Shoreline Habitat Requirements of the Native Milfoil Weevil, *Euhrychiopsis lecontei*, in Portage County, WI

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Eurasian Water Milfoil
(*Myriophyllum spicatum*)

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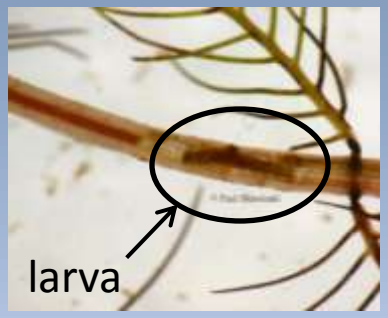
- Control methods
  - Chemical control
  - Mechanical harvesting
- Temporary relief
- Drawbacks and concerns

Eurasian Water Milfoil
(*Myriophyllum spicatum*)

- Biological control
  - Potential long-term, natural solution
  - Milfoil weevil (*Euhrychiopsis lecontei*)
    - Native to U.S.
    - Genus-specific feeder
    - Develops a feeding preference for *M. spicatum*

Milfoil Weevil
(*Eurychiopsis lecontei*)



- **Eggs** laid on apical meristems
- **Larvae** hatch, mines stem, damages plant the most
- **Pupae** develop within a pupal chamber inside stem
- **Adults** feed on leaves, lay eggs
  - **Fall** (Sep – Oct) → fly to shore
  - **Winter** → hibernate at the soil/duff interface
  - **Spring** (Apr – May)→ fly back to lake

Milfoil Weevil
(*Eurychiopsis lecontei*)

- Shoreland habitat critical link in lifecycle
- Adequate shoreland habitat is vital

OBJECTIVE

Evaluate shoreline characteristics that help discriminate site characteristics where weevils overwinter vs. site characteristics where they are absent.

Thomas Lake, Portage County, WI

- 13-ha glacial lake
- Natural shoreline buffers
  - 12 residences
  - low disturbance
- Natural weevil population (0.03-0.34 N/stem)

Springville Pond, Portage County, WI

- 7-ha impoundment of the Little Plover River
  - Study area = Eastern end
- Natural and disturbed shoreline buffers
- Natural weevil population (0.06-4.43 N/stem)

Shoreline surveys

1. Weevils
   a) Presence/absence
   b) Abundance
2. Riparian condition

Weevils

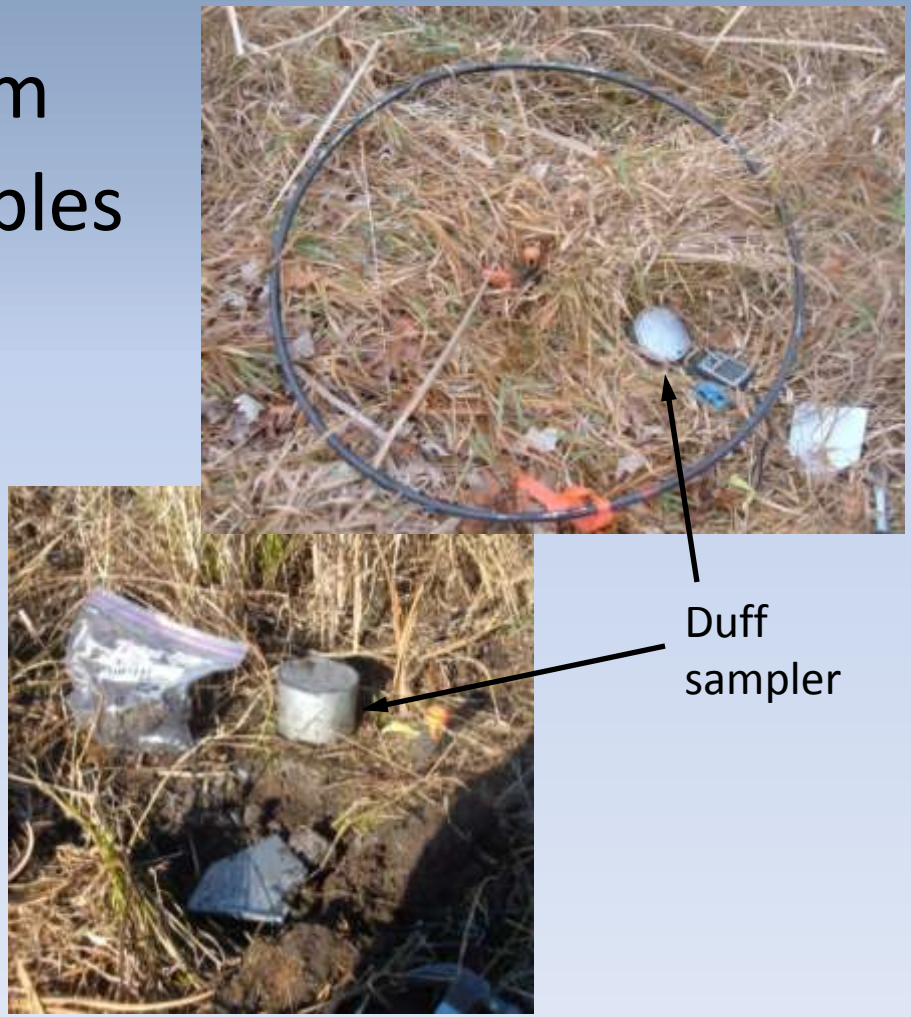
- Sample timing:
  - November = after migration
  - Thomas
    - Nov 2-7, 2009
  - Springville Pond
    - Nov 13-21, 2009

