







The relationship between the location of stormwater inlets and stands of Eurasian watermilfoil in Green Lake, Kandiyohi County, MN

by Jacobson, M.², Anderson, C.¹, Haugen, J.³, Klett, N.³, Michels, J.², Osborne, K.³, Peeters, M.¹, Plevan, A.²
¹-Middle Fork Crow River Watershed District; ²-Simon & Schuster Insurance Inc.; ³-Foth



Green Lake is a 5,500 acre mesotrophic lake located in Kandiyohi County, in west central Minnesota. Its clear waters and excellent fishing represent an outstanding recreational and economic resource for the City of Spicer, the County, and the entire region.

Introduction

Past analyses of the lake substrate suggested that Green Lake was low risk for Eurasian watermilfoil (EWM) propagation, yet Green Lake has experienced rapid establishment and spread of EWM since the plant was first discovered in 2000. This led to the question, what changed?

- In the past 20 years, more than 40 stormwater inlets have been incorporated into the lake, directly delivering sediment, nutrients, and other pollutants to Green Lake

Hypotheses

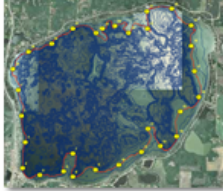






- Stormwater inlets increase nutrient and sediment loading to Green Lake
- Nutrient and sediment loads from stormwater inlets provide an environment more hospitable for EWM propagation

Data Collection

- Macrophytes and sediment cores were collected at 30 total sites along 8 foot contour

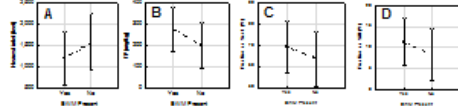
Data Analysis

- Vegetation separated by site and EWM/non-EWM completely dried, and weighed
- Sediment analyzed for pH, TP, TKN, TOC, %gravel, %sand, %silt, %clay
- Proximity of each site to nearest stormwater inlet calculated in GIS

Results & Conclusions

Hypothesis 1: Nutrient and sediment loading from stormwater inlets provide an environment more hospitable for EWM propagation

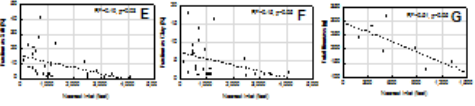


A: Average distance to the nearest stormwater inlet was lower at sites where EWM was present than at sites where EWM was not present

B-D: Average sediment concentrations (TP, TKN, TOC) and the average fraction of sand, silt, and clay were greater at sites where EWM was present than at sites where EWM was not present

Conclusion: The direction of the relationships between sediment parameters or the proximity to stormwater inlets and the presence or absence of EWM supports this hypothesis, but the relationships are not statistically significant

Hypothesis 2: Stormwater inlets increase nutrient and sediment loading



E and F: Linear regressions suggest that the fraction of sediment silt and clay increased with decreasing distance to nearest stormwater inlet ($p < 0.05$)

G: Total vegetative biomass increased with decreasing distance to the nearest stormwater inlet, suggesting that increased nutrient loading from stormwater inlets may provide an environment more hospitable to all aquatic vegetation, and not necessarily just EWM ($p = 0.05$, $r^2 = 0.51$)

Conclusion: Treatment of EWM during study likely confounded results. Additional studies in lakes with and without EWM treatment needed.

This project was made possible by a grant from the Minnesota Pollution Control Agency's Clean Water Partnership Program.

Poster used for outreach and education



Sampling on Green Lake; September of 2010



Analysis of samples at District office in Spicer



Sampling on Green Lake; March 2011



