

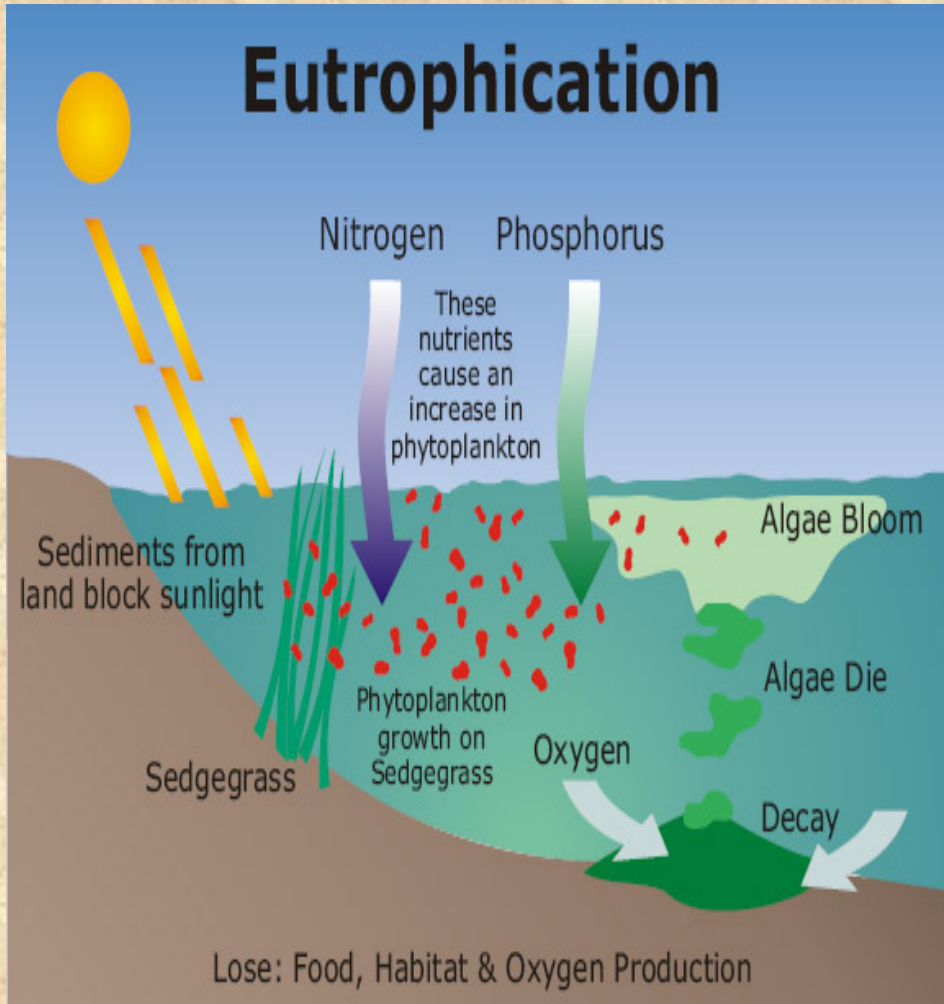
Sediment Role in Wapato Lake Nutrient Budget



By Cierra Hancock

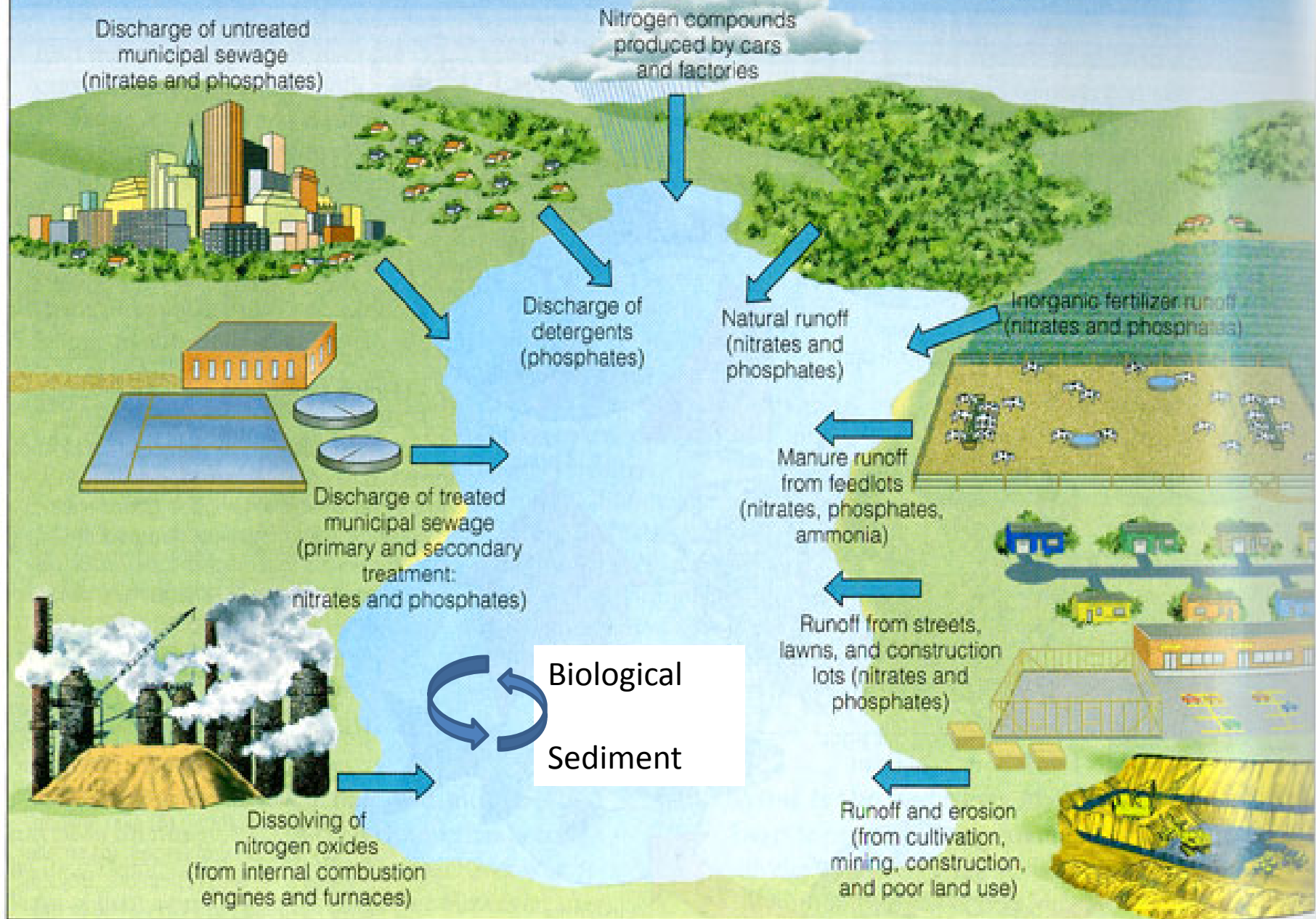
Advised by Dr. Jim Gawel

Eutrophication



- Increased lake productivity due to increased nutrient input
- Urbanization increases the rate of eutrophication
- Pervasive and global water quality issue

