

Pond Treatment with Spent Lime to Control Phosphorus Release from Sediments

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provided
by:



Minnesota Stormwater Research Council



Study goal and summary

- Evaluate whether spent lime can reduce sediment phosphorus release from stormwater ponds (and lakes)
- Spent lime will be applied to two ponds—Oak Knoll Pond and Wakefield Pond (in RWMWD)
- Phosphorus mass-balance monitoring will follow treatment to assess whether phosphorus release has been controlled
- Project team—Barr, VLAWMO, RWMWD & SPRWS, Cities of White Bear Lake and Maplewood

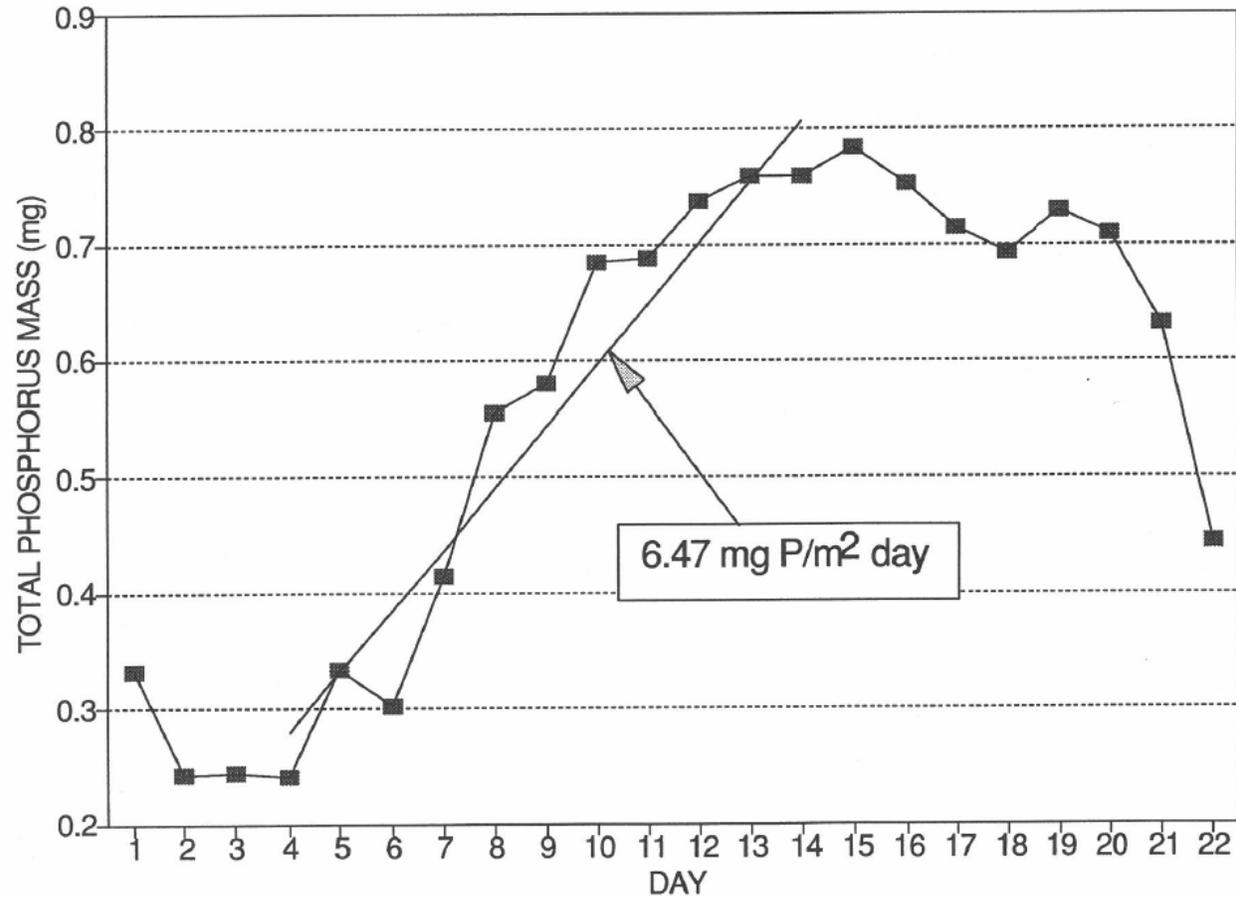
Compare treatment options for sediment phosphorus release

