Ammonia and Phosphate in Algonquin Park

Dhrumil Patel, Amy Peng, David Walji, Jenny Wu

Introduction 1

Experiments 2

Procedure

01

5mL of water for each sample

02

8 ammonia drops into samples, mix for 5 minutes

03

8 phosphate drops into samples, mix for 3 minutes

04

Compare sample colours to scale

Calibrations 3

Sources of Uncertainty

- Ammonia and phosphate dropper bottle
- Data input

Data

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Ammonia and Phosphate Observations

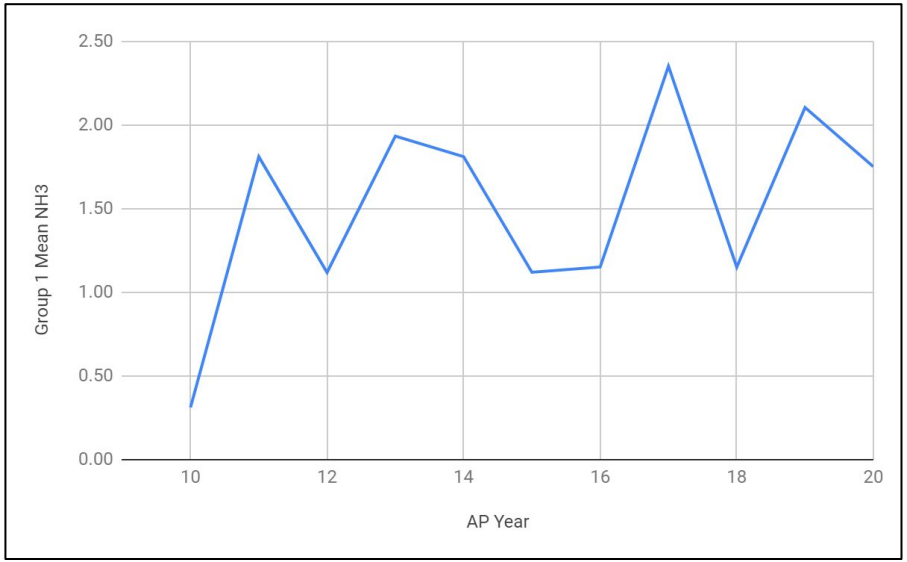
Substance/ppm	Mean	Standard Deviations	Median
Ammonia	1.797	1.33	1.44
Phosphate	2.503	2.949	1.33

Highway Relations

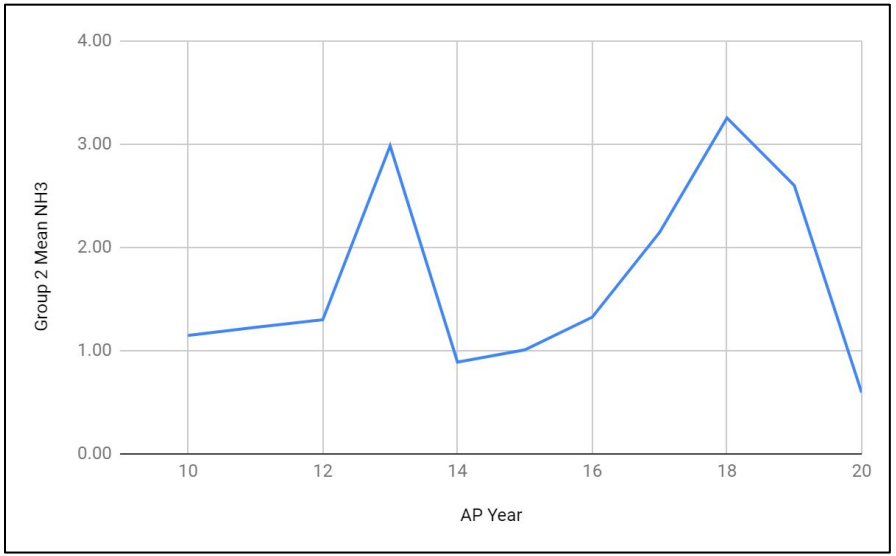
- 6 stations
- Group 1: 3 stations, 2+ km
  - Coon, Madawaska, Smoke
- Group 2: 3 stations, 2- km
  - Starling, Pog, Costello

