# Phosphorus Loads to Lake Simcoe

LSRCA Annual General Meeting

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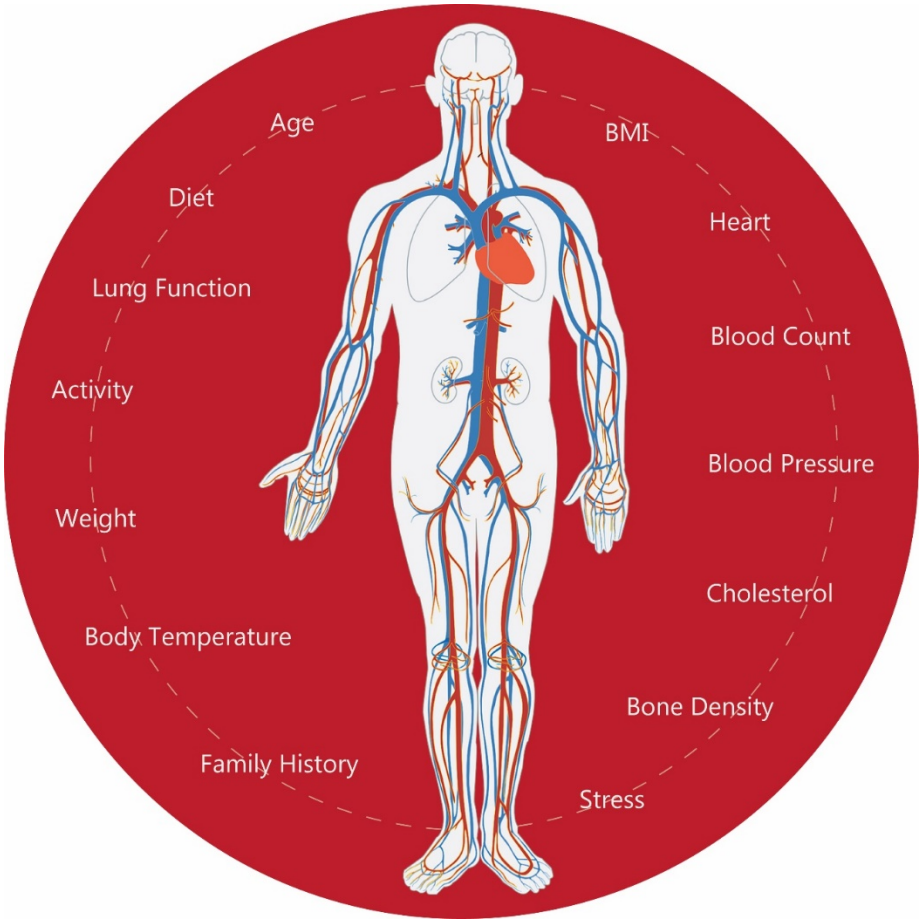
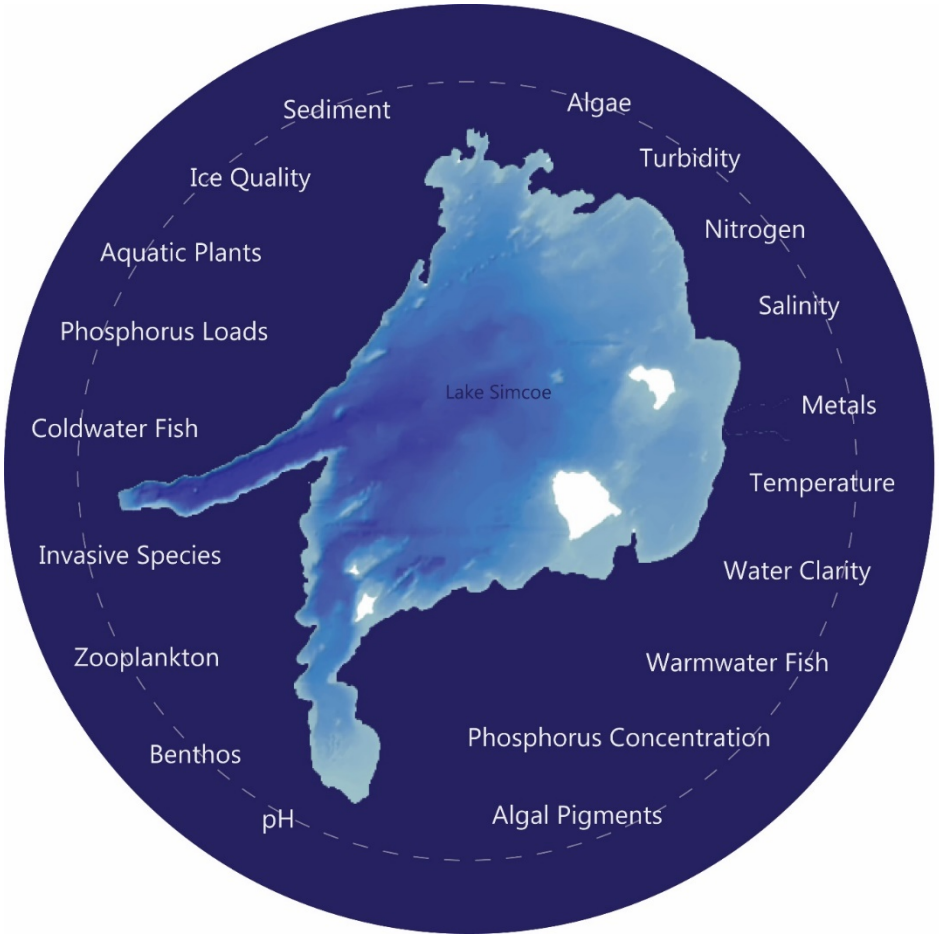
# How we determine overall health