Treatment Option	Benefits	Drawbacks
Dredging	Storage increase, longer term solution	Expensive
Alum	Not sensitive to anoxia; proven	Longevity may be limited in ponds/shallow lakes
Iron filings/ Spent lime	Cheaper (?)	Redox sensitive?? Longevity unknown

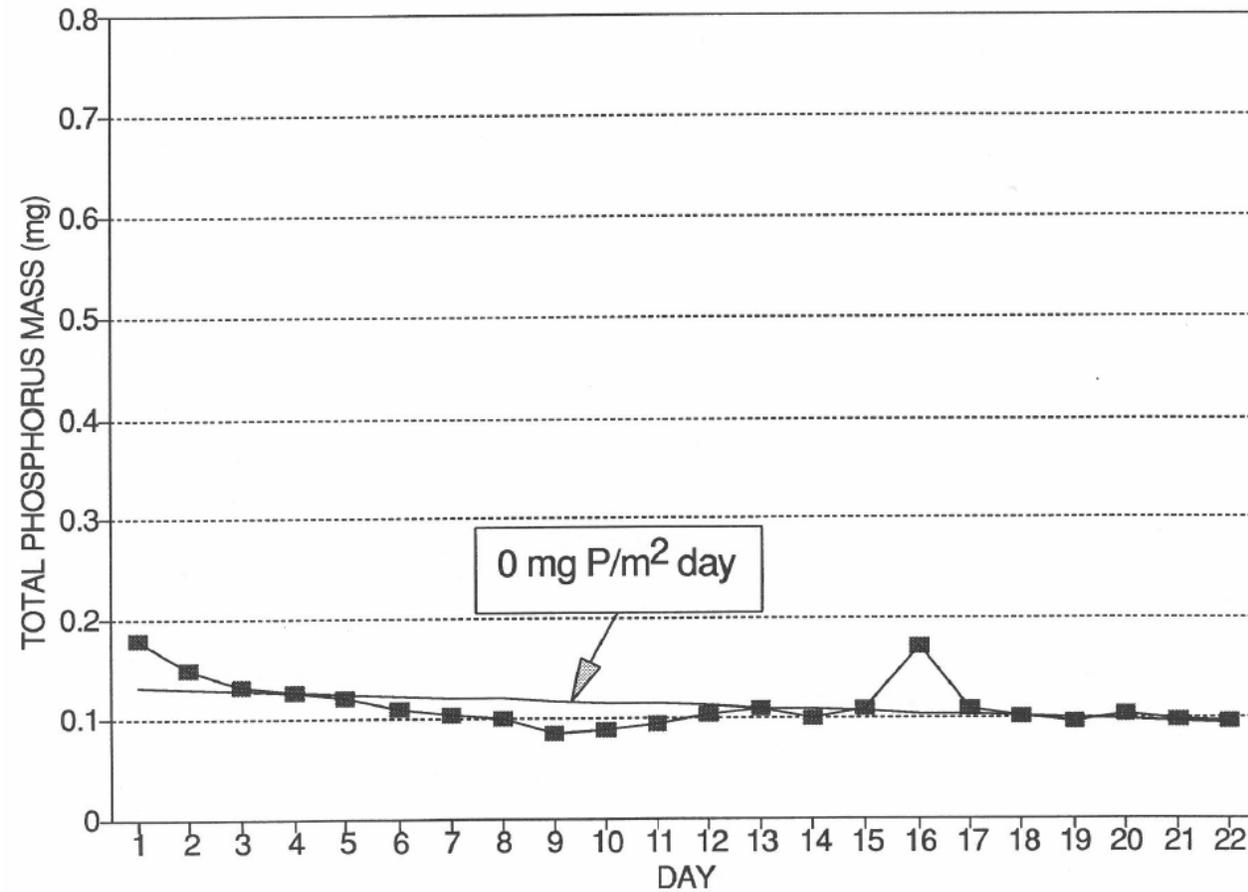


Spent lime for sediment phosphorus release

SPWU SEDIMENT P RELEASE EXPERIMENT
GOOSE LAKE-CONTROL



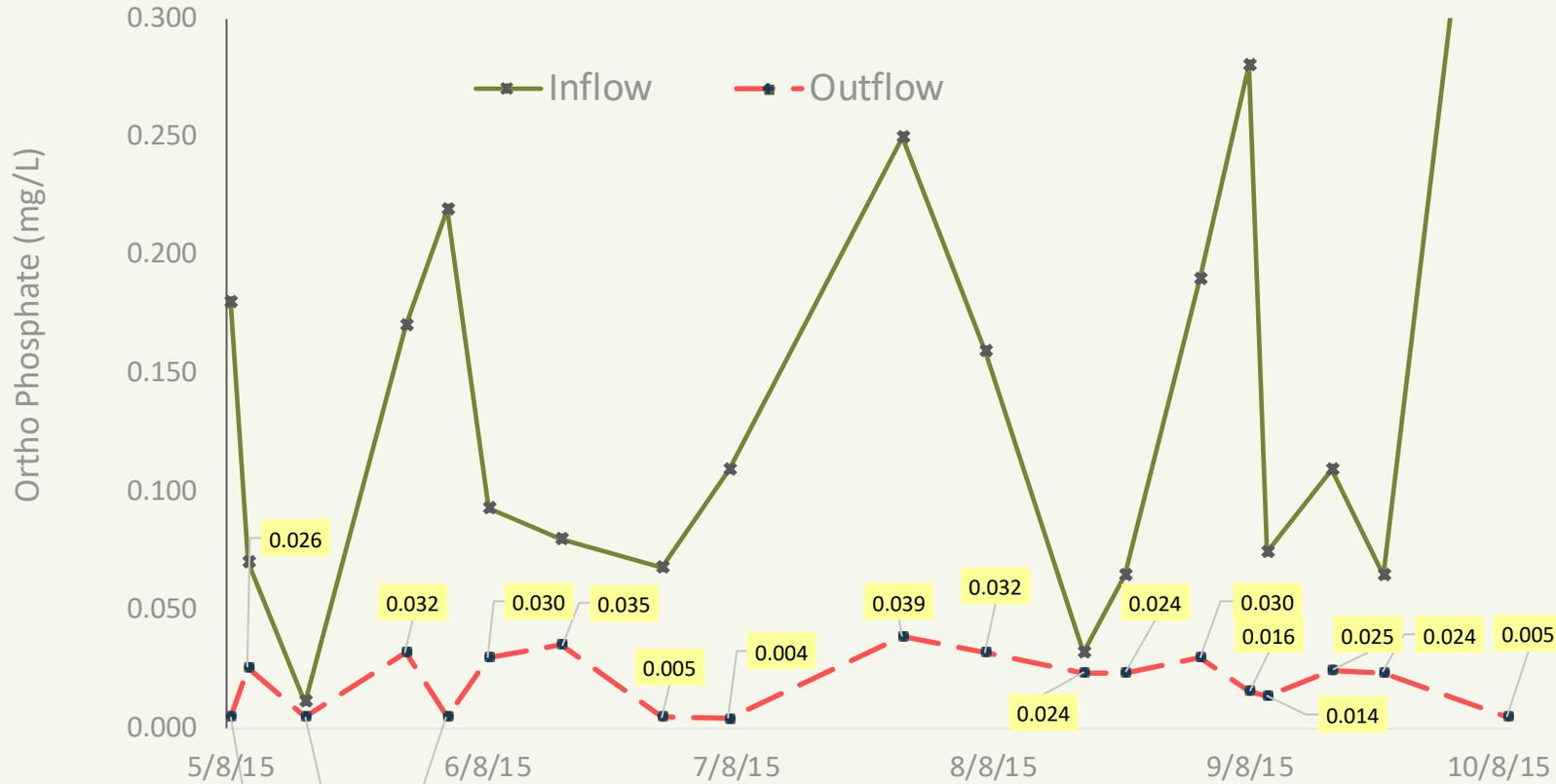
SPWU SEDIMENT P RELEASE EXPERIMENT
GOOSE LAKE-25%



