

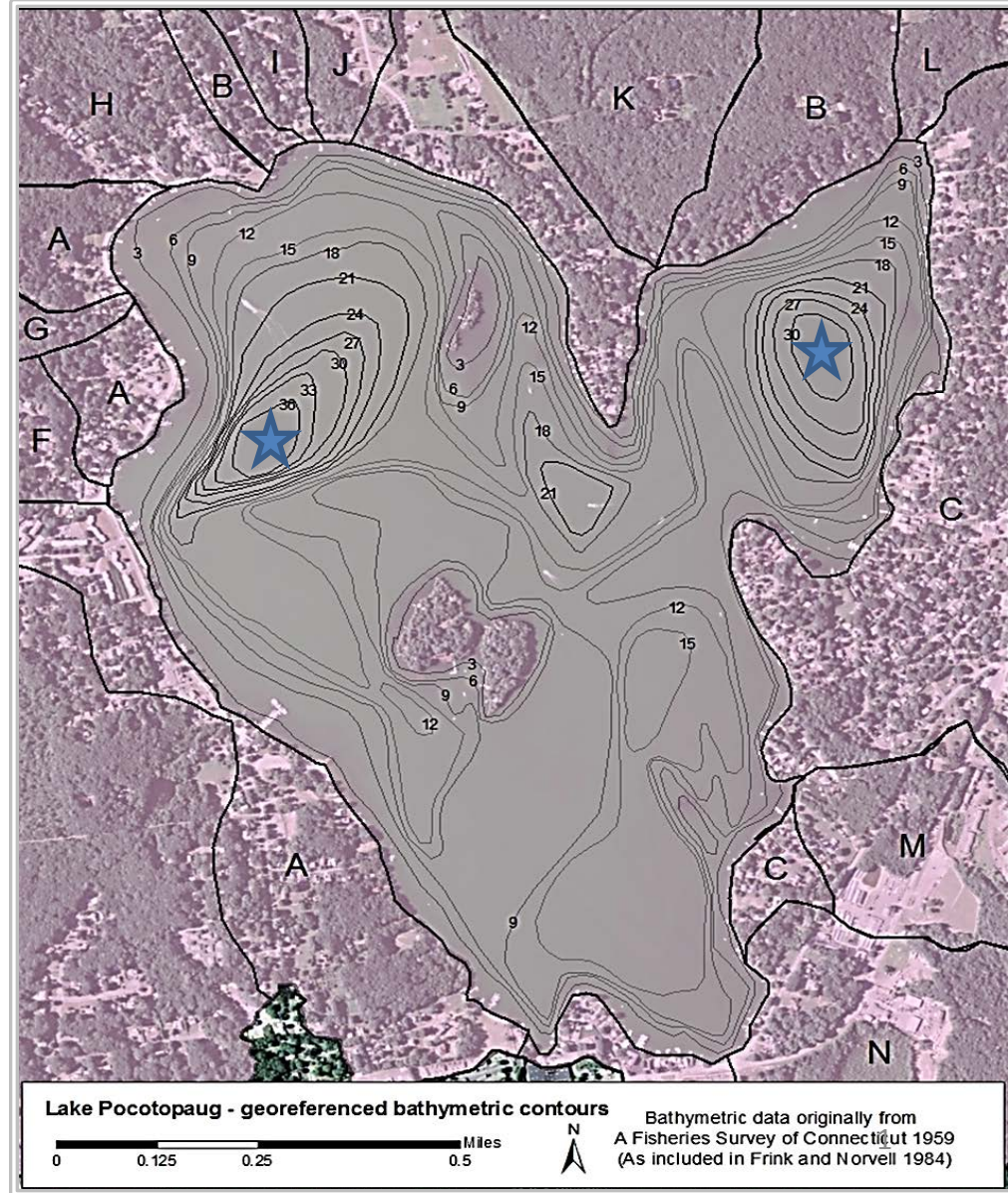
Lake Pocotopaug

Water quality update

July 24, 2018

Lake Pocotopaug monitoring conducted to track the Trophic Factors related to cyanobacteria blooms.

Water Clarity
Water Temperature
Dissolved Oxygen
Phosphorus
Nitrogen
Cyanobacteria

