



# Does Lake and Stream Connectivity Control Phosphorus Retention in Lakes?

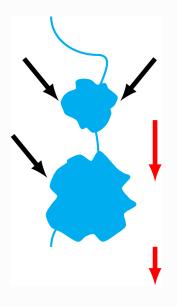
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### CLAKE PHOSPHORUS (P) RETENTION



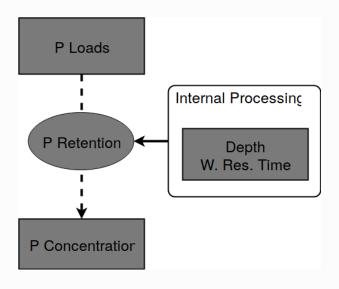
P retention directly controls downstream transport [Alexander et al., 2002]

P retention indirectly controls sediment P accumulation [Søndergaard et al., 2013]

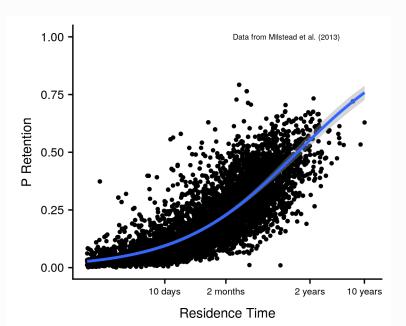
# **ESTIMATING P RETENTION FOR A SINGLE LAKE**

- · Field work material
- · Sediment traps
- · Benthic coring

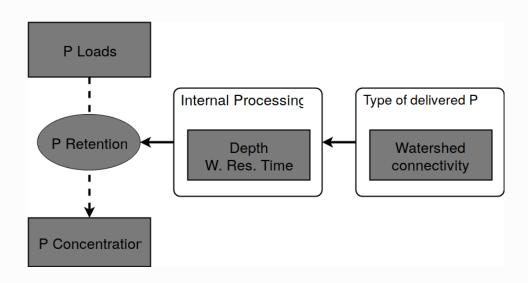
#### P RETENTION CONCEPTUAL MODEL



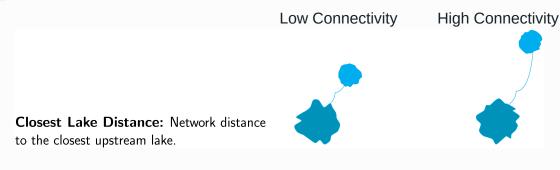
#### P RETENTION VERSUS WATER RESIDENCE TIME



#### **EXTENDING P RETENTION MODELS**



#### MULTIPLE WAYS TO DEFINE CONNECTIVITY

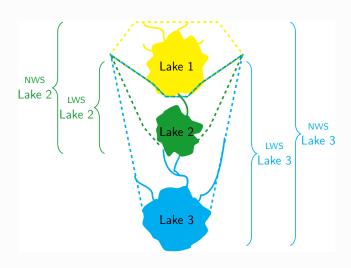


**Average Link Length:** Sum of the total length of stream reaches between junctions divided by the total number of reaches.





# **WATERSHED EXTENTS**

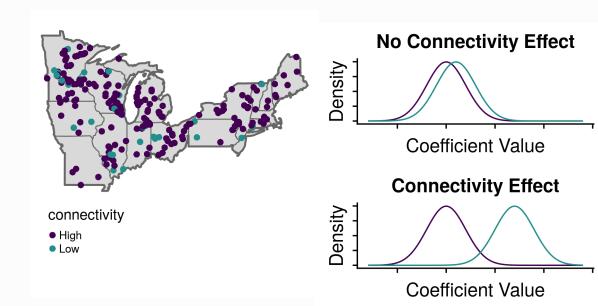


1. Does connectivity of lakes and their watersheds influence lake phosphorus retention?

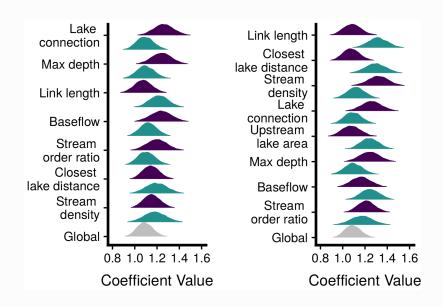
2. What is the relative importance of different connectivity metrics in determining lake P retention and what spatial extents are most important for connectivity and P retention?



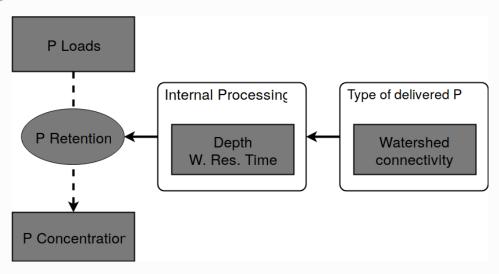
#### METHODS - P RETENTION MODELLING



#### P RETENTION (PROCESSING) COEFFICIENT DISTRIBUTIONS



# CONCLUSION



Connectivity of lakes and their



· WS:LA ratio





Alexander, R. B., Elliott, A. H., Shankar, U., and McBride, G. B. (2002).

Estimating the sources and transport of nutrients in the Waikato River Basin, New Zealand: Sources and transport of nutrients.

Water Resources Research, 38(12).



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Estimating Summer Nutrient Concentrations in Northeastern Lakes from SPARROW Load Predictions and Modeled Lake Depth and Volume.

PLoS ONE, 8(11):e81457.



Søndergaard, M., Bjerring, R., and Jeppesen, E. (2013).

Persistent internal phosphorus loading during summer in shallow eutrophic lakes.

Hvdrobiologia, 710(1):95-107.



Stachelek, J. and Soranno, P. ("In prep").

Does lake and stream connectivity control phosphorus retention in lakes?