Our Health




Lake Health

**Assessing health requires a holistic approach**

# Phosphorus Concentration vs. Load?

**Concentration** = the amount of substance per defined volume (µg/L or mg/L)

**Load** = the amount of substance discharged over time (tonnes/year)

# Phosphorus Concentration Vs. Load

## Kool Aid for a Family

2 scoops to 1 litre of water (2 scoops/L)

## Kool Aid for a Group

4 scoops to 2 litres of water (2 scoops/L)

# How to Calculate a Phosphorus Load

1 mg/L x 10 L/s = 10 mg/s instantaneous load

10 mg/s x 86,400 seconds = daily load

**However:**

**2 mg/L x 10 L/s = 20 mg/s load (double concentration = double load)**

**1 mg/L x 20 L/s = 20 mg/s load (double flow also = double load)**

Concentration (mg/L) x Flow (L/s) = Load

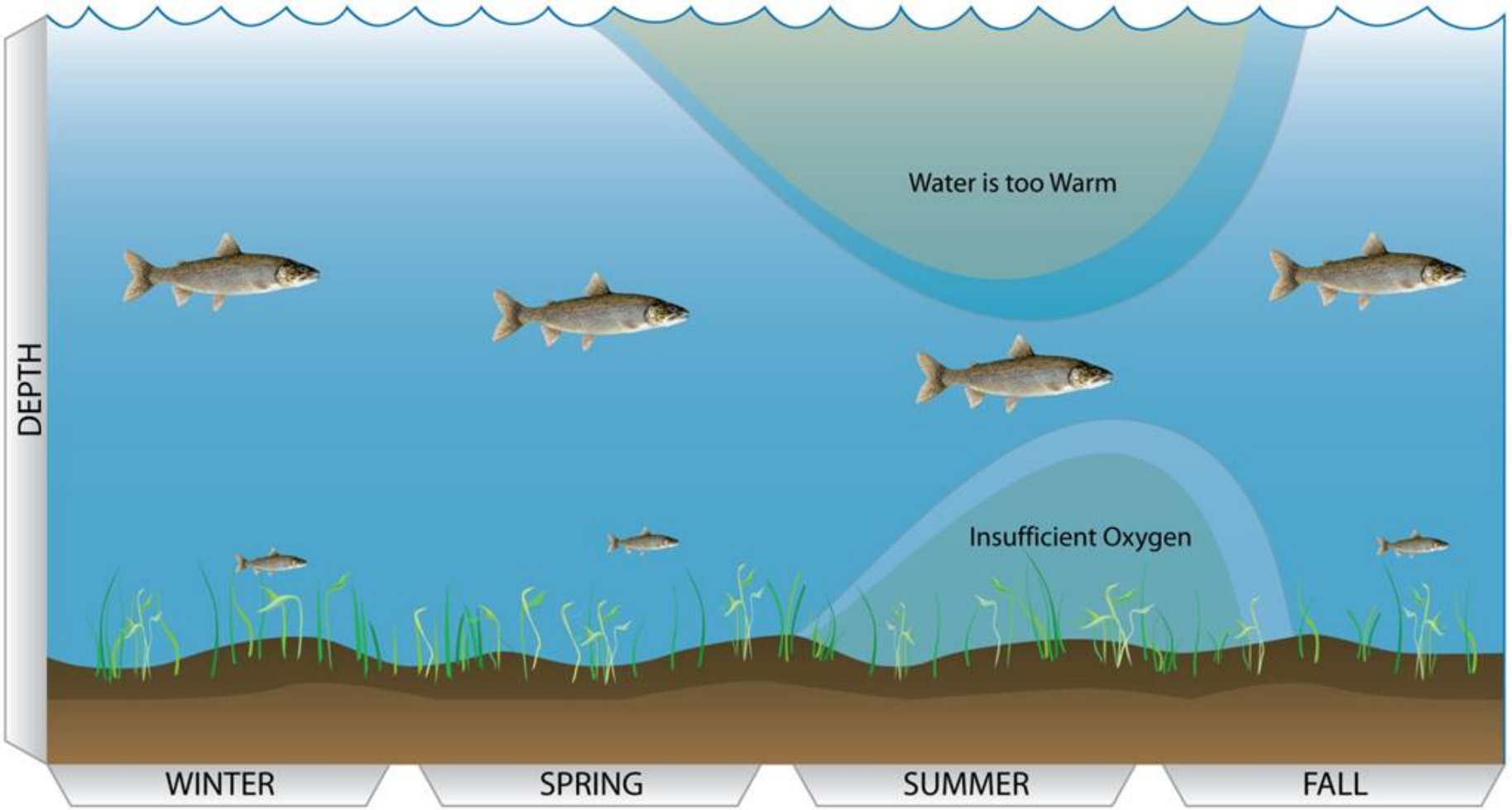
# Why all the Fuss over Phosphorus?

