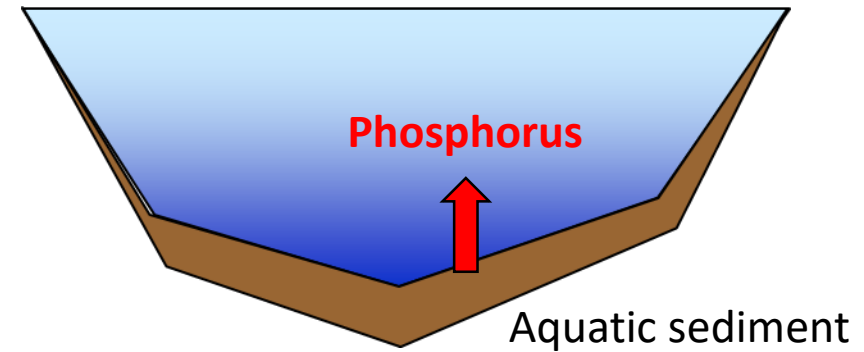


Research on North Pipe Lake

- Does phosphorus recycling from bottom sediment contribute to algal blooms?



Objectives

- Examine seasonal lake water quality trends
- Possible links between internal P loading and algal blooms



Objectives

- Examine recycling of phosphorus from the bottom sediment





Sediment research

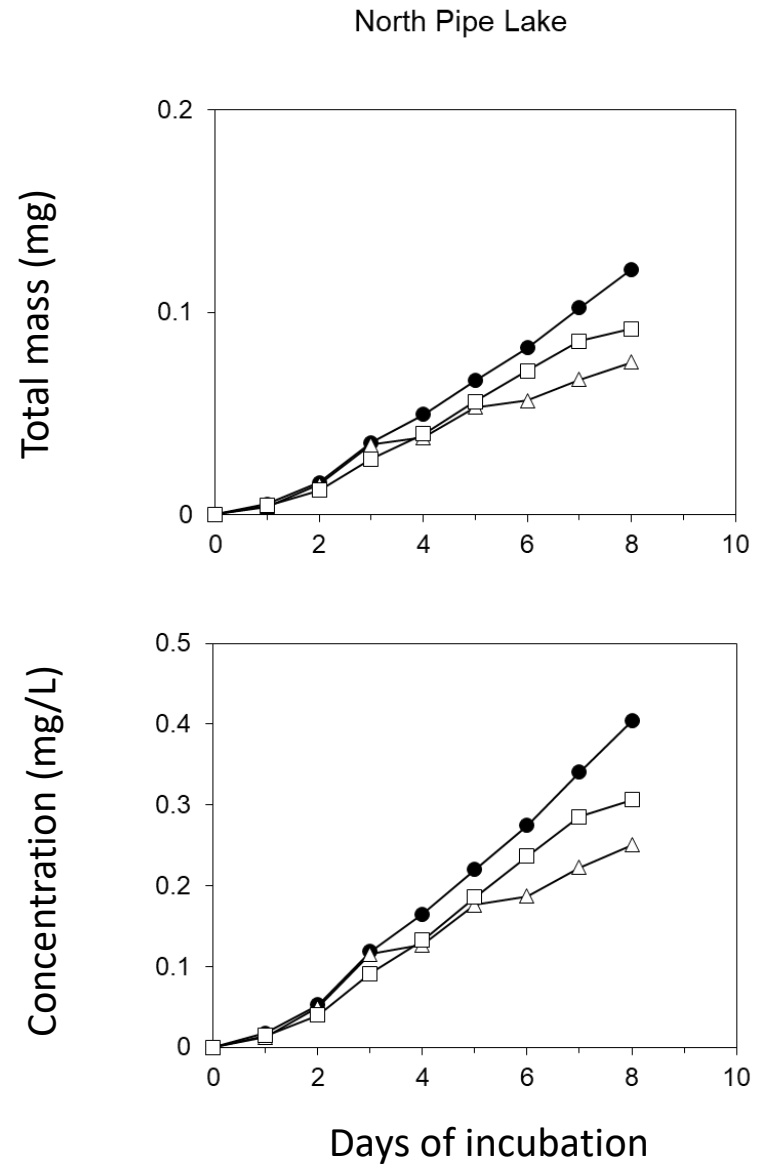
- Sediment cores are incubated in the laboratory
- The overlying water is sampled every day for phosphorus
- A rate of phosphorus movement from sediment into the water is calculated



