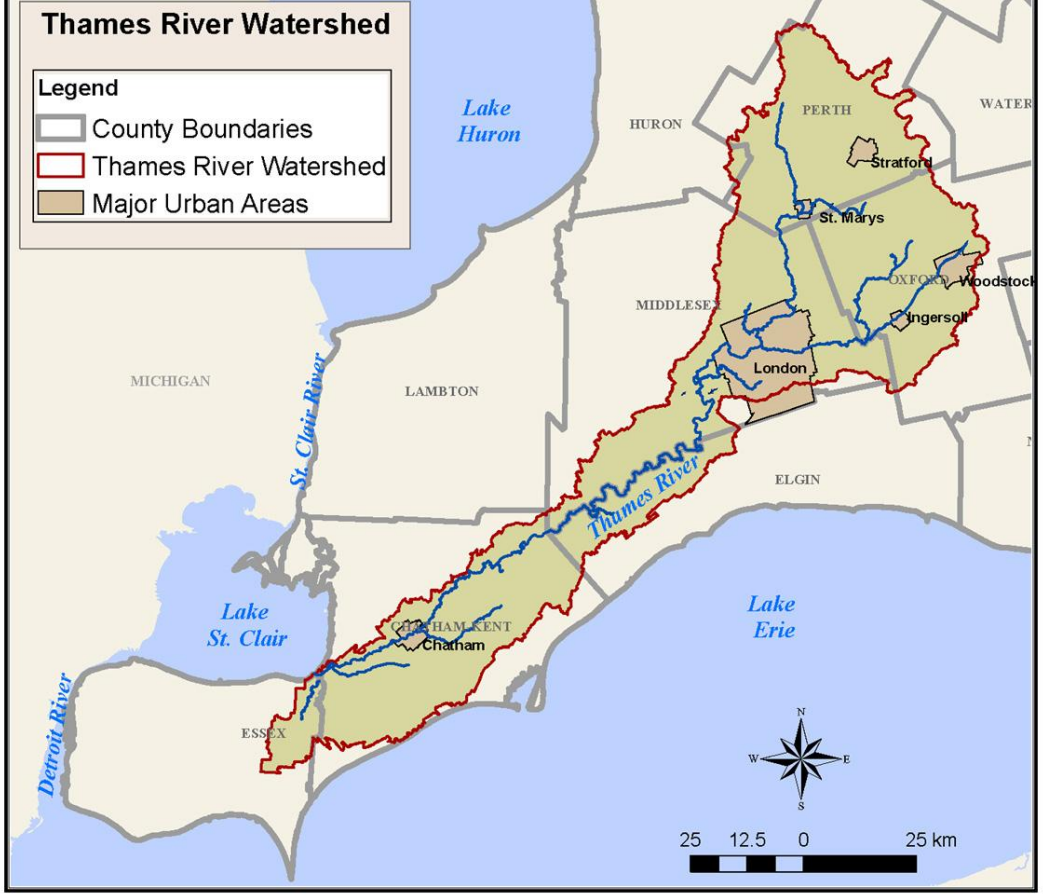
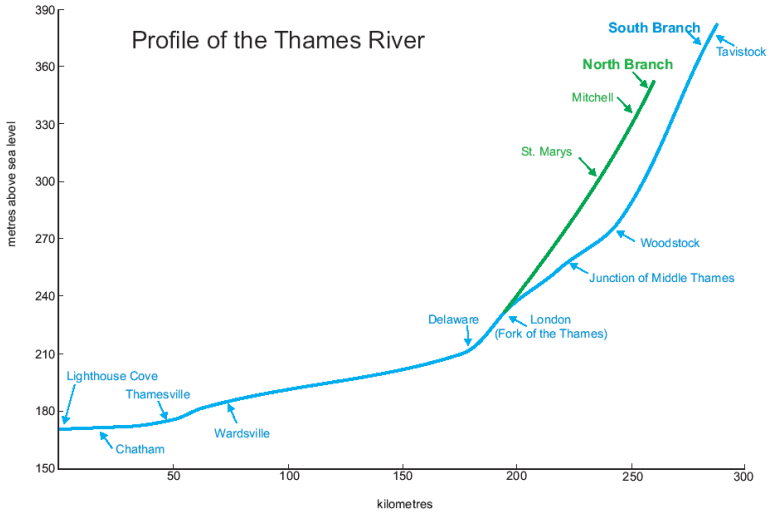
Looking Upstream Phosphorus Transport & Delivery from the Thames and Grand Rivers

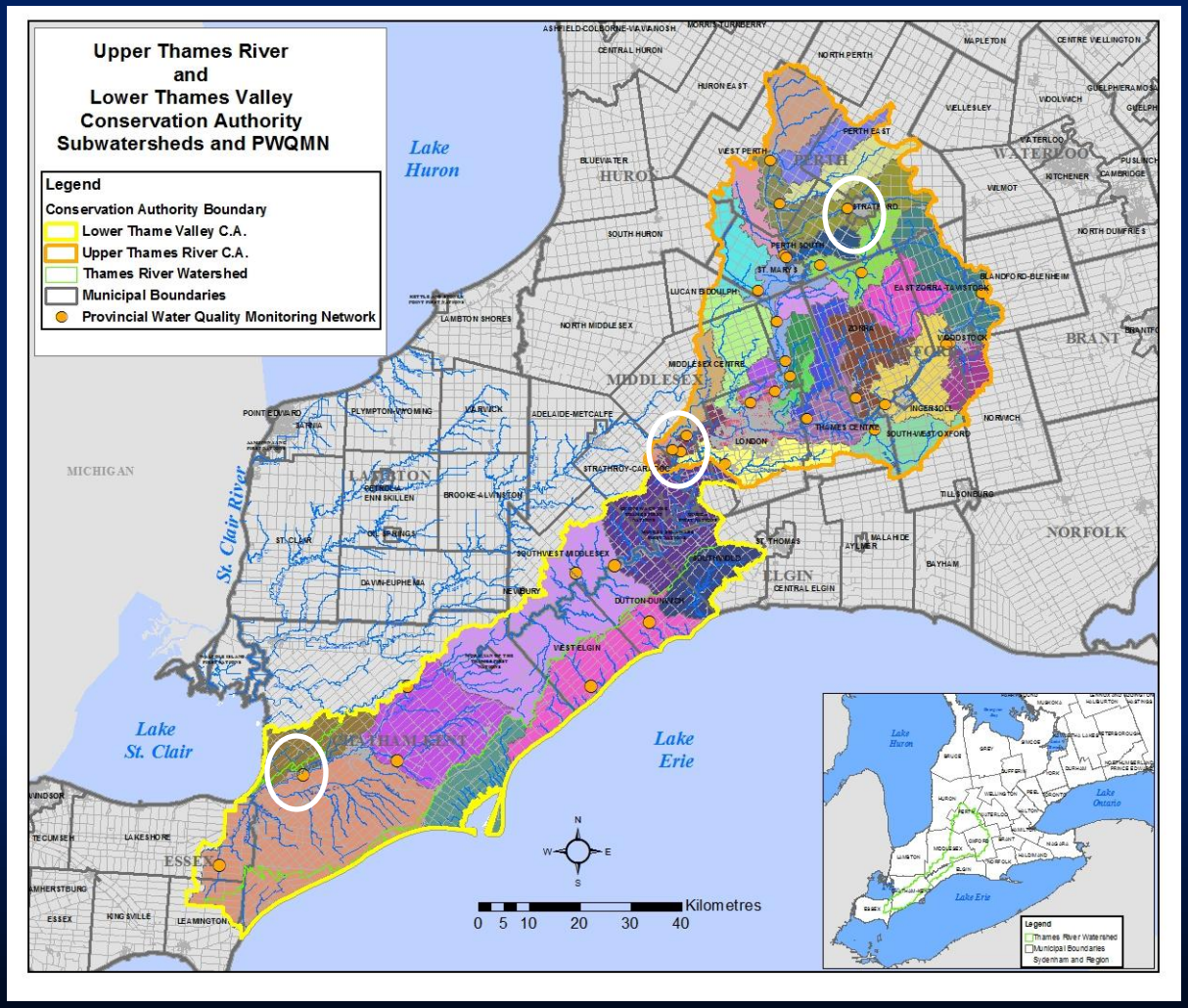
Thames River Watershed





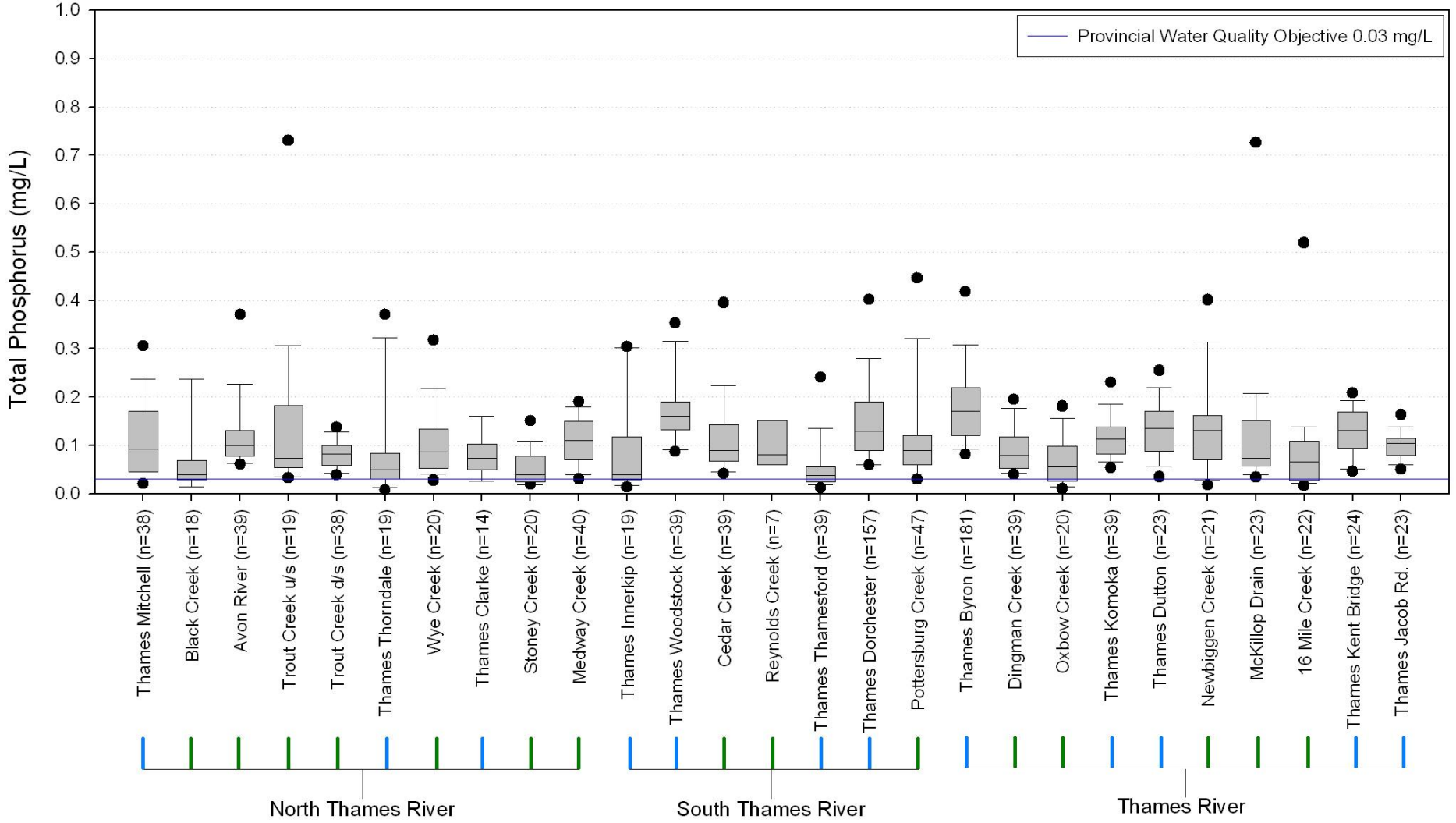
- 6700 square km
- 81% agriculture
- Population > 600,000
- 37 wastewater treatment plants
- Field tiles drain 60 to 80% of rural area
- Watercourses 48% channelized, 25% buried
- 4 – 10 days from headwaters to Lake St. Clair, 270 km

