

Figures

Table 1: Mean and interquartile range of selected lake characteristics.

| | Mean | IQR |
|-----------------------------|-------|---------------|
| Total Phosphorus (ug/L) | 40 | 20 - 110 |
| Chlorophyll (ug/L) | 11.85 | 6.05 - 21.3 |
| Secchi Depth (m) | 1.5 | 0.9 - 2.4 |
| P Retention (%) | 0.46 | 0.24 - 0.59 |
| Residence Time (yr) | 0.63 | 0.2 - 1.8 |
| Maximum Depth (m) | 12.95 | 9.2 - 21.34 |
| Agricultural Landuse (%) | 53.27 | 17.68 - 74.05 |
| Lake Watershed Area (ha) | 8839 | 2117 - 41006 |
| Network Watershed Area (ha) | 14326 | 5425 - 55026 |

Table 2: Classification and ranking of connectivity metrics, lake depth, and their partition split values according to median effect size.

| Metric | Scale | Connectivity Type | Split Value | Delta k |
|-----------------------|-------|-------------------|-------------|---------|
| Average Link Length | nws | Longitudinal | 2380 | 0.23 |
| Closest lake distance | nws | Longitudinal | 3274 | 0.22 |
| Stream density | nws | Lateral | 13.84 | 0.20 |
| Lake Connection | focal | Longitudinal | - | 0.17 |
| Upstream lake area | nws | Longitudinal | 154 | 0.16 |
| Max Depth | focal | - | 19.81 | 0.15 |
| Average Link Length | iws | Longitudinal | 2177 | 0.14 |
| Baseflow | iws | Lateral | 63.76 | 0.12 |
| Stream order ratio | iws | Longitudinal | 0.67 | 0.10 |
| Baseflow | nws | Lateral | 53.43 | 0.08 |
| Closest lake distance | iws | Longitudinal | 3774 | 0.05 |
| Stream order ratio | nws | Longitudinal | 0.4 | 0.04 |
| Stream density | iws | Lateral | 4.43 | 0.03 |

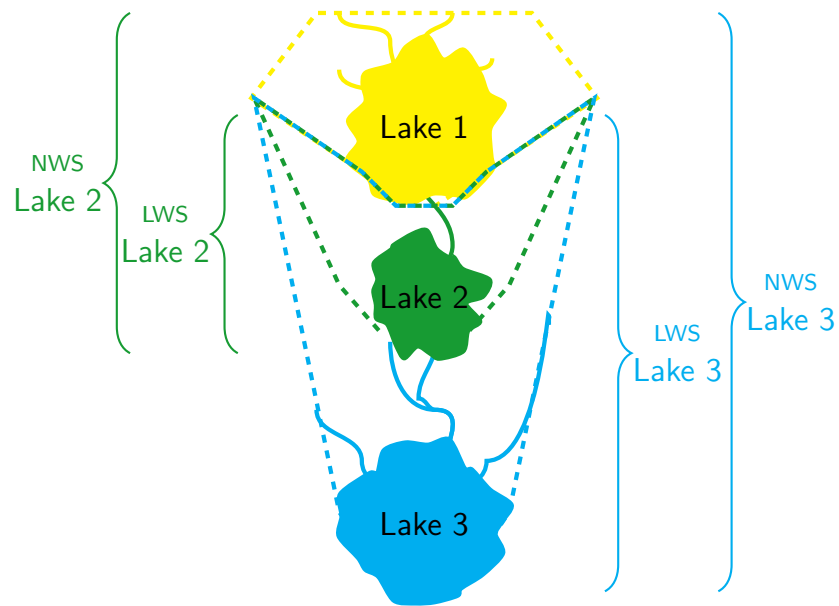


Figure 1: Diagram showing the inter-lake watershed (IWS) and network watershed (NWS) of three lakes. Here the IWS of lake 3 encompasses the IWS of lake 2 because of its small size but it does not encompass the IWS of lake 1 because it has an area of at least 10 ha. In contrast to the IWS boundaries, the NWS boundaries extend to the headwaters of the lake chain.



Figure 2: Connectivity metric definitions and examples of high and low connectivity lakes.