Group Mean Ammonia

Group 1 Mean NH_3 vs AP Year

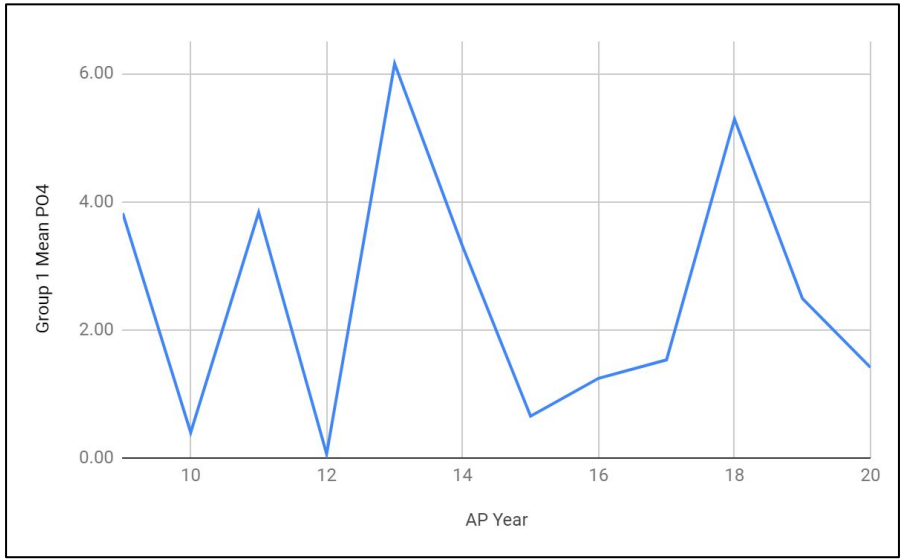


Group 2 Mean NH_3 vs AP Year

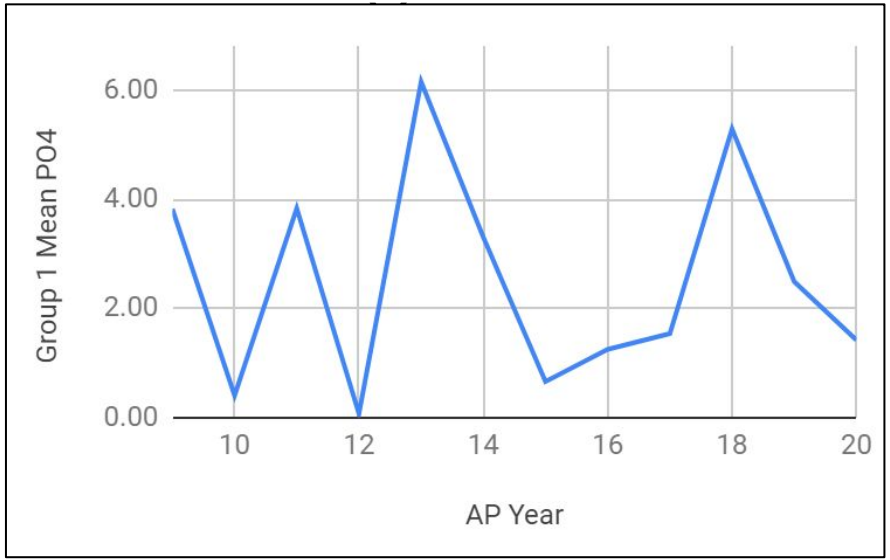


Group Mean Phosphate

Group 1 Mean PO_4^{3-} vs AP Year



Group 2 Mean PO_4^{3-} vs AP



Trends

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Ammonia

Weak positive correlation

Correlation: 0.06

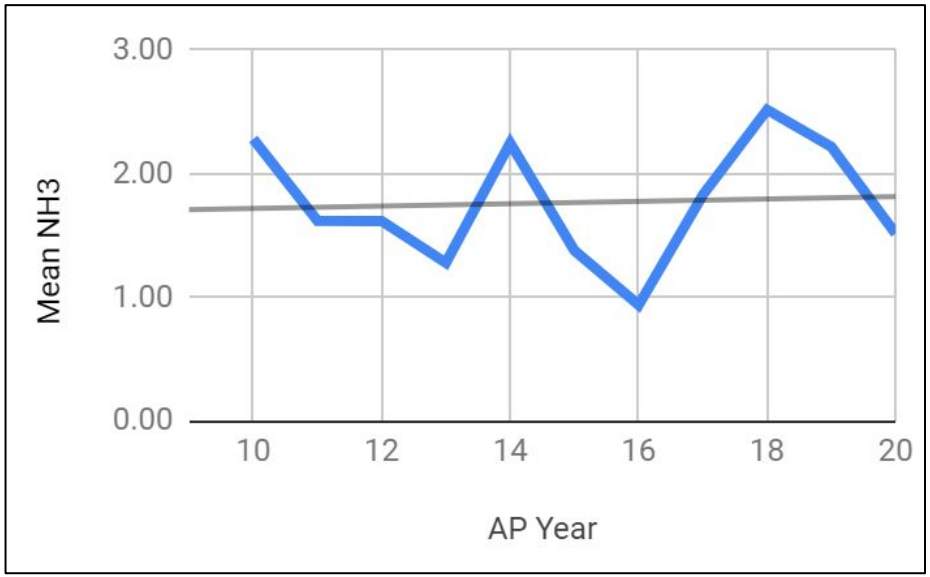