Thames Watershed Monitoring

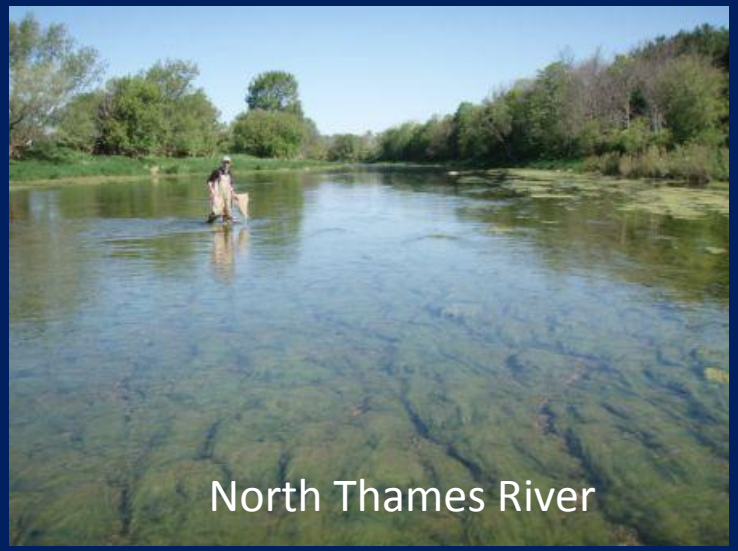


- 32 long term Provincial monitoring sites
- 51 total monitoring sites
- subwatershed approach to monitoring, planning, and targeted implementation

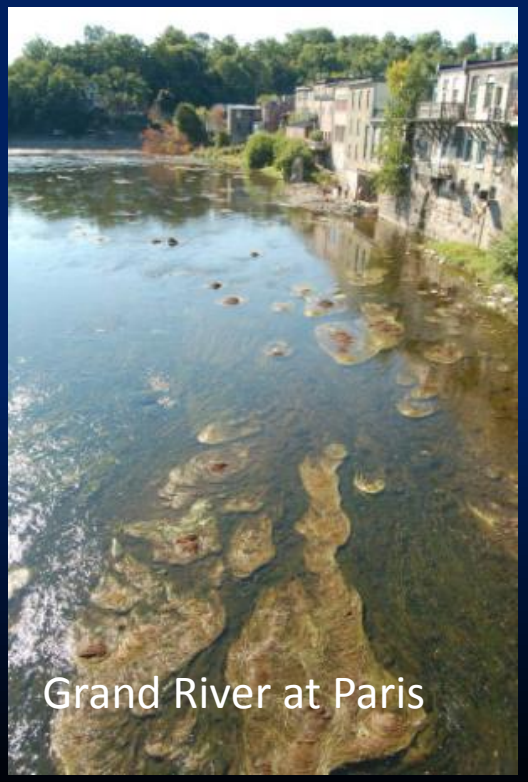
Phosphorus levels in the Thames River 2004 – 2008
3 to 6 Times Target



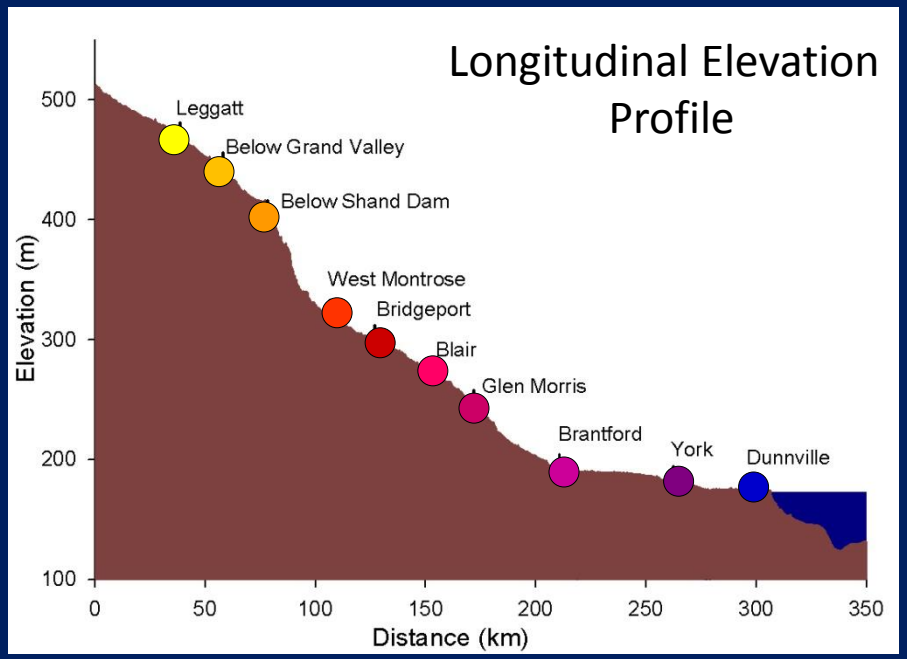
- Within the Thames & Grand river watersheds seeing greater effects of excess phosphorus availability
- Earlier and longer blue-green algae blooms


