Assessment and Prioritization of the Riparian Buffer Zone of Lac Courte Oreilles Using Geographic Information Systems

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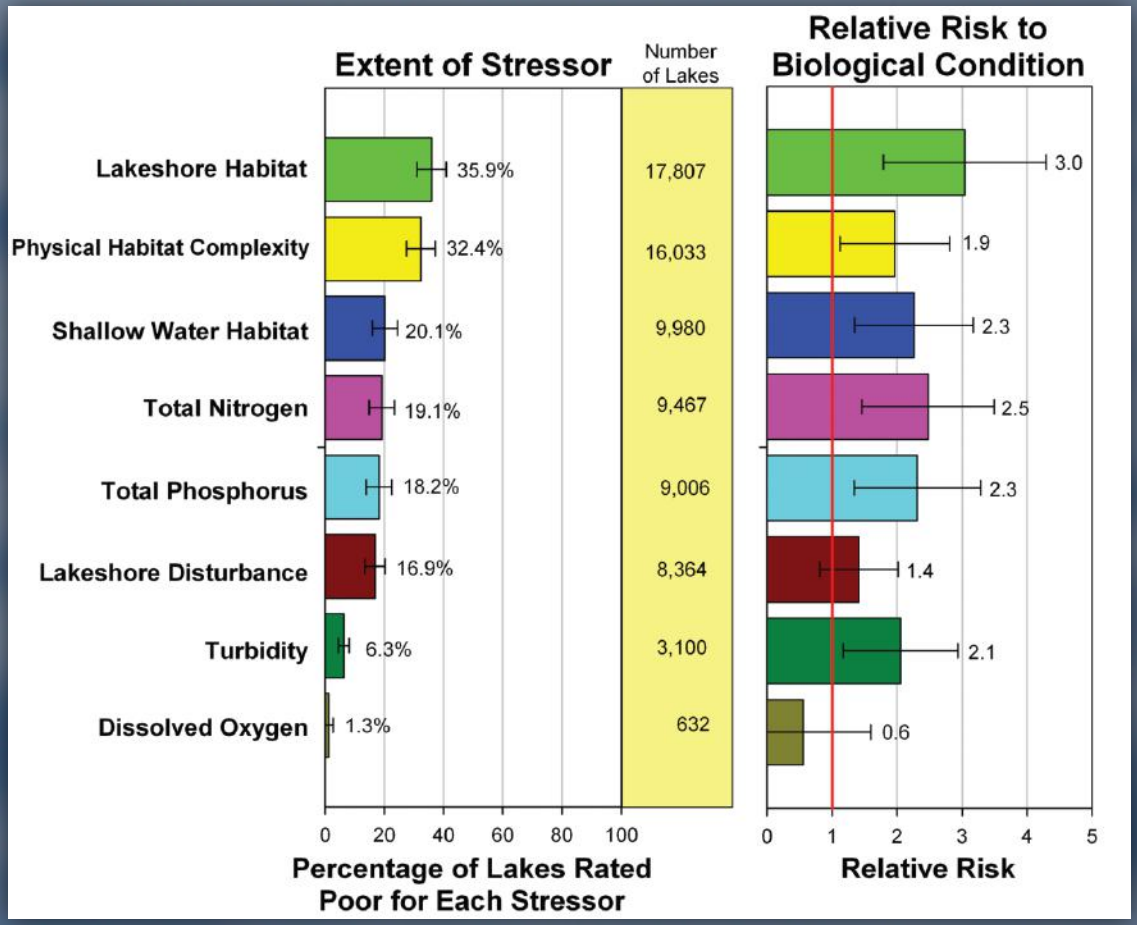
Special thanks to the Courte Oreilles Lakes Association (COLA)