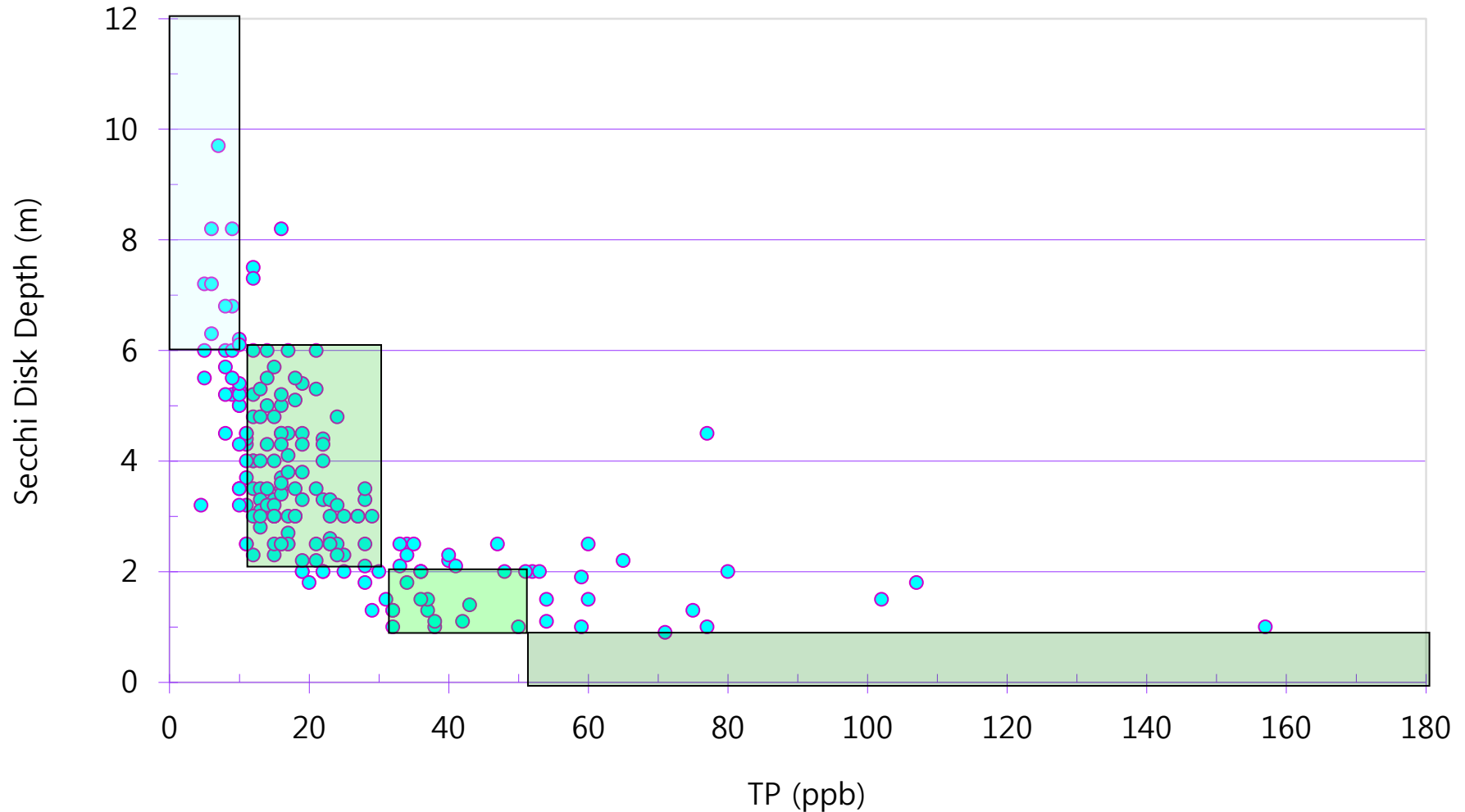


Categories of increasing nutrient levels

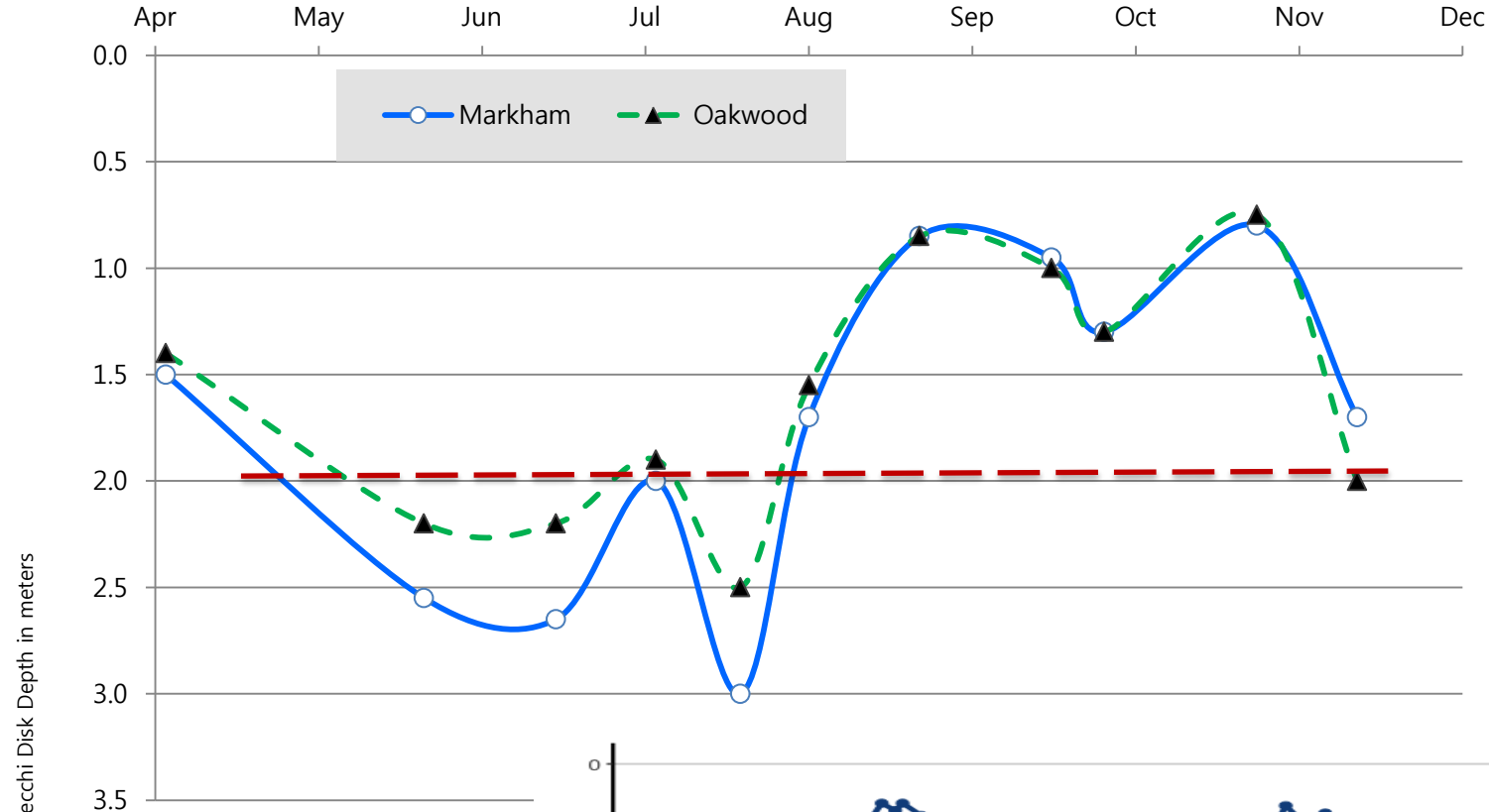
| Trophic state=> | Oligotrophic | Mesotrophic | Eutrophic | Highly Eutrophic |
|-----------------------|--------------|-------------|------------|------------------|
| TP –ppb | 0 – 10 | 10 – 30 | 30 – 50 | >50 |
| TN –ppb | 0 - 200 | 200 - 600 | 600 - 1000 | >1000 |
| Secchi –meters | >6 | 6 - 2 | 2 – 1 | <1 |
| Chlor.- <i>a</i> –ppb | 0 - 2 | 2 – 15 | 15 – 30 | >30 |