Determination: 0.4%

Growth rate: $9.51*10^{-3}$ ppm

AP 14 - AP 16

AP 16 - AP 18

Mean NH_3 vs AP Year



Phosphate

Weak positive correlation

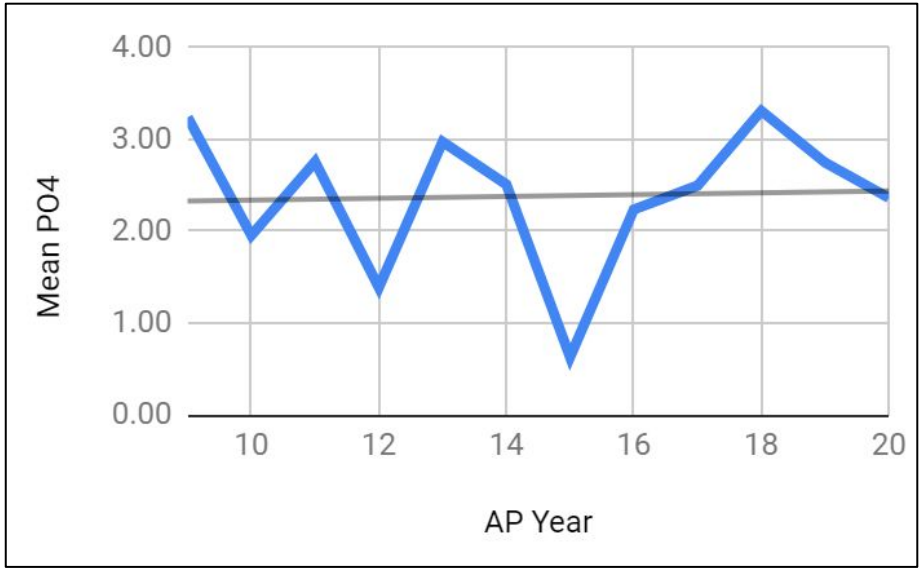
Correlation: 0.04

Determination: 0.2%

Outlier in AP 15

Growth rate: $9.78*10^{-3}$ ppm

Mean PO_4^{3-} vs AP Year



Group 1 Ammonia

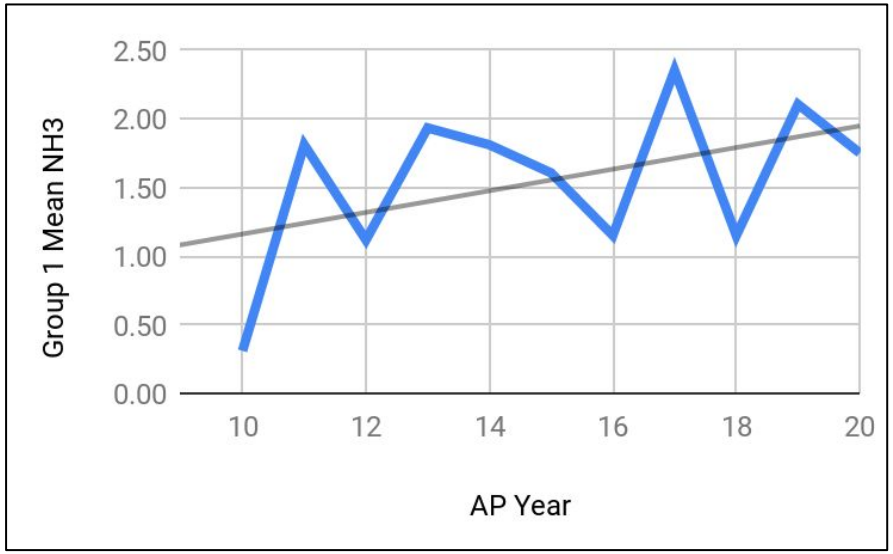
Strong Positive Association