Weevils

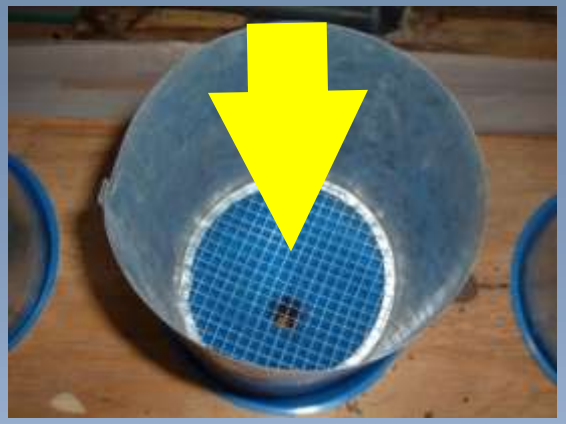
- Equidistant transects
  - 27 on Thomas Lake
  - 21 on Springville Pond
- All transects sampled at 4m and 6m from shore
- Three randomly chosen transects were also sampled at 10m from shore

Weevils

- Sample point = 1 m diam
- Collected soil/duff samples
  - Composite samples
  - Sample size = 0.05 m^2
  - Soil depth = 5 cm
  - 4 replicates/sample pt



Tullgren Funnels



Riparian Condition

- Distance from shore
- Height above water
- Habitat type
- Presence of milfoil fragments at shoreline
- Duff layer depth
- Duff composition

Riparian Condition

- Habitat type
  1. Tamarack/Black Spruce
  2. Wetland – Alder
  3. Wetland – non-forested
  4. Forested – conifer dom.
  5. Forested – deciduous
  6. Forested – mixed
  7. Grass/woody mix
  8. Grass/forbs
  9. Low disturbance
  10. Mod disturbance
  11. High disturbance

Riparian Condition

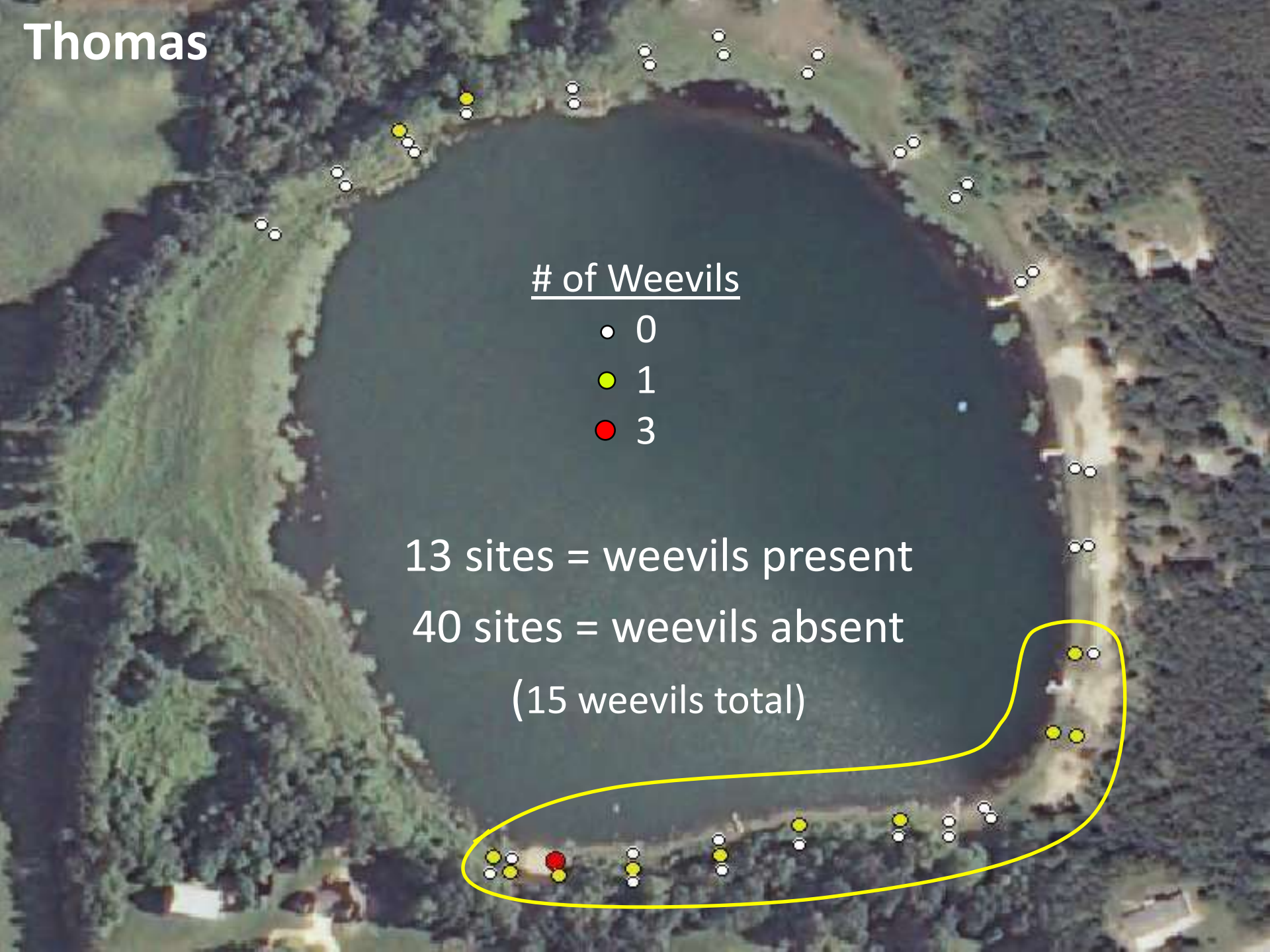
- Duff composition
  (% cover)
  - Woody
  - Deciduous tree leaves
  - Conifer needles
  - Grasses
  - Forbs
  - Rock
  - Bare soil