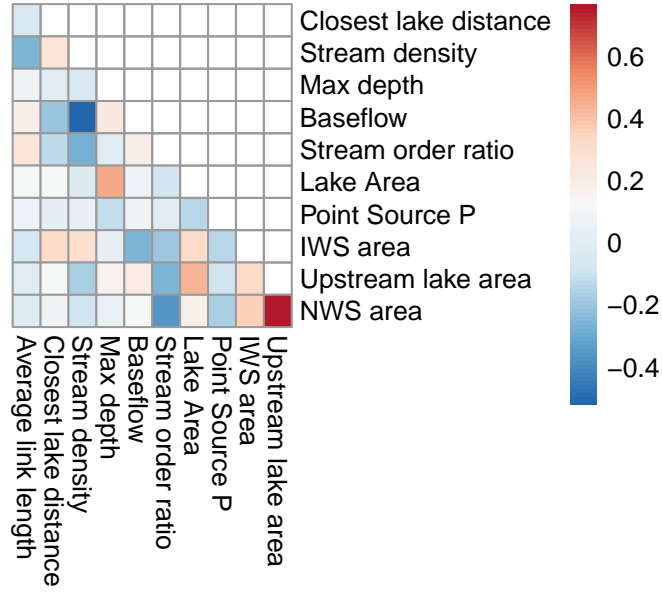


Figure 3: Correlation between connectivity metrics and selected lake characteristics.

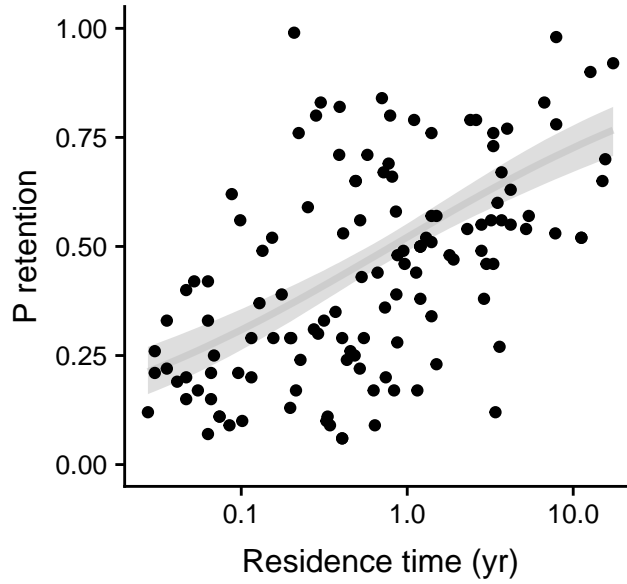


Figure 4: Residence time (yr) versus P retention for the NES dataset and the global model fit to the data as the median and central 95% interval estimates.

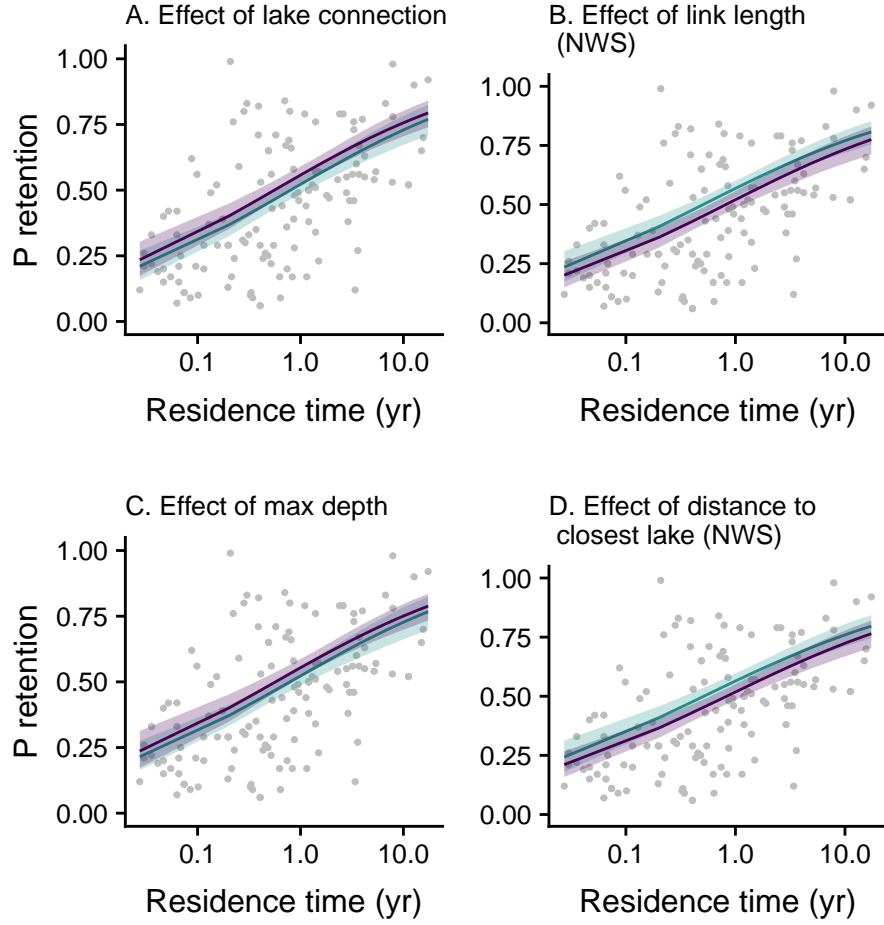


Figure 5: Residence time (yr) versus P retention (%) for the NES dataset and hierarchical model fits to the data as the median and central 95% interval estimates. The green lines and symbols are the estimates from the lower of the two partition groups while the purple lines are estimates for the upper of the two partition groups (see Table 2).