North Thames River

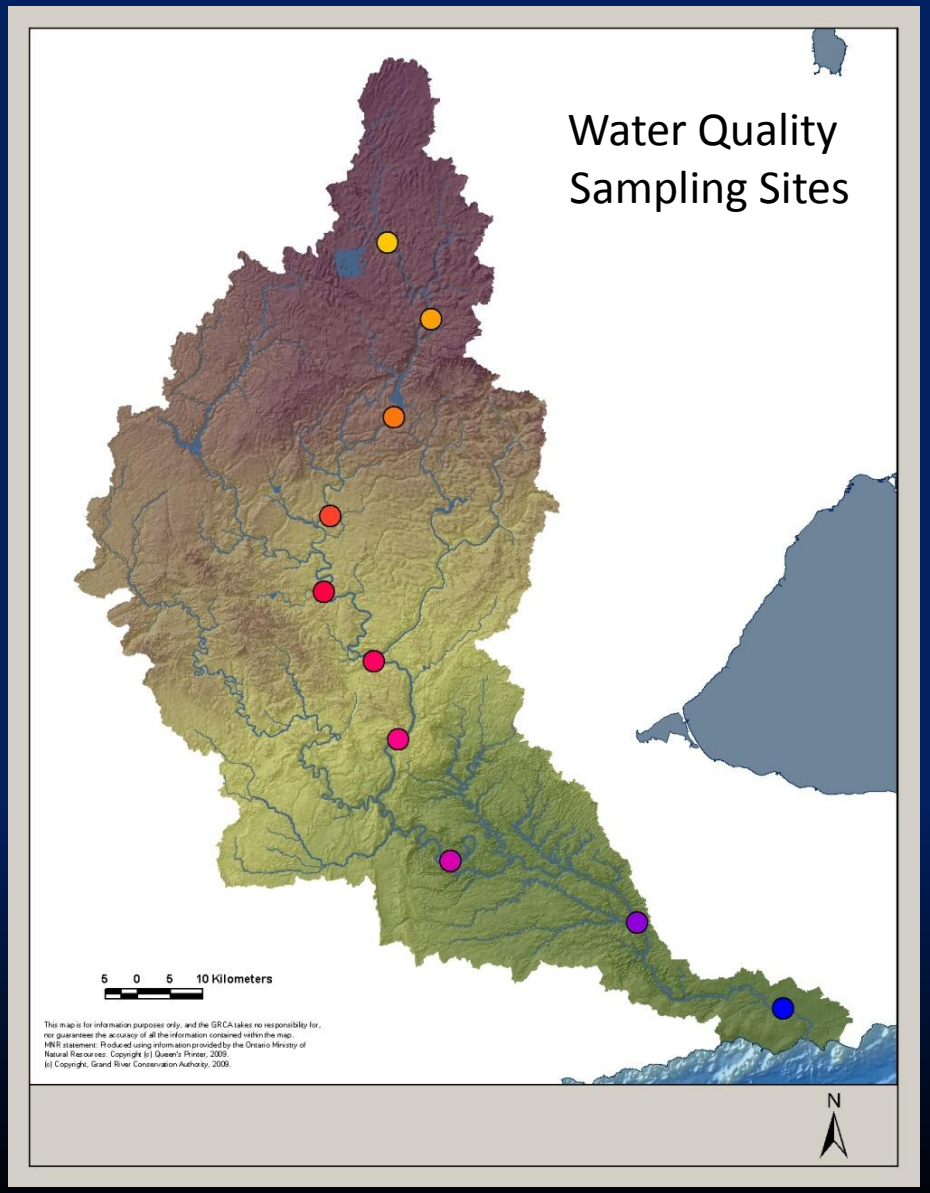

Fanshawe Reservoir, London


Grand River at Paris

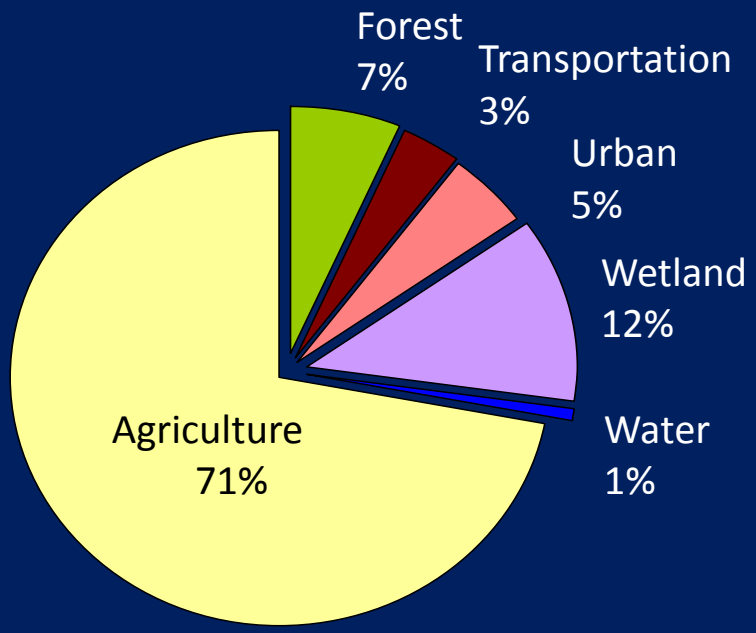
Grand River

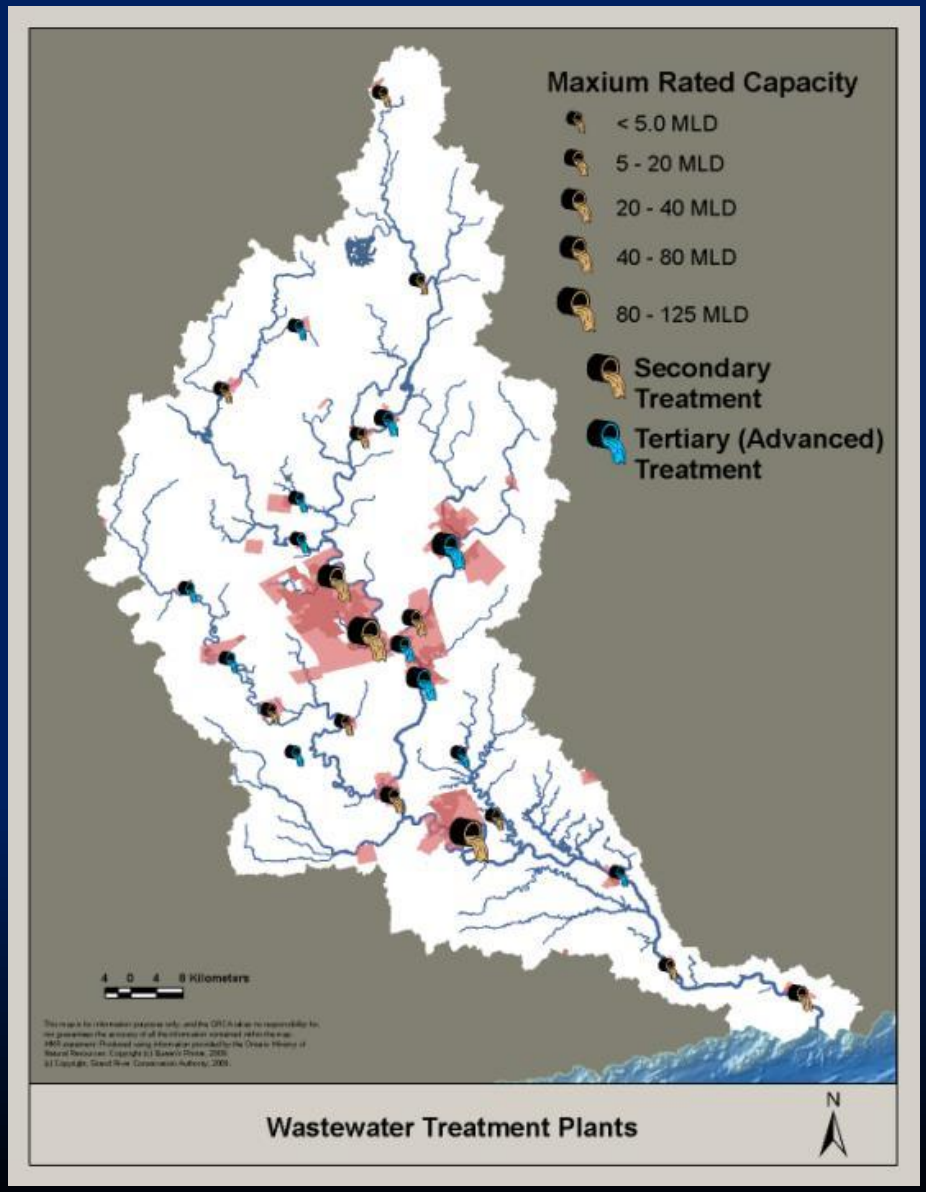


- 6800 km²
- 310 km long
- 950,000 people +



Grand River


Forest
7%
Transportation
3%
Urban
5%
Wetland
12%
Water
1%
Agriculture
71%

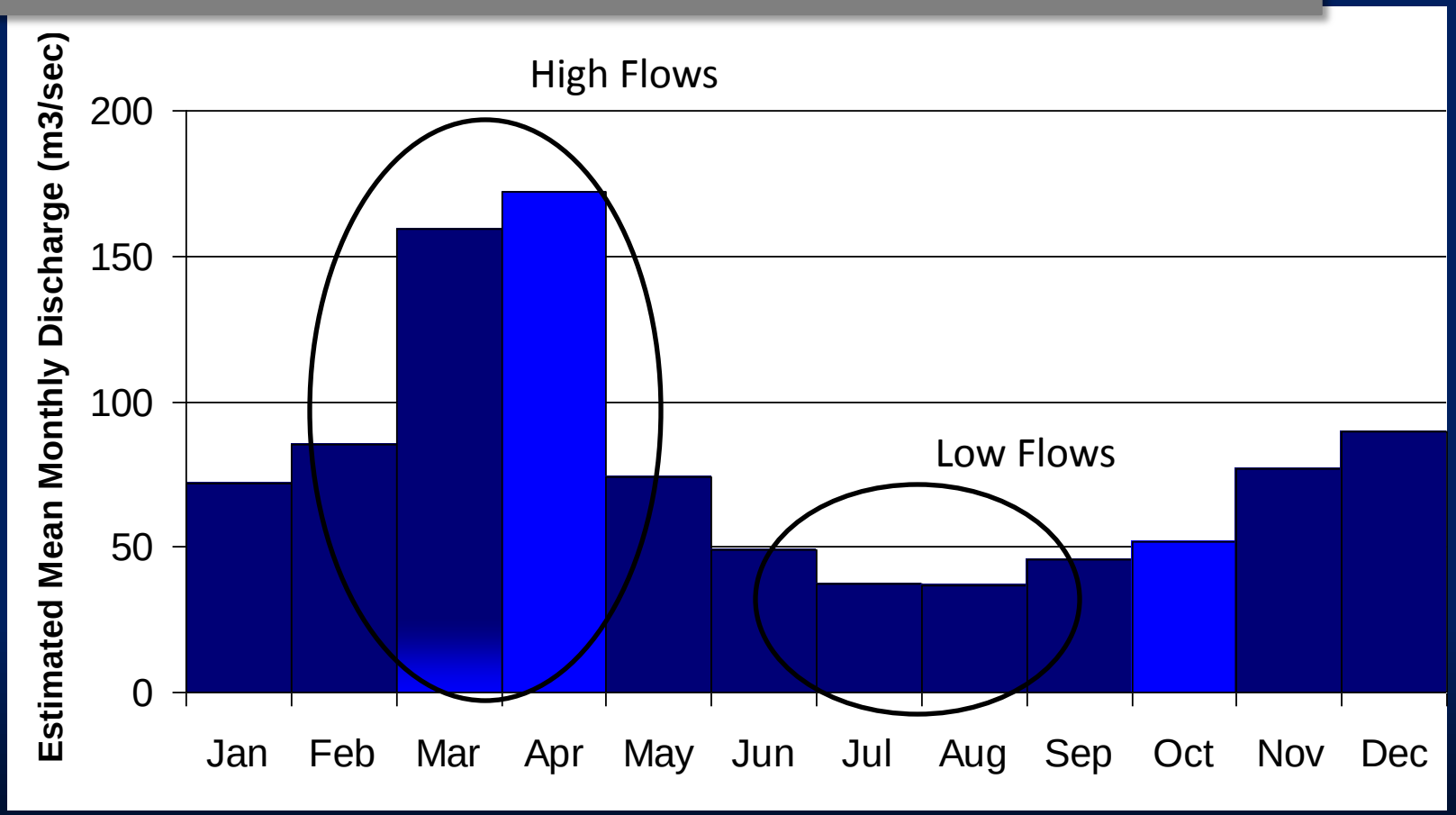

Maxium Rated Capacity
< 5.0 MLD
5 - 20 MLD
20 - 40 MLD
40 - 80 MLD
80 - 125 MLD
Secondary Treatment
Tertiary (Advanced) Treatment
4 0 4 8 Kilometers
Wastewater Treatment Plants
N

Contributing Areas

- High flows deliver much of the nutrient load to Lake Erie
- Conceptual contributing areas based on typical spring runoff conditions & summer low flows
- Provincial Water Quality Monitoring Network
- More monitoring and research to quantify and confirm

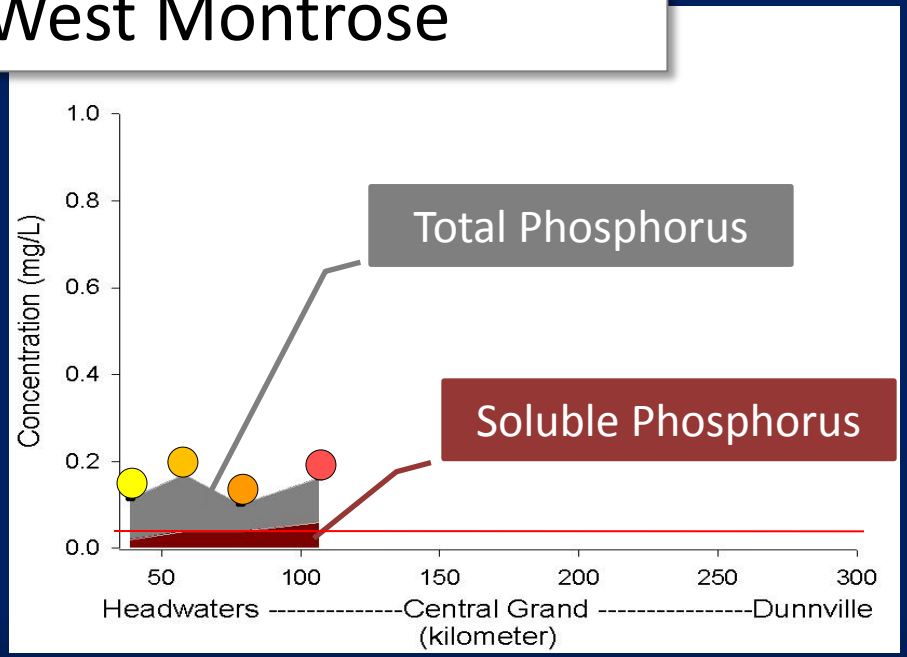
P Loading to Lake Erie tied to River Flow

