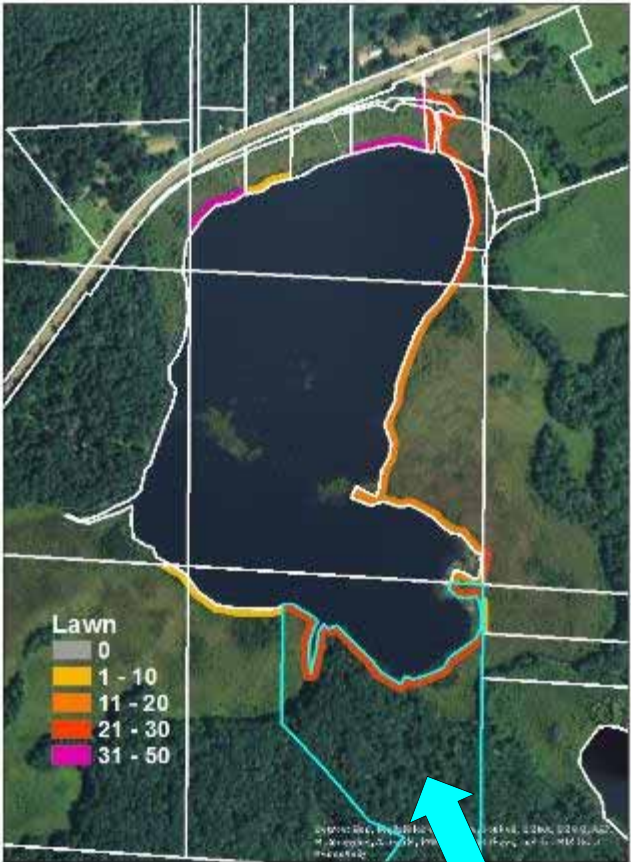
- Less than 10%
- Less than 50%
- Up to 100%

