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

<table>
<thead>
<tr>
<th>Date</th>
<th>Lake name</th>
<th>WBIC</th>
<th>Parcel ID</th>
<th>Observers</th>
</tr>
</thead>
</table>

**RIPARIAN ZONE**

- **Percent Cover in Riparian**
  - Canopy: [ ]
  - Shrub: [ ]  Herbaceous: [ ]
  - Shrub/Herbaceous: 
  - Impervious surface: 
  - Manicured lawn: 
  - Agriculture: 
  - Other (e.g. duff, soil, mulch): 
  - Percent: (0-100)
  - Sum: 100

- **Human Structures in Riparian**
  - Buildings: 
  - Boats on shore: 
  - Fire pits: 
  - Other: 
  - Number: 

- **Runoff Concerns**
  - Present in Riparian: 
  - Present out of Riparian: 

**BANK ZONE**

- **Length (ft)**
  - Vertical sea wall: 
  - Rip rap: 
  - Other erosion control structures: 
  - Artificial beach: 
  - Bank erosion > 1 ft face: 
  - Bank erosion < 1 ft face: 

**LITTORAL ZONE**

- **Human Structures**
  - Piers: 
  - Boat lifts: 
  - Boat shelters: 
  - Swim rafts/water trampolines: 
  - Boathouses (over water): 
  - Marinas: 
  - Other: 
  - Description: 
- **Number**

- **Aquatic Plants**
  - Present: 
  - Emergents: 
  - Floating: 
  - Plant Removal: 

If Applicable (low water level):

- **EXPOSED LAKE BED ZONE**
  - **Plants**
    - Present: 
    - Canopy: 
    - Shrubs: 
    - Herbaceous: 
    - Disturbed: 
      - Plants (moved or removed): 
      - Sediment (till or dug): 

**Notes:**
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

35 foot riparian
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

Bank Erosion

Rip Rap

>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

Emergents
Floating
Plant Removal

Present

☑

☑
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

<table>
<thead>
<tr>
<th>Plants</th>
<th>Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canopy</td>
<td>☐</td>
</tr>
<tr>
<td>Shrubs</td>
<td>☐</td>
</tr>
<tr>
<td>Herbaceous</td>
<td>☐</td>
</tr>
<tr>
<td>Disturbed</td>
<td>☐</td>
</tr>
<tr>
<td>Plants (mowed or removed)</td>
<td>☐</td>
</tr>
<tr>
<td>Sediment (tilled or dug)</td>
<td>☐</td>
</tr>
</tbody>
</table>

HWL
How long does the survey take?

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photos (minutes/mile)</td>
<td>14</td>
<td>50</td>
</tr>
<tr>
<td>Parcel Assessment (minutes/parcel)</td>
<td>3.5</td>
<td>4</td>
</tr>
<tr>
<td>Coarse Woody Habitat (minutes/mile)</td>
<td>29</td>
<td>120</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lake</th>
<th>Area (acre)</th>
<th>Shoreline length (mi)</th>
<th>Parcels</th>
<th>Total Hours – Photos</th>
<th>Total Hours – Parcels</th>
<th>Total Hours – Wood</th>
<th>Total Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>7433</td>
<td>23.6</td>
<td>~1000</td>
<td>5.5</td>
<td>58.3</td>
<td>11.4</td>
<td>75</td>
</tr>
<tr>
<td>Rock</td>
<td>1364</td>
<td>11.2</td>
<td>341</td>
<td>2.6</td>
<td>17.5</td>
<td>5.4</td>
<td>26</td>
</tr>
<tr>
<td>Buffalo</td>
<td>105</td>
<td>2.1</td>
<td>26</td>
<td>0.5</td>
<td>1.5</td>
<td>1.0</td>
<td>3</td>
</tr>
</tbody>
</table>
Most lakes are small and could be completed in a “reasonable” amount of time.
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

- 56% Shrubs/Herbaceous
- 28% Agriculture
- 7% Lawn
- 5% Impervious
- 4% Other

Total: 100%
Percent Cover: Natural Vegetation
Natural Vegetation in Parcels

- 3 vegetation layers present: 8
- canopy absent: 1
- shrub absent: 0
- herbaceous absent: 0
Percent cover: impervious surface, lawn, and total disturbed land covers

**Total Surface Area:**
- Impervious surface = 0.08 acres
- Lawn = 0.11 acres
- Impervious + Lawn + Crops + Pasture + Other
Total Length of Modified Banks

Sea Wall = 400 feet

Rip Rap = 150 feet

Artificial Beach = 100 feet

20% of shoreline is modified
# Density of Human Structures

<table>
<thead>
<tr>
<th>Riparian Structures</th>
<th>Number per Mile</th>
<th>Littoral Structures</th>
<th>Number per Mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residences</td>
<td>3</td>
<td>Piers</td>
<td>40</td>
</tr>
<tr>
<td>Out Buildings</td>
<td>7</td>
<td>Boat Lifts</td>
<td>25</td>
</tr>
<tr>
<td>Commercial</td>
<td>0</td>
<td>Swim Rafts</td>
<td>3</td>
</tr>
<tr>
<td>Stairways</td>
<td>31</td>
<td>Boathouses</td>
<td>1</td>
</tr>
<tr>
<td>Fire Pits</td>
<td>3</td>
<td>Mooring buoys</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dredge channels</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marinas</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bridges</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Public Beaches</td>
<td>0.5</td>
</tr>
</tbody>
</table>
## Total Signs of Erosion

<table>
<thead>
<tr>
<th>Erosion concern</th>
<th>Number within riparian</th>
<th>Number in parcel but out of riparian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point Source</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Channelized flow</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>Straight path to lake</strong></td>
<td><strong>3</strong></td>
<td><strong>NA</strong></td>
</tr>
<tr>
<td>Sloped lawn/soil</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Bare soil</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Slumping banks</td>
<td>1</td>
<td>NA</td>
</tr>
<tr>
<td>Sand/silt deposits</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8</strong></td>
<td><strong>5</strong></td>
</tr>
</tbody>
</table>
Interactive Web Display

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

![Bar chart showing the fraction of parcels]

- Emergent: 0.2
- Floating: 0.4

Aquatic Plants Present
Littoral Woody Habitat

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

Legend
- Shore Connectivity
  - 3_Brandy Lake CWH
    - No Branches
    - Few Branches
    - full canopy
  - Brandy_Vilas_1541300_POLY

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