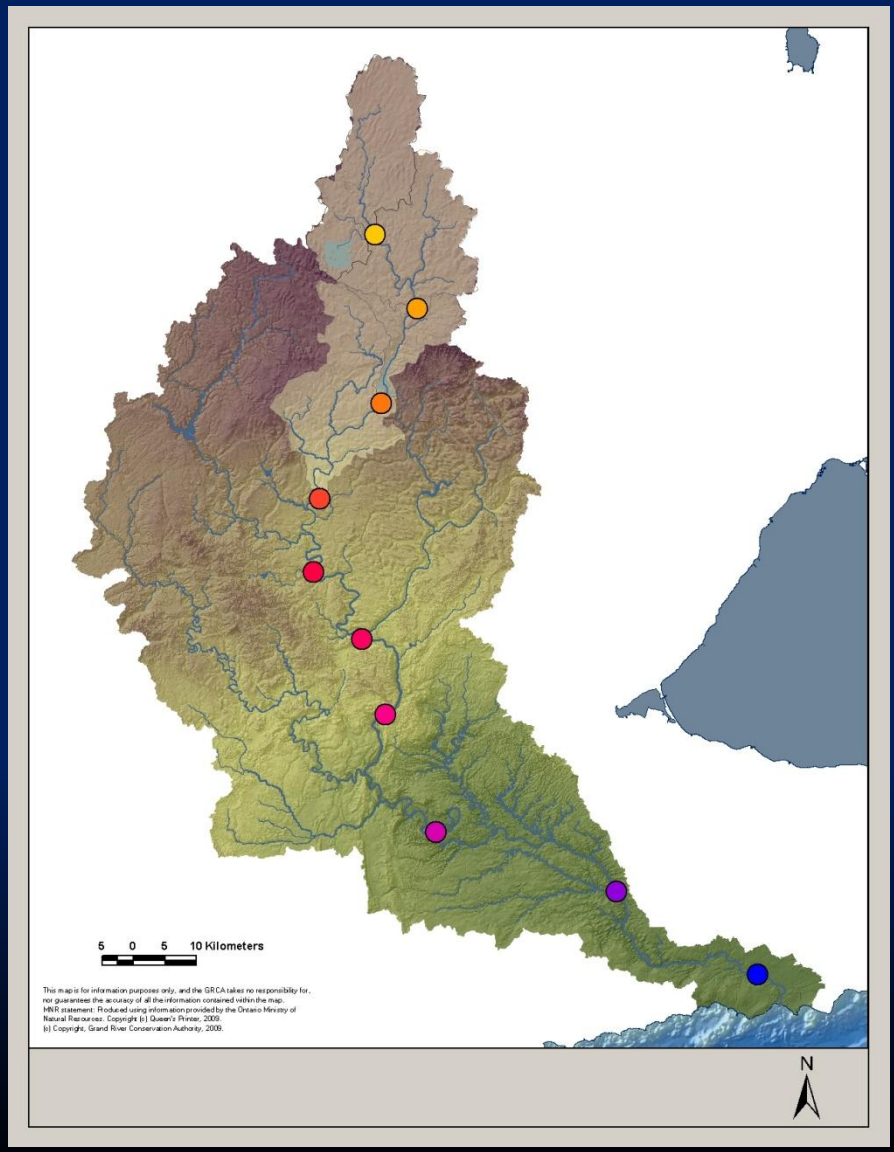
Mean monthly discharge at Port Maitland



High Flow Contributing Areas

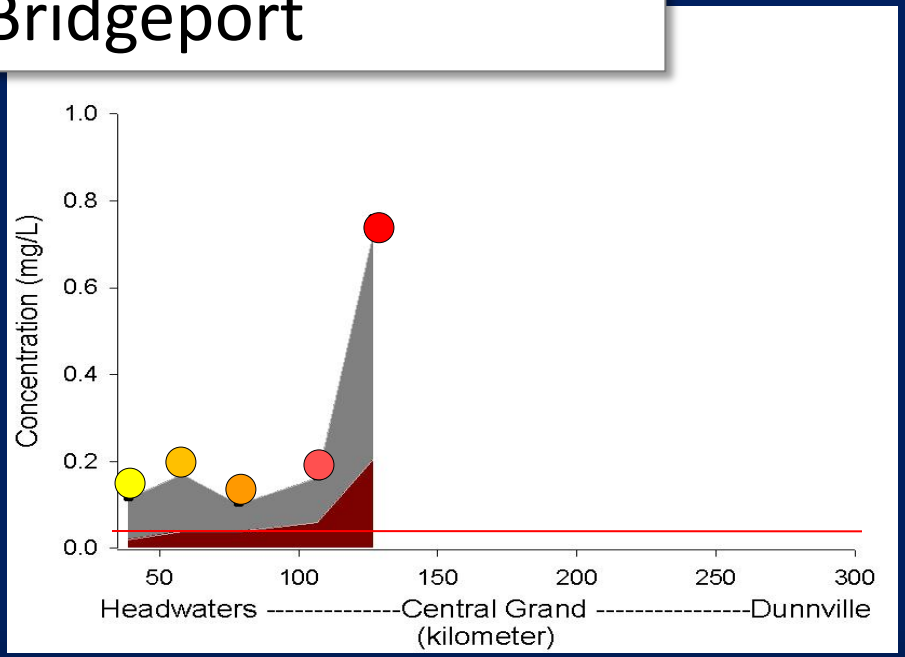
Phosphorus Levels to West Montrose

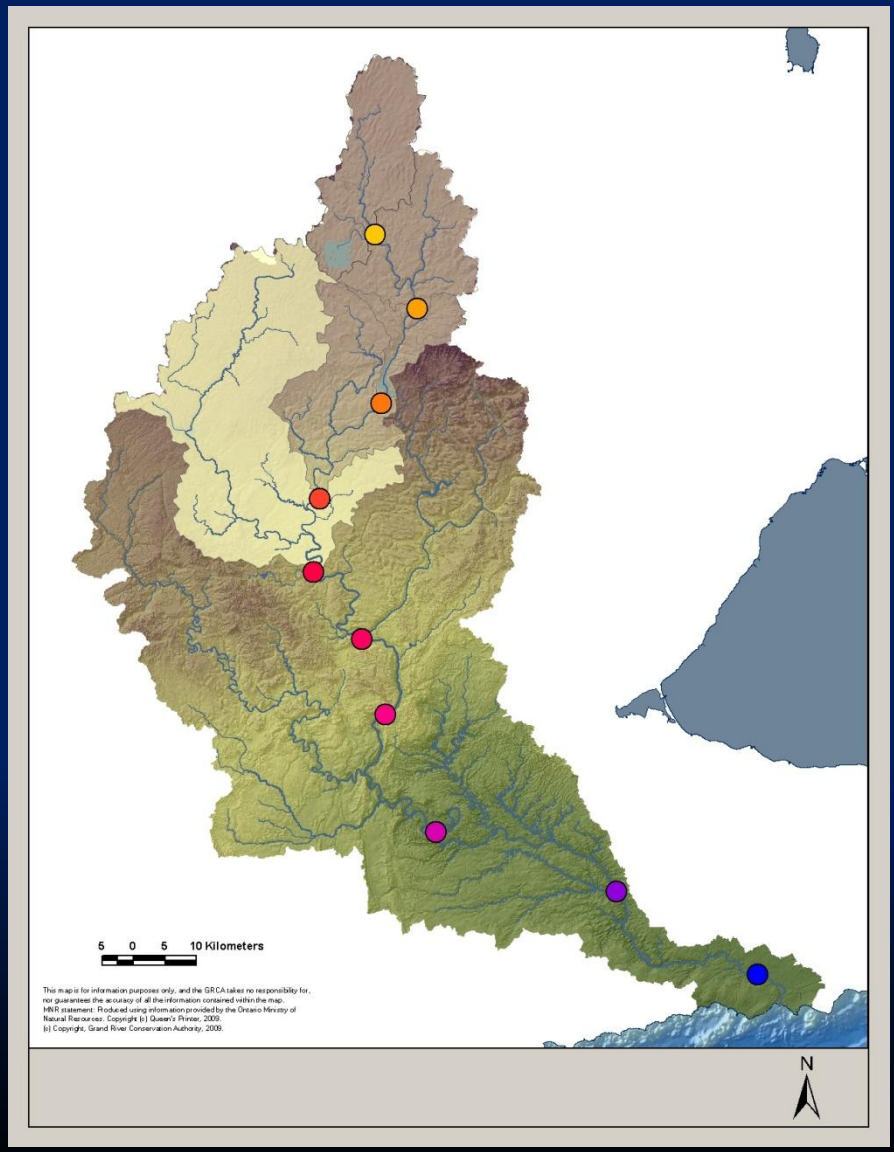




High Flow Contributing Areas

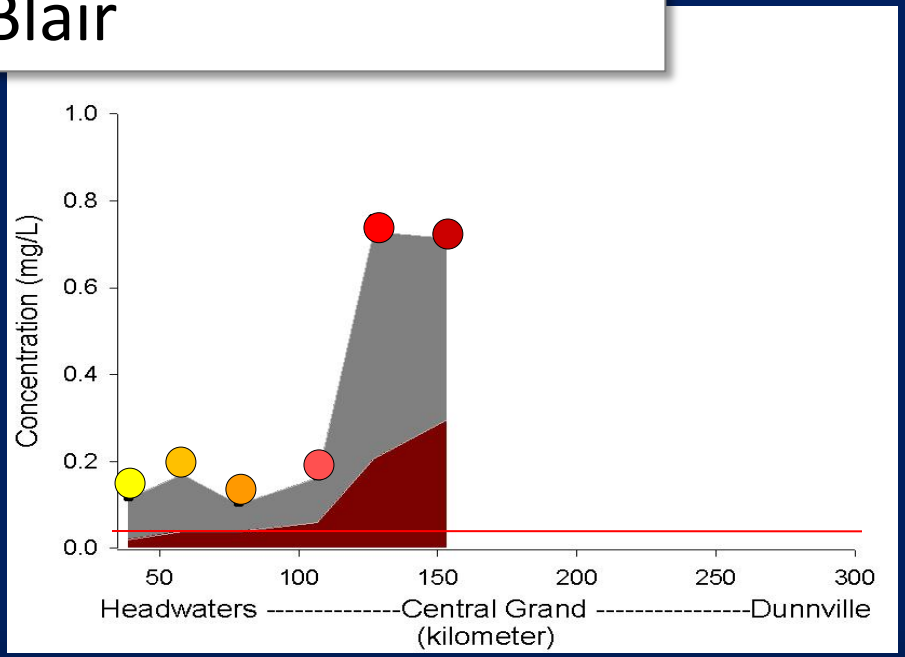
Phosphorus Levels to Bridgeport

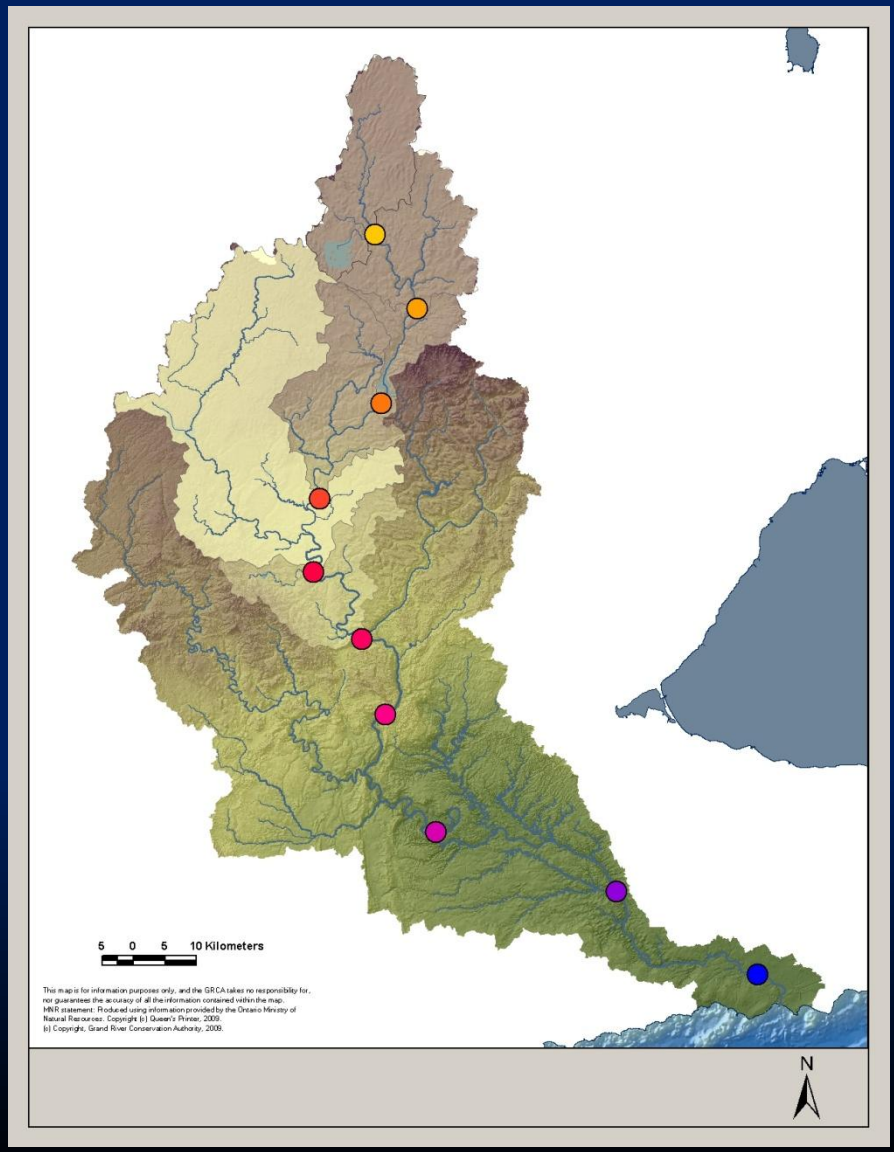