- Too much phosphorus in the lake
- Eutrophication (nutrient enrichment)
- Excessive plant and algae growth
- Reduced oxygen

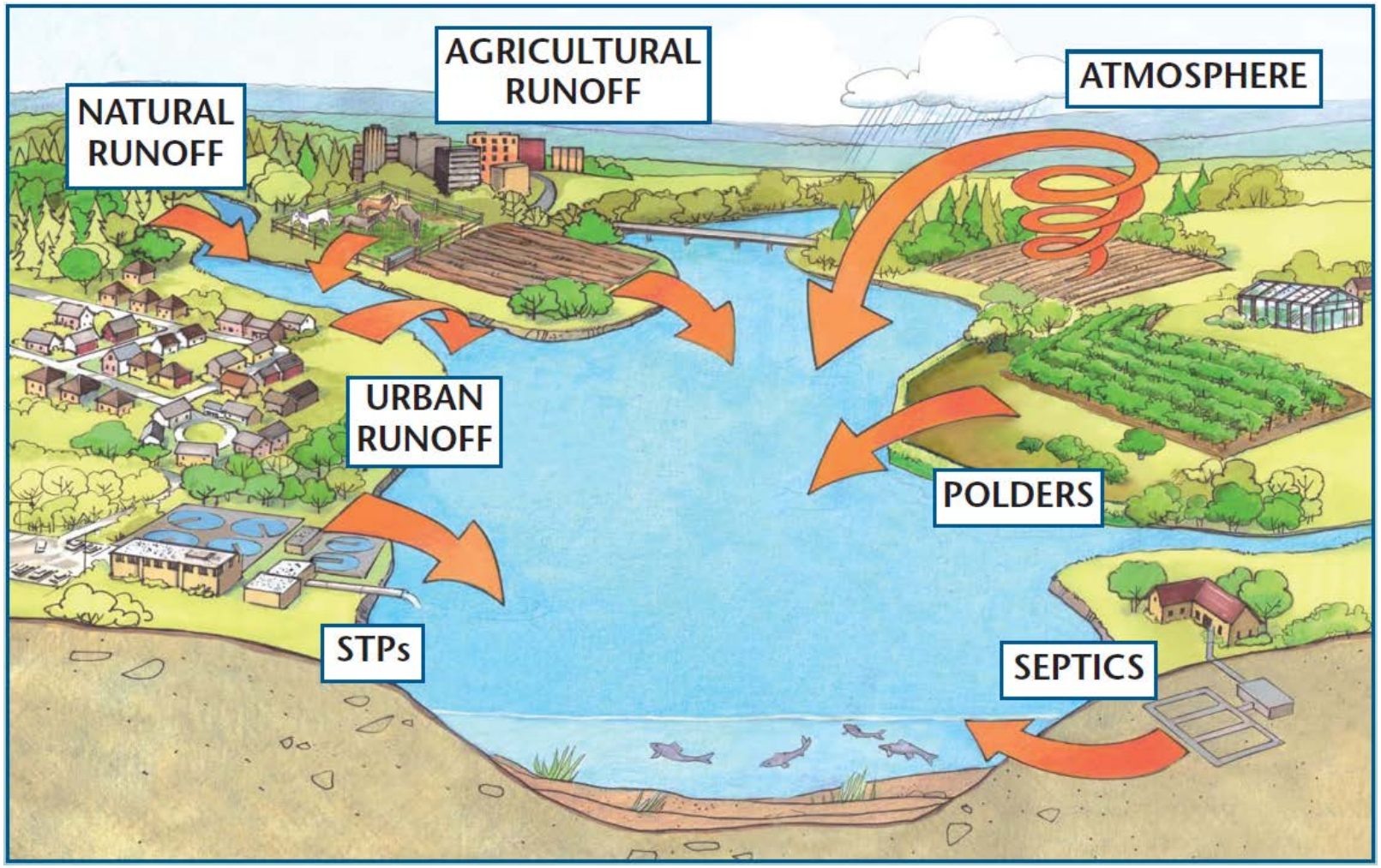

Lake Erie

# LSPP Water Quality Target

- Target for dissolved oxygen of 7mg/L
- Estimated load 44 tonnes per year

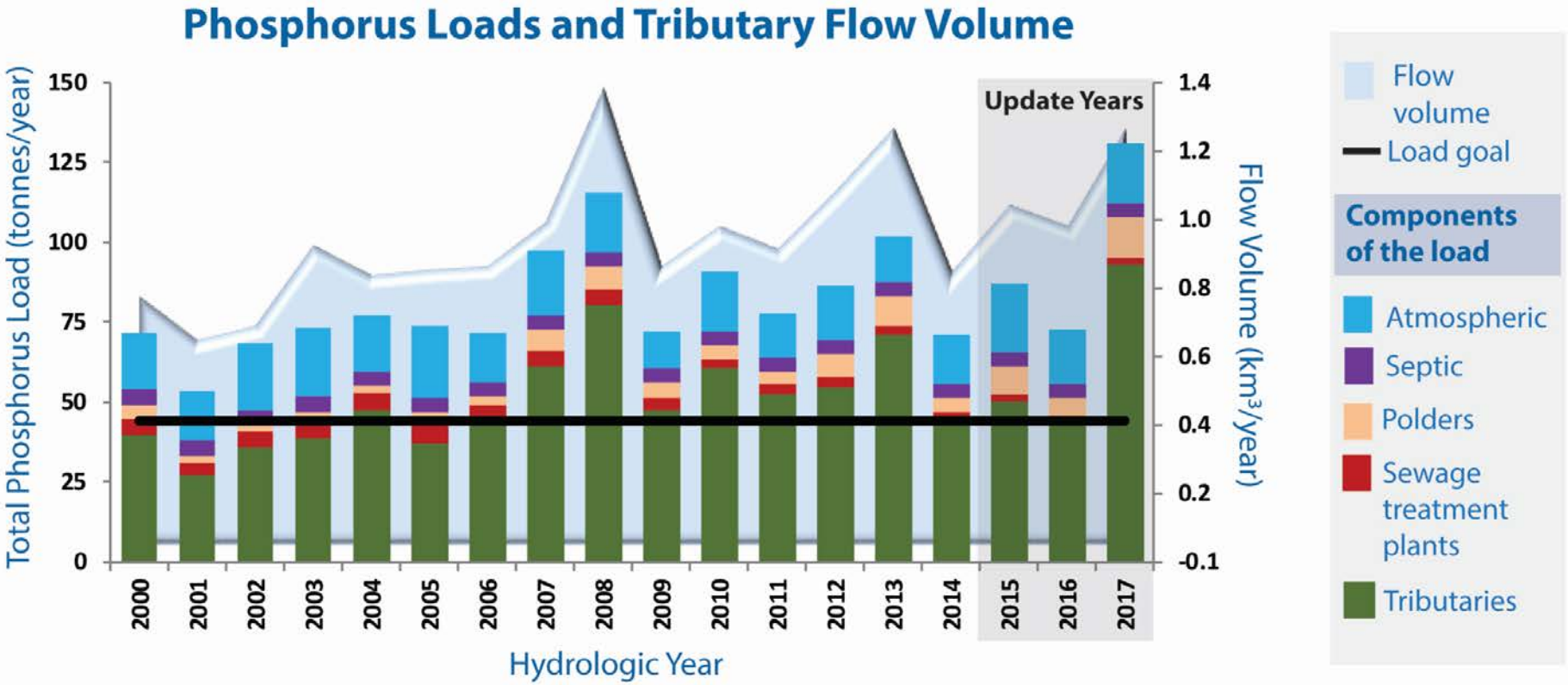


