MOE Multi-Watershed Nutrient Study

Current concerns with agricultural NPS

Are agricultural NPS loadings increasing?

- Could this be part of the explanation for nearshore issues in the Great Lakes?

What is the scope for loading reductions?

- Only ‘dial’ that we have (can’t control the food web or climate)

Problems in the 1960's and '70s- What was done on the land side

The **P**ollution from **L**and **U**se **A**ctivities **R**eference **G**roup (the PLUARG) was formed to :

- Examine the magnitude of non-point source loading
  - agricultural, urban, and forested watersheds
- Develop relationships between land use, features of the landscape and nutrient loading
- Develop recommendations to reduce these loads, if significant

- 1972-1979

PLUARG

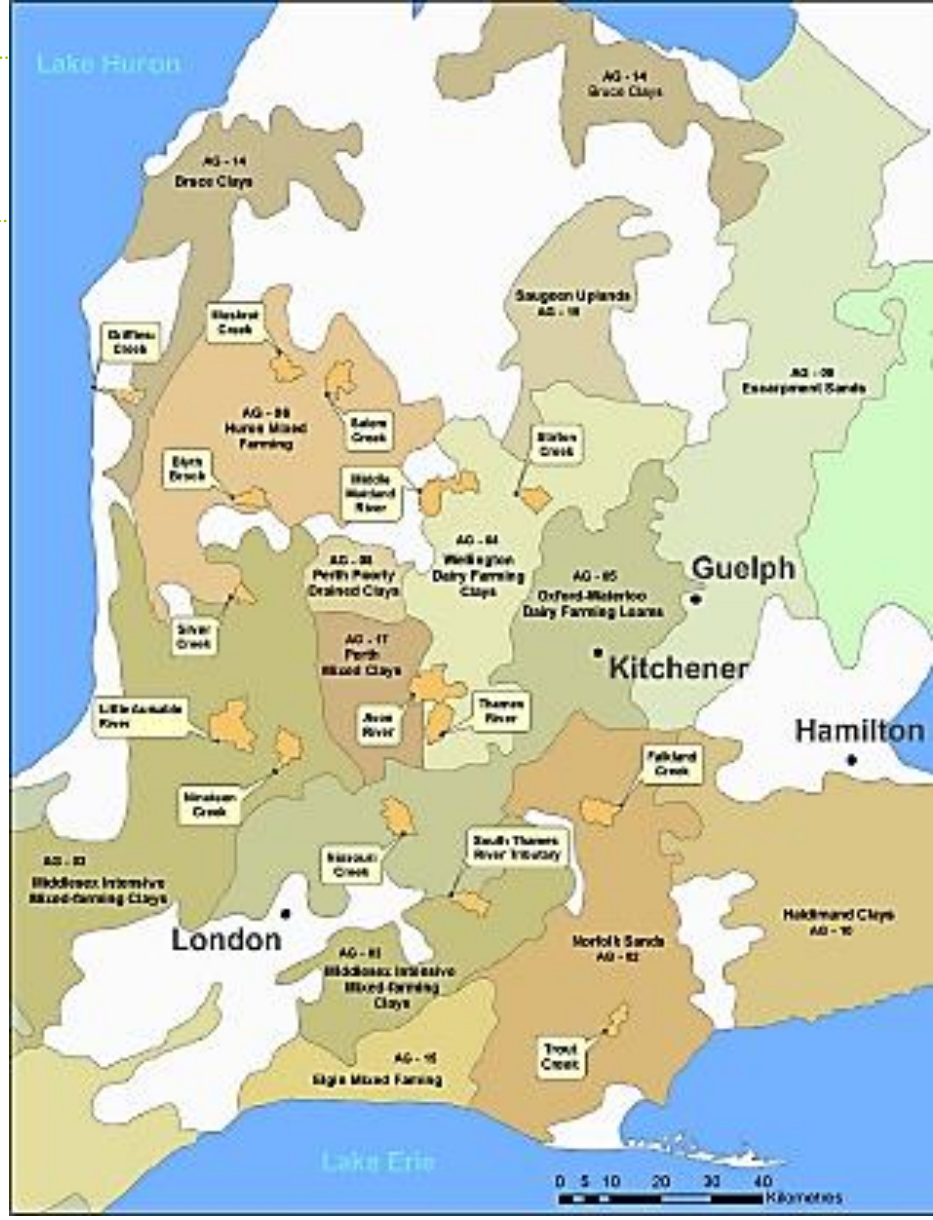
How to estimate total agricultural NPS loadings?