Sources of Cultural Eutrophication



Significant Dates in Wapato History

1910	Lake dredged
1936	180,000 cubic yards of mud is dredged from Wapato Lake to improve water clarity.
1942	Newspapers report that sewage has been linked to a stormwater pipe which drains into Wapato Lake.
1942-1948	The Health Department closes the lake to swimmers due to health concerns from the sewage.
1957	A concerned citizens group complains to the Park Board of the terrible smell of Wapato Lake.
1971	A contractor was hired to remove a nuisance aquatic plant. Eighty three tons were removed the first year and only 0.5 tons were removed the subsequent year. Copper sulfate treatments were applied to the lake but discontinued.
1981	The lake is emptied, sediment is excavated from the lake bottom, and the dike separating the north and south basins is built. Drinking water is piped into Wapato to dilute the lake, but later disconnected.
1984	Alum treatment
1997	The lake is closed due to toxic algae blooms, it has since been permanently closed to swimmers
2008	Alum treatment, shoreline planting

Identify Sediment Contribution to Nutrient Budget

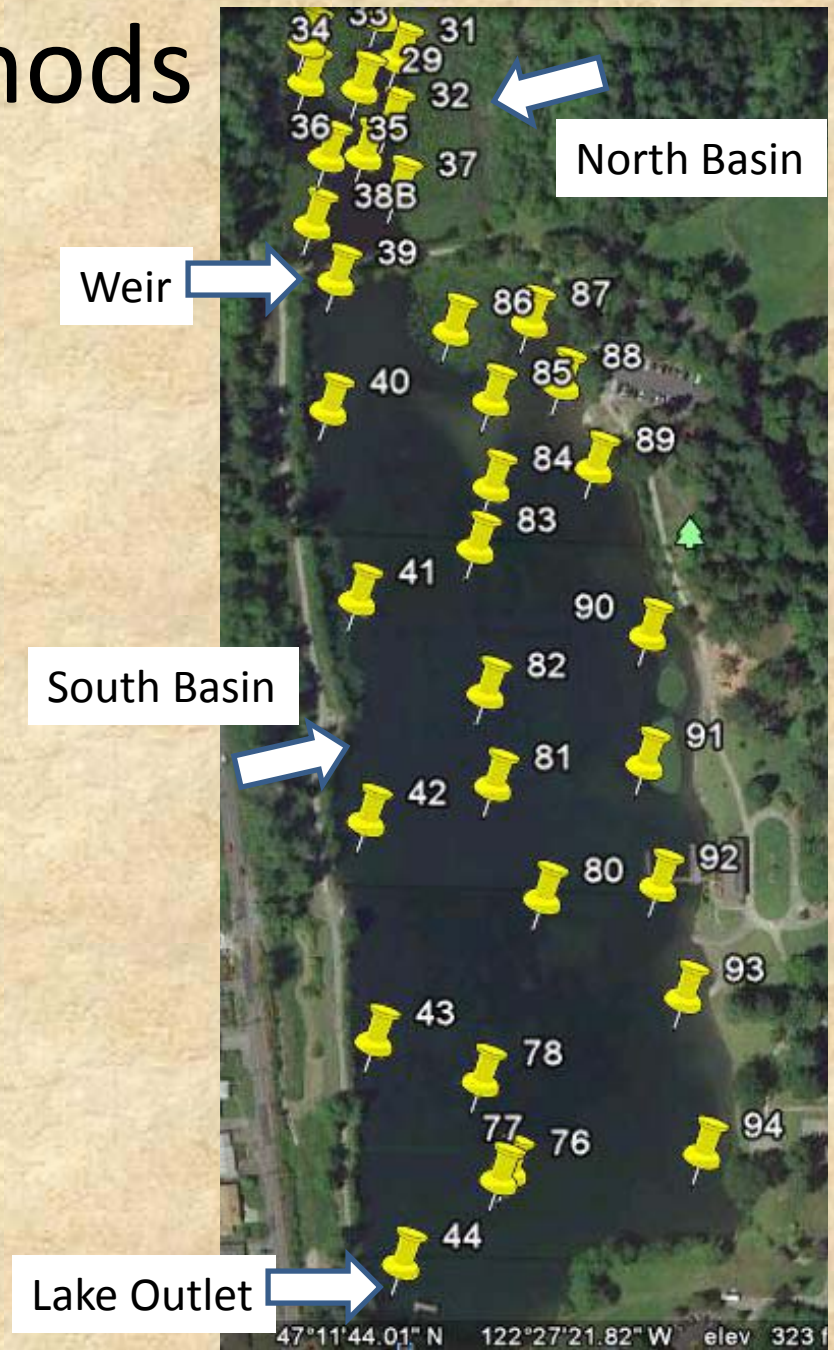
- Create a surface sediment map of nutrient concentrations
- Correlate nutrient concentrations in sediment core sections to section dates