# Major Components of the Phosphorus Load




**Interesting fact:** More than 3,000,000 data points annually are used to calculate the load

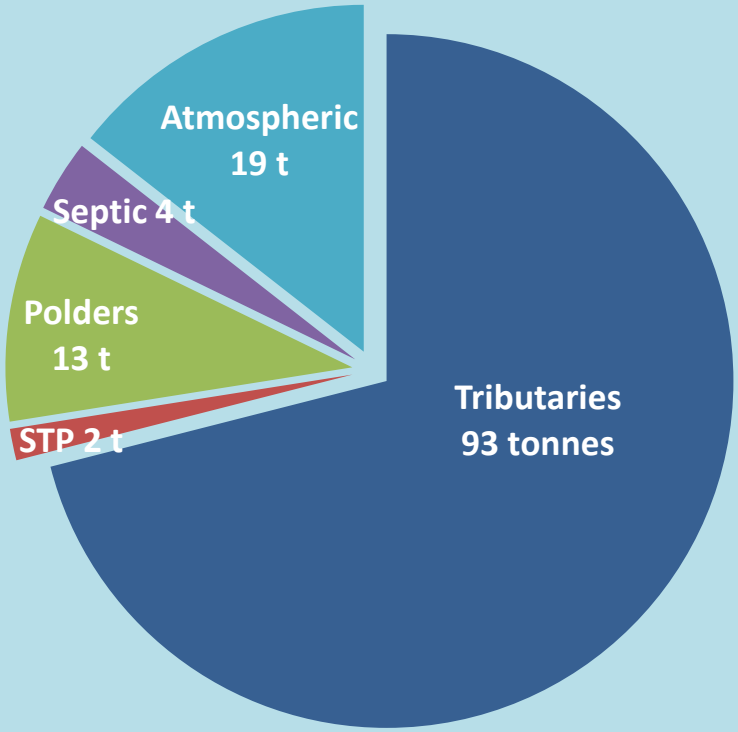
# Lake Simcoe Phosphorus Loads




2015 = 87 tonnes
2016 = 73 tonnes
2017 = 131 tonnes