Correlation: 0.44

Determination: 19%

Growth rate: 0.09 ppm

Mean NH_3 vs AP Year



Group 1 Phosphate

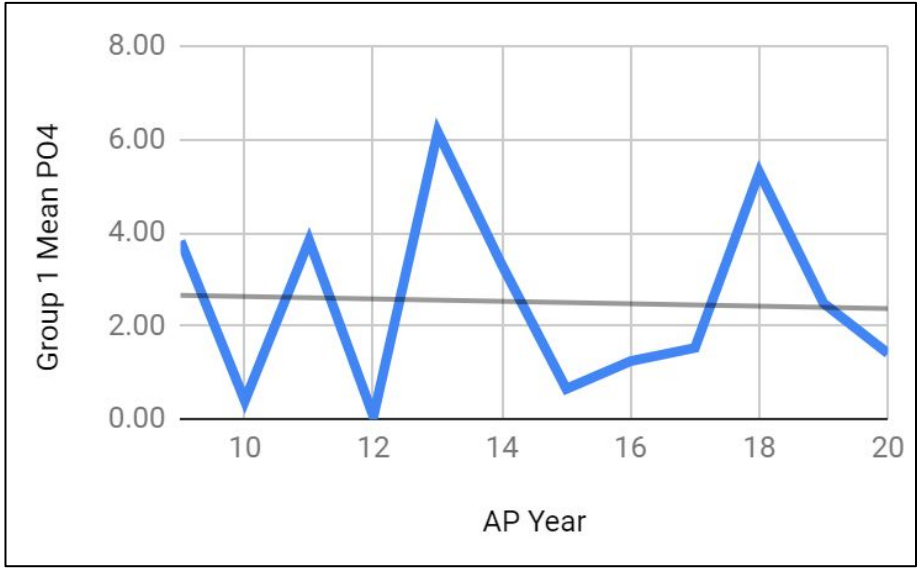
Weak Negative Association

Correlation: - 0.04

Determination: 0.2%

Growth rate: - 0.03 ppm

Mean PO_4^{3-} vs AP Year



Group 2 Ammonia

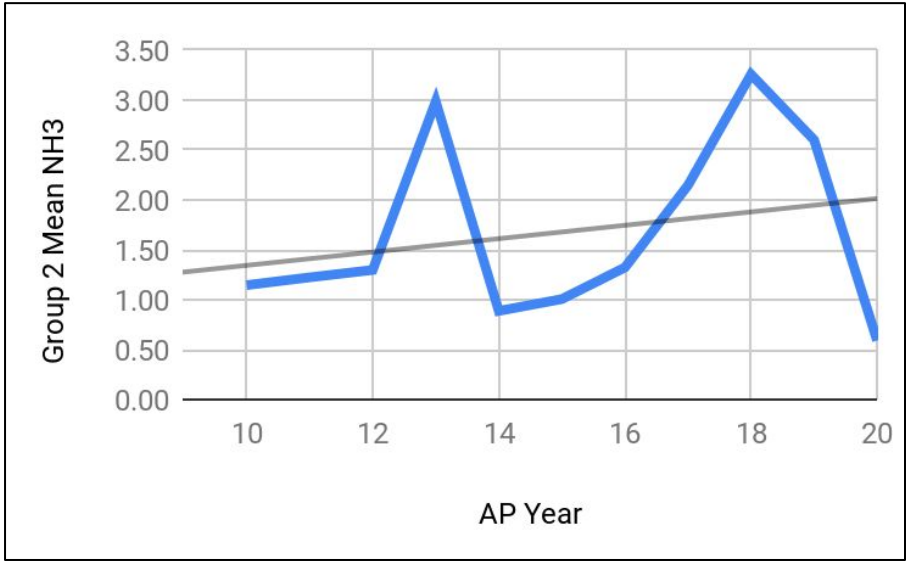
Moderate Positive Association

Correlation: 0.24

Determination: 5.9%