Lakes should remain on the left side of the red line to support Recreational Use

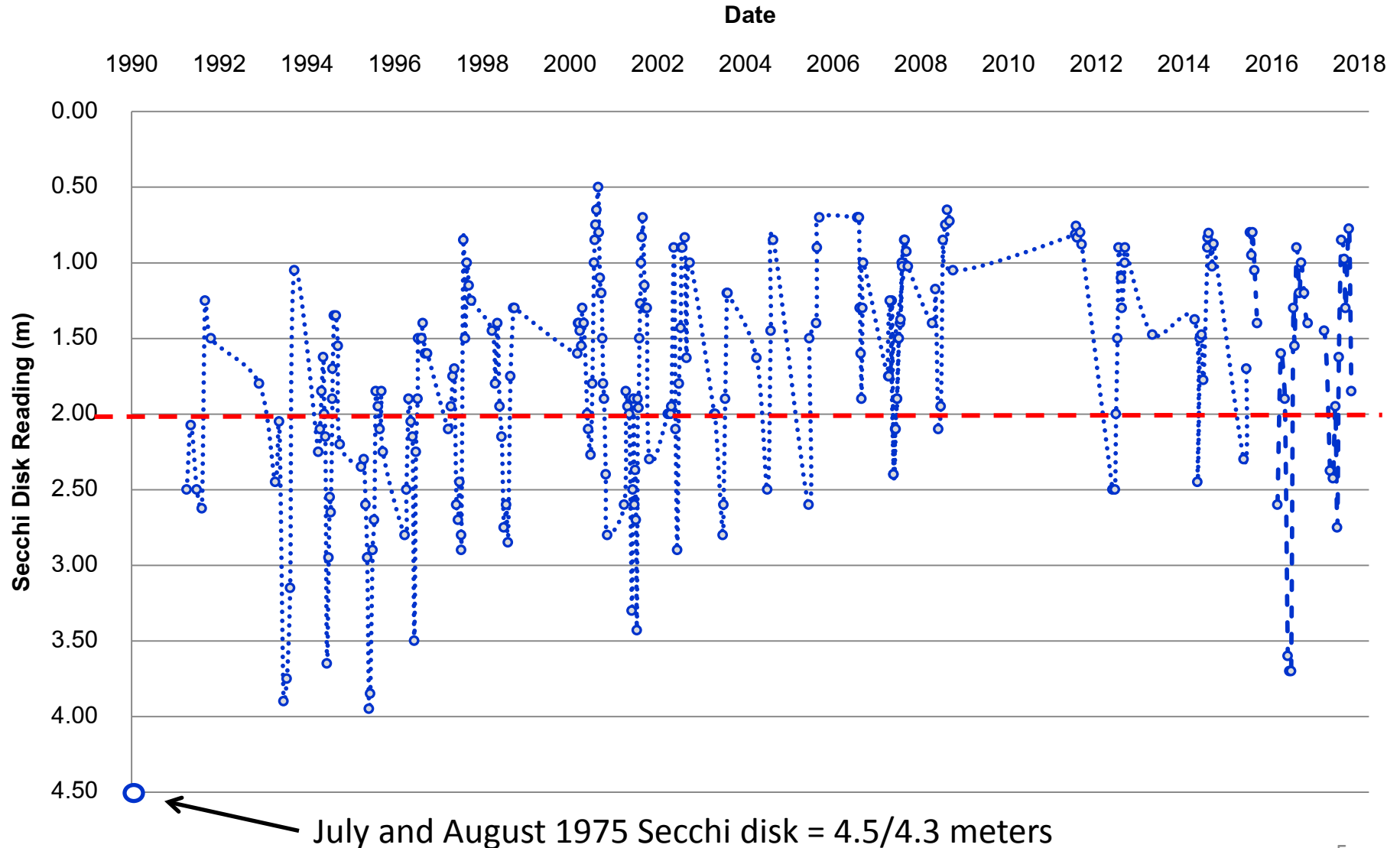
Relationship between increasing phosphorus and declining water clarity