# Phosphorus Loads: What's going on?

2017 Loads by Source



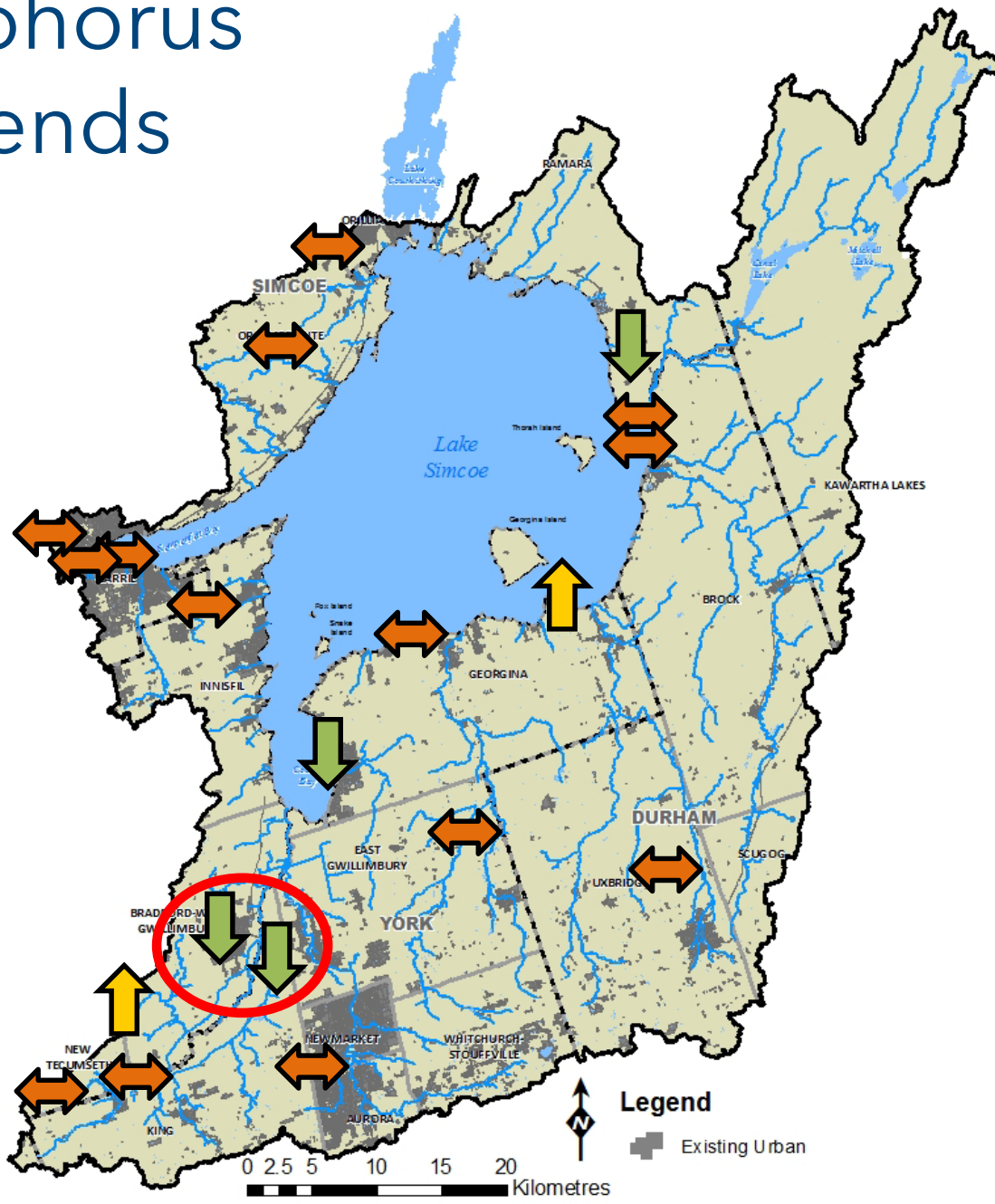

2017 load = 131 tonnes
80% from Tributaries and Polders

- High averages largely driven by 3 high load years 2008, 2013 and 2017
- Atmospheric stays relatively constant
- Flow is driving high load years, not concentrations

