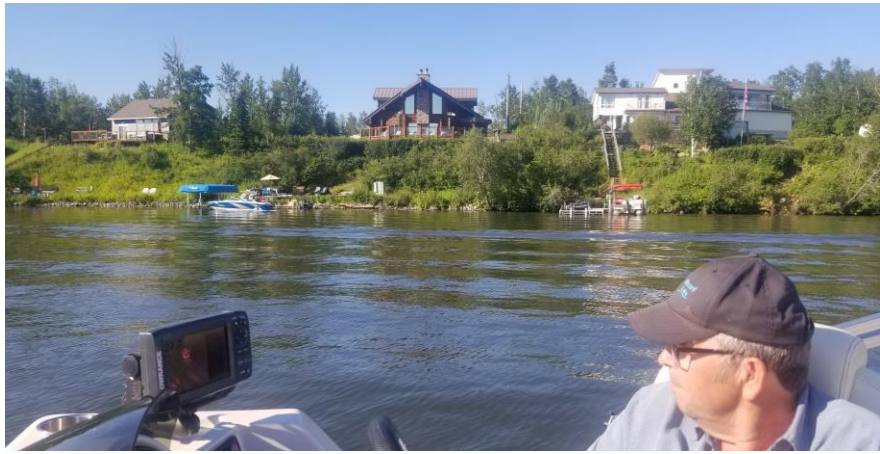
Associated Environmental

CANADA BEST MANAGED COMPANIES Platinum member



Wizard Lake

Preliminary Data Summary

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November 10, 2020

Overview

- Summary of Existing Documents – What do we know?
- Tributary Sampling Approach:
  - Locations
  - Sampling Procedures
  - Sampling Dates
- Tributary Water Quality Results + Interpretation
- Summary and Recommendations

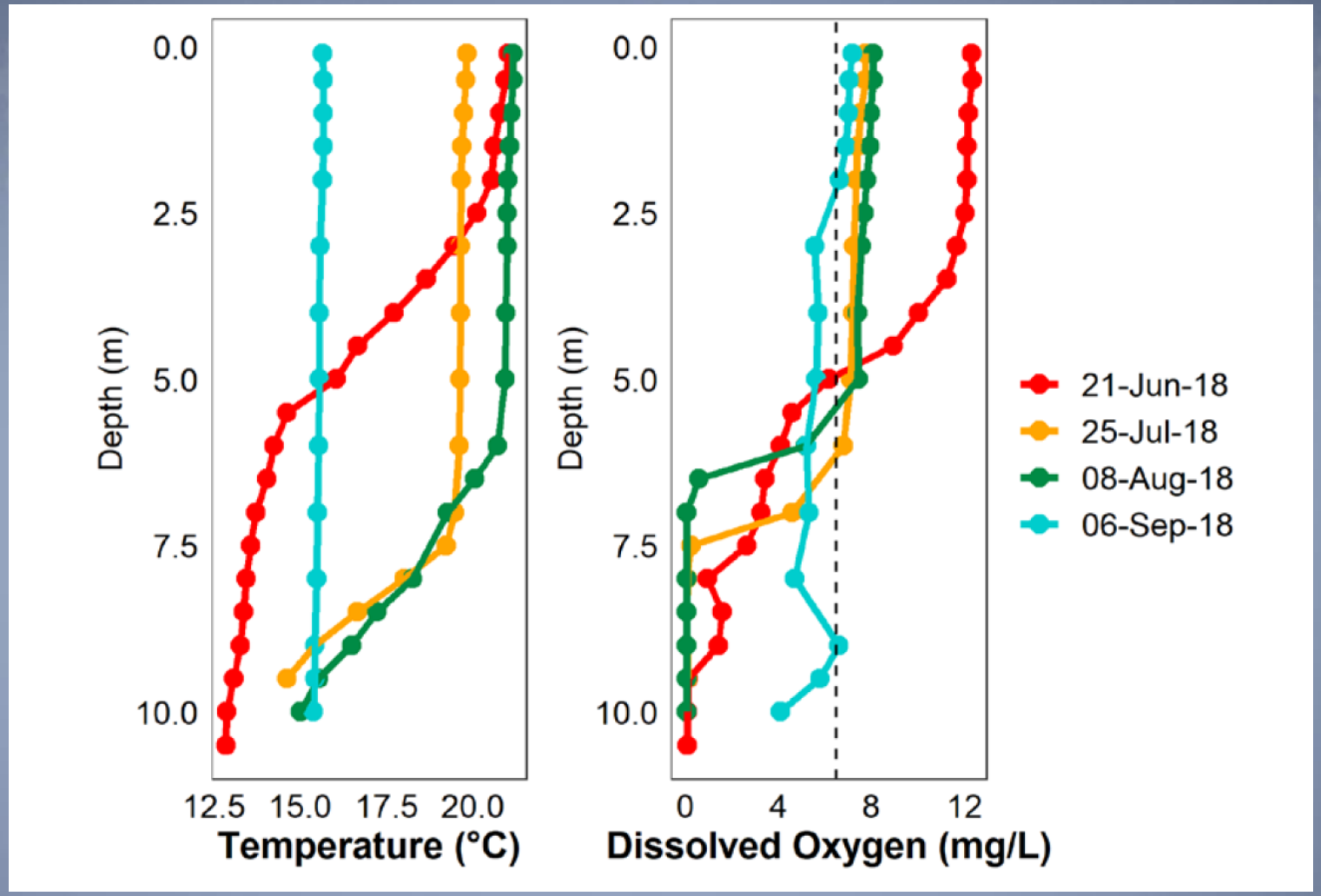
Lots of Work Done!