Methods

Surface Sediment Grab Sampler



- Sampled July 2010
- Dried
- Homogenized
- Sent off for analysis



- Sample Wapato Lake in August and Wards Lake in September 2010

- Sectioned

- Dried

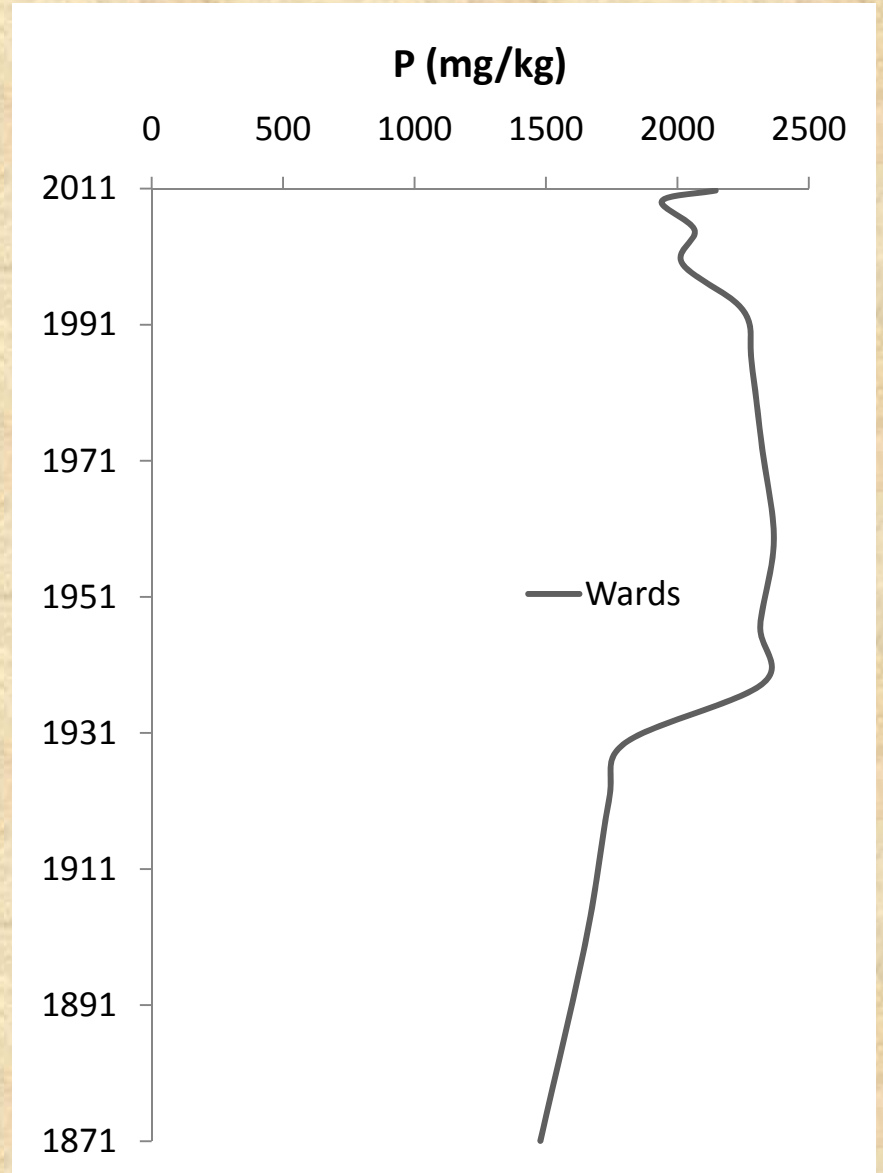
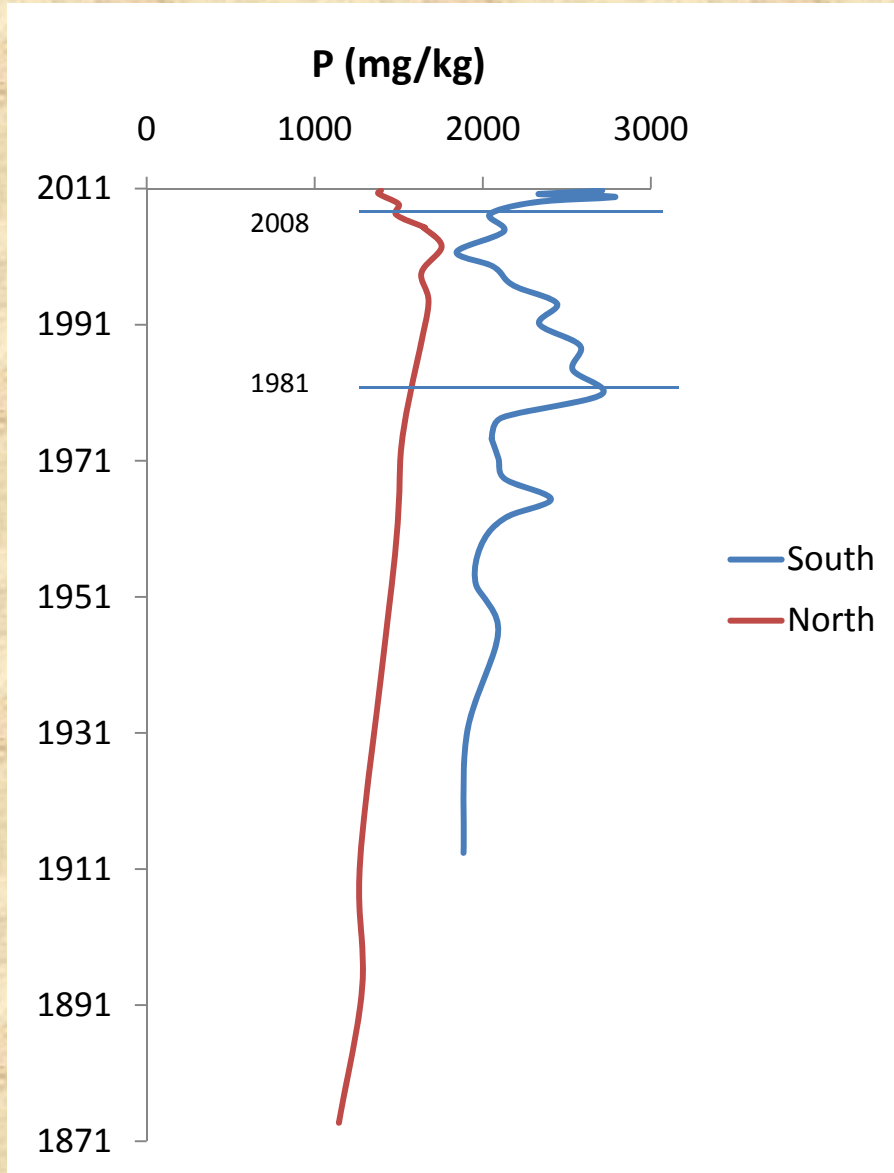
- Homogenized