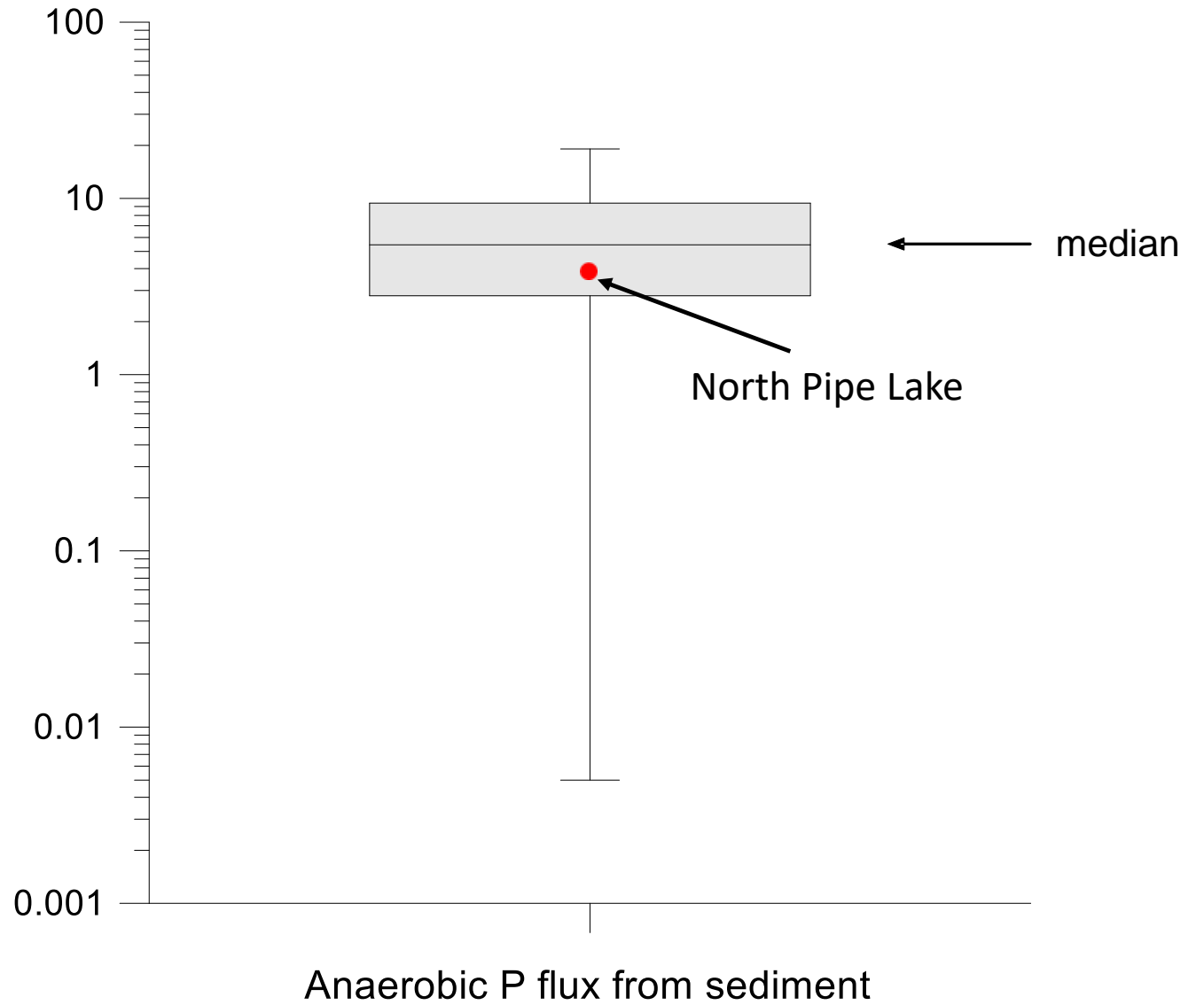
Phosphorus flux from anaerobic sediment

- Phosphorus accumulates in the water over time
- The rate is approximately 3.95 mg/m² d
- The rate is moderate compared to other lakes in the region