Report	Author	Years of Report(s)
The Alberta Lake Management Society Lakewatch Program: Wizard **Lake Water Quality**	Alberta Lake Management Society	2006, 2008, 2009, 2010, 2011, 2013, 2016, 2018
Wabamun–Genesee Area **Biomonitoring** Program	TransAlta	2015, 2016, 2017
Regional **Groundwater** Assessment Leduc County	Hydrogeological Consultants Ltd	1999
Regional Groundwater Assessment Wetaskiwin County	Hydrogeological Consultants Ltd	2008
Shoreline Assessment - Wizard Lake	North Saskatchewan Watershed Alliance	2016
Wizard Lake **State of the Watershed** Report	Aquality Environmental Consulting	2012
Strawberry Watershed **Riparian Area Assessment**	Fiera Biological Consulting	2018
Water Quality of Wizard Lake	Alberta Environmental Protection	1998
Tracking changes in water quality due to catchment land-use and lake morphometry across spatial and temporal scales	Zofia Taranu, McGill University (Thesis)	2007

What do we know about Wizard Lake?

- Eutrophic: nutrient rich, plenty of algae: average for AB
- Deep (max. depth: 11 m) and stratified (see next slide)
- Water quality did not change 2006-2018
- Water levels vary with no trend

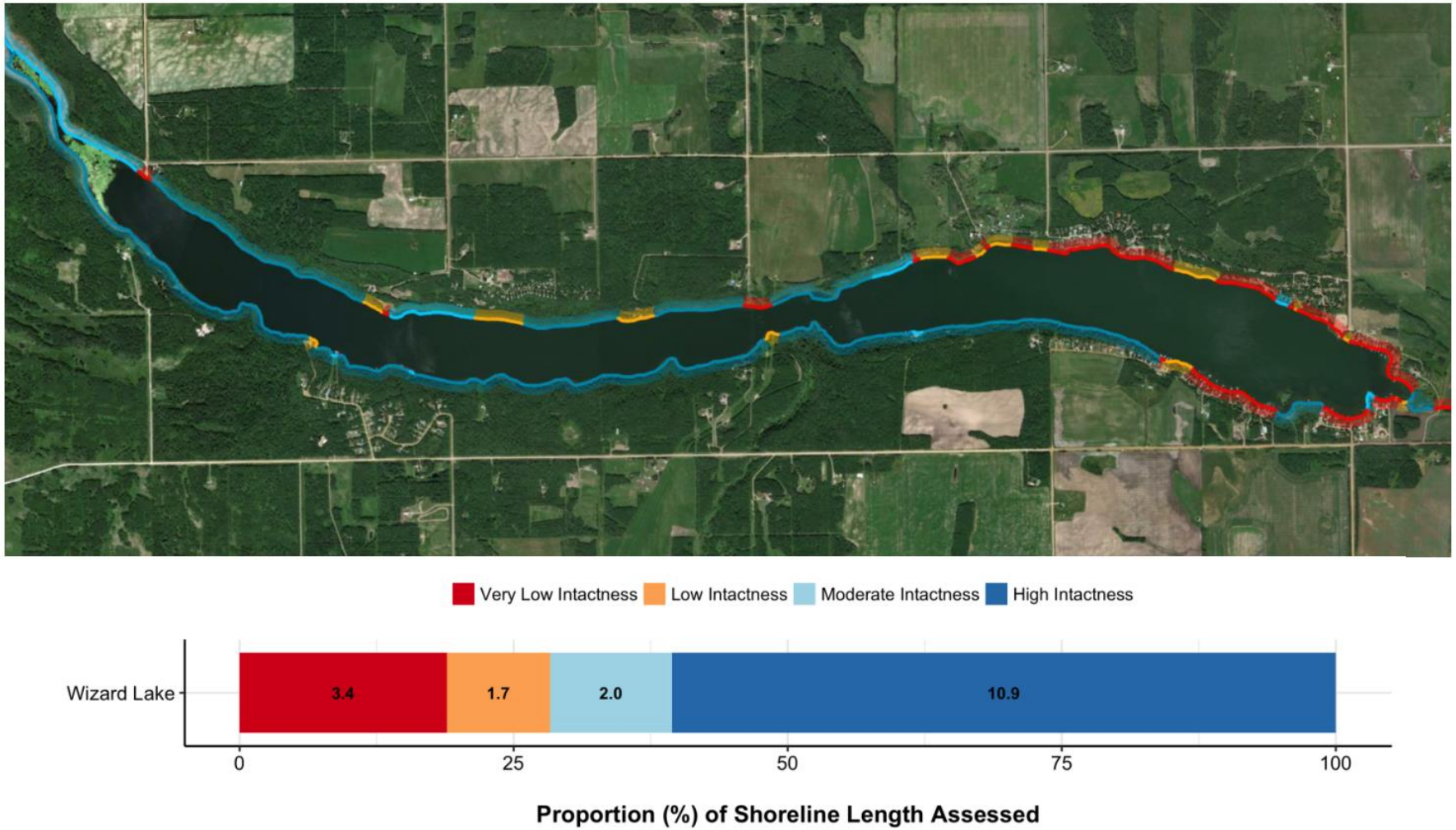
Stratification and Anoxia



Thermal layering (Stratification) results in oxygen depletion in bottom waters

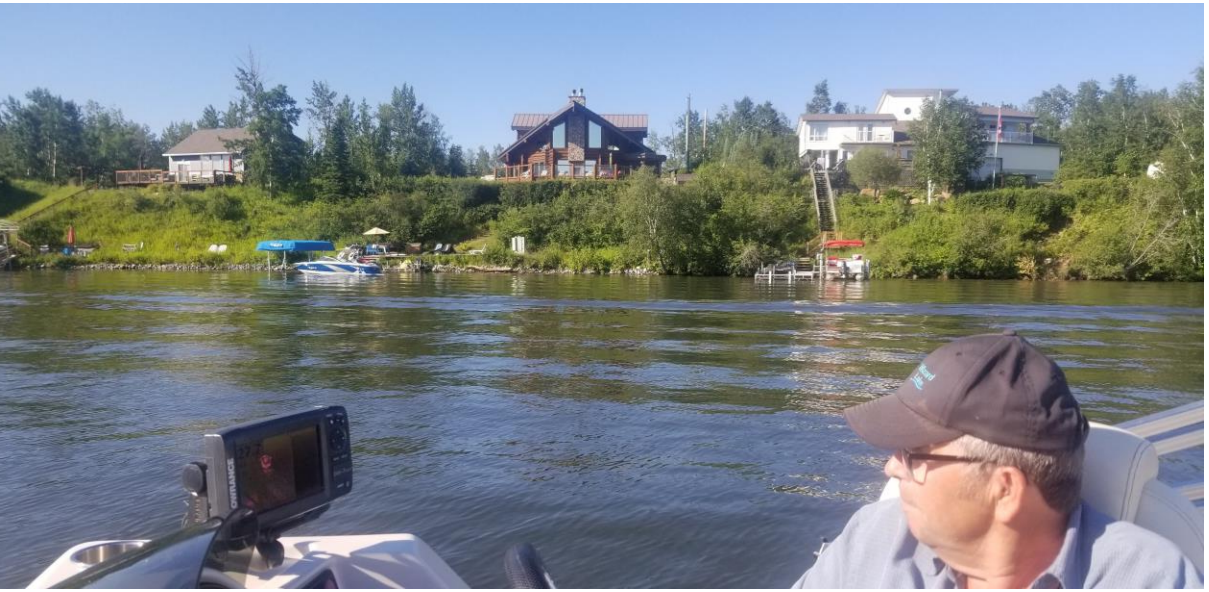
From: Alberta Lake Management Society 2019. Wizard Lake Report. Lakewatch Volunteer Lake Monitoring Program.