- Sent off for analysis

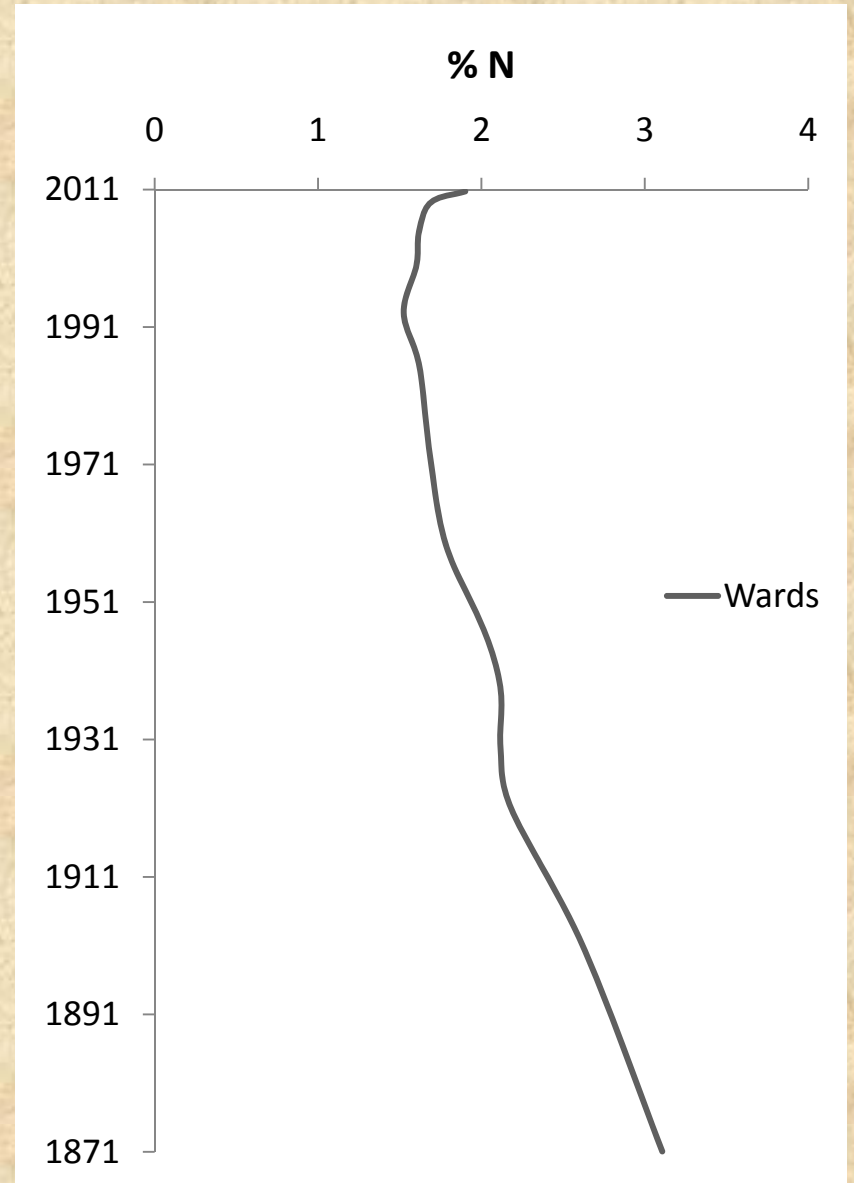
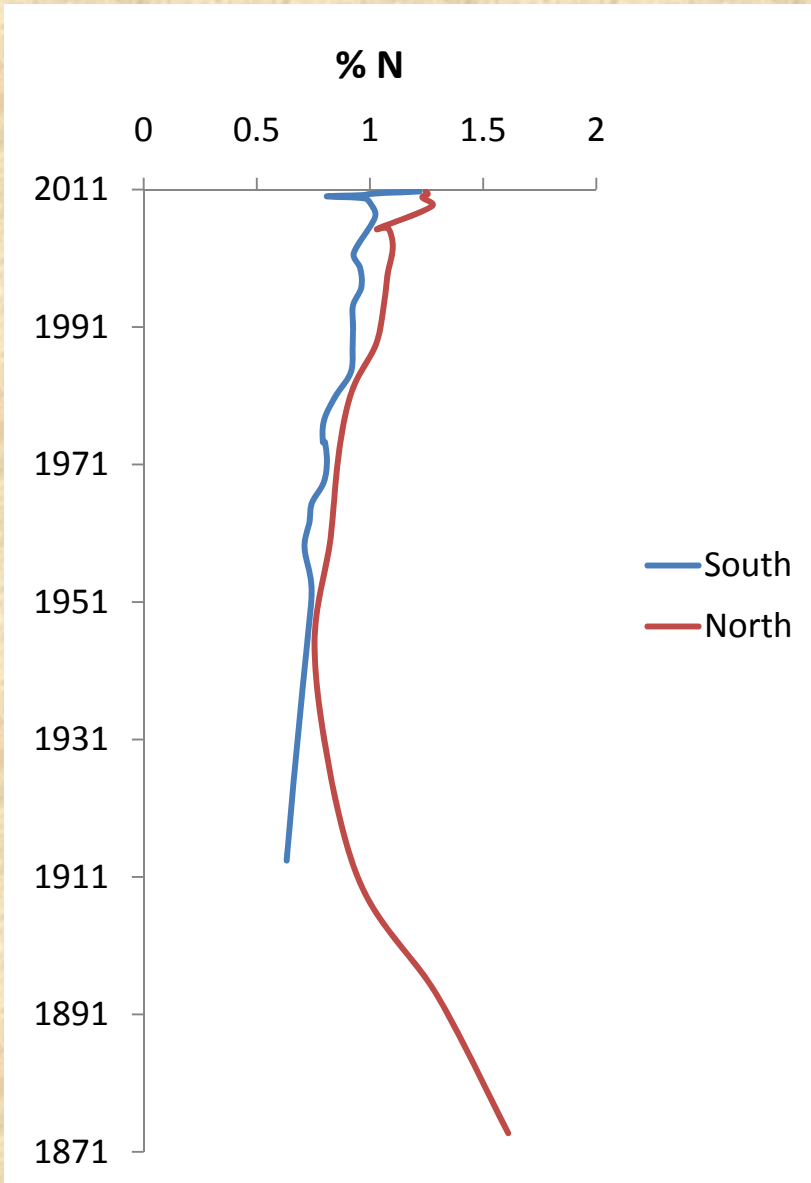