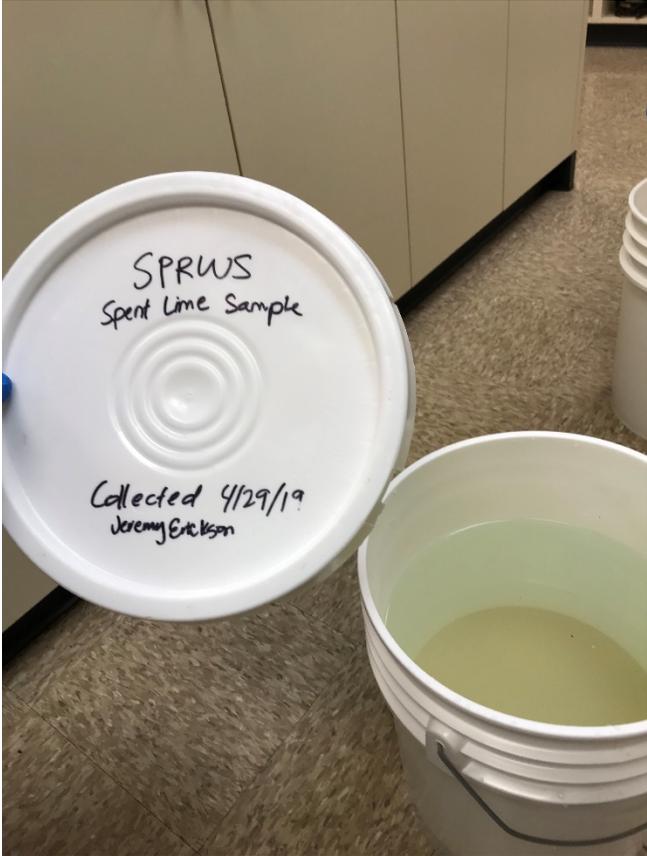
Spent lime



Spent lime for stormwater treatment



Spent lime slurry for pond applications



St. Paul Regional Water Services (SPRWS)



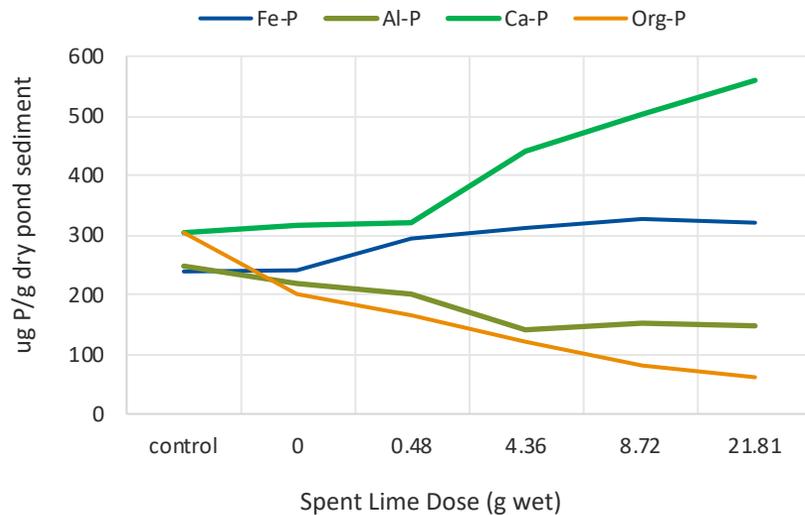
City of White Bear Lake

Spent Lime Lab Experiment

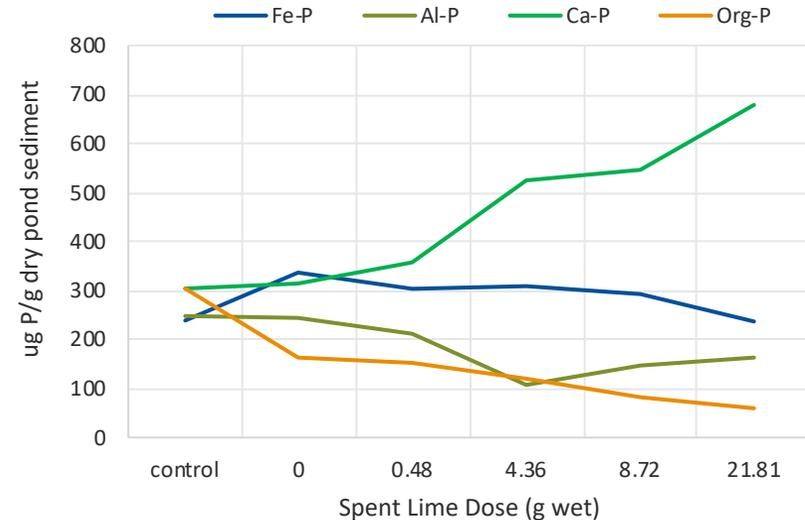
- 3 sediment cores collected from each pond (Wakefield Pond and Oak Knoll Pond)
- Sediment from each core composited for use in the dosing experiment
- Spent lime sourced from the Saint Paul Regional Water Services
- General characteristics of the sediment and spent lime:
 - Spent Lime: 87% water
 - Oak Knoll Pond Sediment
 - 86-91%
 - Wakefield Pond
 - 81-87%