Shoreline Health: 75% Moderate – High Intact

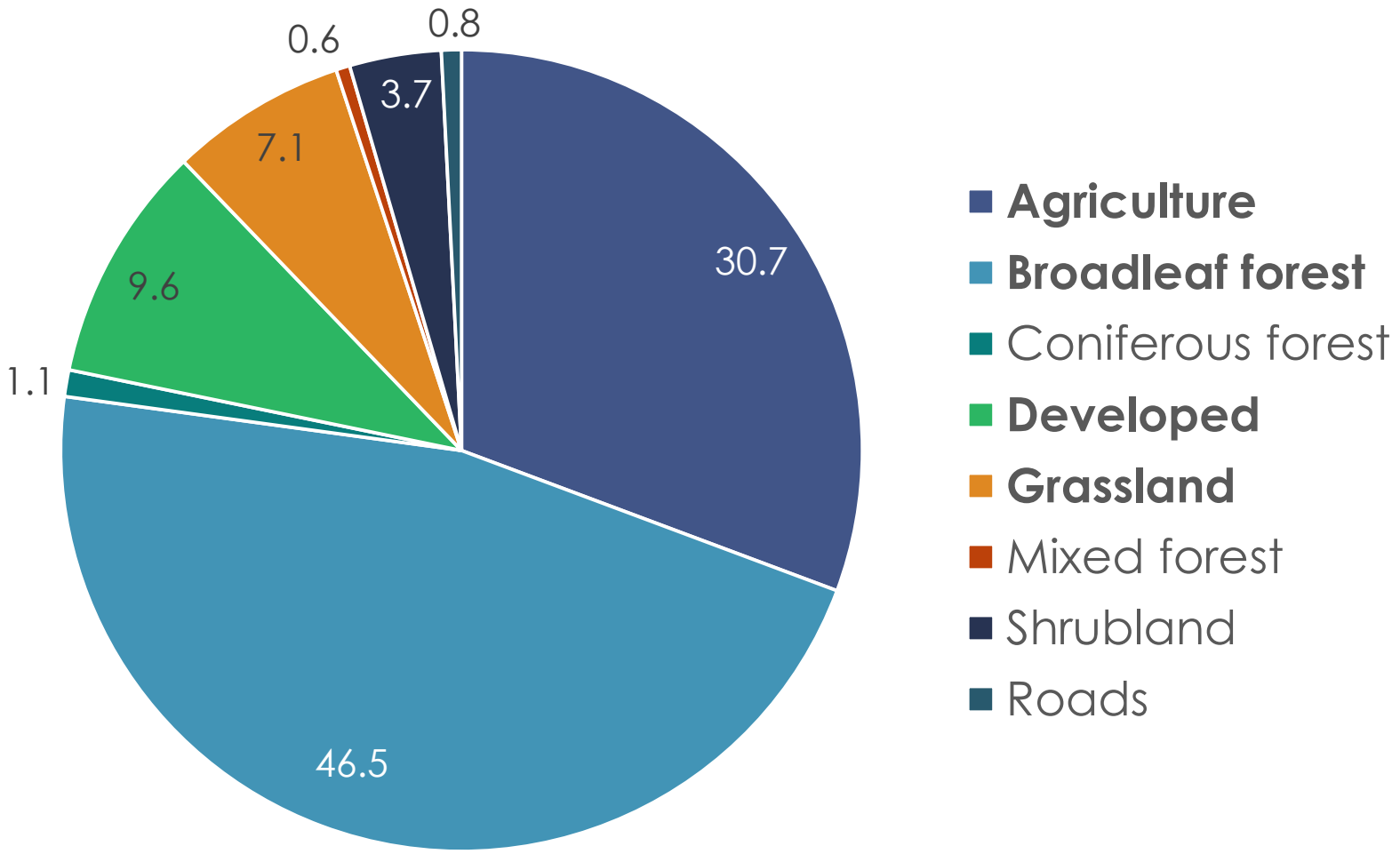


From: Fiera Biological Consulting Ltd. 2018. Strawberry Watershed Riparian Area Assessment

Shoreline Health: Examples



Watershed Land Cover



Tributary Sampling Approach

Sampling Locations

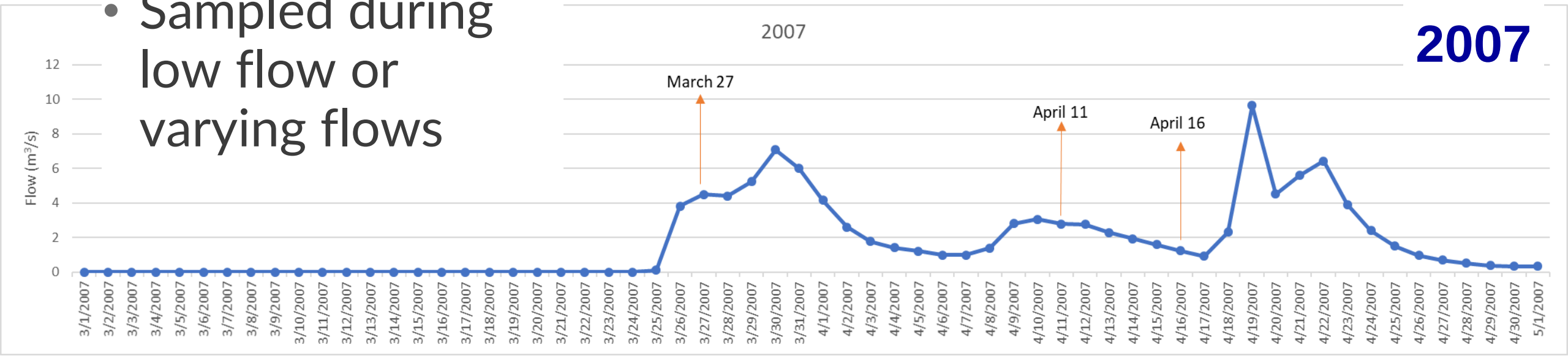
- Inflows 1-4 are useful to study watershed water quality
- Trib A, Trib B are outside of Wizard Lake watershed, so they are not directly relevant for Wizard Lake water quality

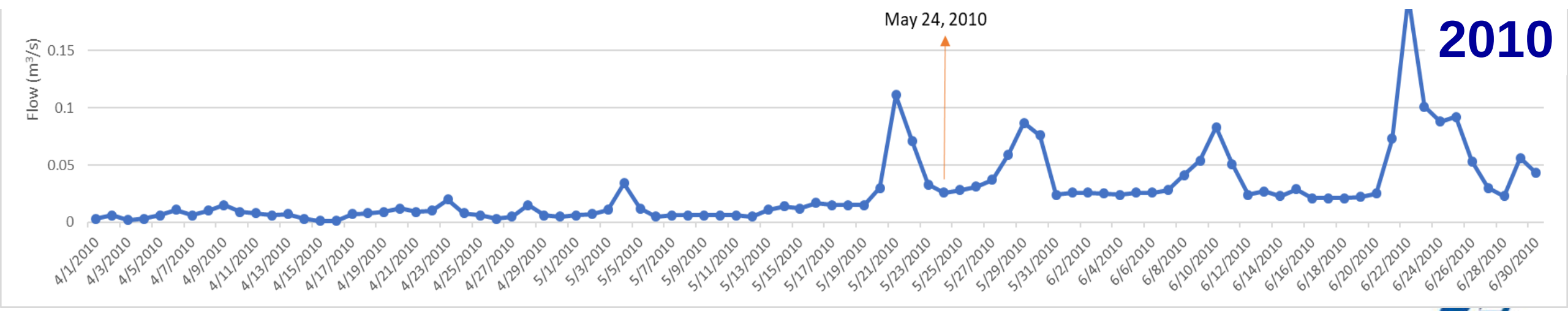
Sampling Methods

- Overall sampling methods were like those of environmental scientists
- In the future, consider field filtering samples for dissolved parameters