Phosphorus In the
overlying water column



Anaerobic P flux from sediment



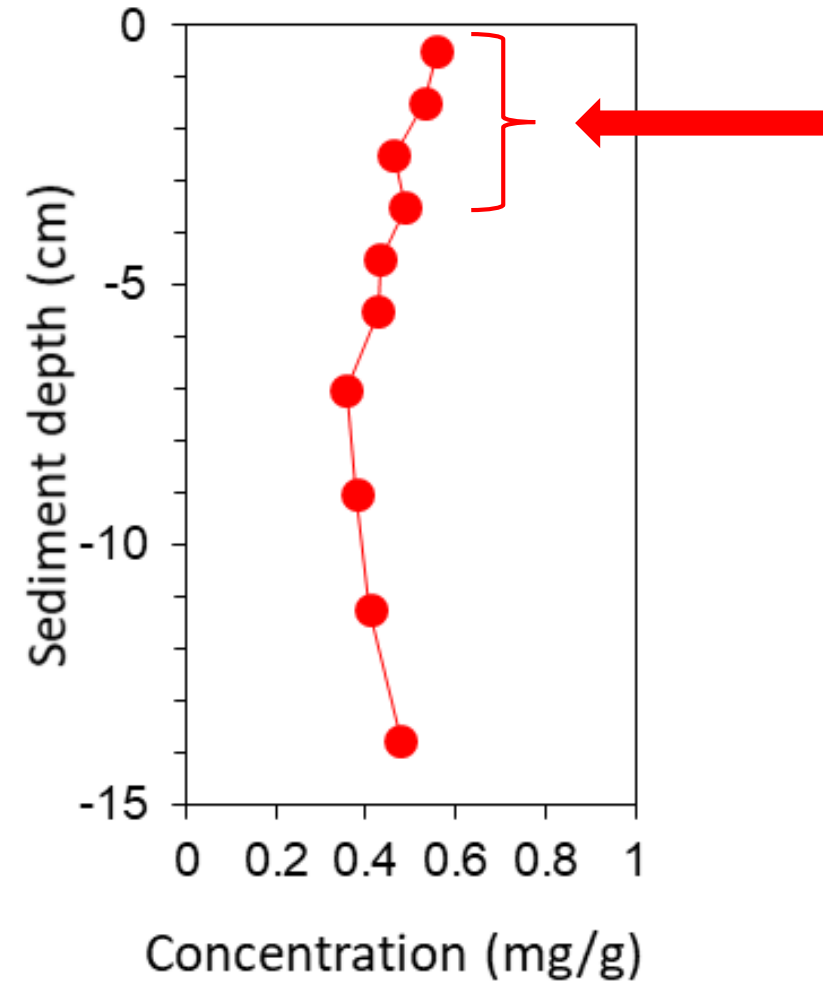
Sediment chemistry

- Slice sediment core into sections
- Measure phosphorus in sediment that is related to internal loading