High Flow Contributing Areas

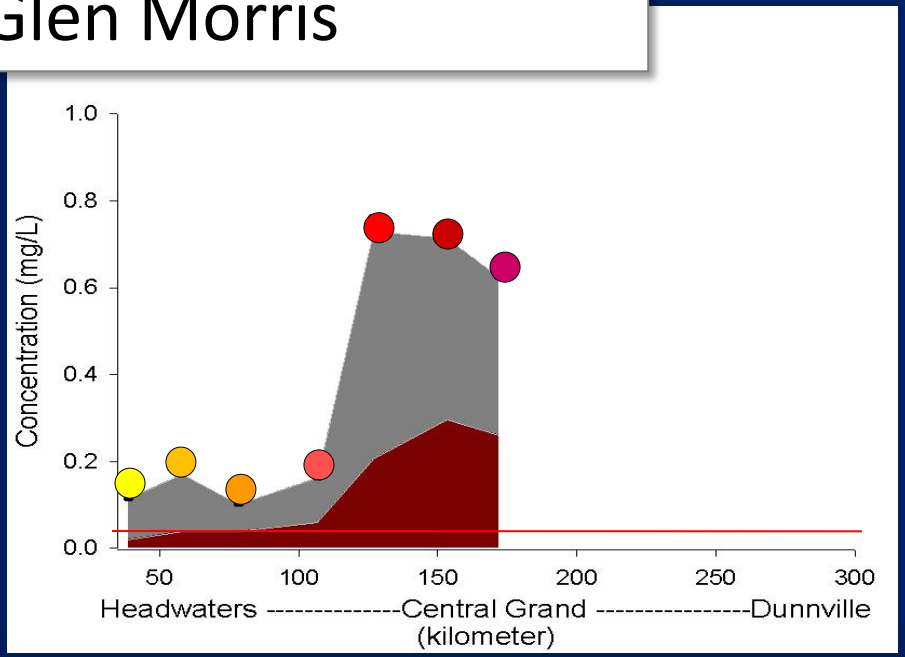
Phosphorus Levels to Blair

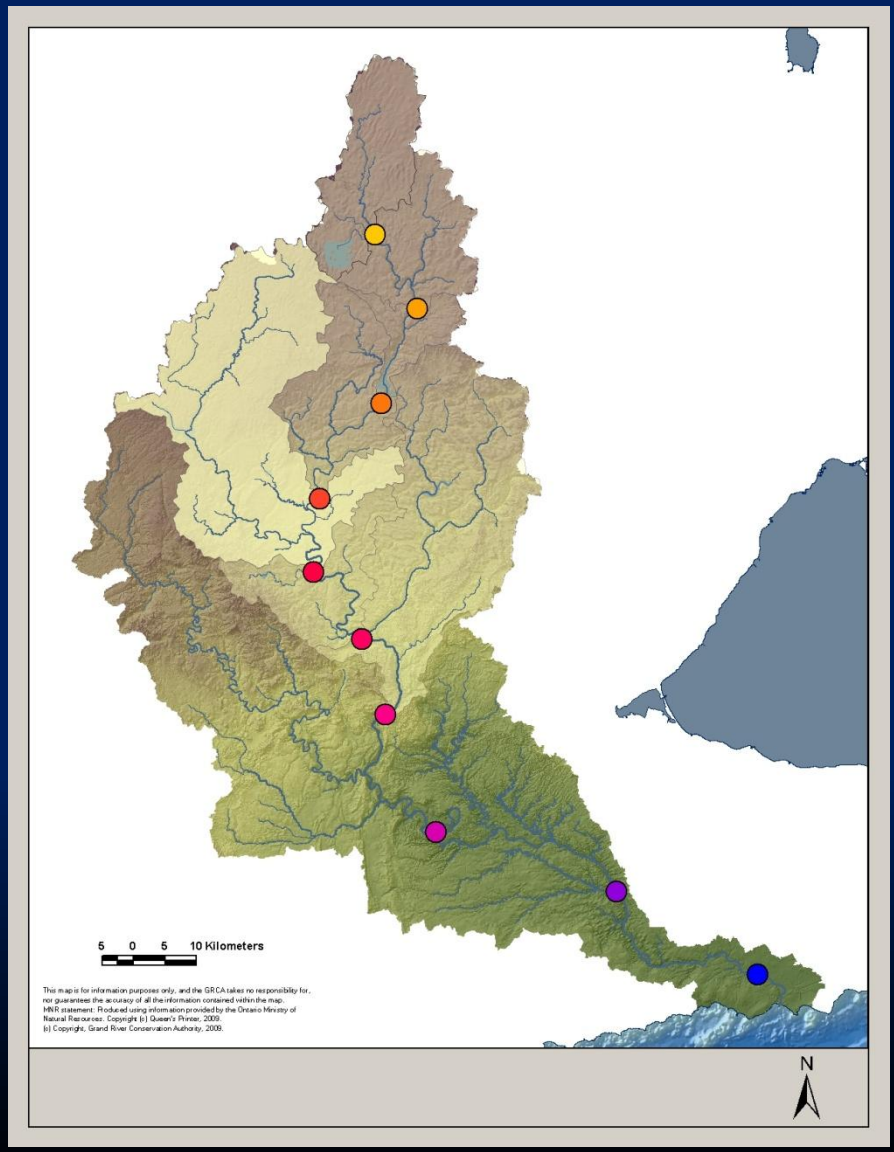




High Flow Contributing Areas

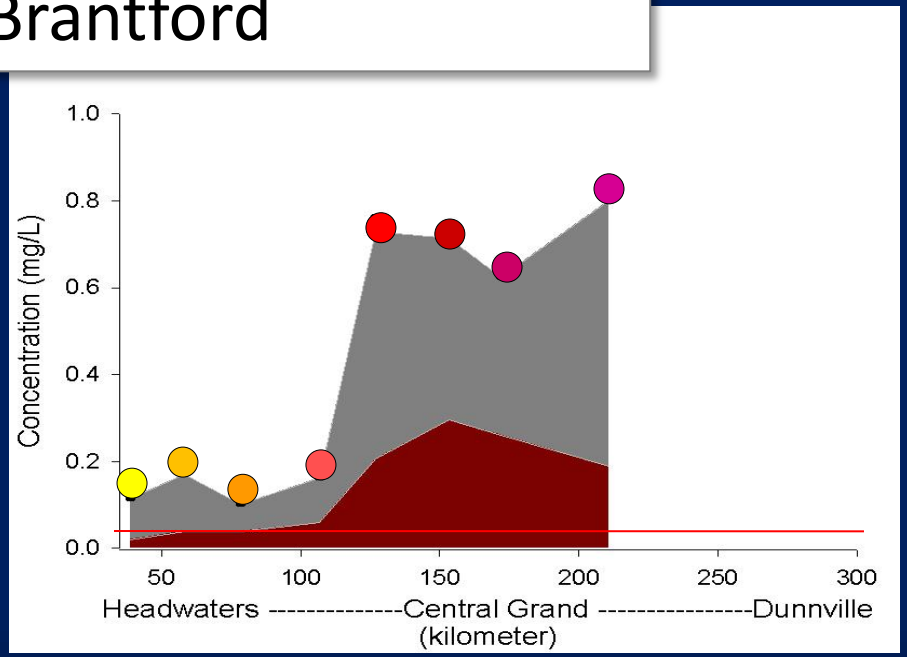
Phosphorus Levels to Glen Morris

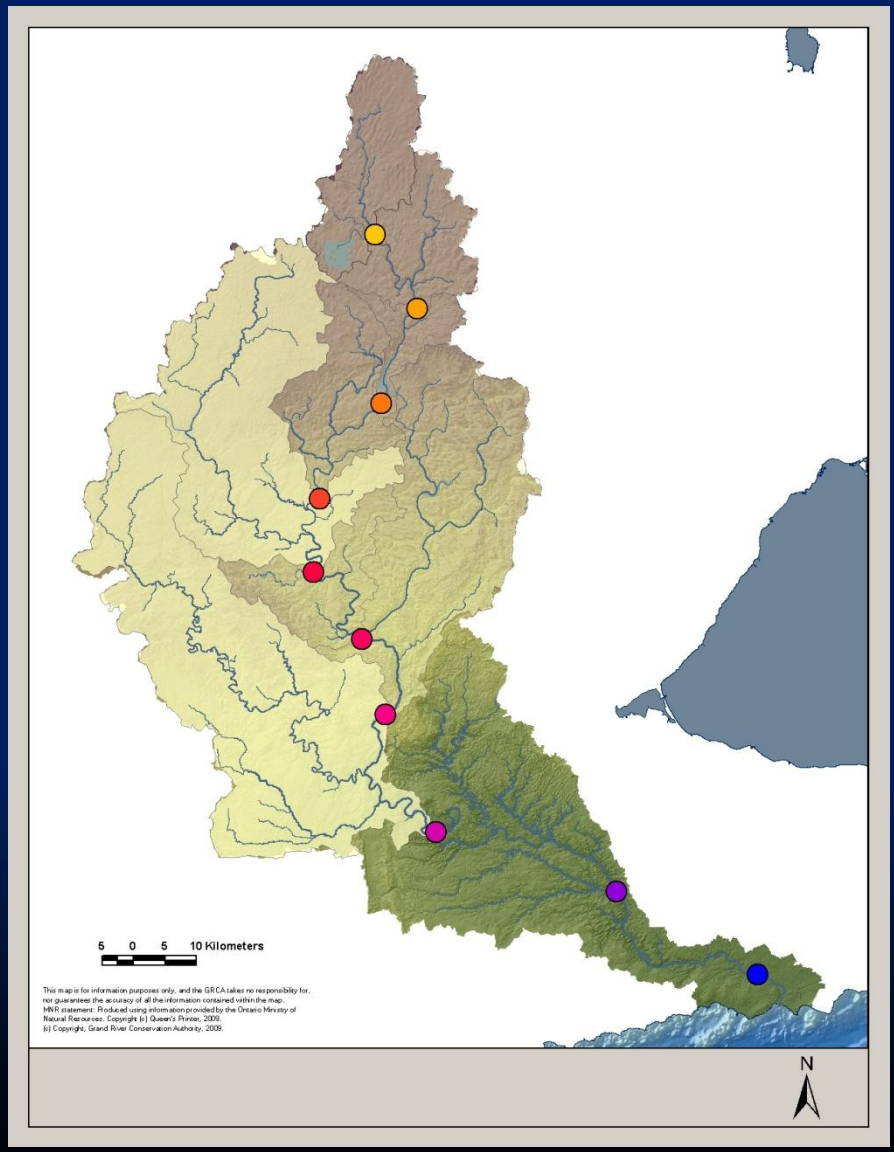




High Flow Contributing Areas

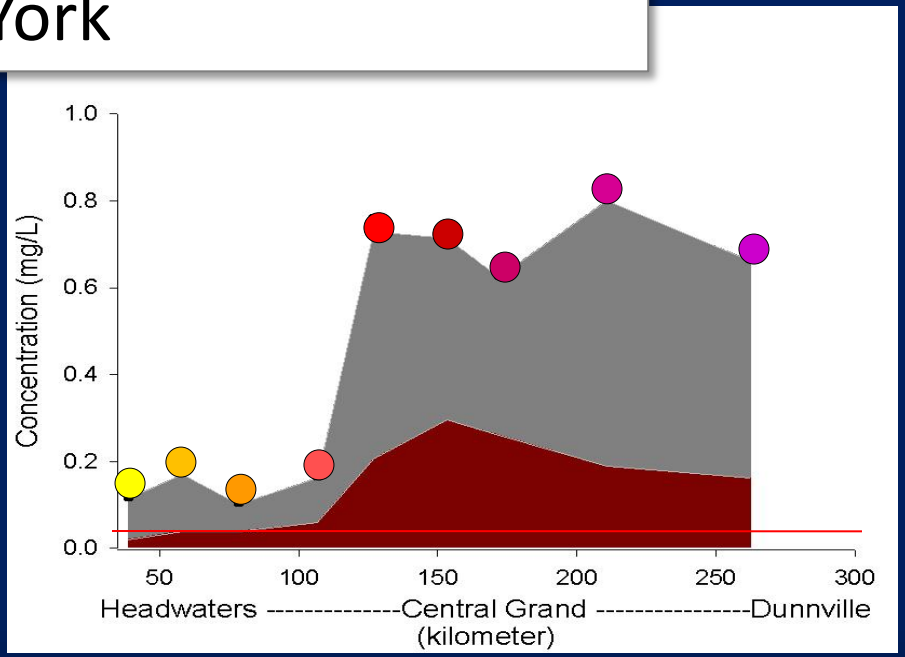
Phosphorus Levels to Brantford