Sampling Dates 2007, 2010

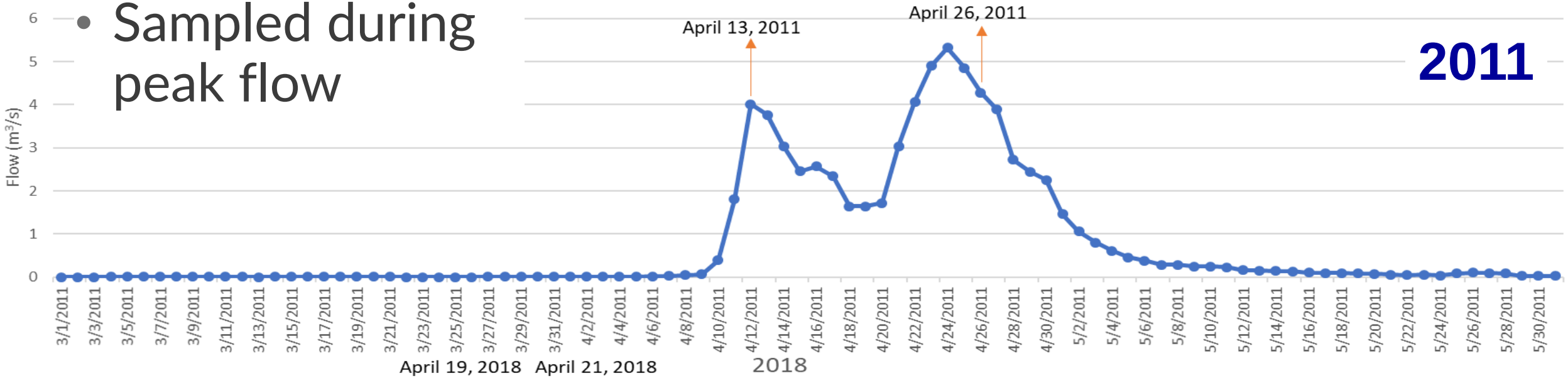
- Sampled during low flow or varying flows