Growth Rate = 0.07 ppm

Mean NH_3 vs AP Year



Group 2 Phosphate

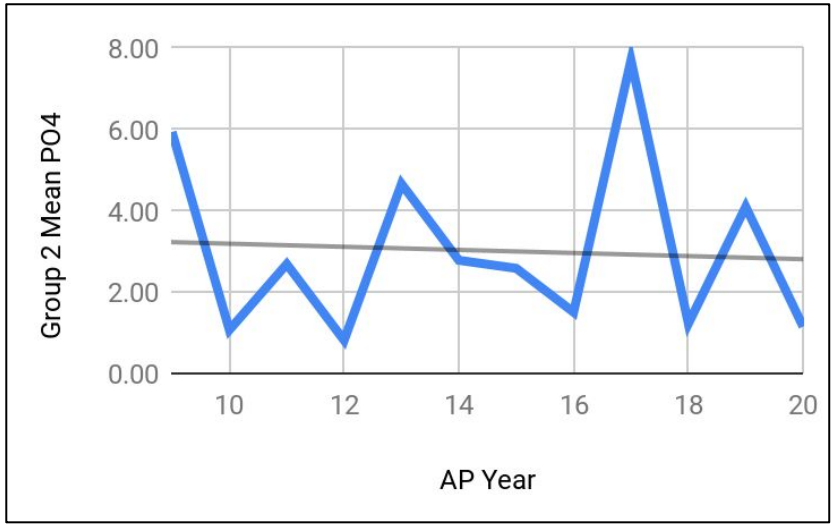
Weak Negative Association

Correlation: - 0.06

Determination: 0.4%

Growth rate: - 0.04 ppm

Mean PO_4^{3-} vs AP Year



Highway Ammonia Associations

- Group 1
  - Mean NH_3: 1.51 ppm
  - NH_3 Growth Rate: 0.09 ppm
- Group 2
  - Mean NH_3: 1.68 ppm
  - NH_3 Growth Rate: 0.07 ppm