Spent Lime Addition: results for Wakefield and Oak Knoll Ponds

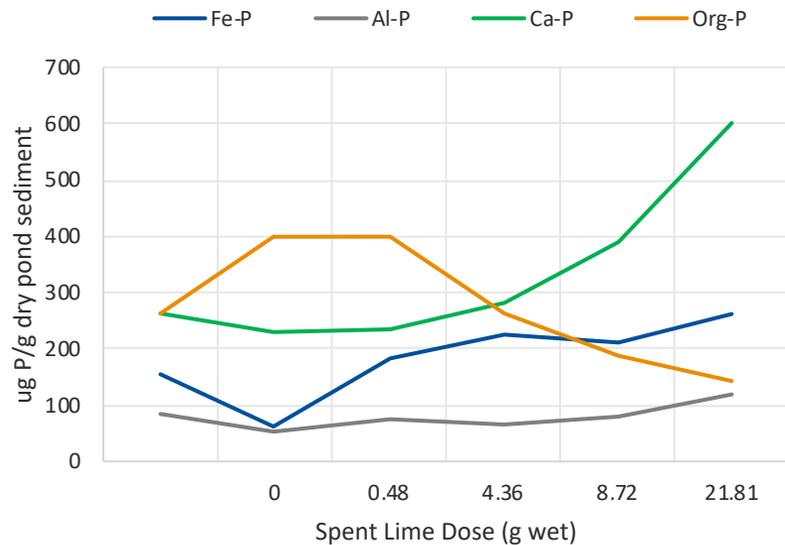
Wakefield Core 1: Aerobic



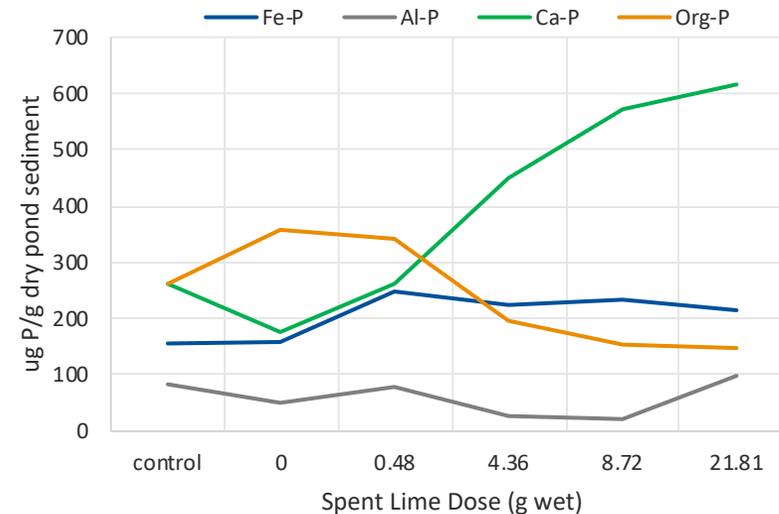
Wakefield Core 1: Anaerobic



Oak Knoll Core 1 Aerobic



Oak Knoll Core 1 Anaerobic



Spent Lime Addition: pH



Individual Tests

preliminary conclusions and next steps

- Identifying the expected Ca-P formation in the natural environment is challenging given that Ca-P formation is likely to be slower than other metal-phosphate reactions (such as Al-P formation)
- Tests demonstrated that Ca-P will be formed in sediments
- Ca-P formation in the tests appears to be predominantly due to organic P decay
- Optimal dose is approximately a 1:1 sediment/spent lime mixture on a volumetric basis
- Spent lime will be applied to two ponds—Oak Knoll Pond and Wakefield Pond (in RWMWD)
- Evaluate whether spent lime can reduce sediment phosphorus release from stormwater ponds (and lakes)

Questions??

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