Water Clarity- Secchi disk depth

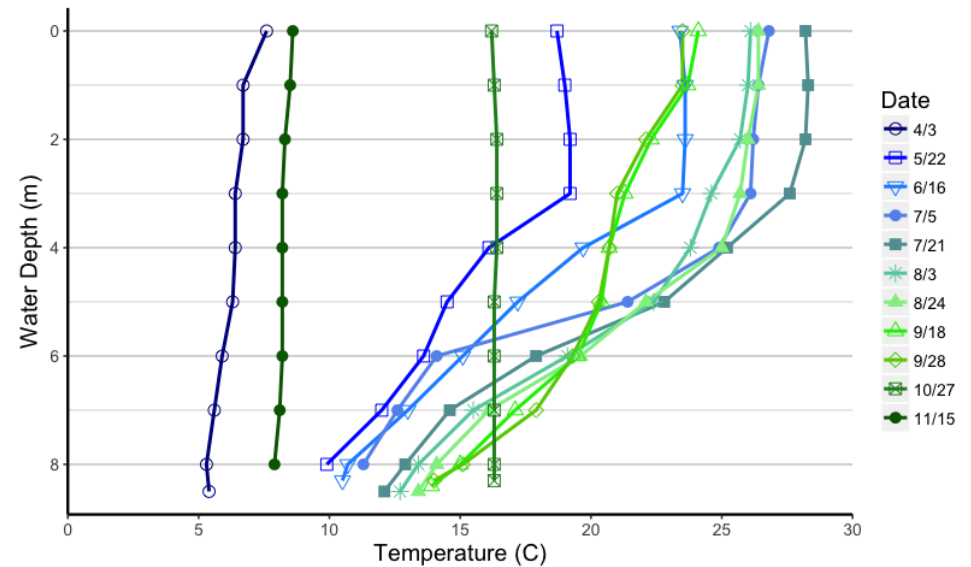


Long-term water clarity trend

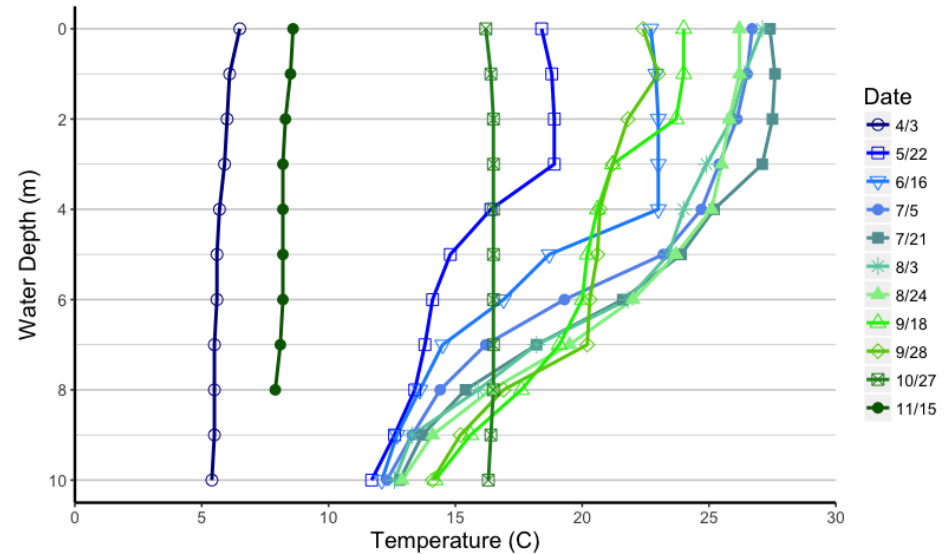


Water Temperature