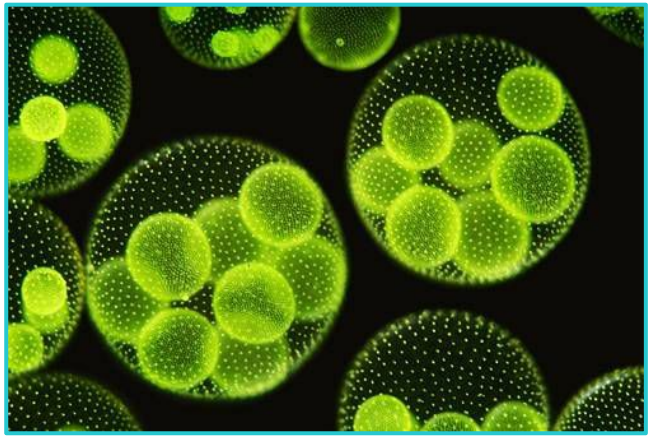
Highway Phosphate Associations

- Group 1
  - Mean PO_4^{3-}: 2.52 ppm
  - PO_4^{3-} Growth Rate: - 0.03 ppm
- Group 2
  - Mean PO_4^{3-}: 3.02 ppm
  - PO_4^{3-} Growth Rate: - 0.04 ppm

Implications 6

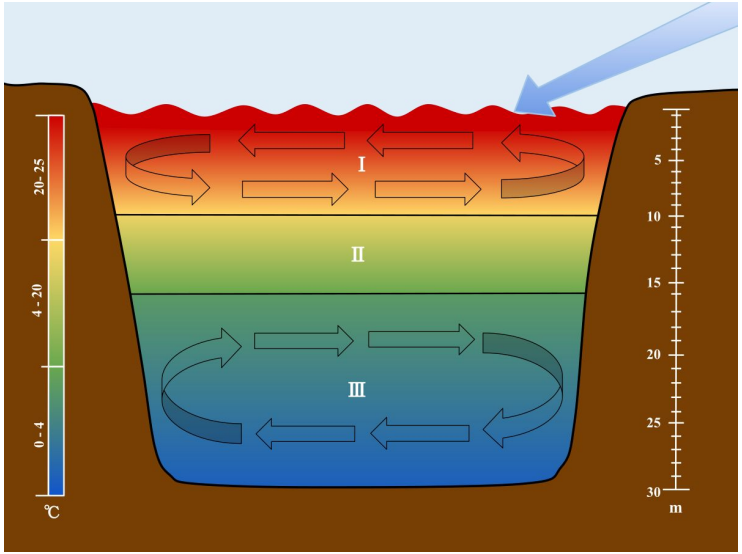
Algae and Eutrophication

- Correlated to +nutrient, +O
- DO levels rise by 0.55ppm
  - Habitability decrease
- Eutrophication → low dissolved oxygen contents
- Suggests strong positive correlation



Anoxic Hypolimnion

- General decrease in DO in water
- Fish at top of food web - thermally sensitive
- Increase in temperature - area inhabitable
- Anoxic hypolimnion - caused by low DO levels with limited sunlight



Temperature levels in bodies of water

Ammonia

- Excess in ammonia levels
- Necessary nutrient
- Overabundance
  - Alteration in metabolism
  - An increase in body pH

Future Research

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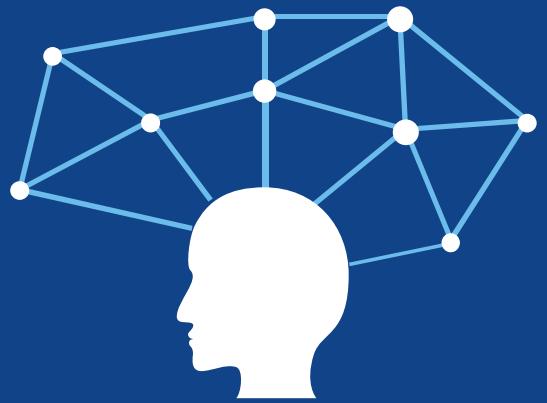
Future Research

- Lack of specificity of the correlation between ammonia and phosphate concentrations
- Simpson's Paradox
- Distance of a sample station from concentrated human activity

Questions?



Sources

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