- Puckaway Parcels
- Point Source In Riparian Zone

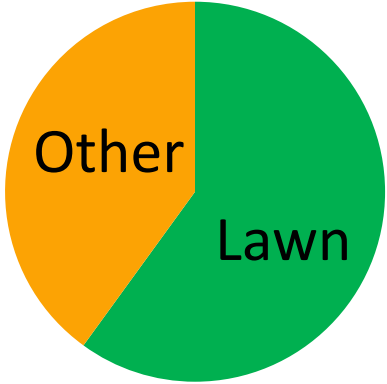
0 1,300 2,600 5,200
Feet



Interactive Web Display

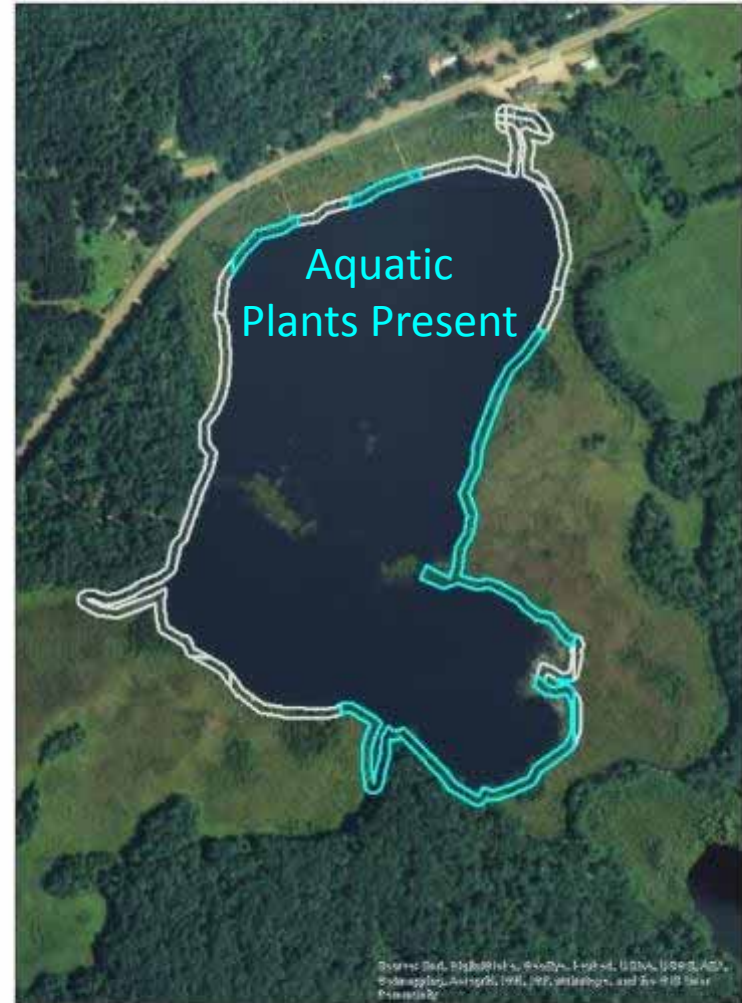
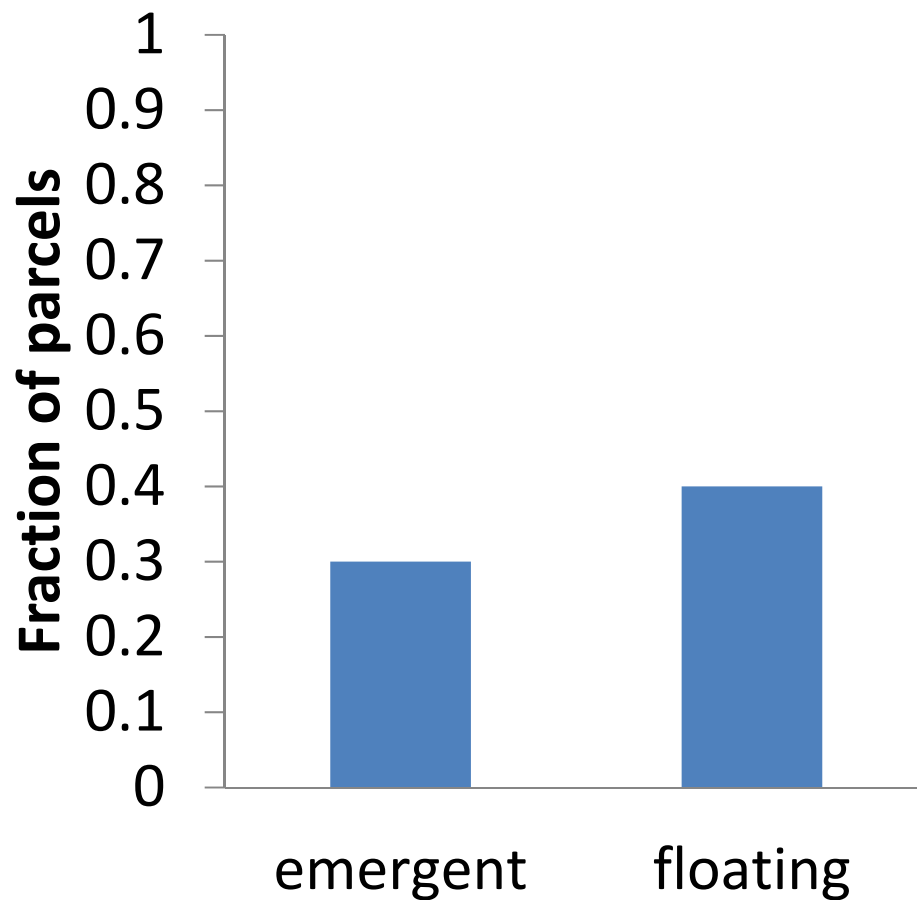