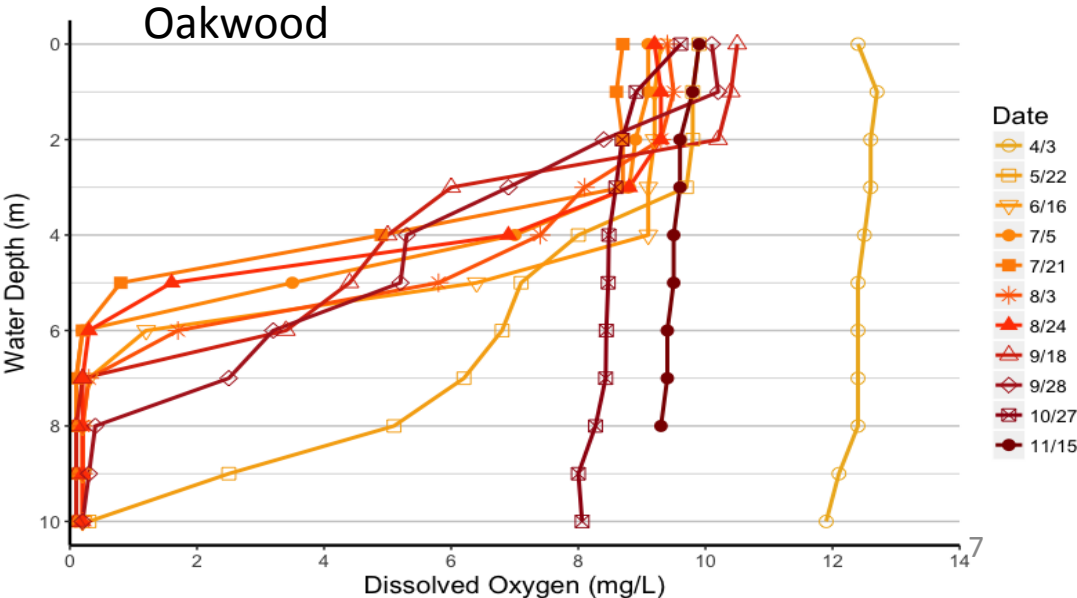
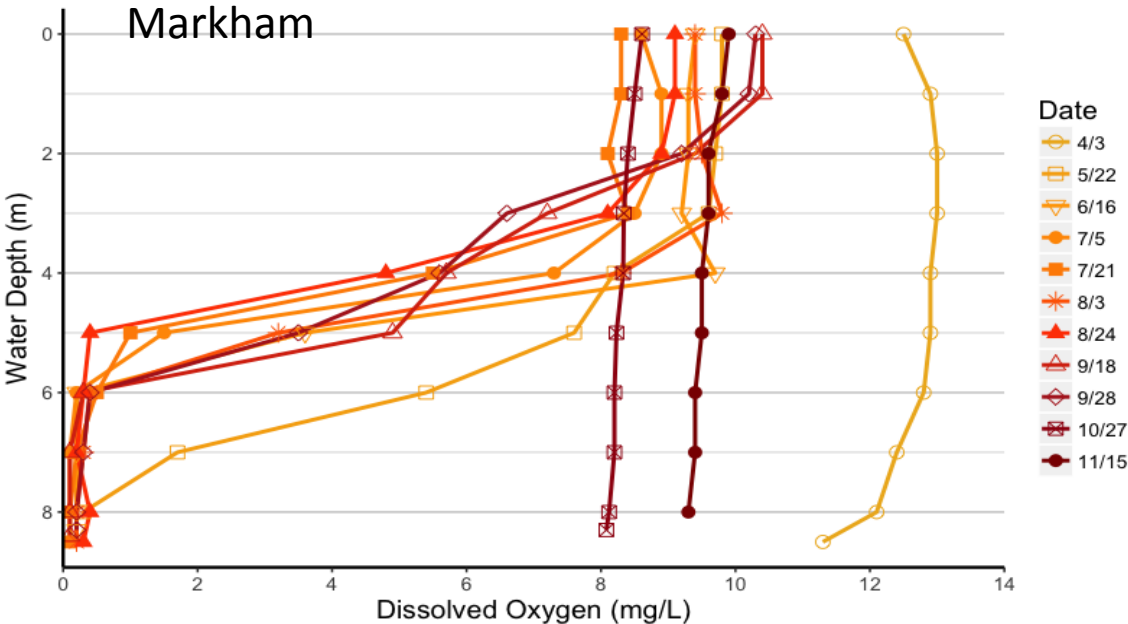
Markham



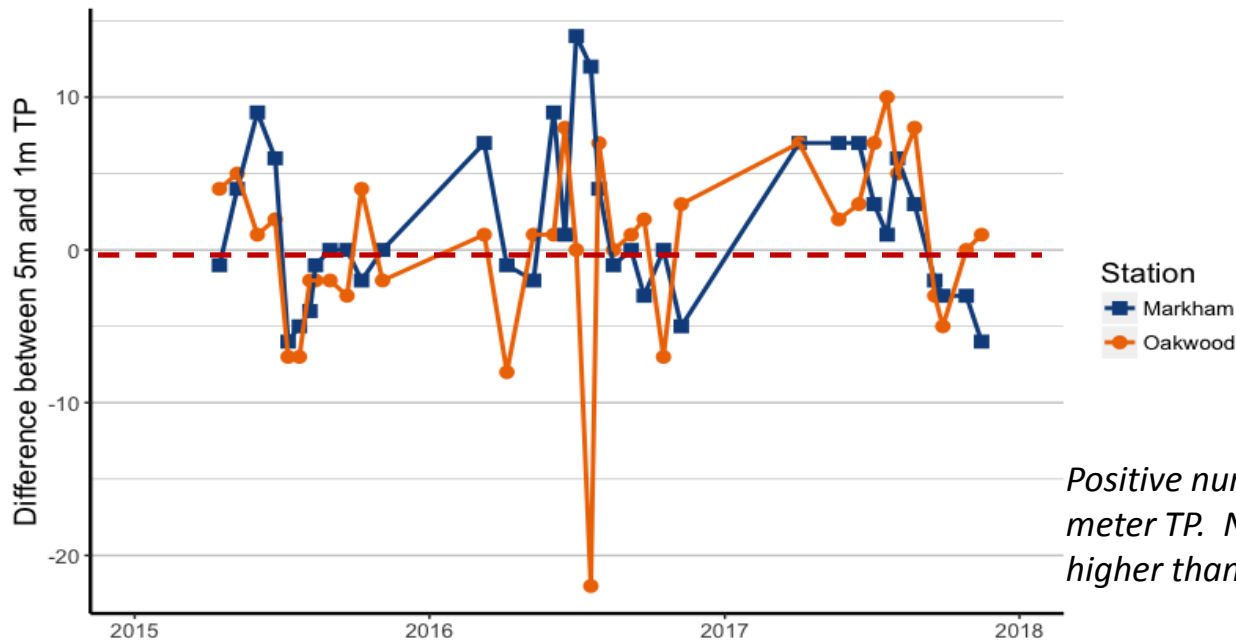
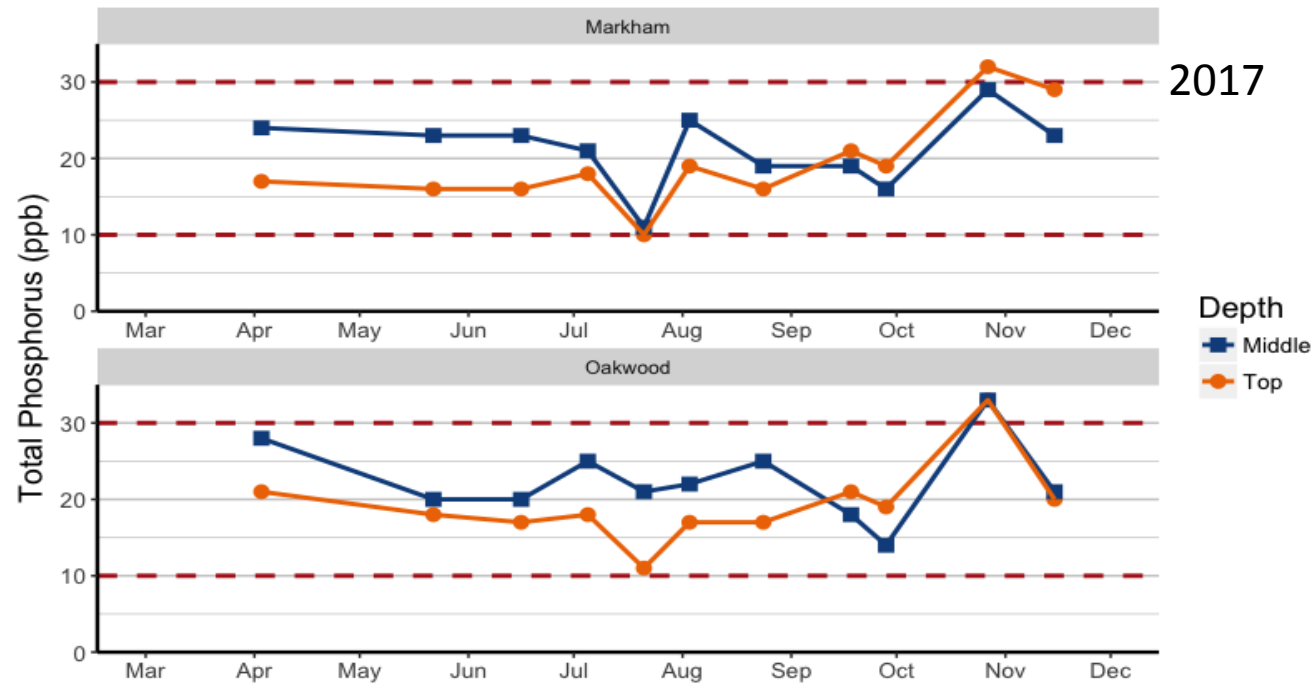
Oakwood