- Large watersheds are mixed use
- Too many small agricultural watersheds to study

Used 3 characteristics that influence nutrient loss:

1) climate
2) potential for runoff (soils, slope)
3) agricultural intensity

Used above to generate ‘PLUARG’ zones



PLUARG

- Selected 11 small (~20-70 km^2) agricultural watersheds in different PLUARG zones
- Measured nutrient concentrations on event basis
- Near-continuous discharge
- Above used to estimate nutrient loadings
- Land features (soils/geology, slope)
- Also detailed field-by-field land use, management practices etc. in each watershed

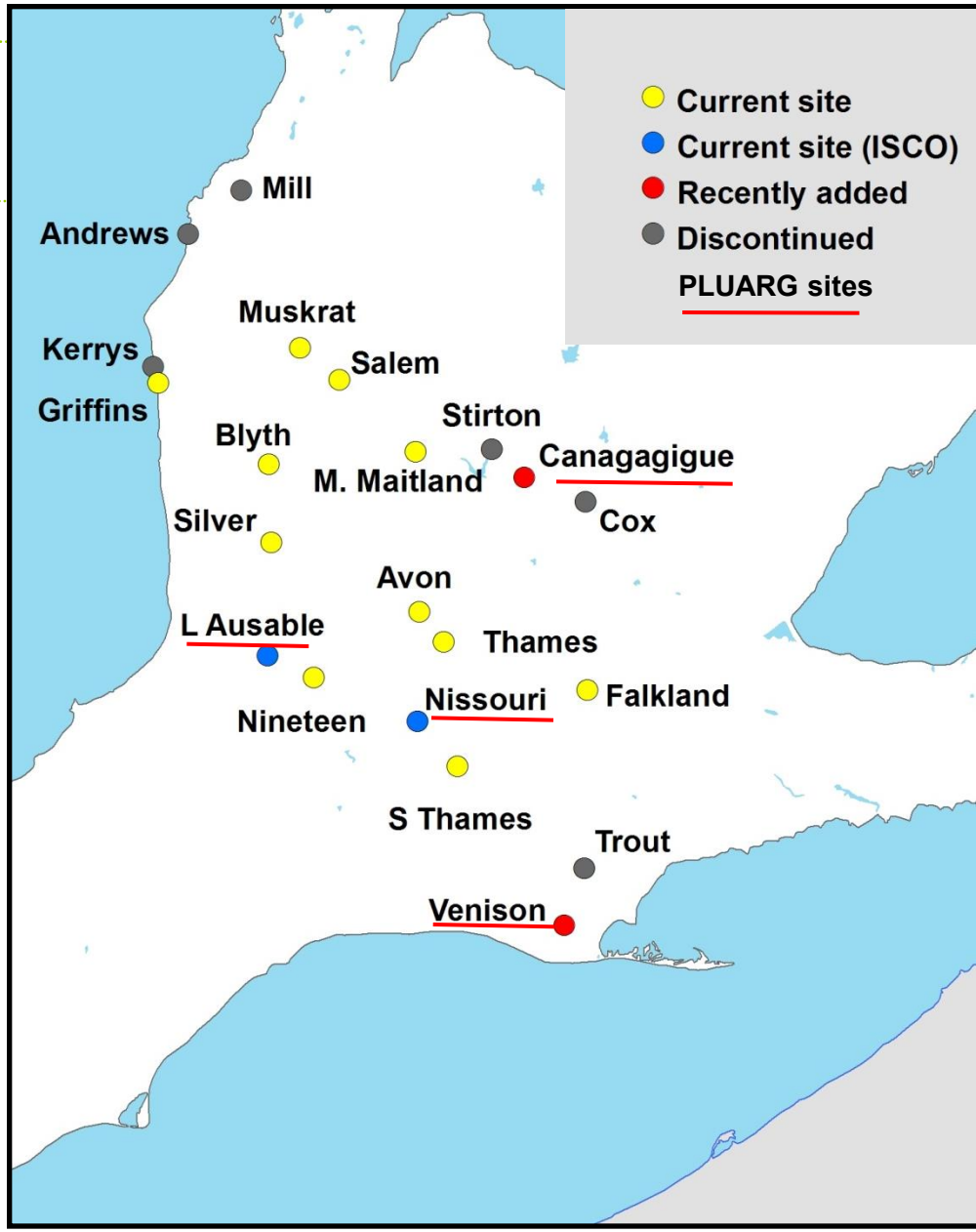
PLUARG- findings

- Land use and watershed characteristics could be used to predict nutrient loadings
  - ~80% of variation in N and P loadings explained % clay and % row crops (e.g. corn, wheat, soy)
- These relationships extrapolated to estimate total agricultural loadings to the Great Lakes
  - loadings were projected to the year 2000 based on expected changes in agriculture
- Recommended voluntary stewardship activities to reduce NPS losses