Sediment Corer

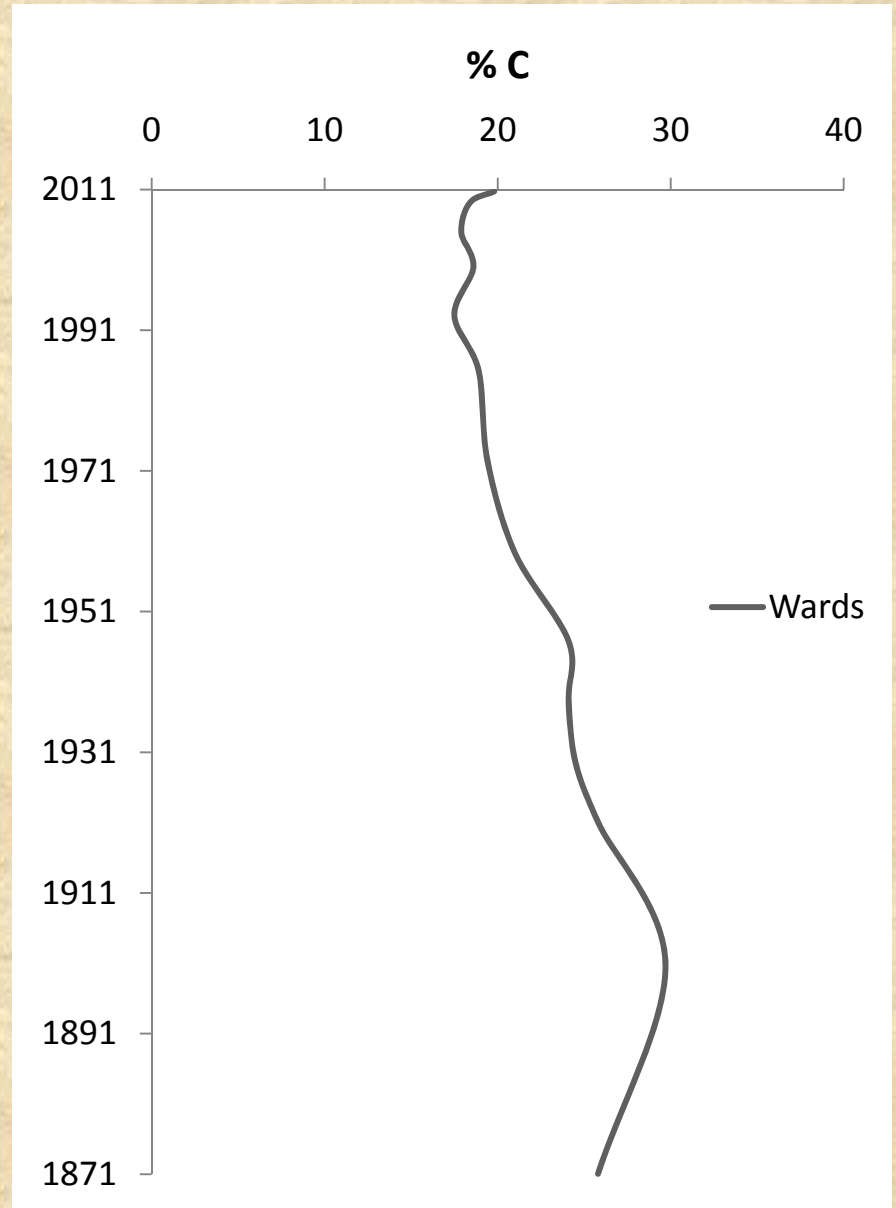
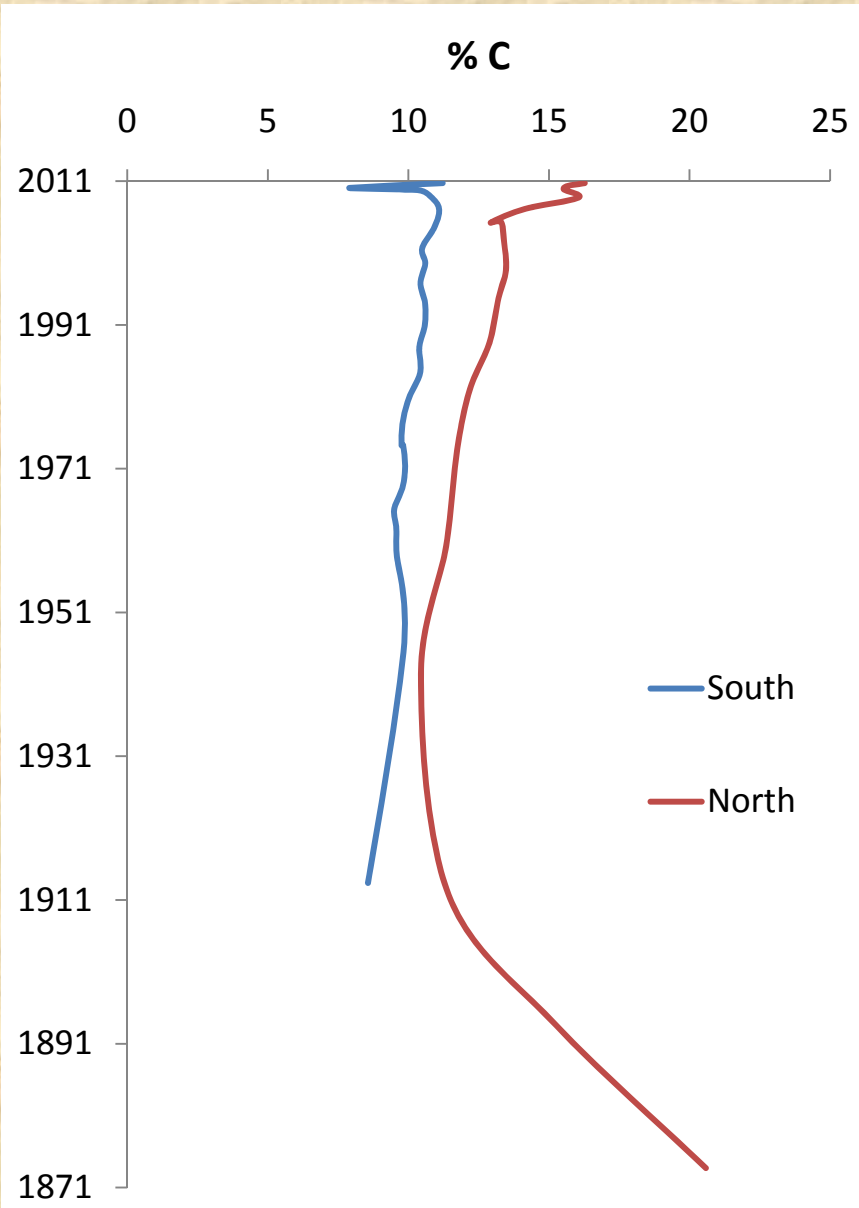
Sediment Cores