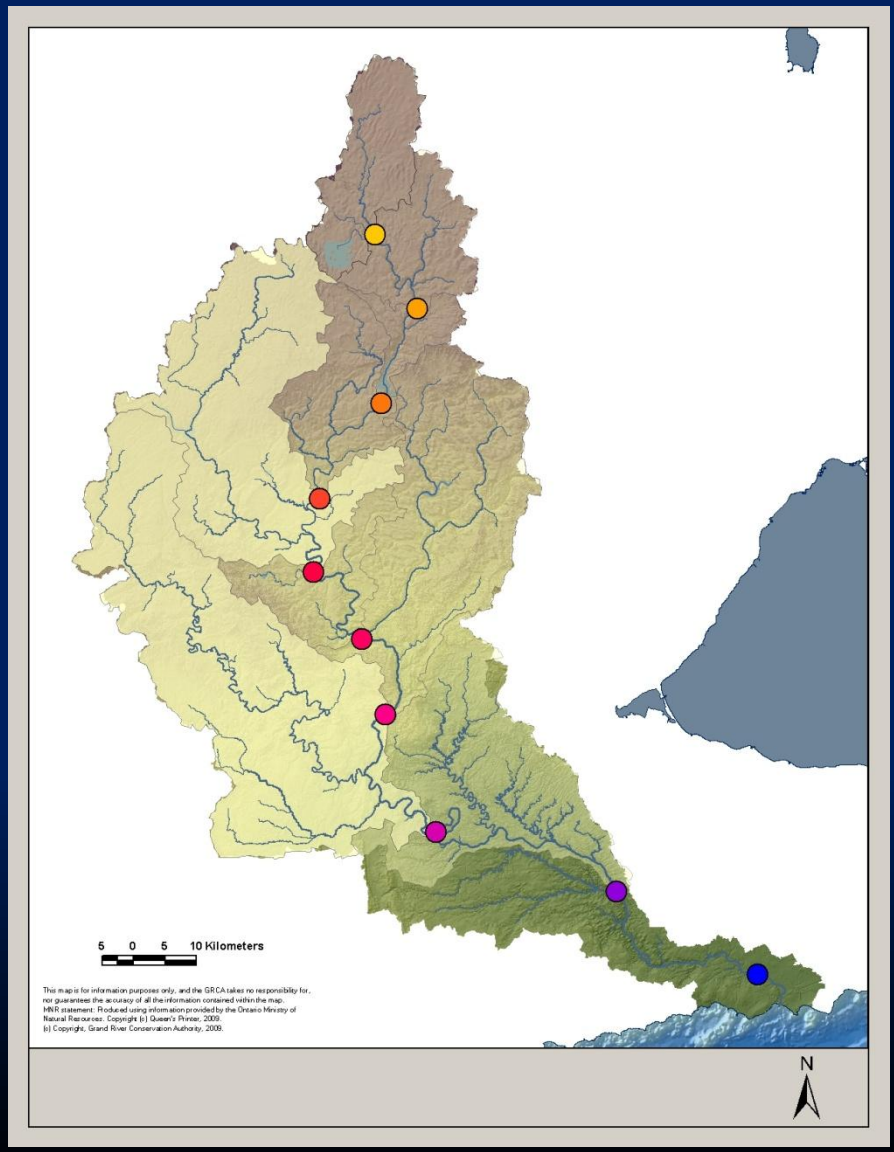




High Flow Contributing Areas

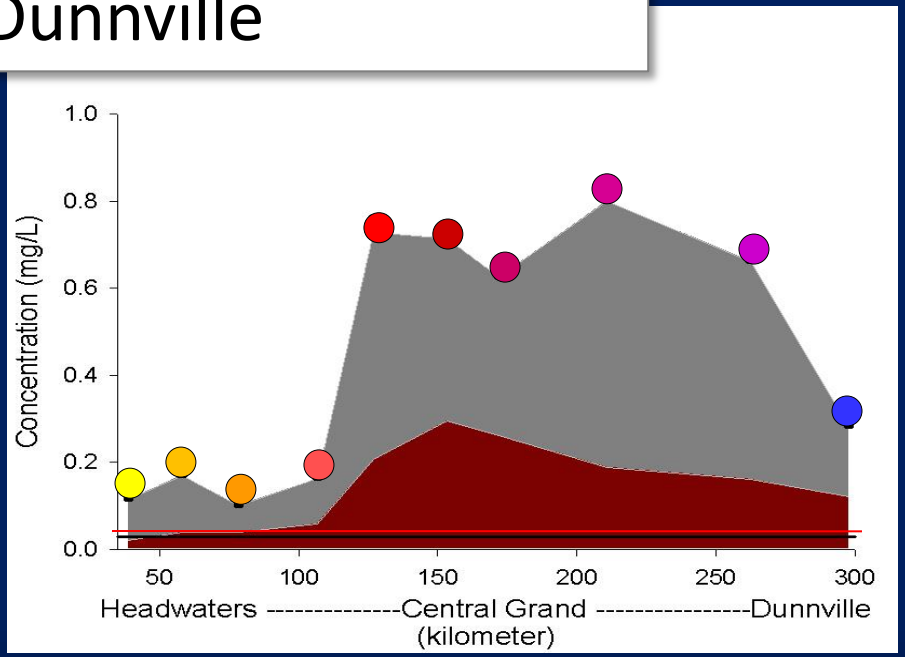
Phosphorus Levels to York

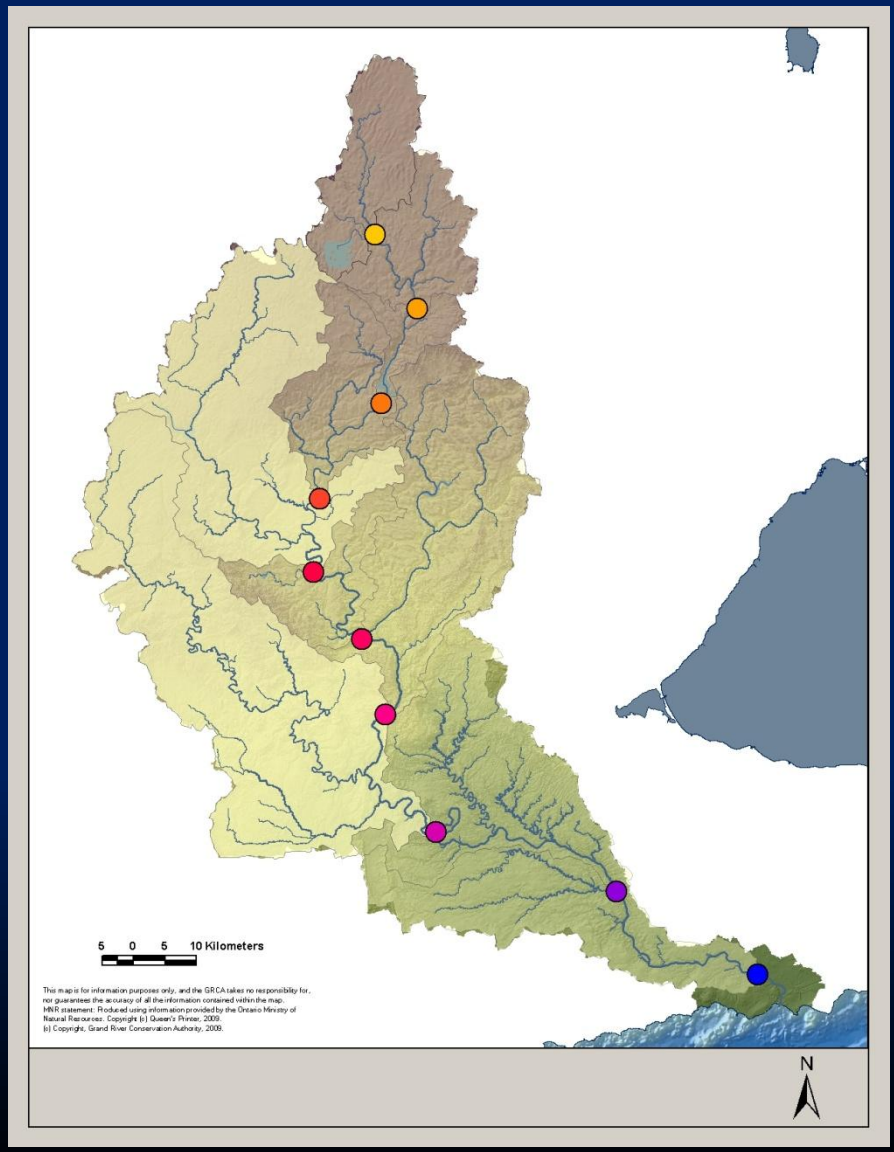




High Flow Contributing Areas

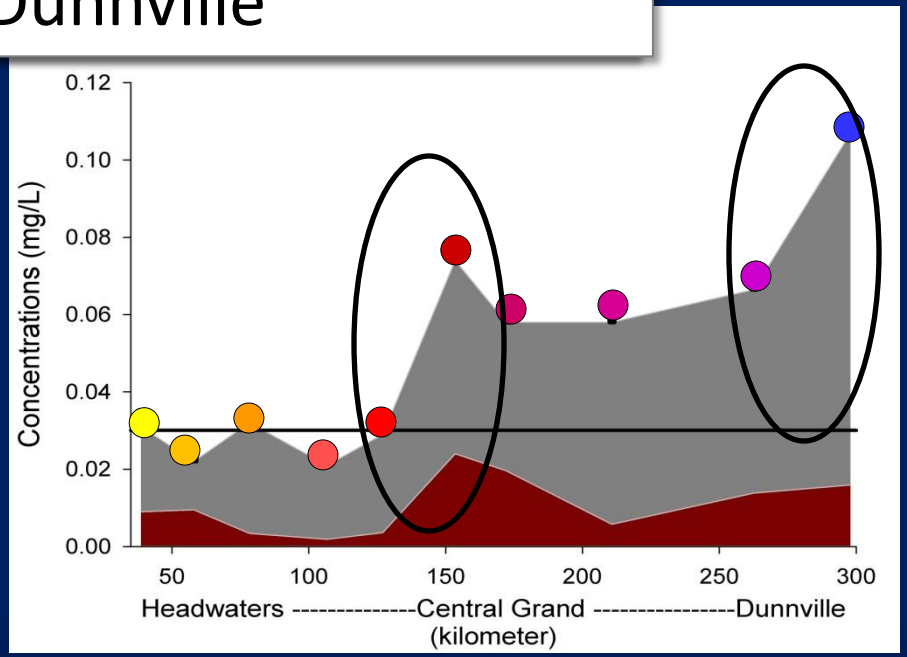
Phosphorus Levels to Dunnville

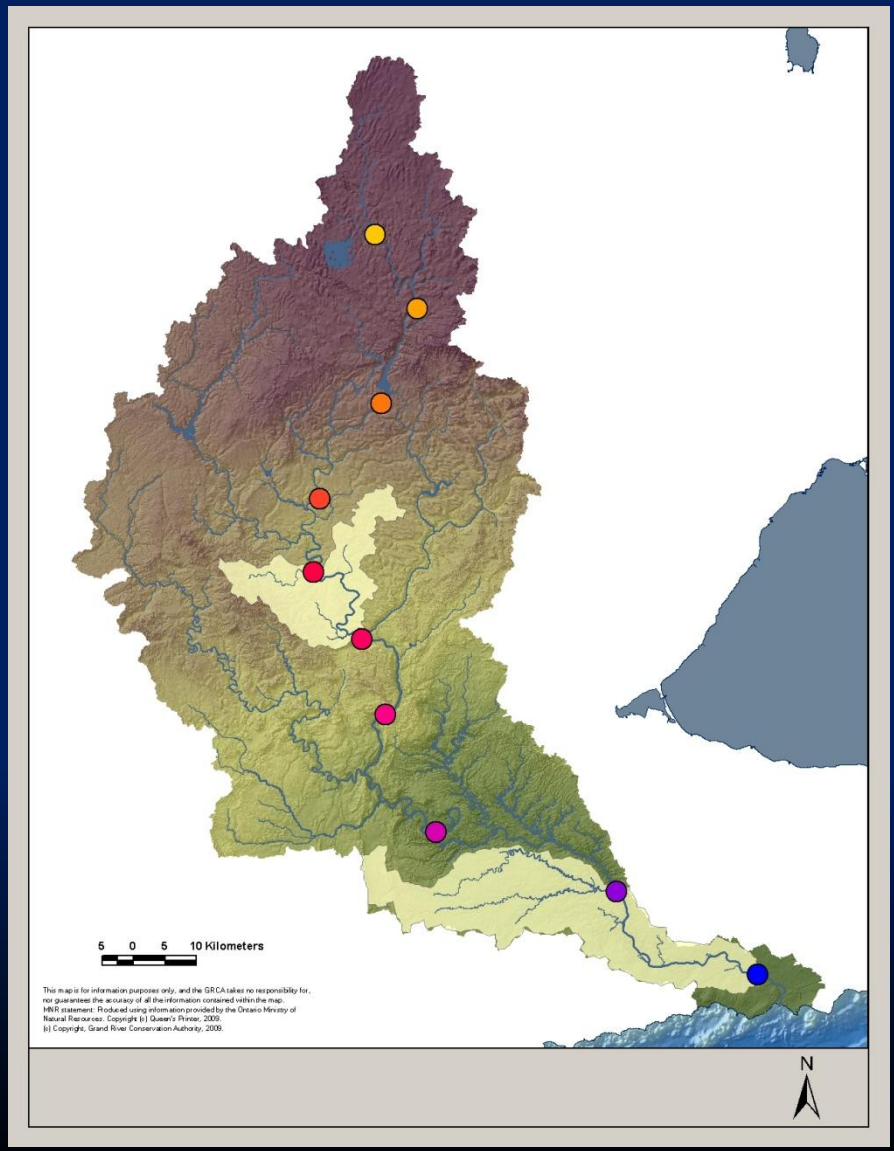




Low Flow Contributing Areas

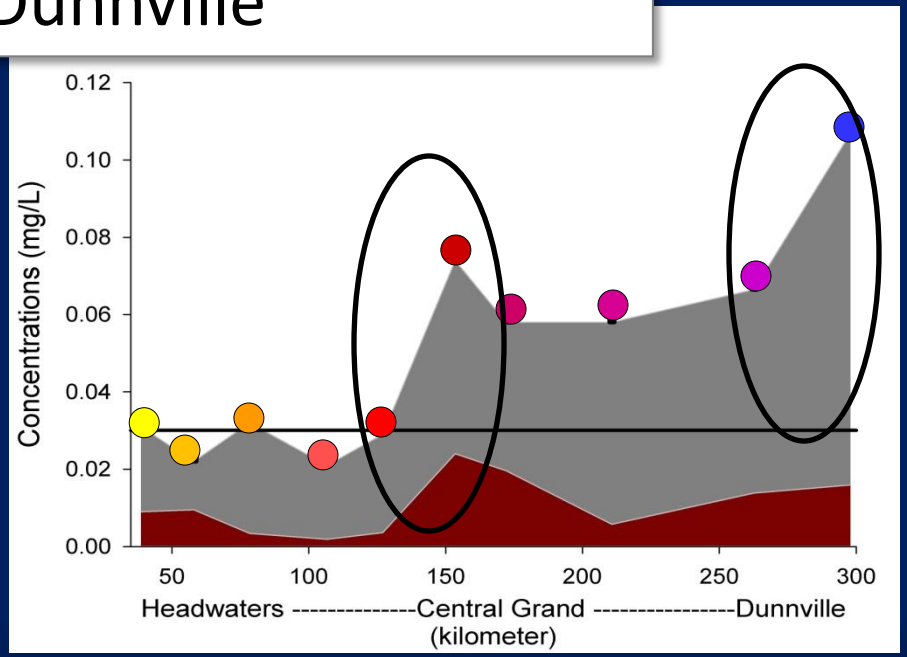