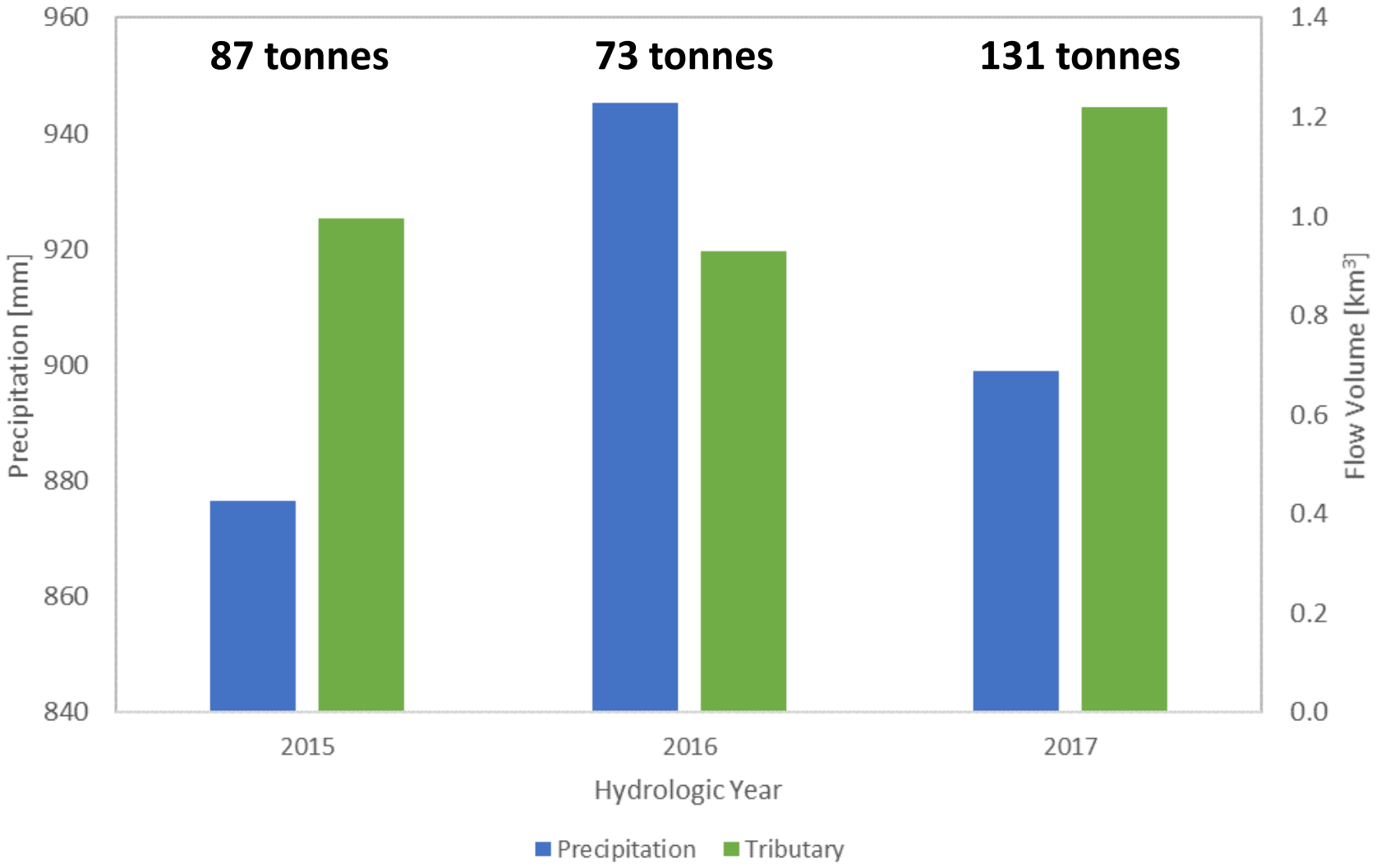
# Short Term Phosphorus Concentration Trends (2005-2014)