Riparian Condition

- Soil/duff samples analyses
  - Composite samples
  - % Moisture
  - % Organic matter
  - Soil texture

Analyses

- Pearson correlation
- Logistic regression
- Discriminant analysis


Thomas
# of Weevils
0
1
3
13 sites = weevils present
40 sites = weevils absent
(15 weevils total)


Springville
17 sites = weevils present
28 sites = weevils absent
(28 weevils total)
Number of Milfoil Weevils Found
0
1
2
3
5

Habitat Type

Springville Pond

- Included 9“highly disturbed” sites
  - Mowed lawns, beaches, landscaping

	Weevils Present
Disturbed sites	11% of sites (1 of 9)*
“Natural” sites	44% of sites (16 of 36)

- 96% of the weevils found were at “natural sites”
- This corroborates existing research

Pearson Correlations

Springville Pond

	Dist From Shore	Duff Depth
Weevil Quantity	R = - 0.30 (p = 0.043)	R = 0.42 (p = 0.004)

Thomas Lake

	Dist From Shore	% Leaves
Weevil Quantity	R = - 0.33 (p = 0.014)	R = 0.28 (p = 0.041)

Weevil presence/absence

- **Logistic Regression**

Springville Pond

	p
Dist From Shore	0.048
Duff Depth	0.018

- **Multiple Logistic Regression**

Springville Pond

	P	Model p
Dist From Shore (-)	0.0147	0.010
Duff Depth (+)	0.0613	

Weevil presence/absence

- **Logistic Regression**

Thomas Lake

	p
Dist From Shore	0.029
% Leaves	0.037

- **Multiple Logistic Regression**
  - **% Leaves** became insignificant (colinearity)

Thomas Lake

	P	Model p
Dist From Shore (-)	0.0170	0.002
Ht Above Water (+)	0.0216	

Discriminant Analyses

- **Discriminates between two groups based on multiple available measurements**

Thomas Lake

Canonical Function	Variables Included	Structure Coefficient	Correct Classification Rate
BEST	Dist From Shore Ht Above Water	0.856 -0.092	**75%**

Summary

- **Distance**
  - Weevil presence & quantity ***decreased*** with Distance From Shore
- **% Leaves**
  - Weevil presence ***increased*** with Leaf Cover
- **Duff Depth**
  - Weevil presence ***increased*** with Duff Depth
- **Height**
  - Weevil presence may also ***increase*** with Height Above Water

Recommendations

- Duff layer *composition* may or may not be important to weevils
  - Colinear relationship between Leaves & Distance
  - Requires more research
- Duff layer *depth* appears important to weevils
  - Refraining from raking, mowing, etc… within shoreland buffers provides “good duff”

Recommendations

- Near shore habitat is most important, although weevils were recorded as far as 8.3 m from shore
  - WI law requires shoreland buffers of 10.6 m
  - May provide adequate support
- Height is an additional consideration
  - Buffers in low, boggy areas may need to be extended into uplands

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Discriminant Analyses

- **Discriminates between two groups based on multiple available measurements**

Springville Pond

Canonical Function	Variables Included	Structure Coefficient	Correct Classification Rate
BEST	Dist From Shore Duff Depth	0.747 -0.884	**66%**