Eurasian watermilfoil impacts to native plants in Christmas Lake

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Milfoil Ecological Impacts

- Often cited, seldom documented
- Important to understand, especially when evaluating impacts of milfoil control
- Provides a larger context for management decisions

This Case

- Is unusual –
  - A record of EWM infestation beginning in its early phases
  - Well-documented plant community inventories
  - Minimal plant control through the study period

Christmas Lake

Area	259 acres	(105 ha)
Littoral Area	114 acres	(46 ha)
	25 feet	(7.6 m)
Max Depth	87 feet	(26.5 m)

Christmas Lake

Total P	13 ppb
Chlorophyll	3 ppb
Secchi	18 feet (5.4 m)

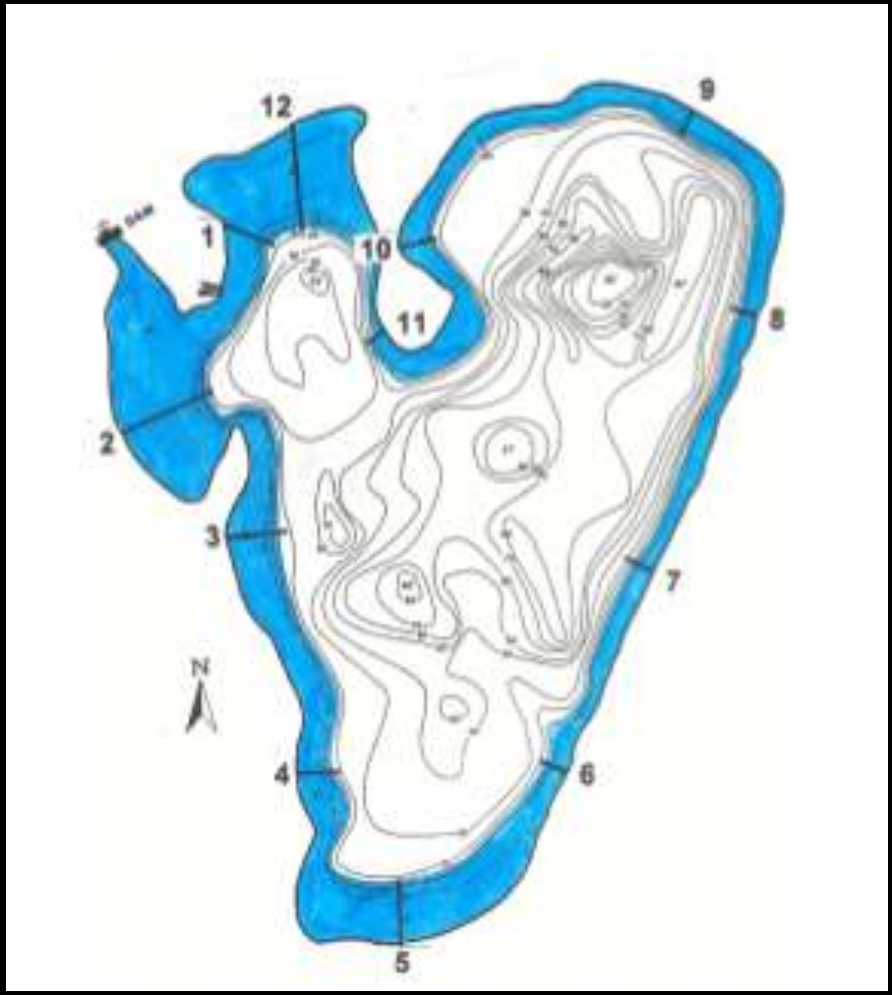
Mesotrophic (Grade = A)

Milfoil in Christmas Lake

- First discovered, 1992
  - Efforts to eradicate – appeared successful
  - No evidence of milfoil throughout 1990s
- Began to noticeably expand, 1999
- First plant survey, 2001