Phosphorus levels to Dunnville

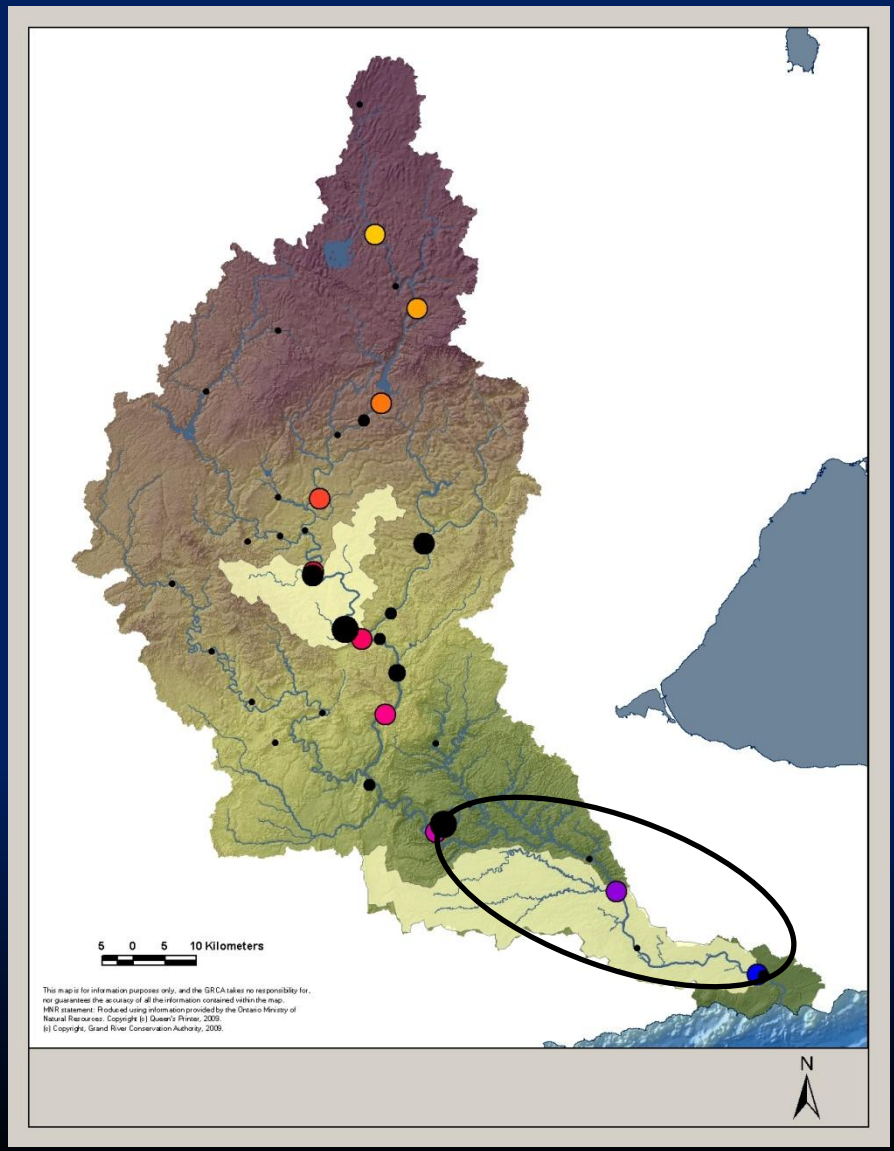




Low Flow Contributing Areas

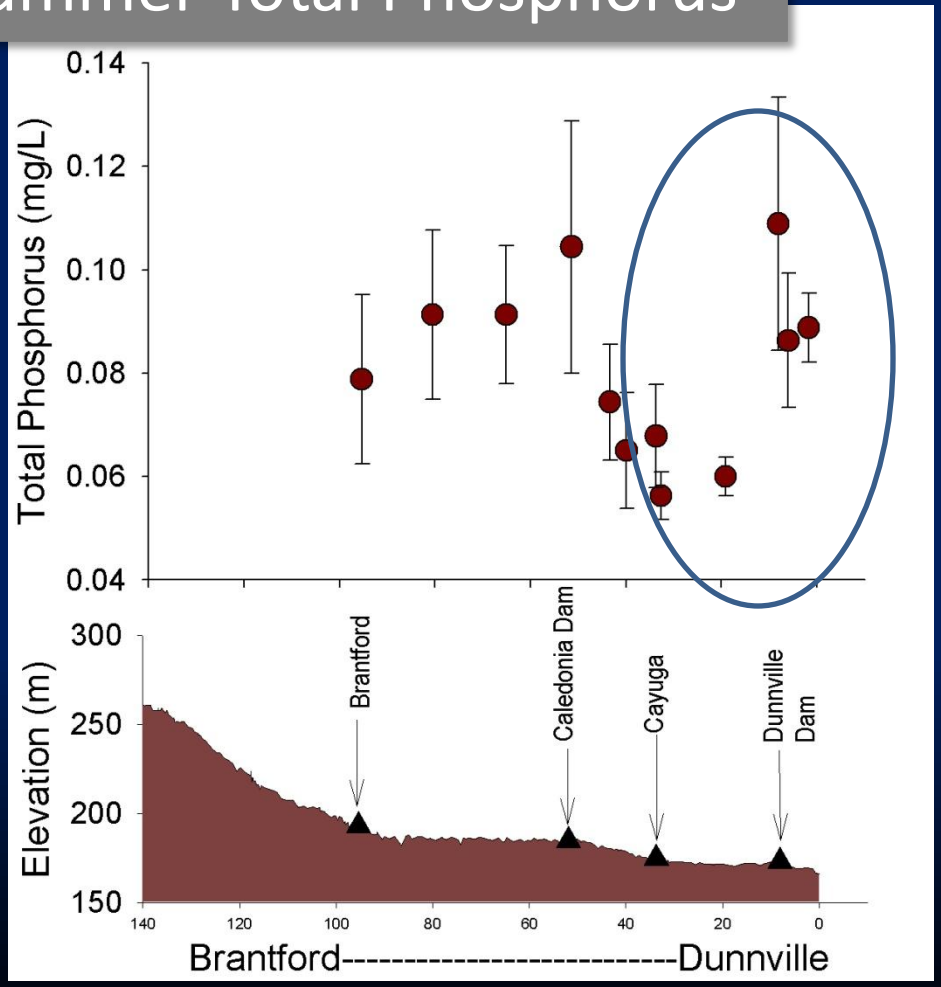
Phosphorus levels to Dunnville





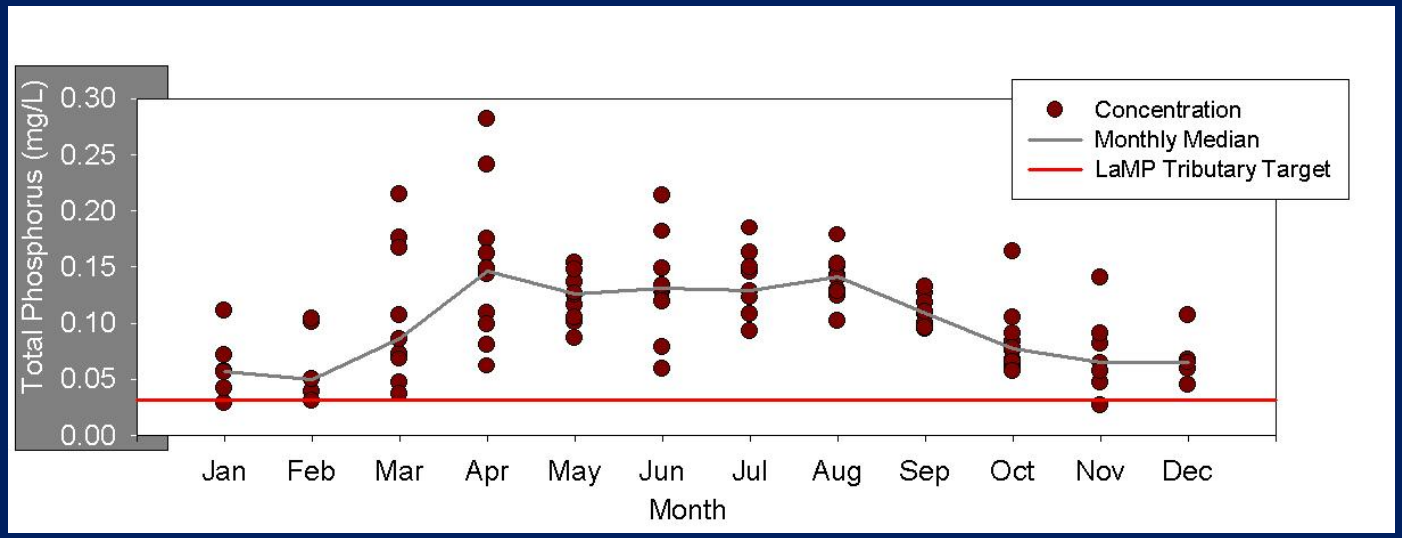
Phosphorus cycling in the lower Grand

Average Summer Total Phosphorus

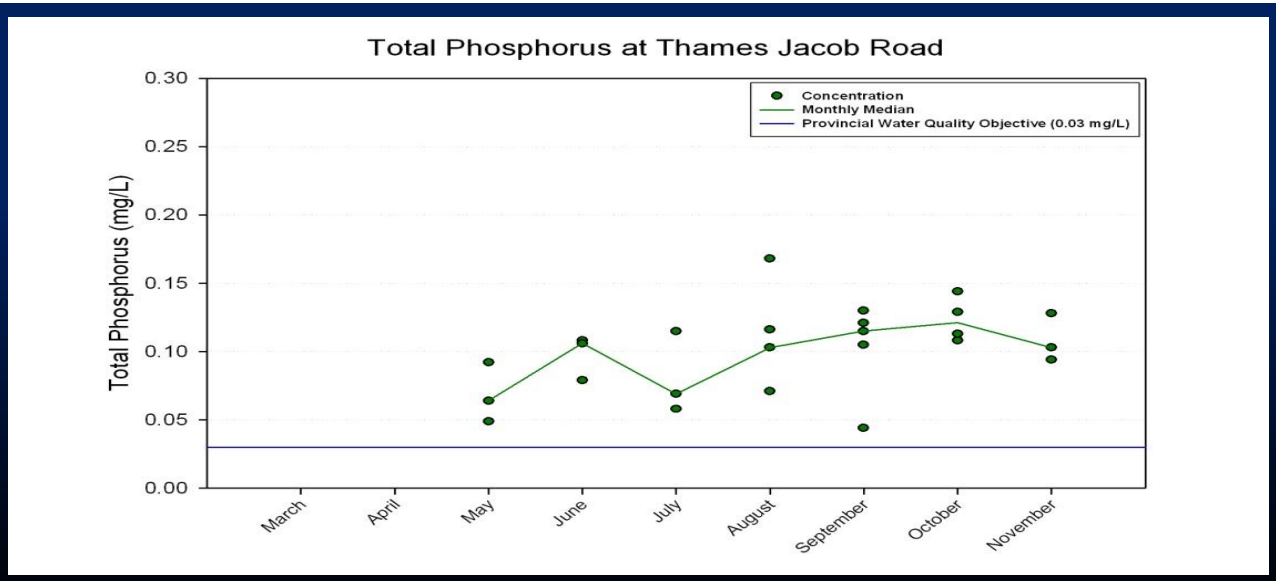


GRCA – COA, 2003

Total Phosphorus at Outlet (2003-2008)