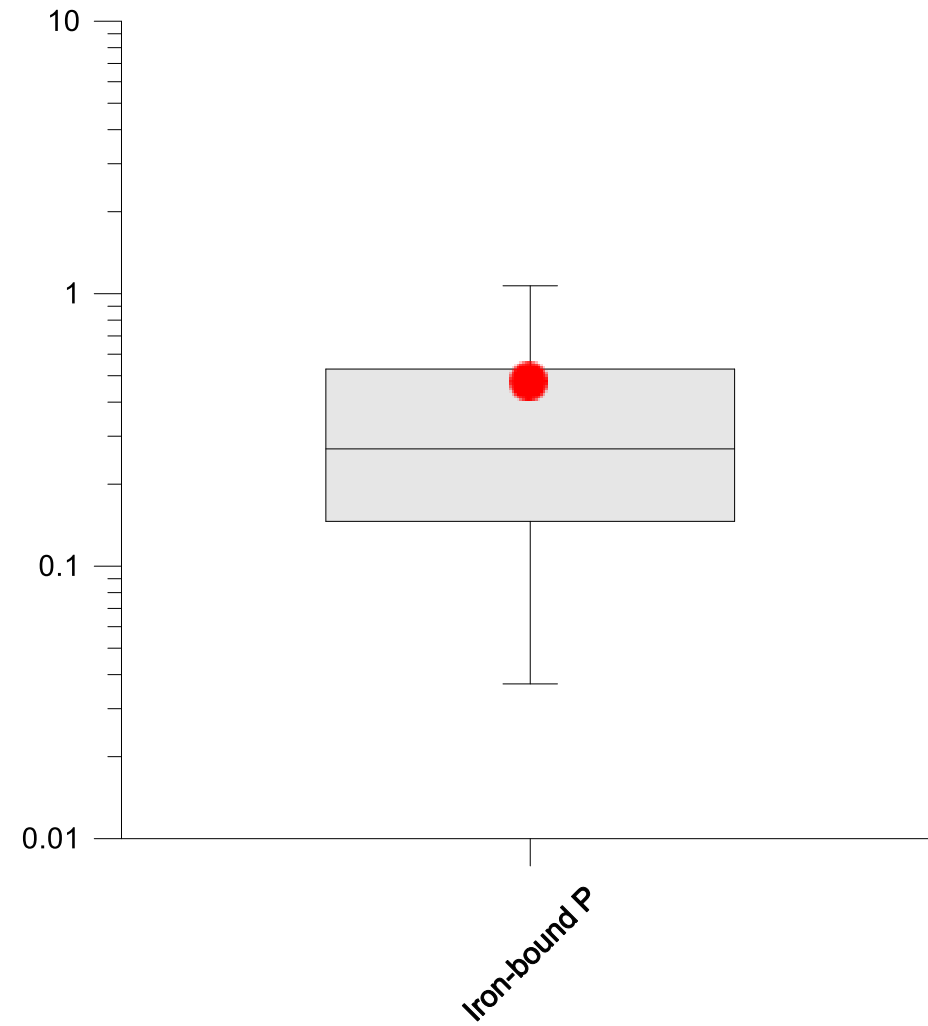
Sediment phosphorus

- Iron-bound P concentrations are moderately high
- Modest surface concentration peak
- Suggests internal P loading