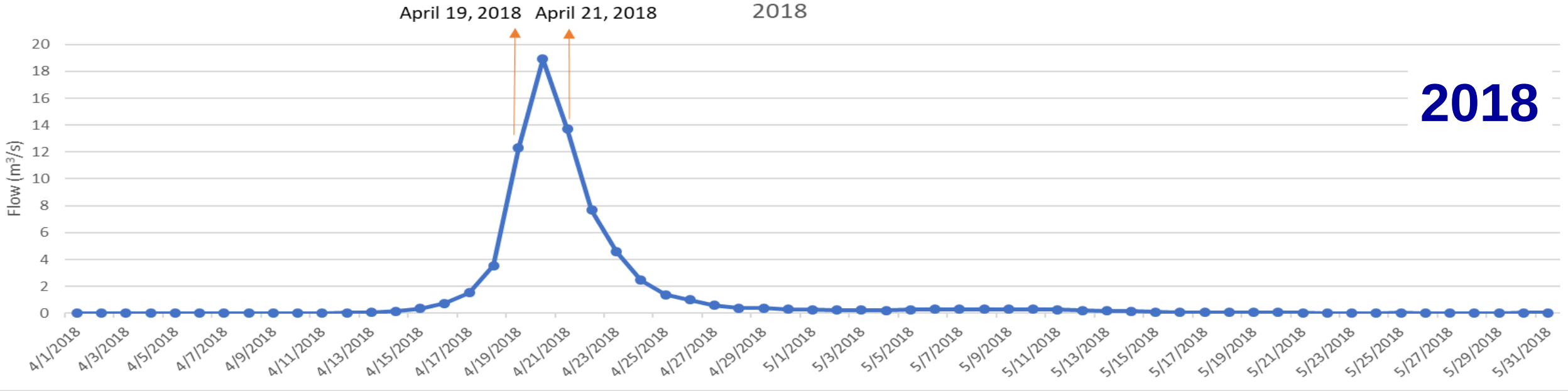




Sample Dates 2011, 2018

- Sampled during peak flow

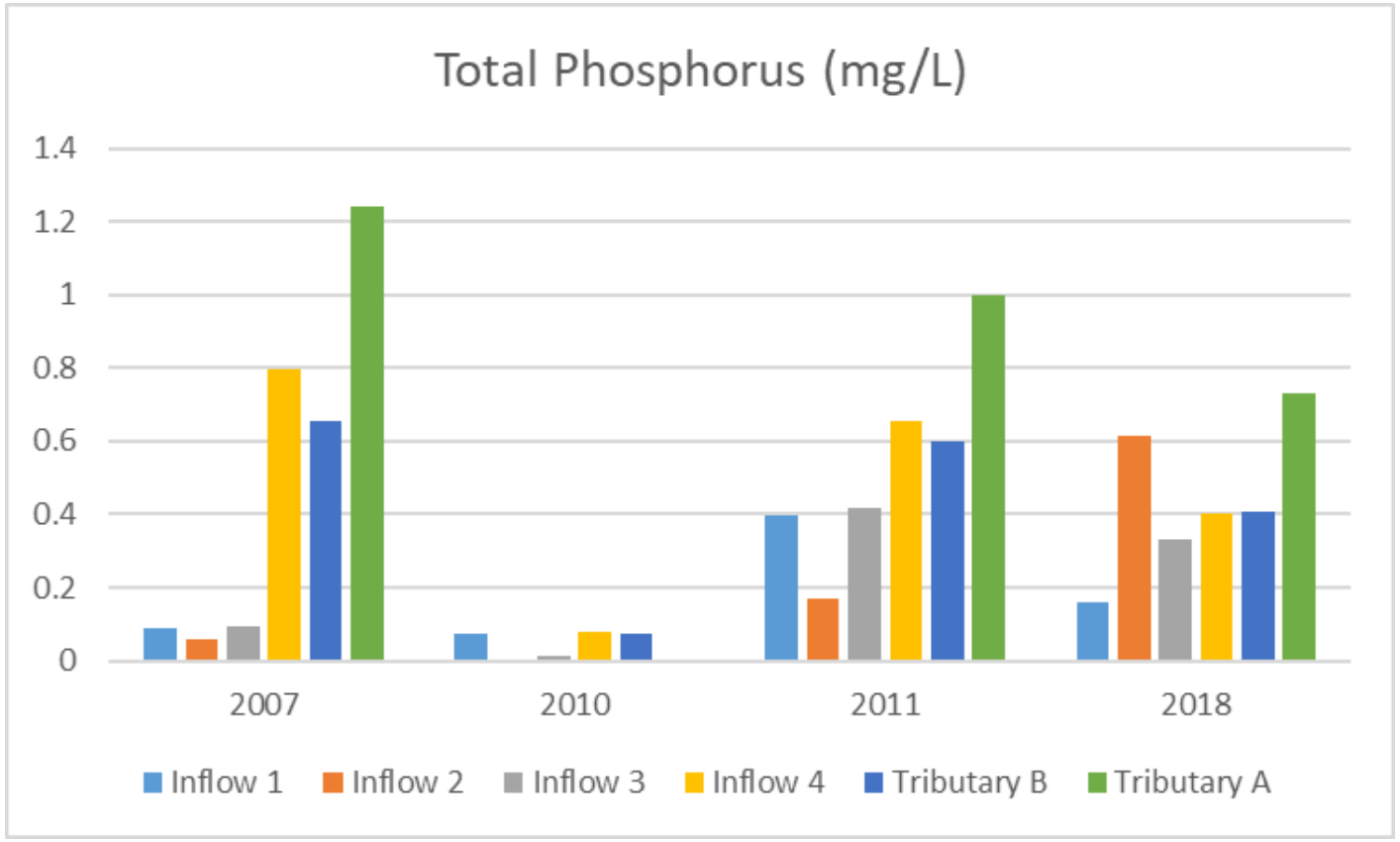




Tributary Water Quality Results

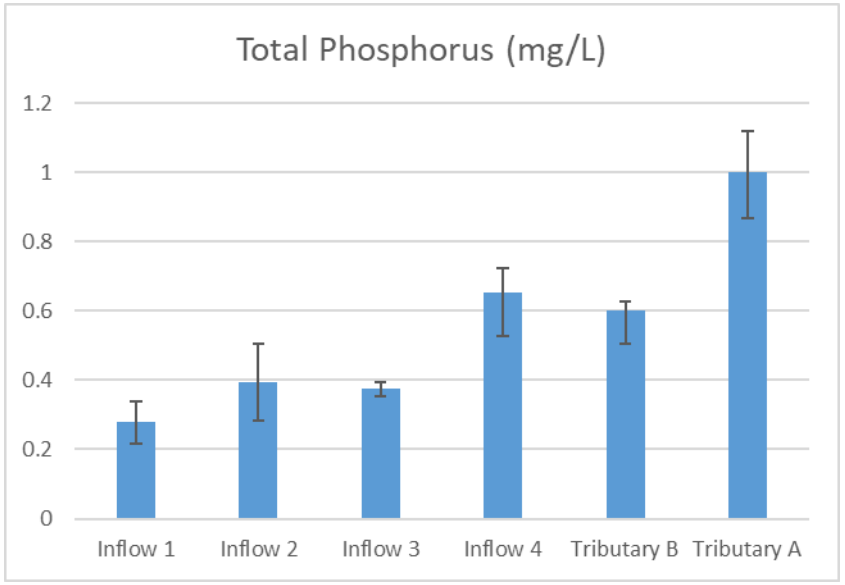
Total Phosphorus (TP): compare years

- 2011, 2018 – generally highest TP concentrations