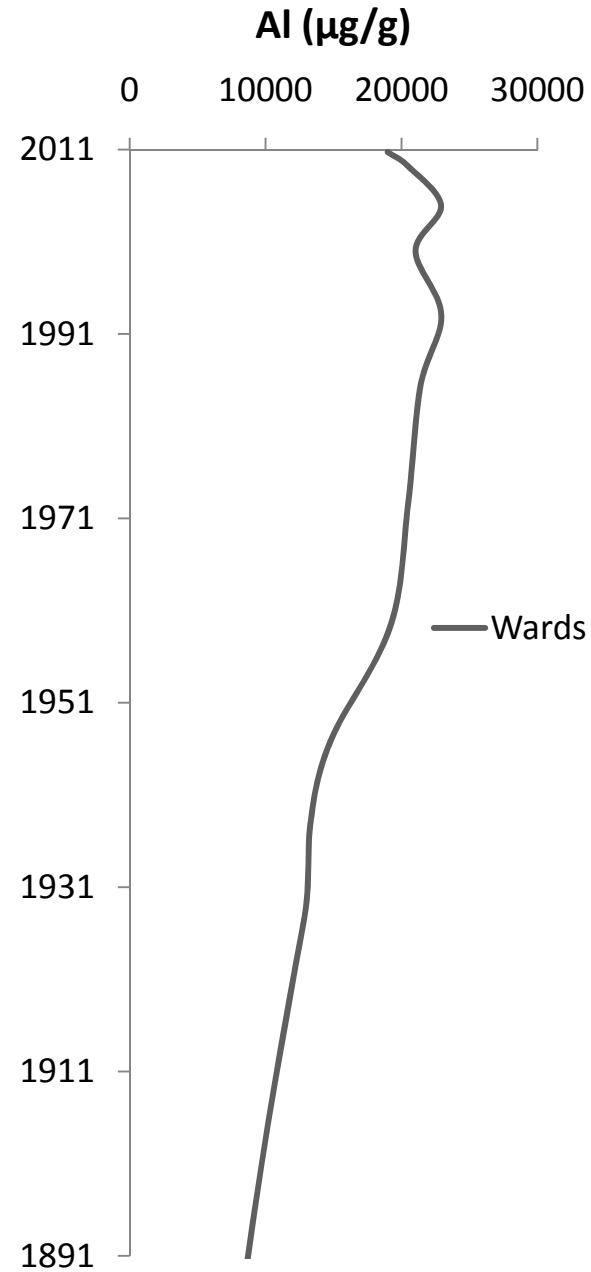
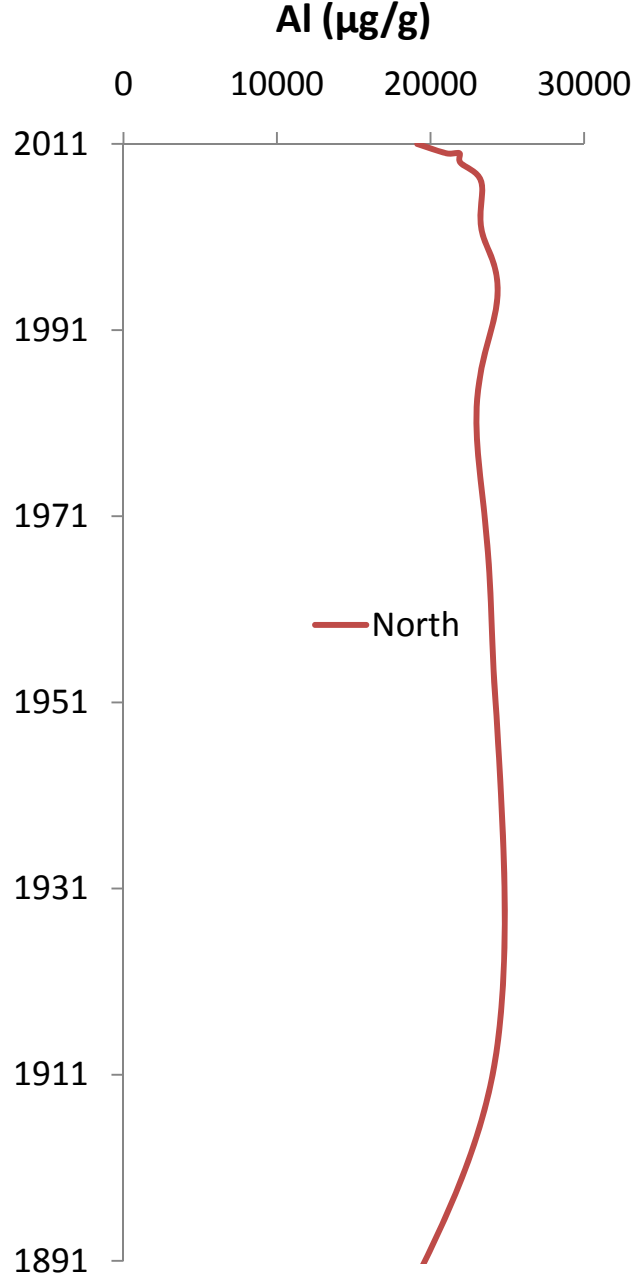
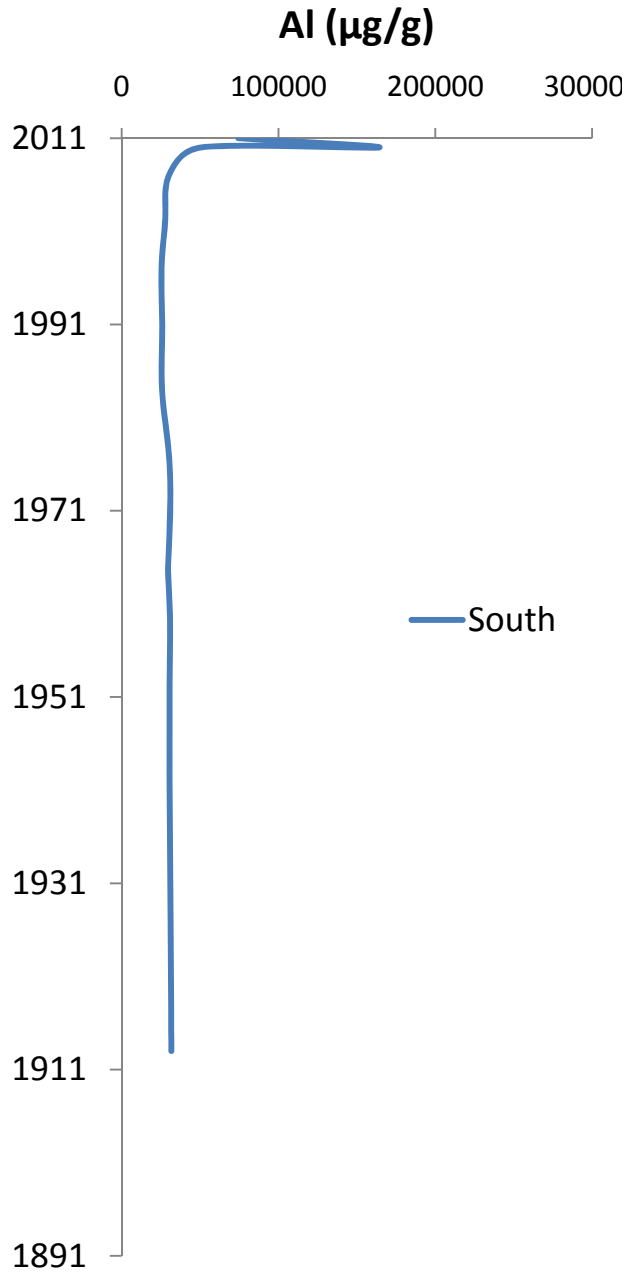
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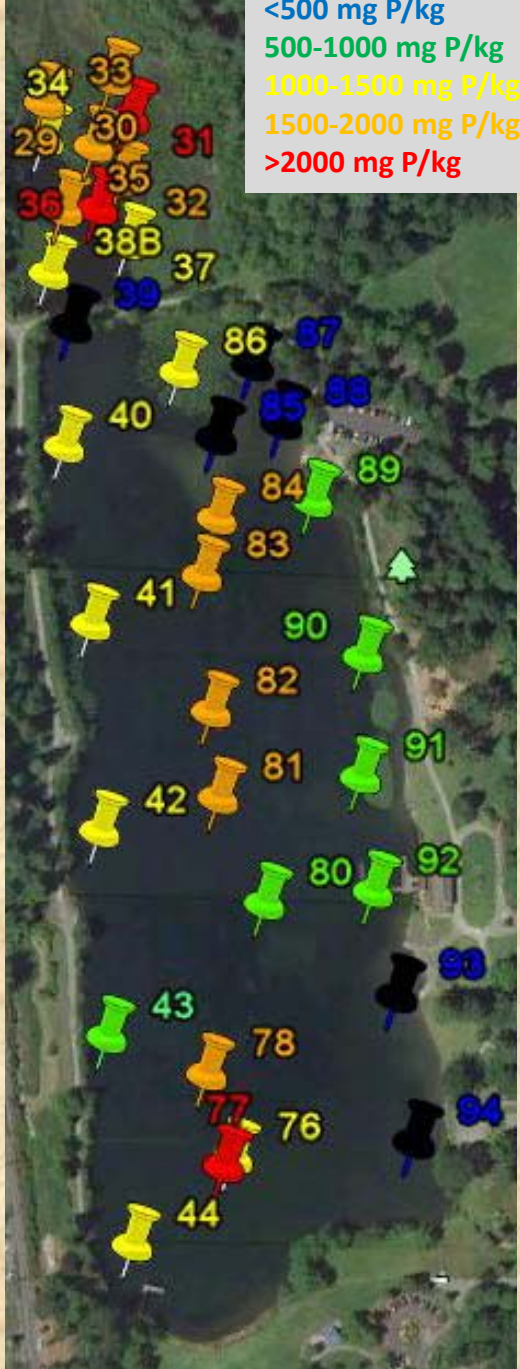
Sediment Cores