Dissolved Oxygen

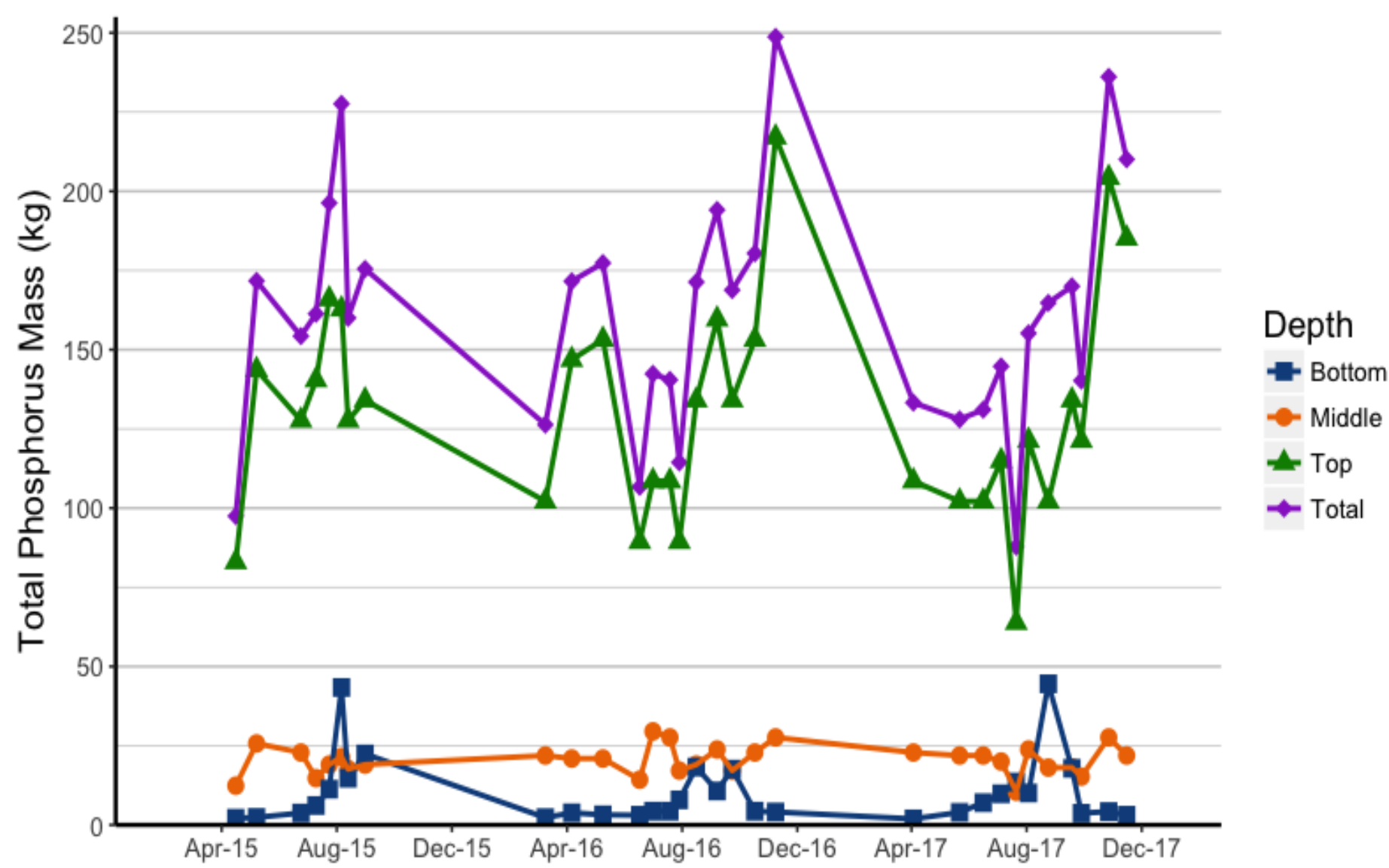


Phosphorus

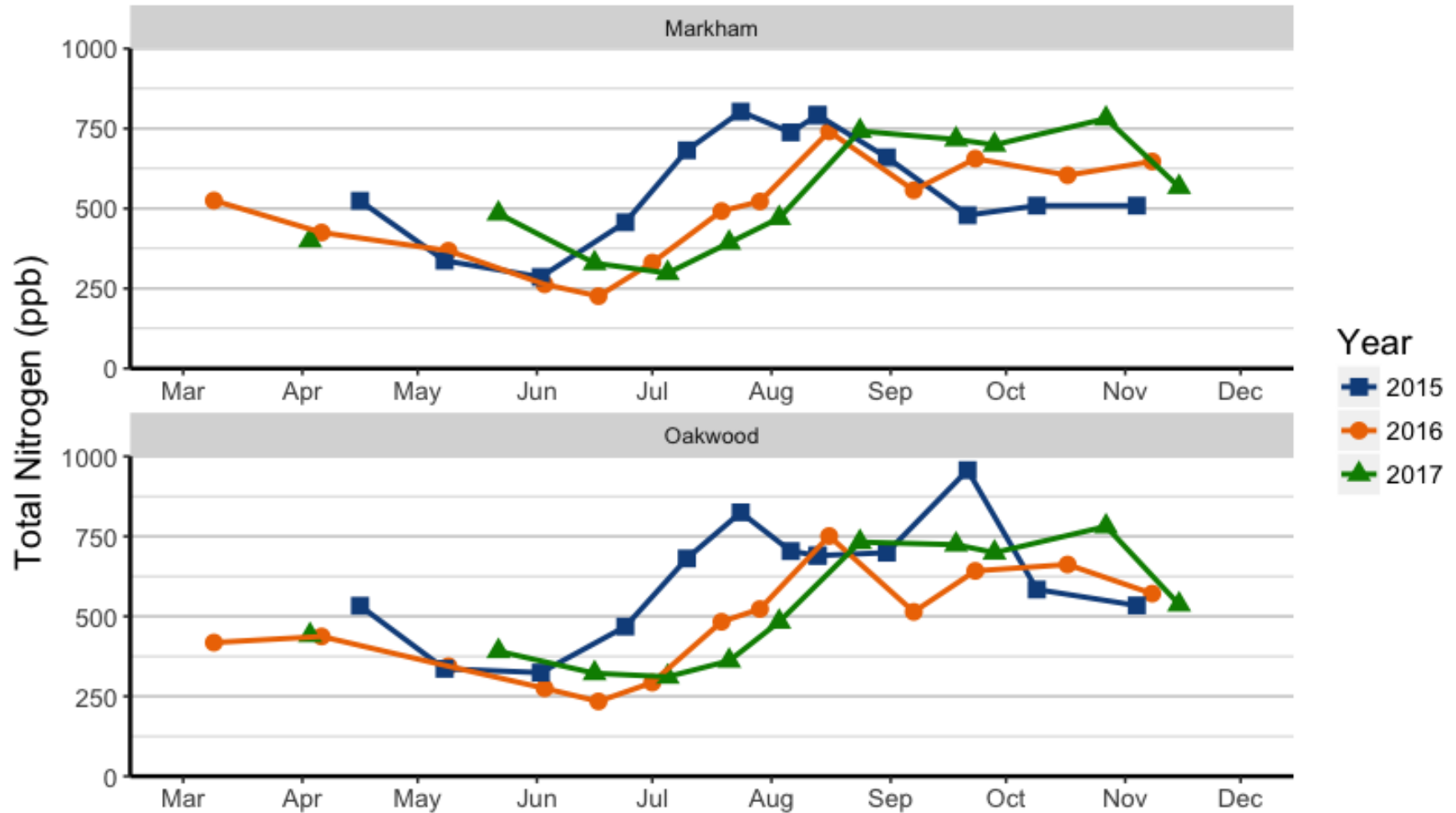


Positive numbers mean 5m TP was higher than 1 meter TP. Negative numbers mean 1 meter TP was higher than 5m.

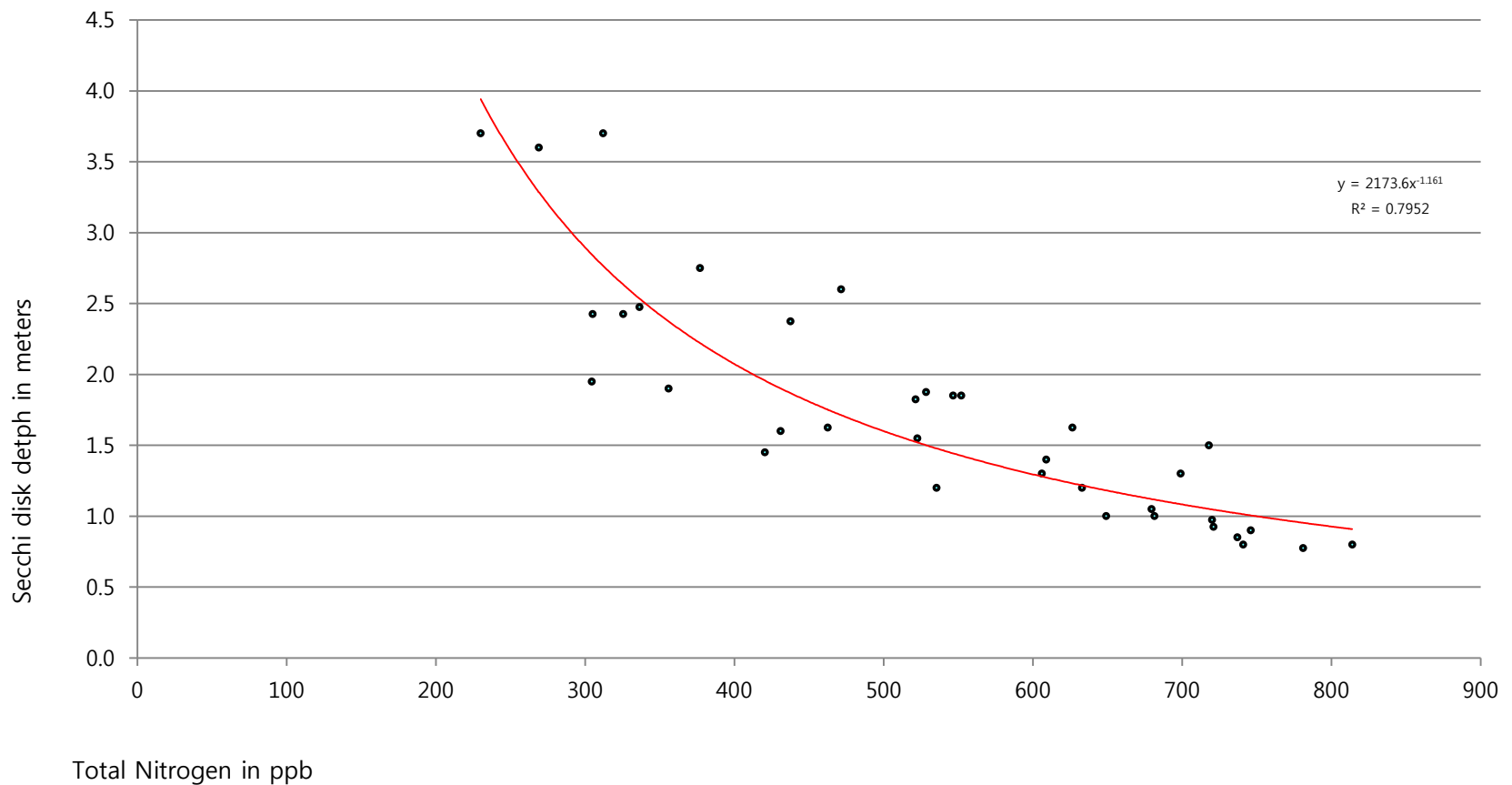
Phosphorus as mass (kg)