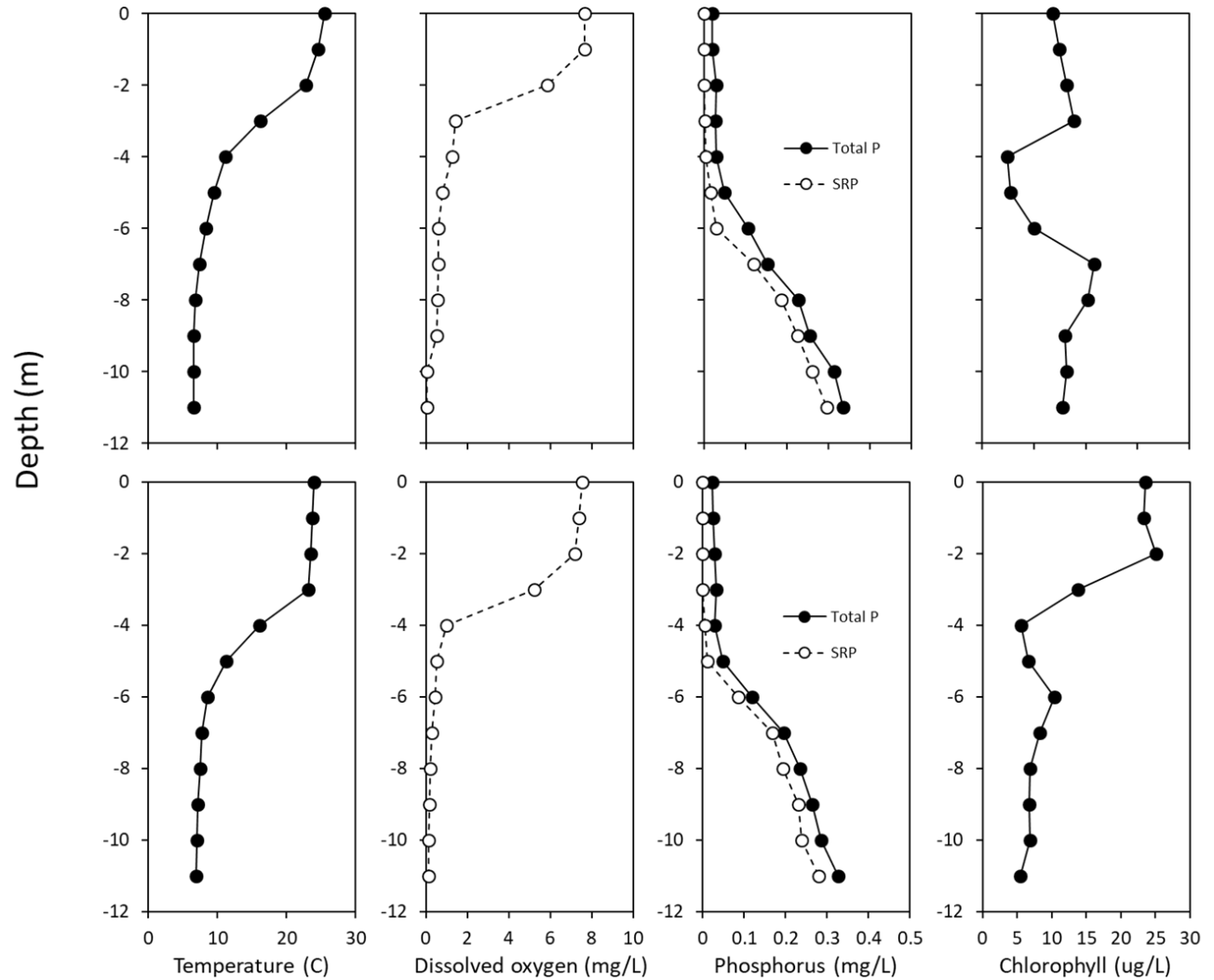
Mobile sediment phosphorus

- Used to estimate aluminum sulfate dosage to control internal P loading



Water chemistry patterns

- Strong stratification – cool bottom temperatures
- Hypolimnetic anoxia since late May
- Buildup of phosphorus in the hypolimnion – internal loading
- Development of algal bloom