Sediment Cores

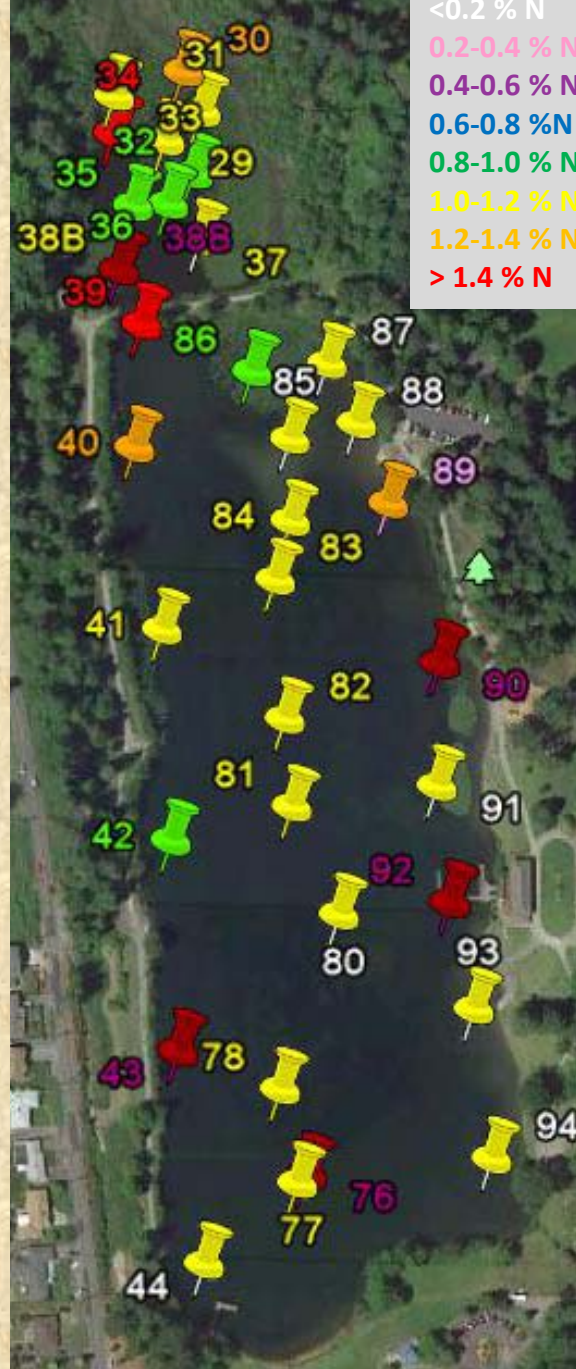


<500 mg P/kg
 500-1000 mg P/kg
 1000-1500 mg P/kg
 1500-2000 mg P/kg
 >2000 mg P/kg