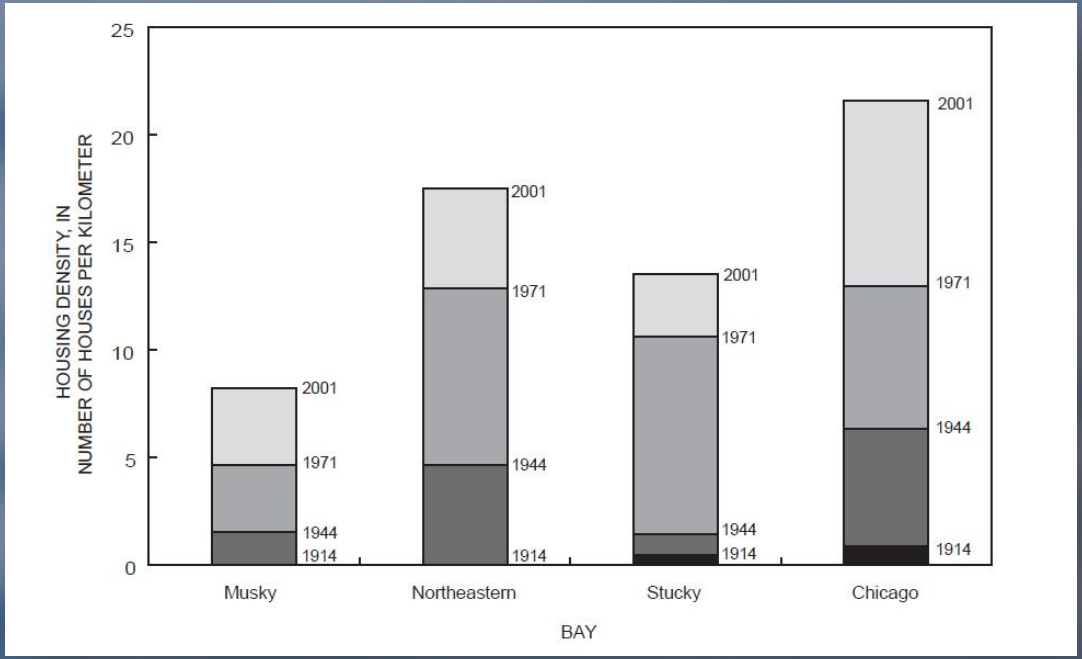
National Lakes Assessment EPA 2007

- "Of the stressors included in the NLA, **poor lakeshore habitat is the biggest problem** in the nation's lakes; over one-third exhibit poor shoreline habitat condition. **Poor biological health is three times more** likely in lakes with poor lakeshore habitat ."



NLA Executive Summary and Key Findings

- "Poor lakeshore habitat condition imparts a **significant stress** on lakes and suggests the need for stronger management of shoreline development, especially as **development pressures** on lakes keep steadily growing."



Housing density in houses per kilometer on various bays of Lac Courte Oreilles **in 1914, 1944, 1971, 2001** (Fitzpatrick 2003).

Research Questions

- Where should riparian buffer management efforts be focused around Big and Little Lac Courte Oreilles?
- What is the local community's opinion on such management?

Photo by Jerome Gundersen

Annual COLA meeting 2009 cola-wi.org

Big Lac Courte Oreilles (LCO)

- Watershed ~70% forested (WDNR 1998)
- 25 miles shoreline
- 2,039 ha
- $Z\downarrow max$ = 28 m
- 840 properties; 15% of developed plots are occupied year-round (Wilson 2010)
- Mesotrophic, can be seasonally oligotrophic as a whole
  - Musky Bay = eutrophic (Fitzpatrick 2003)