- 4 stations decreasing
- 14 stations no trend
- 2 stations increasing

**Important fact:**
East and West Holland are showing decreasing trends!

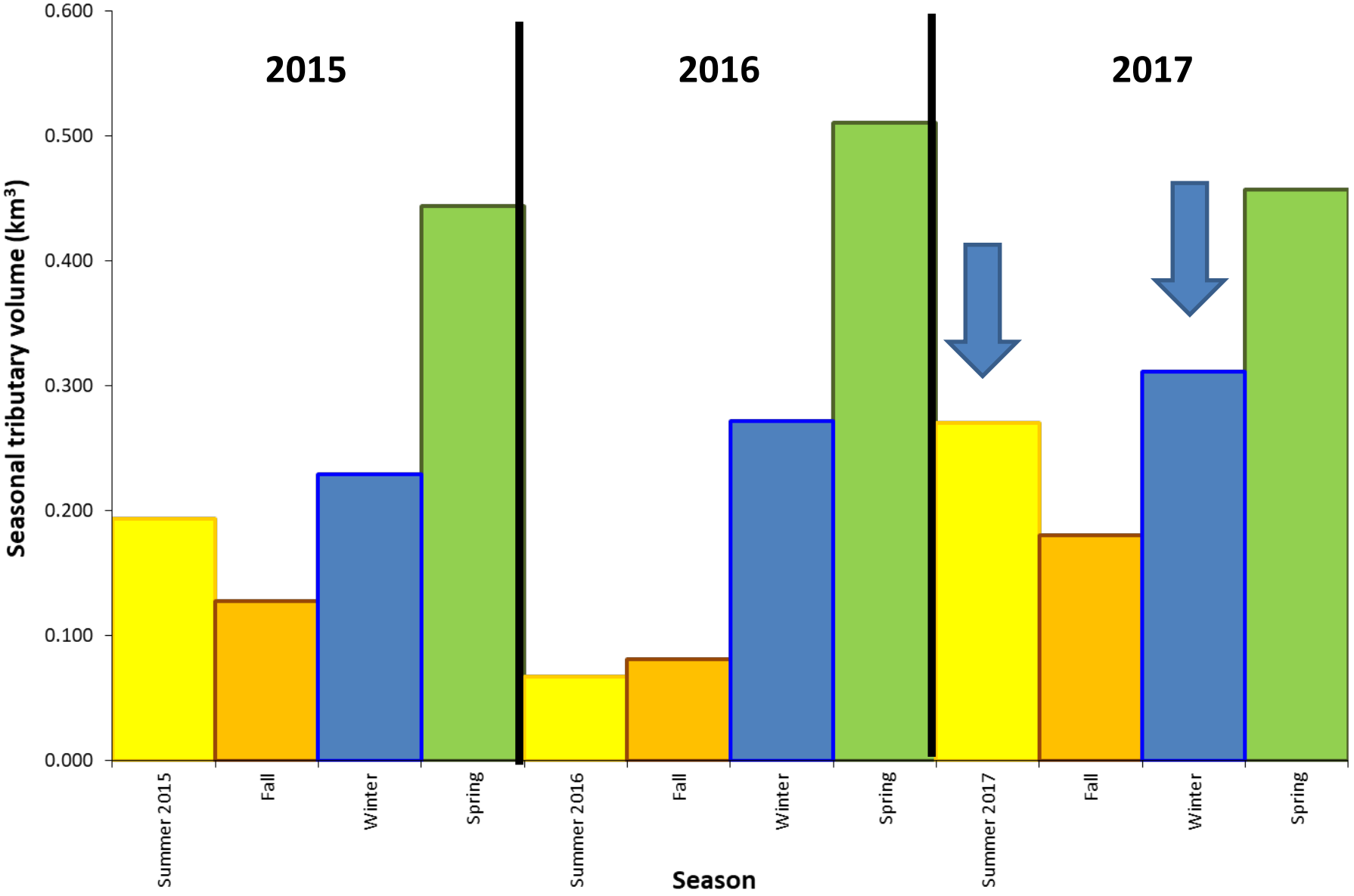


# Annual Precipitation vs Tributary Flow




**2016 was a “typical” hydrologic year**

# Seasonal Tributary Flow Volume



# 2017 Load Drivers

2017 was not a “hydrologically normal”

**June 2017**

- 24% of the load occurred in June
- 12.6 tonnes of phosphorus in 2 days
- 11% from June 23rd storm