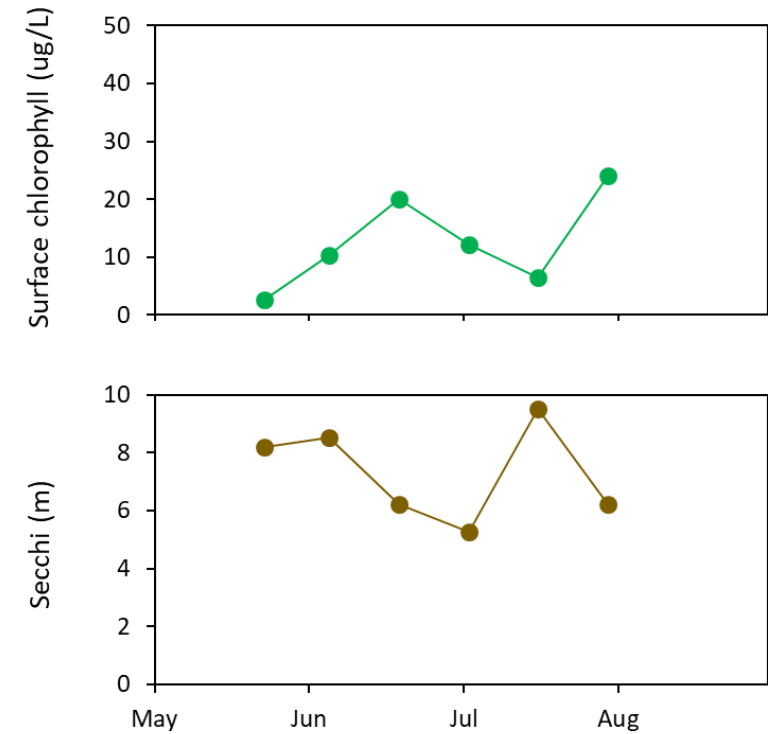
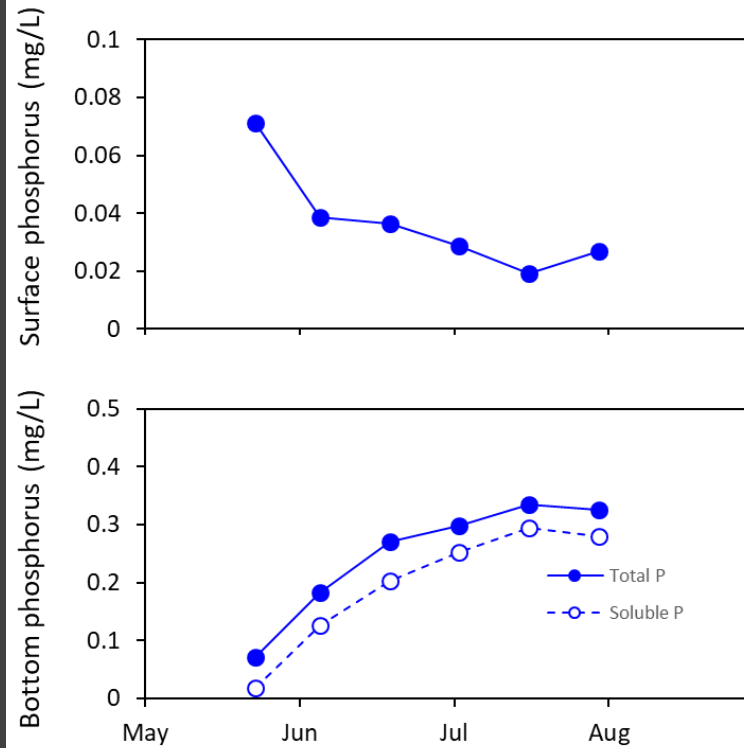
17 July

31 July

Water chemistry patterns

- Modest algal blooms in mid-June and late July
- Seasonal buildup of phosphorus in the anoxic hypolimnion
- Secchi transparency ranged between 5 and 9 feet