http://county-radon.info/countyMaps/WI_Sawyer.png

Courte Oreilles Lakes Association

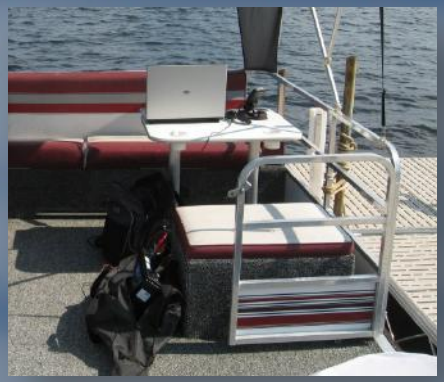
- Founded in 1995 with the purposes:
  - "To protect, preserve, and enhance the quality of the Courte Oreilles Lakes, their shorelands, and surrounding areas while respecting the interests of property owners and the rights of the general public."
- Publish **Loon Call**, a semiannual periodical
- Host annual **community meetings and picnics**
- Organize **Clean Boat Program**

COLA

- Undertaking a privately funded Total Maximum Daily Load (**TMDL**) study.
  - Currently in excess of $170,000 dollars.
- Have funded an extensive and detailed **Lake Management Plan**, currently being implemented
- Have funded an **Aquatic Plant Management Plan**
  - received one of the largest DNR lake management grants given by the WDNR for its implementation
- The Lac Courte Oreilles **Foundation**, Inc., a **501 c(3)** non-profit foundation was created in 2009 to raise funds for the lake activities of COLA.
- To date, raised over $400,000.
- cola-wi.org

Field Methods

- Open parcel map with GPS tracking; record following parameters from boat:
  - Photograph/erosion photograph
  - Slope (flat, moderate, steep)
  - Shoreline component (sand, vegetation, lawn, etc.)
  - Distance inland of vegetation (0-30 feet)



- Mail surveys to randomly selected addresses on shoreline

Analytical Methods

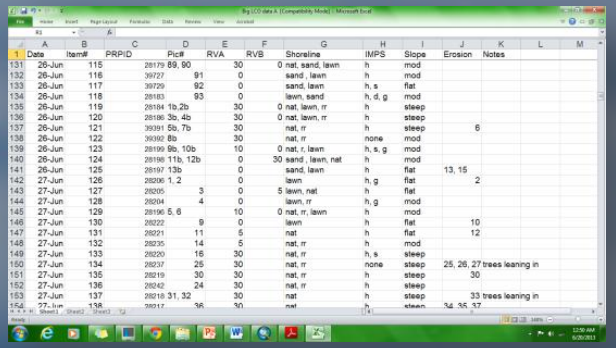
- Assign priority values based on sum of points awarded for poor habitat qualities; map results
  - Riparian Vegetation:
  - Erosion:

Present	1
None	0

  - Slope:

Steep	2
Moderate	1
Flat	0

0	6
5	5
10	4
15	3
20	2
25	1
30	0



Prioritization Results

- Red: highest priority ⟶ Green: lowest priority

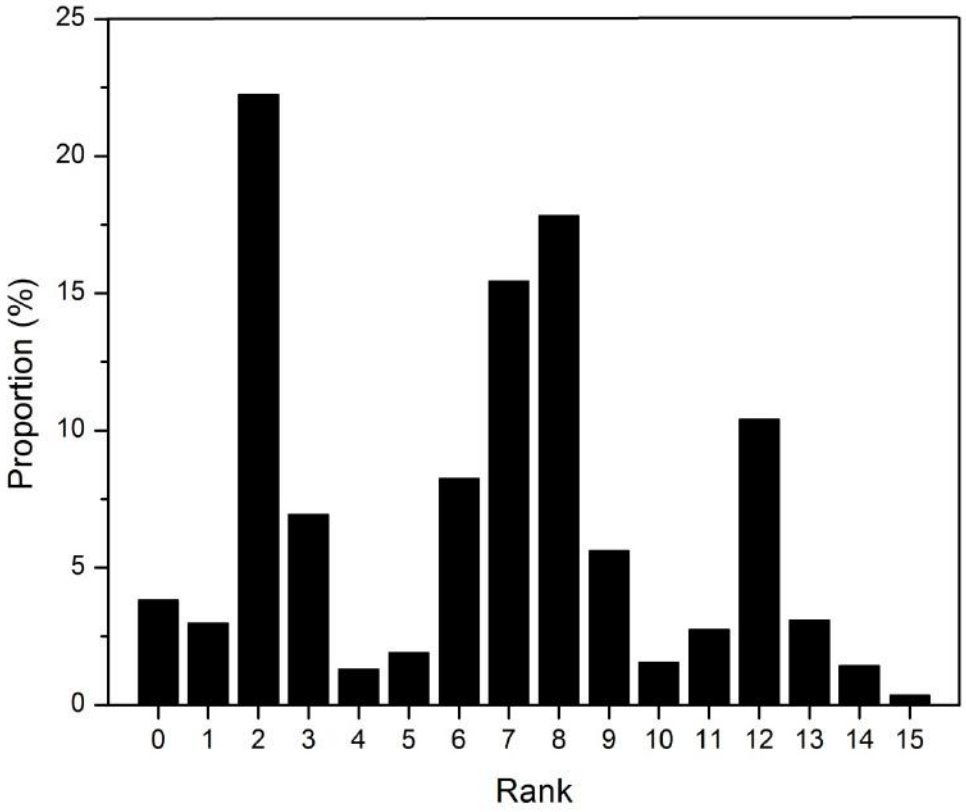
Priority: 14

Riparian Vegetation: 12 Erosion: 1 Slope:1

Priority: 0

Riparian Vegetation: 0 Erosion: 0 Slope: 0

Prioritization Results



- Priorities 0-3 comprise 48% of shoreline
- 43% of plots had $\geq$ 30ft continuous vegetation

- 20% visible erosion
- 22% zero vegetation

Survey Results

% of Respondents	are…
52	concerned with **erosion** on their property
70	taking measures to control erosion on their property
32	using rip rap
11	using a seawall/retaining wall
56	using vegetation
41	concerned about **runoff** from their property
70	taking measures to mitigate their runoff
54	using vegetation to mitigate the runoff
94	aware that shoreline vegetation is important to water quality
75	willing to plant on their shoreline in order to protect the water quality of LCO
83	willing to plant on their property if a free landscaping service were offered
27	willing to volunteer in a program that would organize riparian buffer management and implementation

Discussion

- Prioritization method fails to capture important parameters:
  - shoreline component (i.e. seawall, rip rap, etc.)
  - Length of vegetation
- Quick and inexpensive model for other lakes
- Use free mapping software when possible

Discussion

- Community has shown support of the project so far
  - COLA annual meeting 2012 and 2013
  - On surveys
- Some people just want to blame cranberry bogs
  - NPS v. PS from the general public's perspective

Future Work

- Map on COLA website for public use
- Pilot buffer management projects
  - Track progress of case studies on COLA website
  - Shoreline Habitat Protection campaign
    - Signs in yards
    - Outreach and educational efforts
    - Donations/volunteers accepted for projects

Further prioritization

- Slope
  - Assess slope estimate accuracy with DEM
  - Does slope affect management technique?
- Habitat Analysis
  - Transects of various riparian buffer types for habitat analyses
  - Birds; turtles; macroinvertebrateas (indicator species); fish eggs; planktivores

Why LCO is so ideal for continuing shoreline research:

- Multiple research projects already completed:
  - Paleolimnological assessment (Garrison 2004)
  - Historical Musky Bay assessment (Fitzpatrick 2003)
  - Economic survey and assessment (Wilson 2010)
- Ongoing research and projects:
  - Lac Courte Oreilles Band of Lake Superior Chippewa, Conservation Department (cited as NLA collaborators), water quality and FQI
  - Three years and counting of turtle research
  - COLA Lake Mgt. Plan, Fisheries Mgt. Plan, Aquatic Plant Mgt. Plan, TMDL, CLP monitoring
- Enthusiastic community!

References

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