**February 2018** (2017 Hydrologic Year)

- 9% of the load in February melt event
- 15% of the load occurred in February

- **40% of the load from these two months! (52 tonnes)**

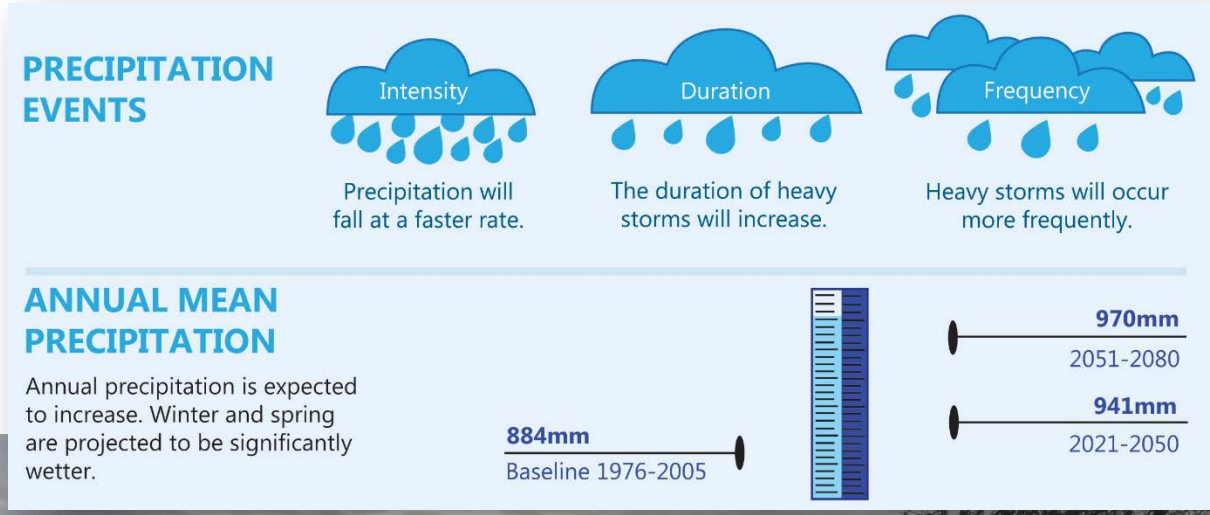
Before June Storm

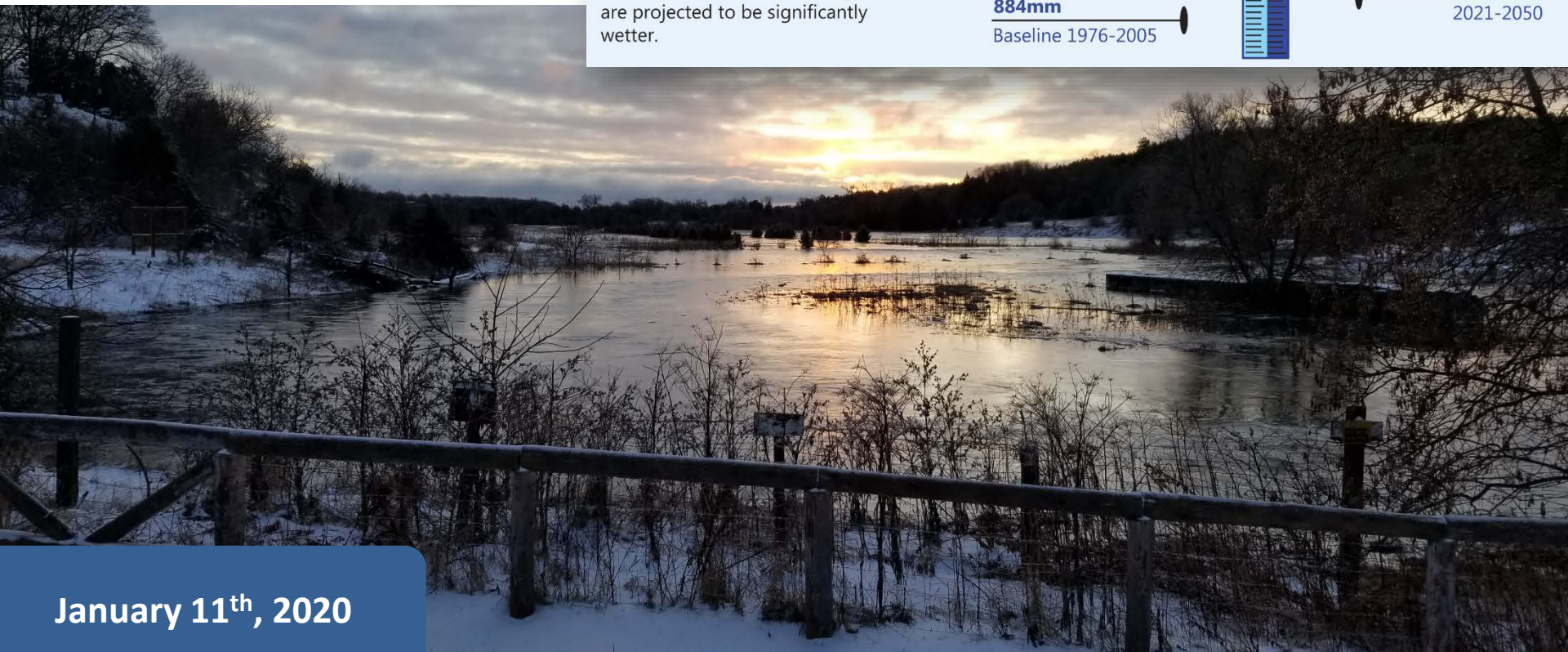
After June storm

# A Changing Climate

**Interesting Fact:**

June has changed since the 1960s; greater volume and magnitude of events



**January 11th, 2020**

# Moving Forward

- Continue to monitor and calculate annual loads
- Continue efforts to reduce phosphorus concentrations across the watershed
- Improve stormwater management to control volume
- Continue to assess the response of the lake to phosphorus inputs