Riparian Percent Cover



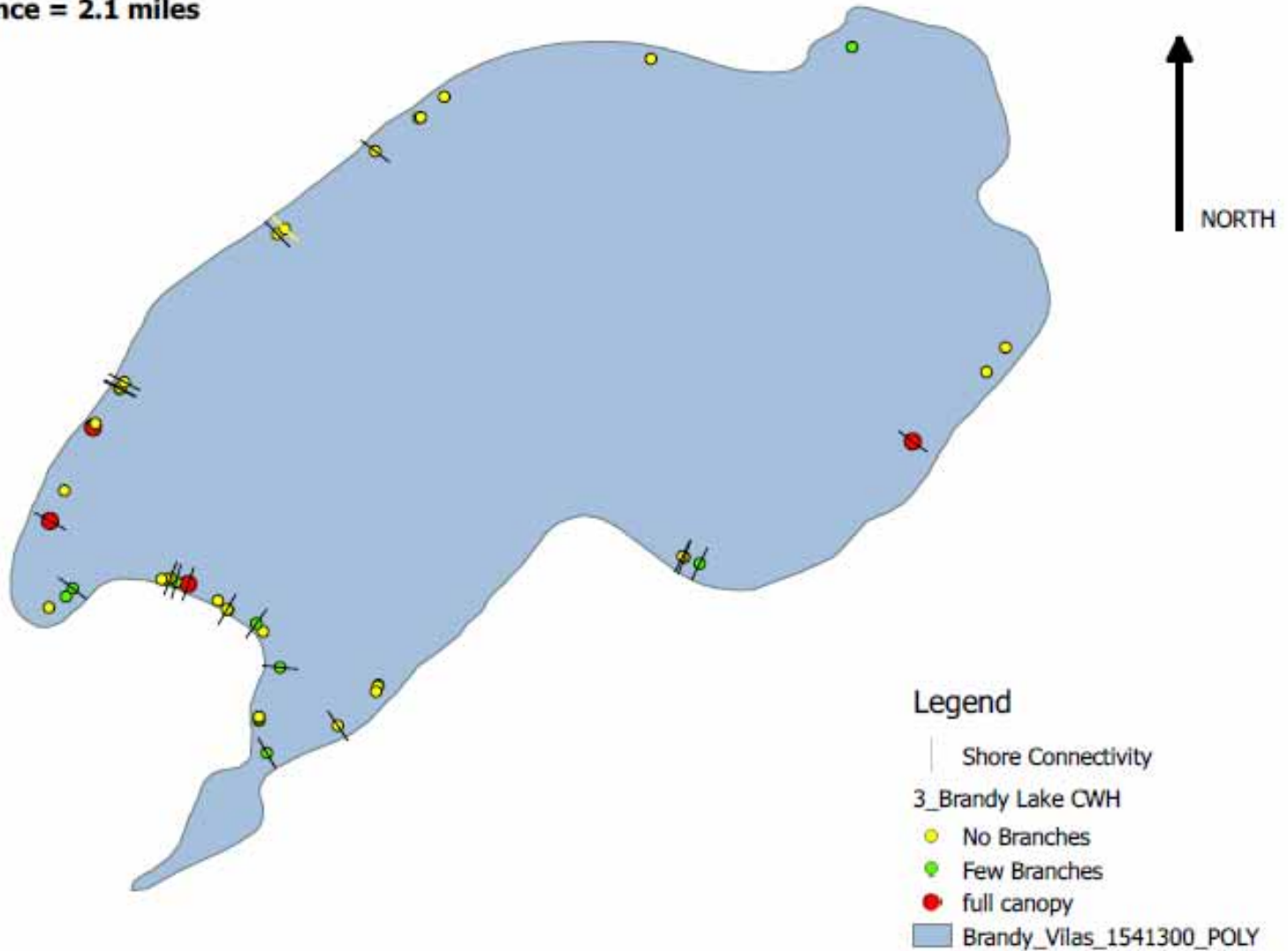
Natural Characteristics	Present in Parcel
Canopy Cover	0%
3 Layers of Vegetation	none
Emergent/Floating plants	none
Woody habitat	none
Human Modifications	Present in Parcel
Human Structures	1 pier
Hydrologic Modifications	Sloped lawn
Bank Zone	122 feet artificial beach