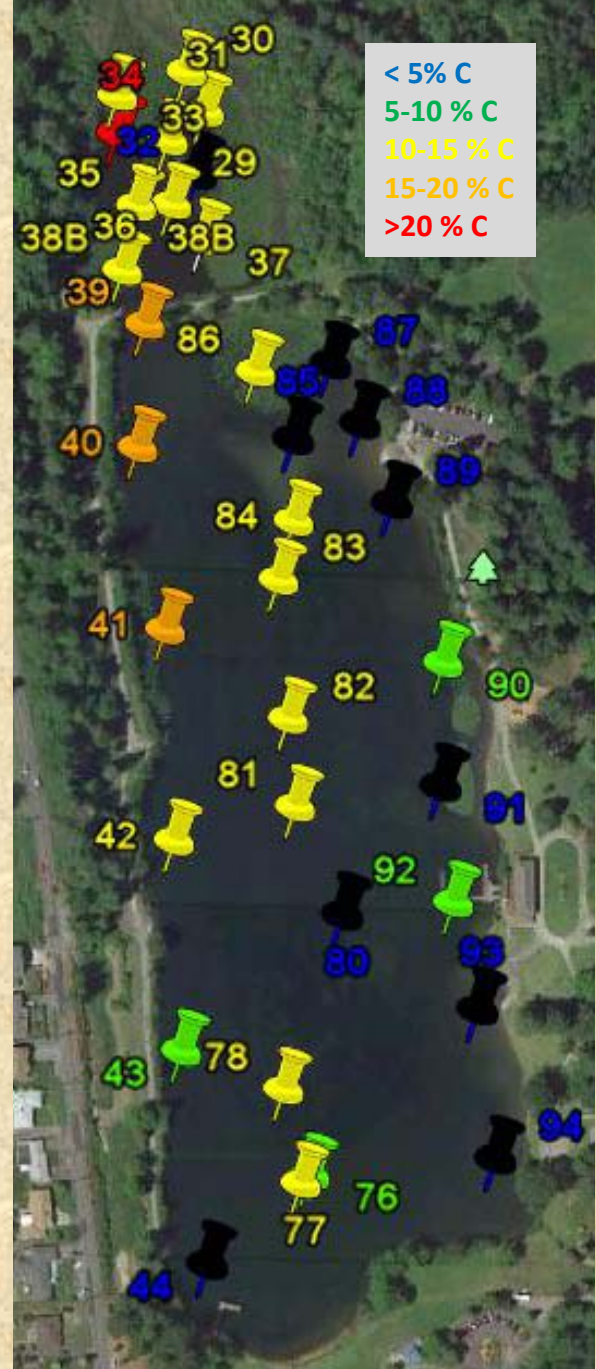
47°11'44.01" N 122°27'21.82" W elev 3

<0.2 % N
 0.2-0.4 % N
 0.4-0.6 % N
 0.6-0.8 % N
 0.8-1.0 % N
 1.0-1.2 % N
 1.2-1.4 % N
 > 1.4 % N



47°11'44.15" N 122°27'21.82" W elev

< 5% C
 5-10 % C
 10-15 % C
 15-20 % C
 >20 % C

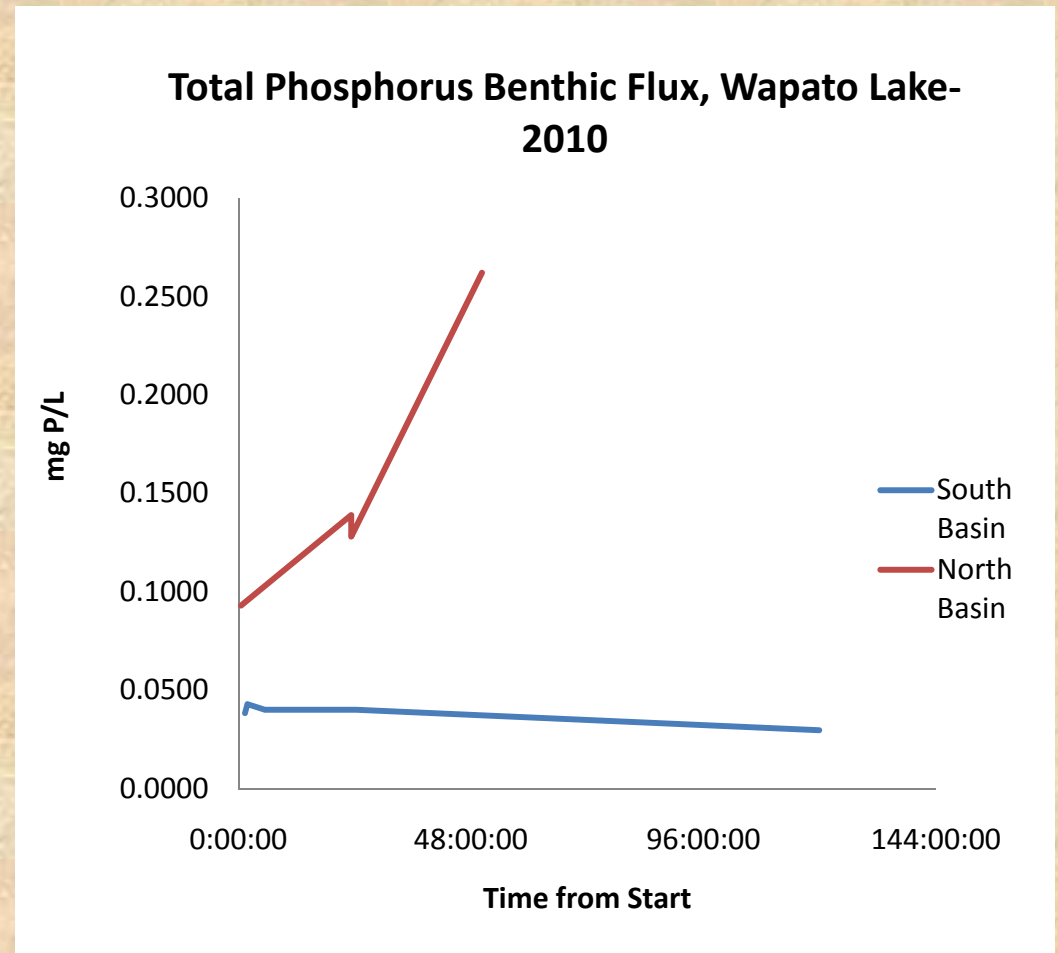


47°11'44.15" N 122°27'21.82" W elev 3

The Next Step...

- Total Nutrient Concentrations (in both basins)
 - Estimated using GIS data
- Phosphorus 536 kg
- Nitrogen 3700 kg
- Carbon 44000 kg

Apply these concentrations to Benthic Flux data to model Total Nutrient Concentrations Released from Wapato Sediment



- 2008 alum treatment is keeping phosphorus from mobilizing out of the sediment
- Phosphorus is being flushed out of the north basin and is now a source to the south basin
- Sediment re-distribution by wind mixing has erased evidence of possible internal source locations in the south basin

Questions?