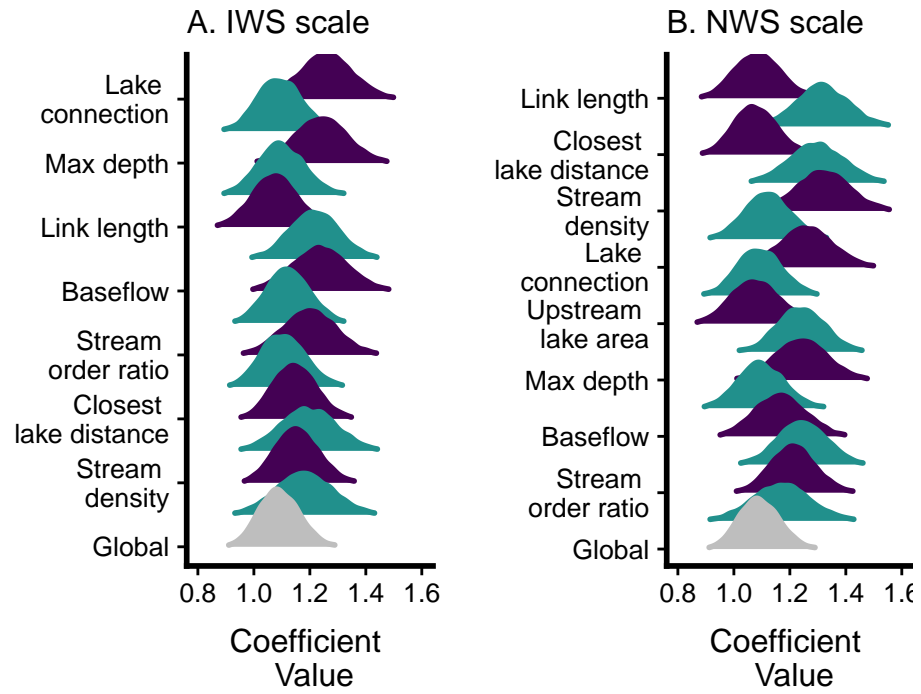
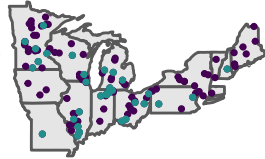
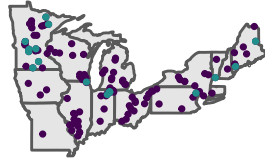


Figure 6: Distribution of the k parameter from the Vollenweider's equation in low and high connectivity partitions at the (A) IWS and (B) NWS scales. Green symbols indicate the lower of the two partition groups while purple symbols represent the higher of the two partition groups (see Table 2).

IWS:

Closest
lake distance

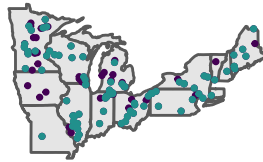
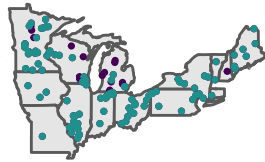
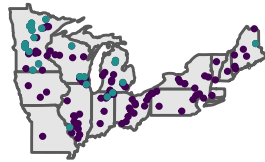
Average
link length



Stream
density

Baseflow

Stream
order ratio

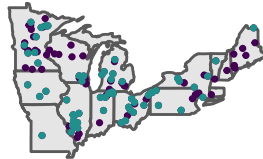
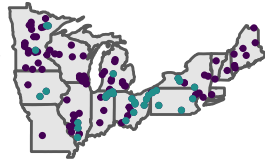
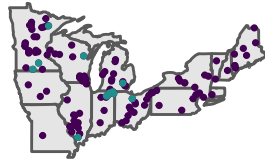


NWS:

Closest
lake distance

Average
link length

Upstream
lake area



Stream
density

Baseflow

Stream
order ratio

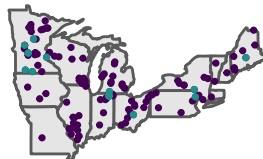
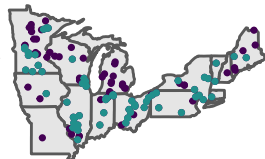
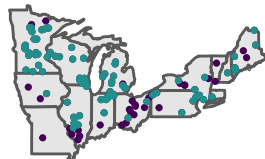


Figure 7: Maps showing the locations of lake connectivity partitions. Green symbols indicate the lower of the two partition groups while purple symbols represent the higher of the two partition groups (see Table 2).