- 2007 - Highest TP concentrations in late March, (sites 4, B, A) compared to mid-April (sites 1-3)
- 2010 – low concentrations due to low flow



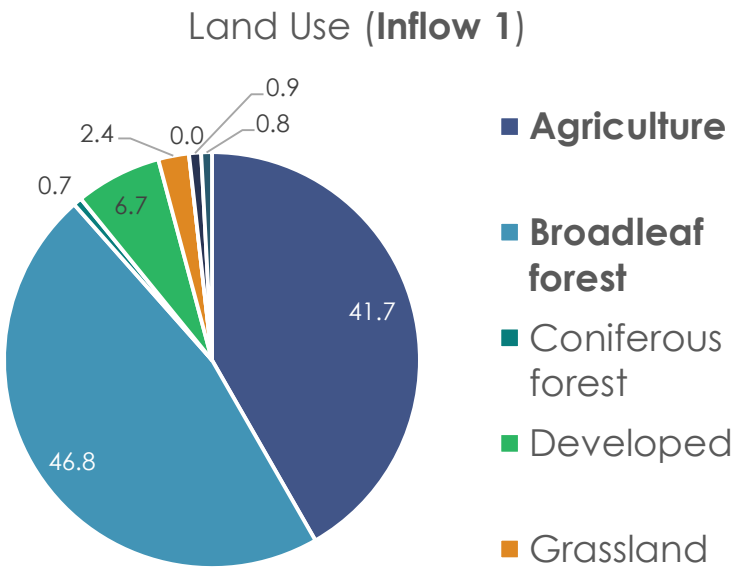
Total Phosphorus: compare locations

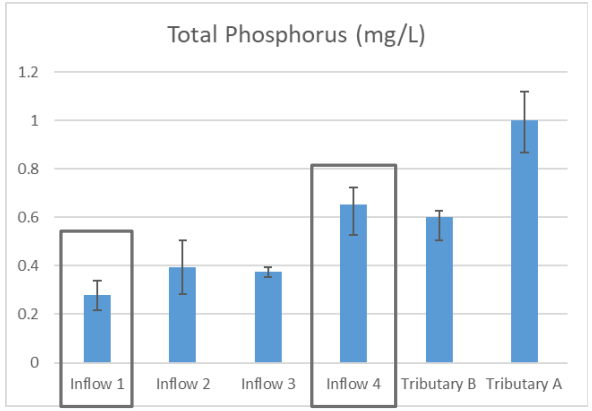
- Highest TP concentrations found at Tributary A (downstream of farm) and Inflow 4 (most eastern inflow to Wizard Lake)