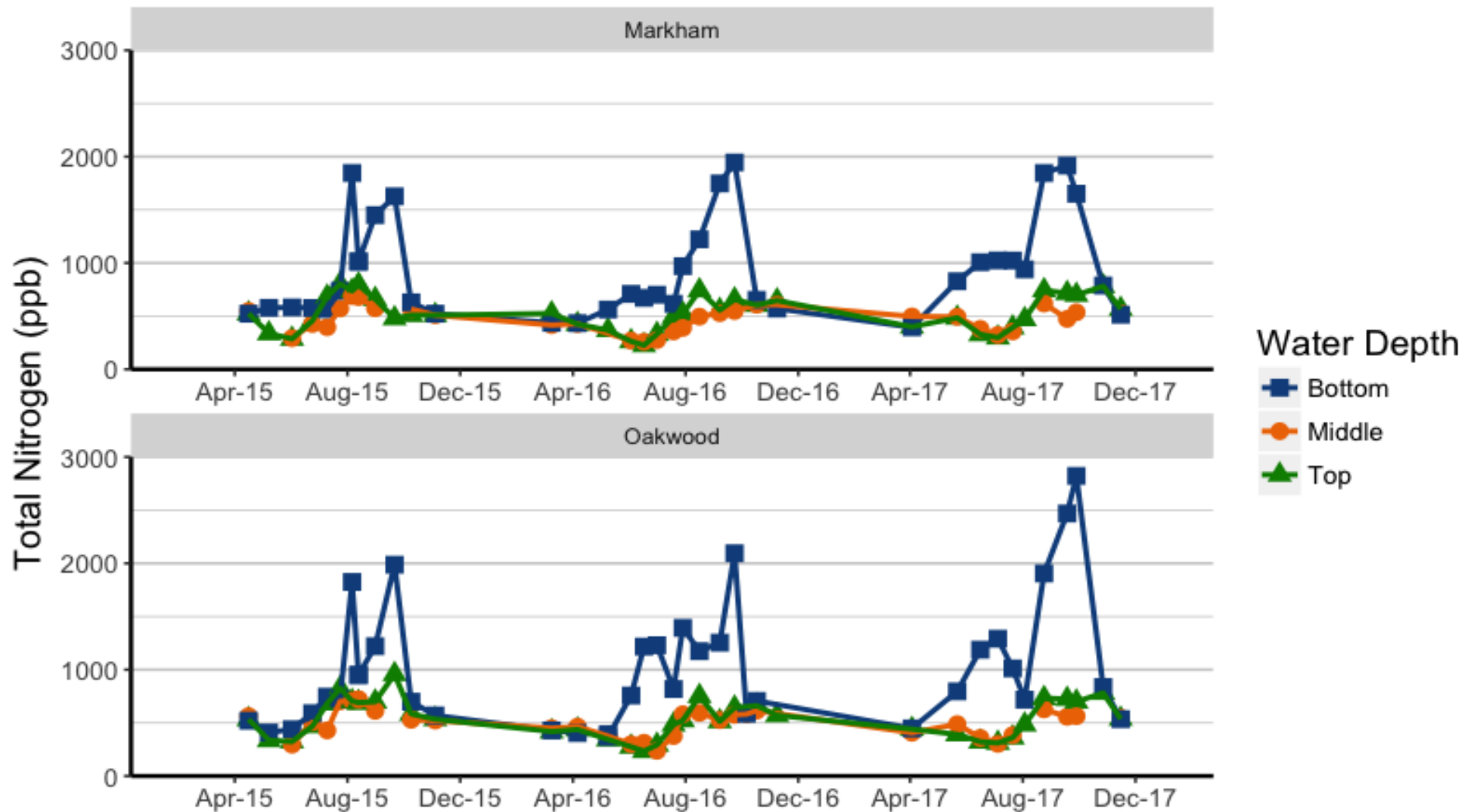
Total Nitrogen



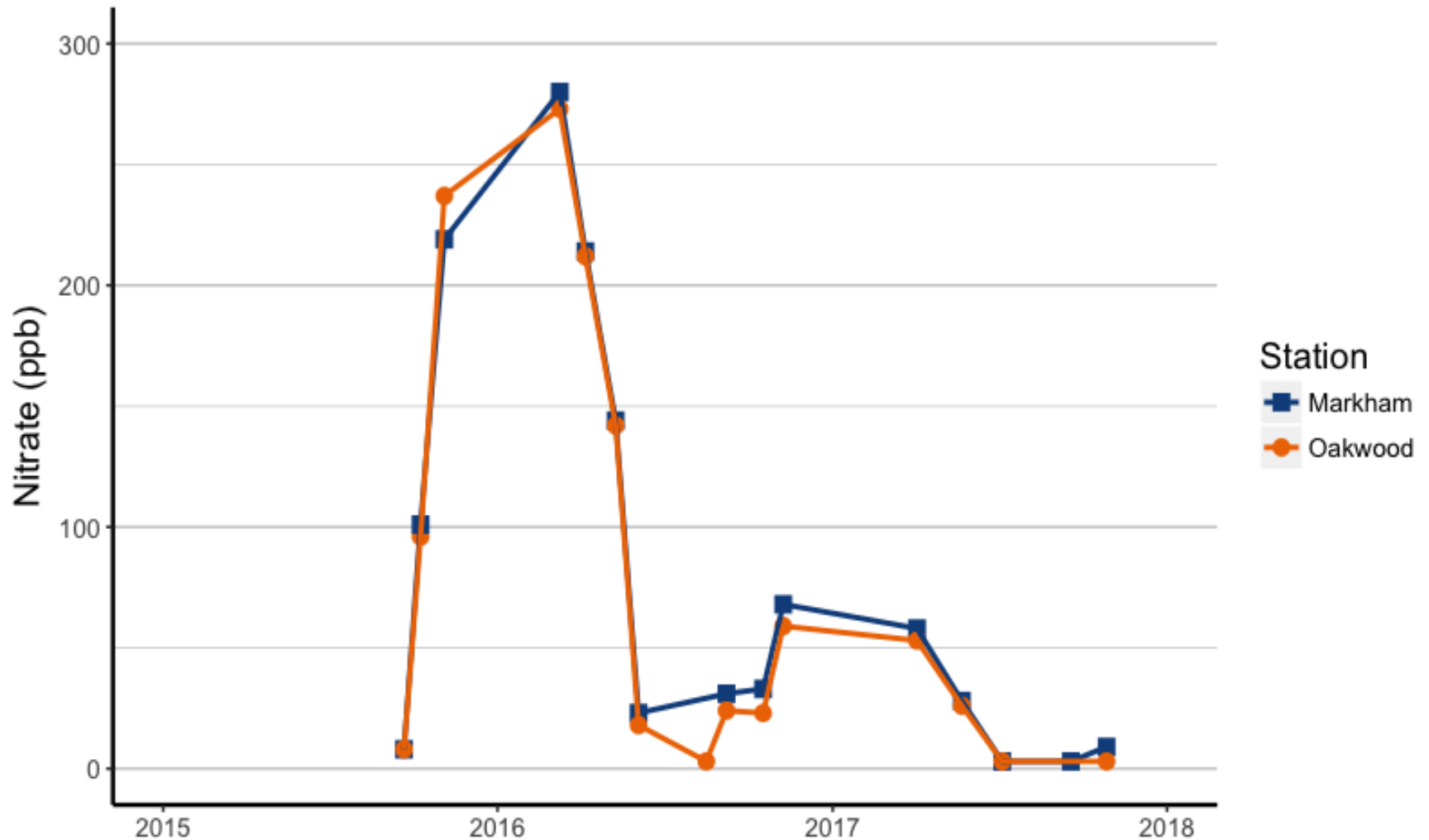
Total Nitrogen and Secchi disk depth



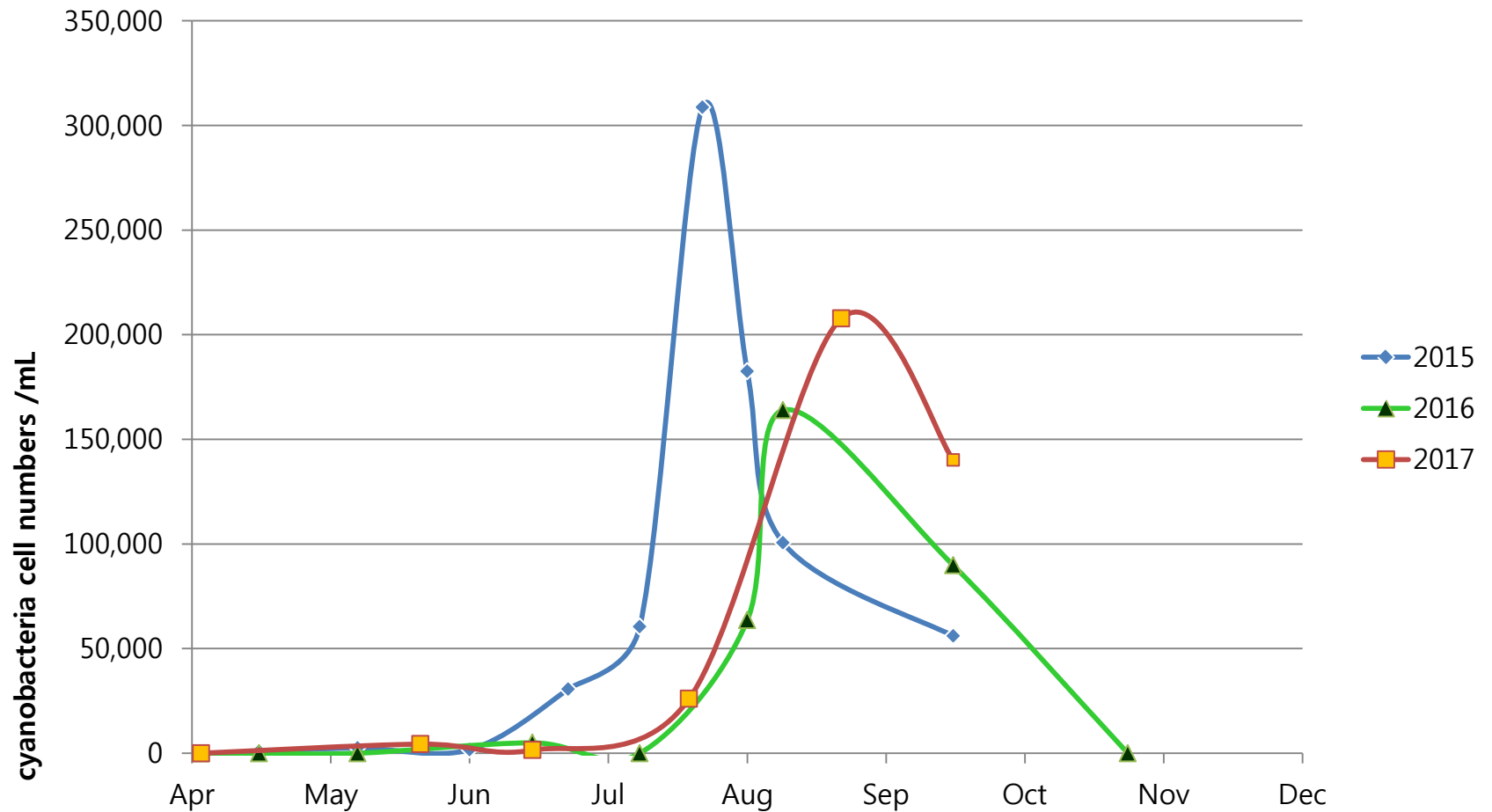
Total Nitrogen



Surface water nitrate



Cyanobacteria Cell Numbers



| 8-3-2017 | Christopher Brook | | | Hales Brook | Fawn Brook |
|-----------------------|-------------------|------------------|------------|-------------|------------|
| | At Lake | Christopher Road | Clark Hill | | |
| Total Phosphorus ppb | 111 | 60 | 85 | 24 | 27 |
| Total Nitrogen ppb | 939 | 842 | 687 | 373 | 521 |
| Suspended Solids mg/L | 16 | 10 | 13 | <2 | 3 |



Summary

- Water clarity is good for only two months every year; May and June.
- Water clarity declines rapidly in July as cyanobacteria numbers increase to reach seasonal low values between August-October.
- Temperature profiles show very strong stratification below about 3 meters that persists until October.
- Oxygen is depleted below 6 meters by June, and 5 meters by August.
- Oxygen and water temperature profiles show abnormalities in changes with depth suggesting groundwater influx.
- Phosphorus in upper waters mostly remains between 10 and 30 ppb suggesting that the lake has enough phosphorus generally to promote blooms.
- Phosphorus in bottom water can reach 150-300 ppb during summer, however it is unclear if these high concentrations are transferred to upper water.
- Nitrogen levels are good in spring months March – June, but rapidly increases in July to remain at high levels for the remainder of the season.
- Increased nitrogen levels occur contemporaneously with increased cyanobacteria numbers such that this is a good relationship between TN and cyanobacteria.
- It is unclear if there is transference between high bottom nitrogen and upper waters.
- High levels of nitrate nitrogen appear in the lake water in late fall and early spring indicative of watershed loading.
- Cyanobacteria numbers exceed 100,000 cells/mL each summer and fall
- Watershed nutrient loading may be getting worse based on declining vernal phosphorus content but inlets were not monitored in 2017