Plant Surveys

June 2001	Line-Intercept
Sept 2001	Line-Intercept
July 2003	Point-Intercept
June 2006	Point-Intercept
August 2006	Point-Intercept
July 2007	Point-Intercept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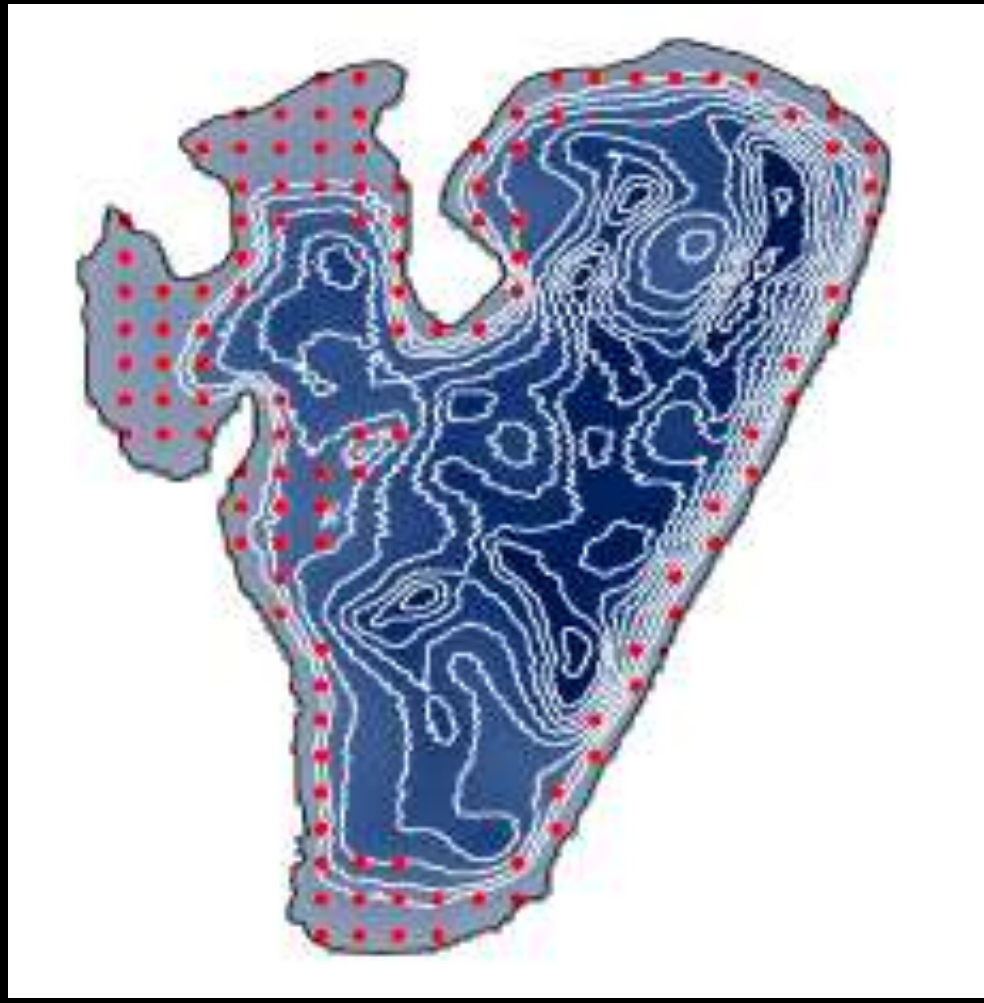

Results

2003 & 2007 (July)

- Milfoil increased
- Native plants decreased
- Species richness decreased

2001 – 2007 (all)

- Data manipulations to better illustrate trends

2003 to 2007 (July)

Eurasian watermilfoil freq. (Chi-Square)

47% to 59% ($p < 0.02$)

Species Richness (t-test)

4.2 to 2.7 ($p < 0.001$)

2003 to 2007 (July)

Ceratophyllum demersum	-
Myriophyllum sibericum	-
Potamogeton illinoisis	-
Potamogeton praelongus	+
Potamogeton richardsonii	-
Potamogeton zosteriformis	-
Ranunculus longirstris	-
Vallisnaria americana	-
Zosterella dubia	-

(Chi-square; $p < 0.05$)

2003 to 2007 (July)

- 23 species of native submersed plants
- 19 species, excluding those never > 5%
- 42% (8/19) of major native species declined

All Data

- Depth-weighting to compare point- vs. line-intercept

- Regressions
  - Milfoil $r = 0.91$ ($p = 0.01$)
  - Native Species Richness $r = -0.92$ ($p < 0.01$)

Comments

- No comprehensive plant control, before are throughout the study period
  - Looking at DNR permits, assuming maximum allowable treatment (100 x 100')
    - 3 acres (< 3% littoral area) in 2007
    - 1 acre or less in preceding years

Comments

- Depth-weighting of all data, statistically 'iffy' but helps to demonstrate:
  - EWM frequency increase
    - 25% in 2001 to 59% in 2007
  - Native plants (mean native plant frequency)
    - 17.5 in 2001 to 8 in 2007

Comments

- This case is unusual in:
  - Documentation beginning in an early phase of the EWM infestation
  - Documentation – at all

Management Implications

- The 'Do Nothing' Alternative:
  - Can have significant ecologic impacts
  - Is not necessarily the most conservative management approach

Management Implications

- Because we most often address EWM control in later (well-established) phases, we lack a baseline to evaluate management goals

… and we often accept an impaired condition as normal or acceptable

Management Implications

- Rules governing lake-wide EWM control should be updated.

- We must have (and use) agreed-upon metrics to evaluate plant community health and management goals.

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