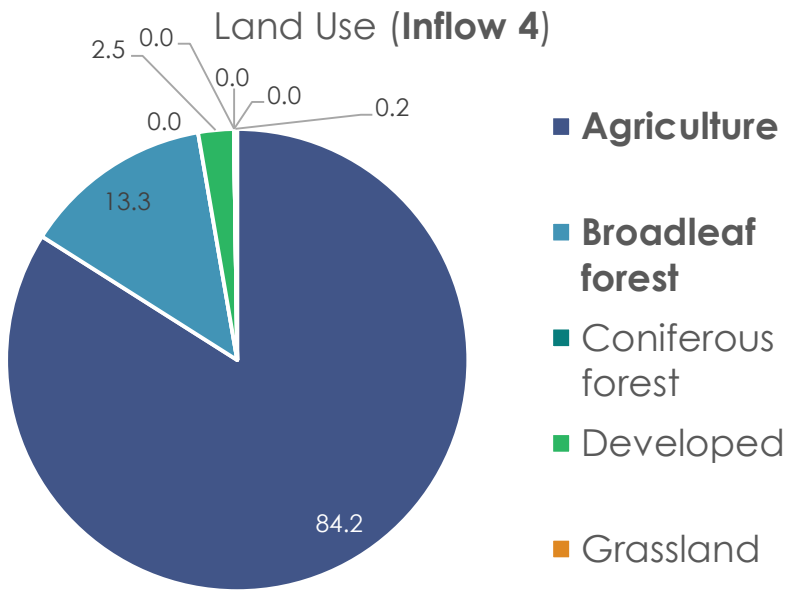


Tributary Phosphorus and Land Use

- Highest TP at Inflow 4 related to highest proportion of agricultural land use



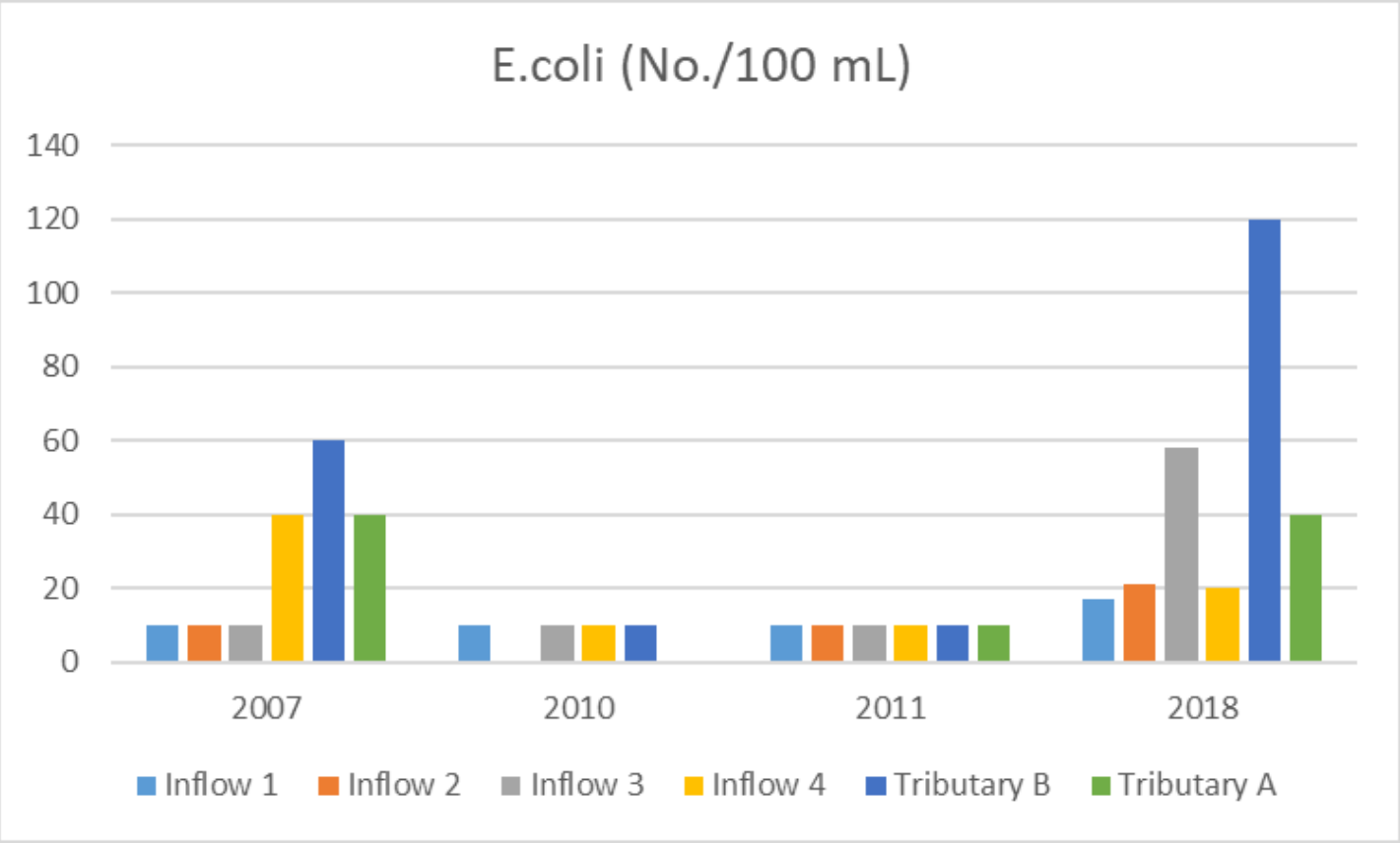




- Phosphorus Budget will evaluate impact of these inputs on lake water quality

E. Coli (coliform bacteria)

- Generally low: meet recreational guideline of 100#/100mL (except Tributary B in 2018)
- Inflow 4, Tribs A+B highest



Summary and Recommendations

- Citizen Monitoring Programs: successful and meaningful