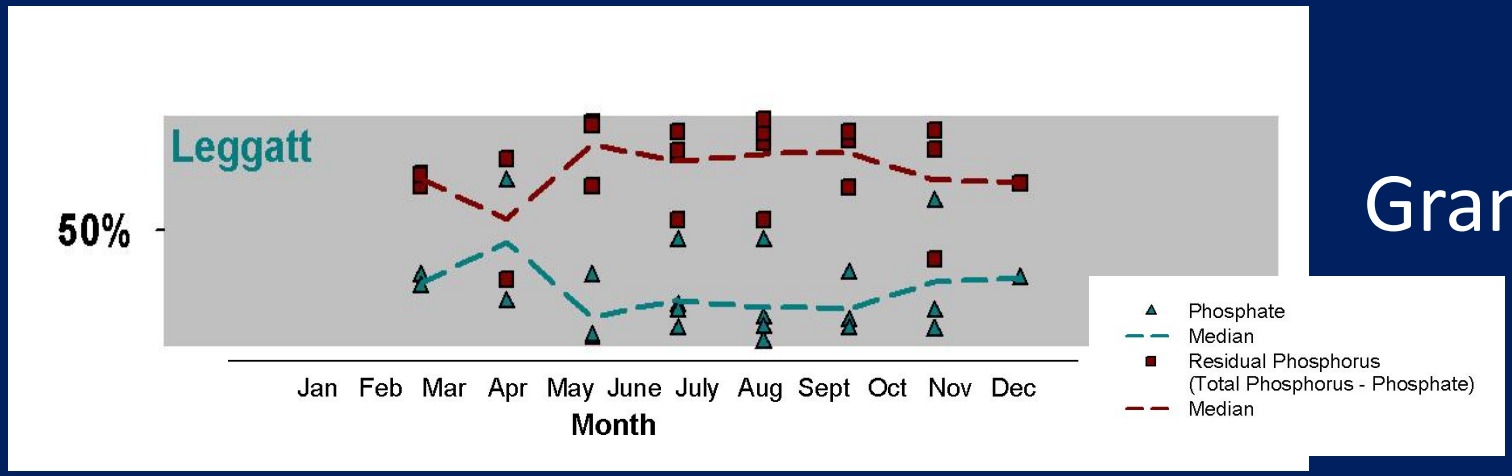


Grand River

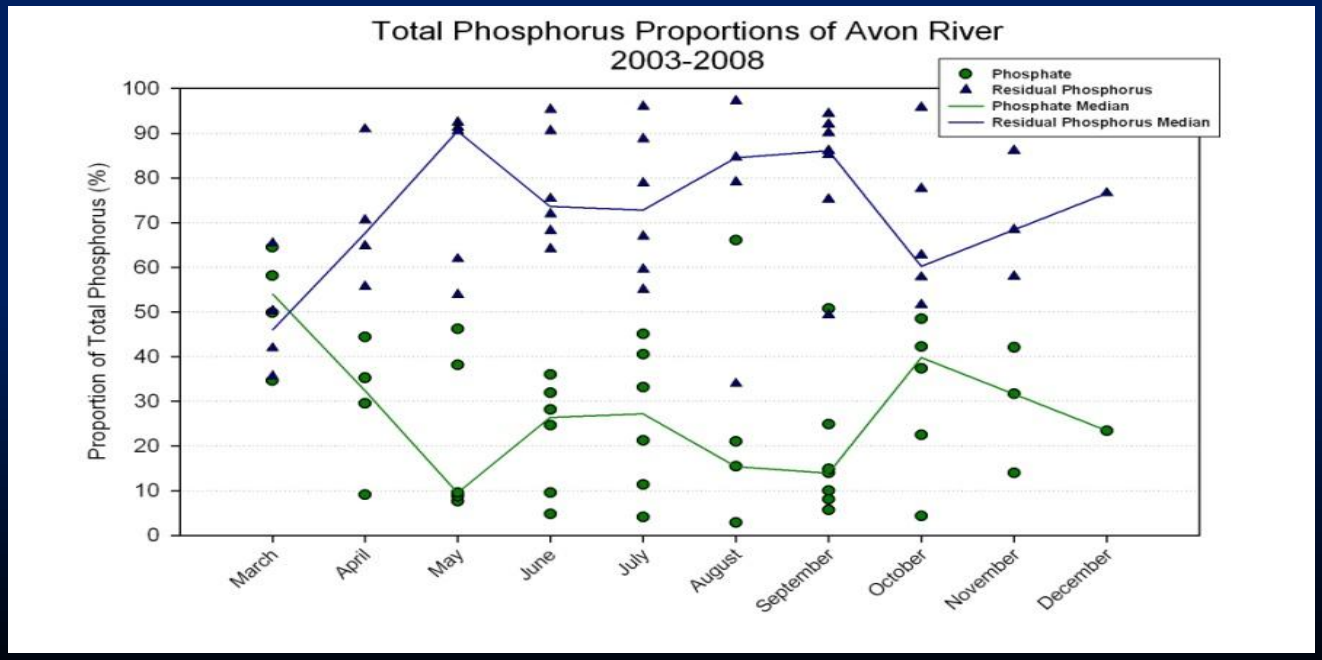


Thames River

Soluble Reactive P vs Residual P Headwaters

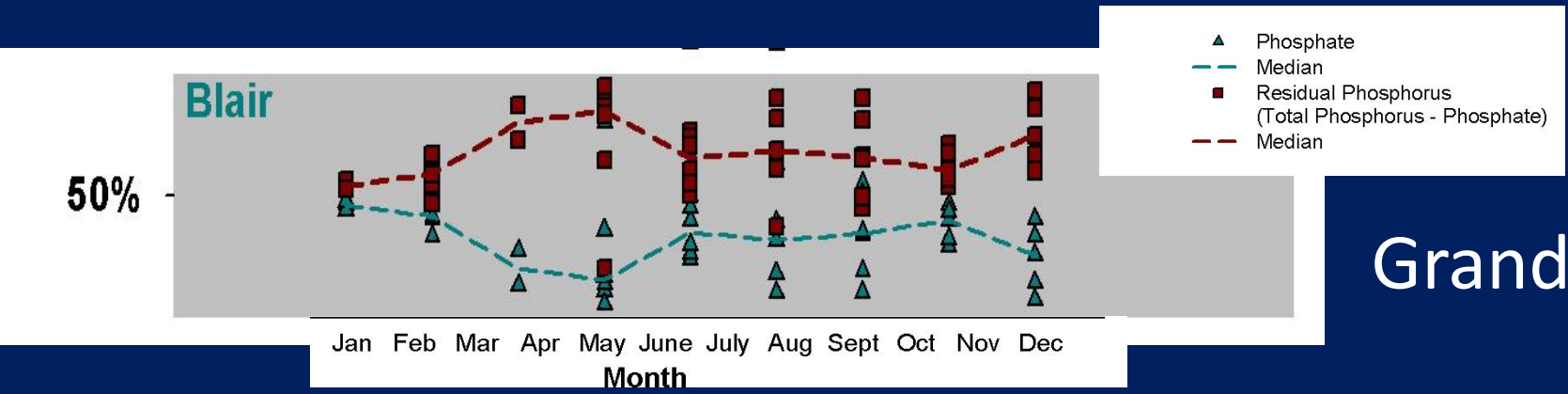


Grand River

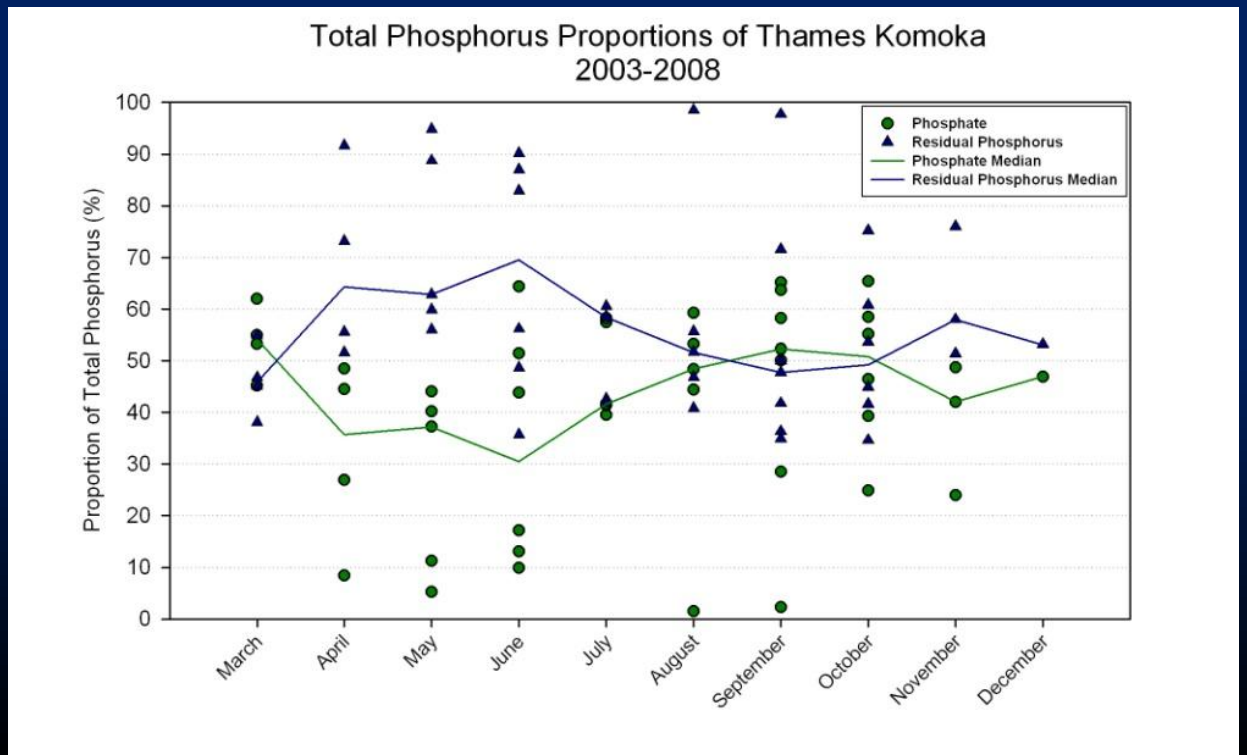


Thames River

Soluble Reactive P vs Residual P Urban

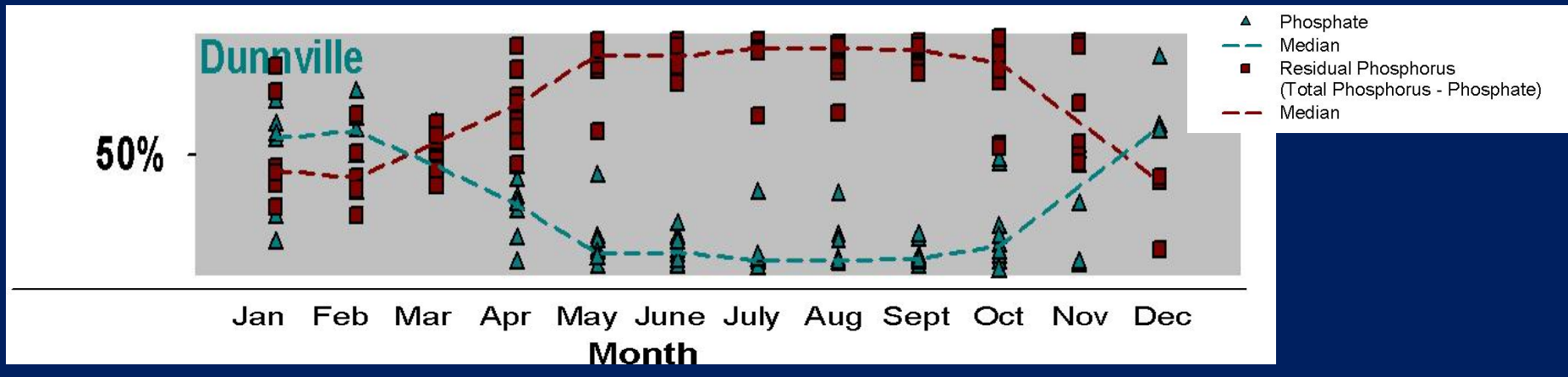


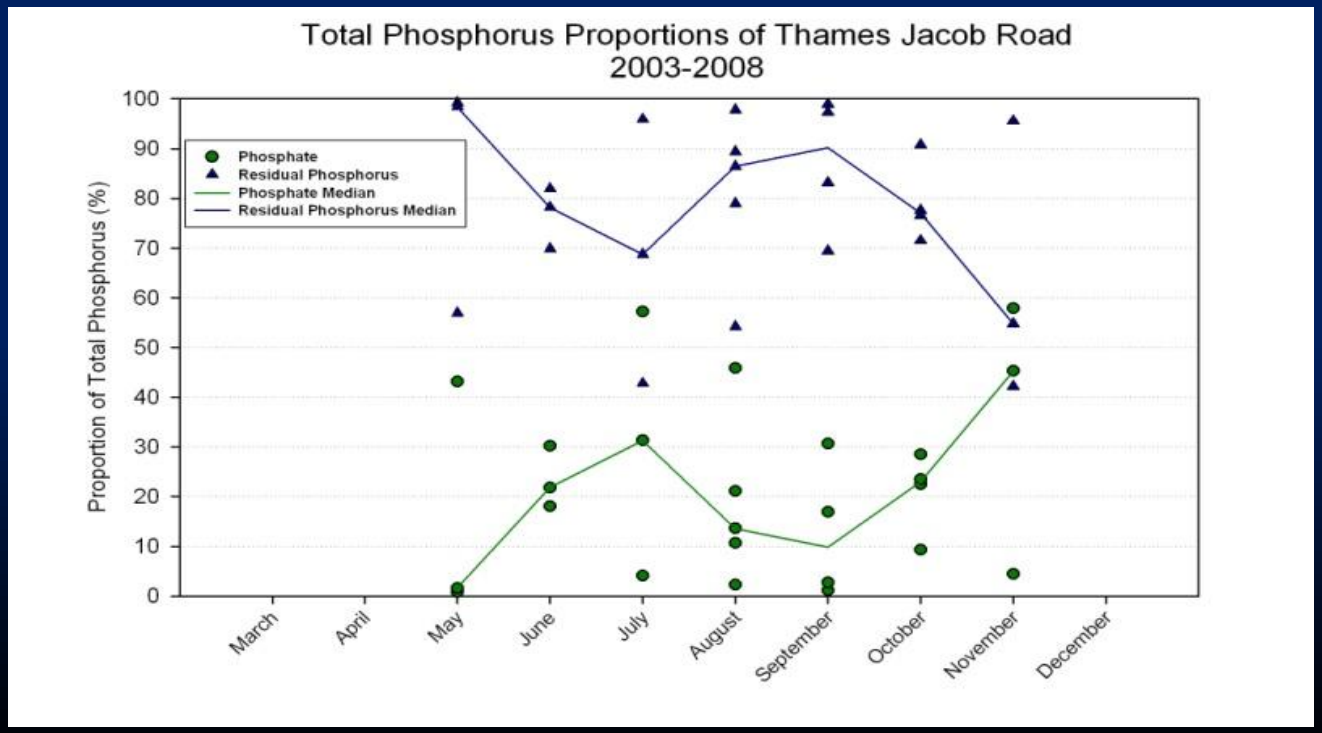
Grand River



Thames River

Soluble Reactive P vs Residual P River Mouth





Recommendations

- Enhanced river monitoring for nutrient budget development to target nutrient-reduction implementation
  - Improve: frequency, 12-month, range of flow
- Optimize existing non-point source programs through increased scale and targeting (Binational Nutrient Management Strategy)
- Point source reduction strategies
- Research to identify causes and BMPs of dissolved P increases

Thank-you !

Karen Maaskant & Sandra Cooke