Emergent and Floating Aquatic Plants

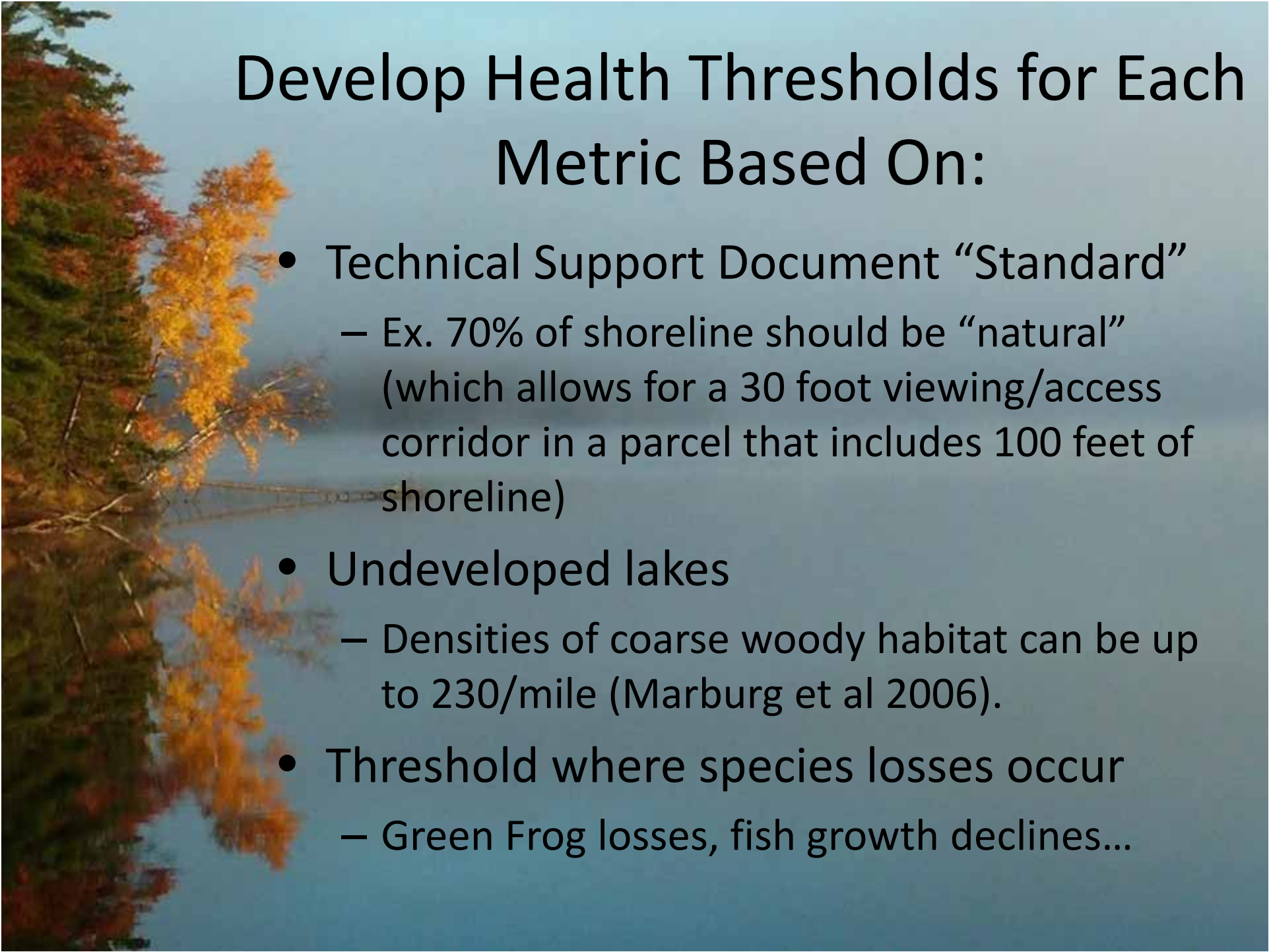


Littoral Woody Habitat

Brandy Lake (Vilas)
Woody Habitat_2016
N = 47
Shoreline Distance = 2.1 miles



Map by Ty Krajewski



Develop Health Thresholds for Each Metric Based On:

- Technical Support Document “Standard”
 - Ex. 70% of shoreline should be “natural” (which allows for a 30 foot viewing/access corridor in a parcel that includes 100 feet of shoreline)
- Undeveloped lakes
 - Densities of coarse woody habitat can be up to 230/mile (Marburg et al 2006).
- Threshold where species losses occur
 - Green Frog losses, fish growth declines...

Lake Research Session

Shoreline Habitat Presentations

Tomorrow

- *1:45-2:25 - Best Management Practices for Shoreland Restoration in the Northern Highlands Ecological Landscape – Mike Meyer*
- *2:35-2:55 - Monitoring Lakeshore Habitat: Why to do it and How to use it! – Katie Hein and Derek Kavanaugh*
- *2:55-3:15 - Social Barriers to Shoreline Restoration – Dr. Bret Shaw*

Questions