- Tributary water quality is worst in areas with most agriculture
- 25% of riparian areas are impacted
- Current conditions well know, long term trends not
- Phosphorus Budget ?
- Sample Inflows 1-4 for 2-3 more years, continue ALMS monitoring
- Work with farmers on BMP implementation
- Look into shoreline restoration options
- Study long-term trends (paleolimnology)
- ?

Questions?

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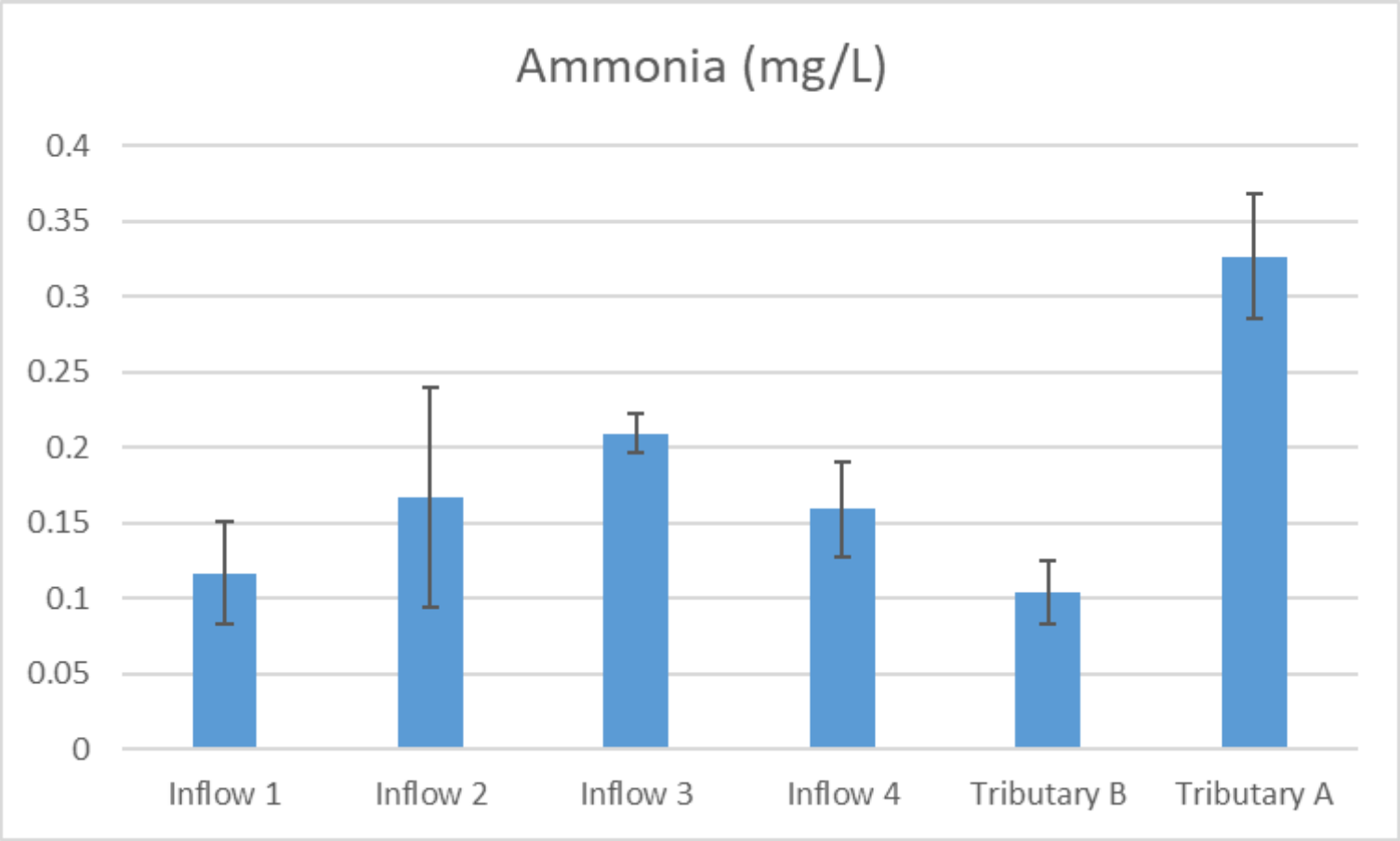
Ammonia: compare locations

- Highest concentrations at Tributary A