Seasonal trends

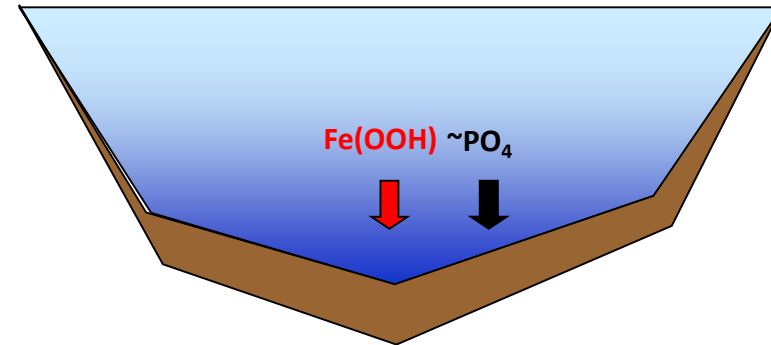


2019

Role of iron in trapping internal P loads

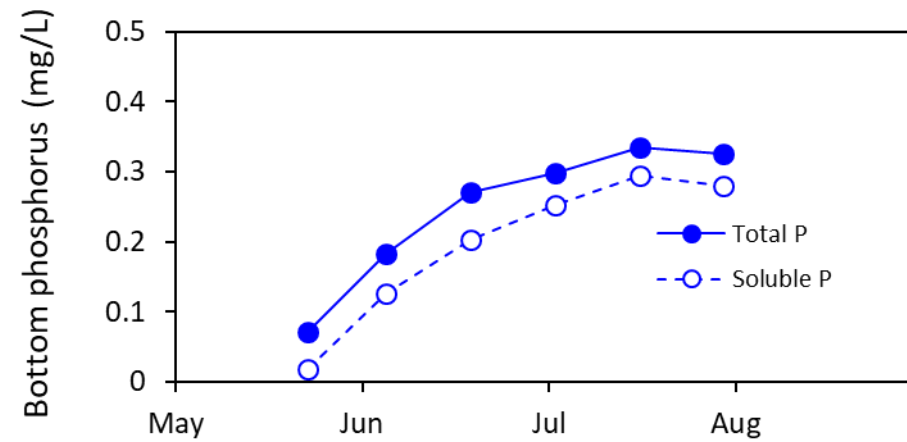
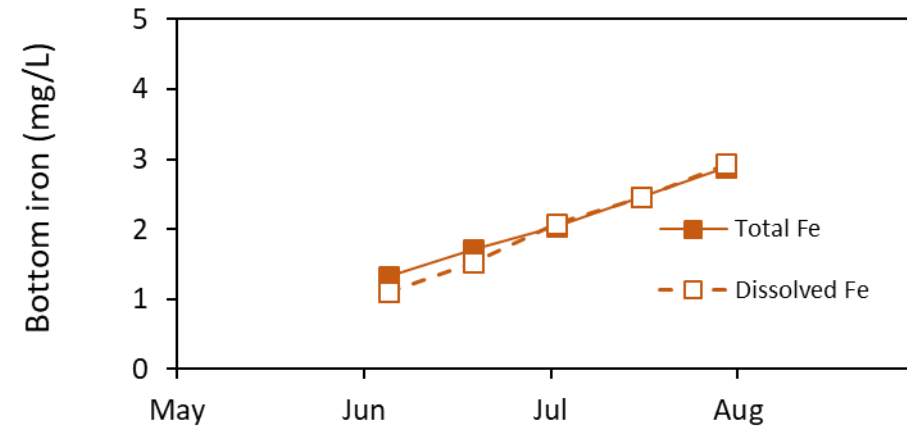
- At least 4 parts of iron are required to completely react with phosphorus during fall turnover
- Iron with attached phosphorus settles to the sediment
- Availability for algal uptake is low

Fall Turnover



As of early July, North Pipe Lake bottom water has enough iron
To react with all of the internal phosphorus load

- Sediment releases both iron and phosphorus to the bottom waters of North Pipe Lake in the summer
- Iron concentration is high enough to react with all the phosphorus when fall turnover occurs.



2019

Preliminary Summary

- Internal P loading is moderate in North Pipe Lake
- Both iron and phosphorus build up in the bottom waters due to sediment flux
- So far, it appears that iron can react with all the phosphorus during fall turnover (more data will support this).
- Phosphorus availability to algae during water mixing is predicted to be low