Recent studies

Study of 15 agricultural watersheds in SW Ontario

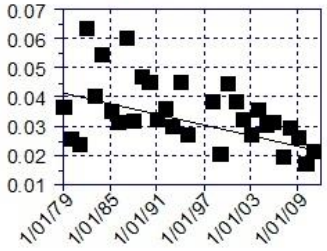
- Studied from 2004 to present
- Most sites ‘grab’ sampled, targeting events
- Nissouri Creek with automated sampler
- Two watersheds same as PLUARG watersheds
- Preliminary results suggest nutrient loading increasing



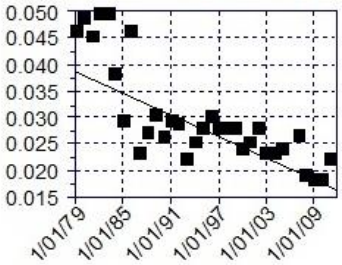
Recent studies: long-term trends in TP

Median annual TP (mg/L)

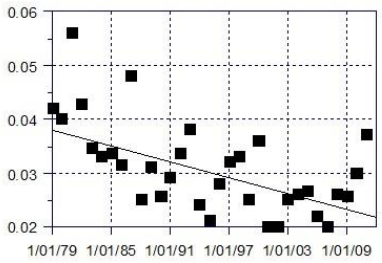
Blythe Brook ↓



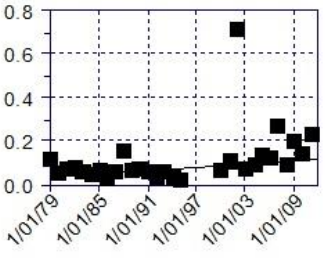
Twelve mile creek ↓



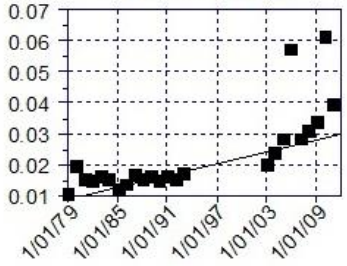
Cataraqui River ↓



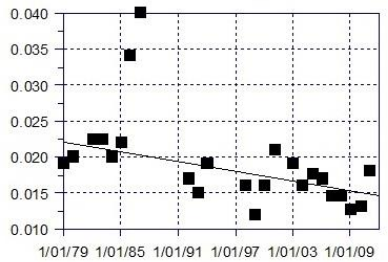
Ausable River ^



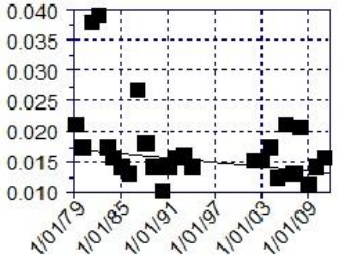
Lovers Creek ^



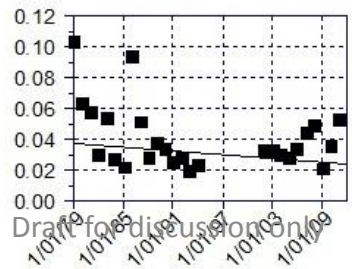
Skootamotta River ↓



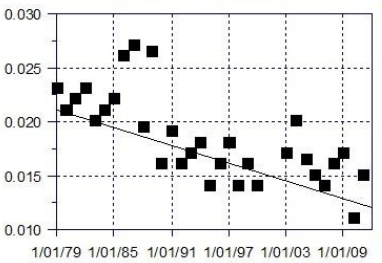
Graham Creek x



Rouge River x



Salmon River ↓



Multi-Watershed Nutrient Study

Revisit some of the goals of the PLUARG in a 'then-and-now' analysis

1) Have agricultural NPS nutrient loadings changed since the PLUARG work?
2) Has the relationship between agricultural land use/ management and nutrient loadings changed?
3) Has the seasonal pattern of stream nutrient loadings changed between now and those found in past studies?
4) What are the relevant fractions of P delivered by agricultural watersheds? Has this changed over time?
5) Assess the scope for change in agricultural NPS loadings
6) Make new recommendations on mitigation strategies

Multi-Watershed Nutrient Study (MWNS)

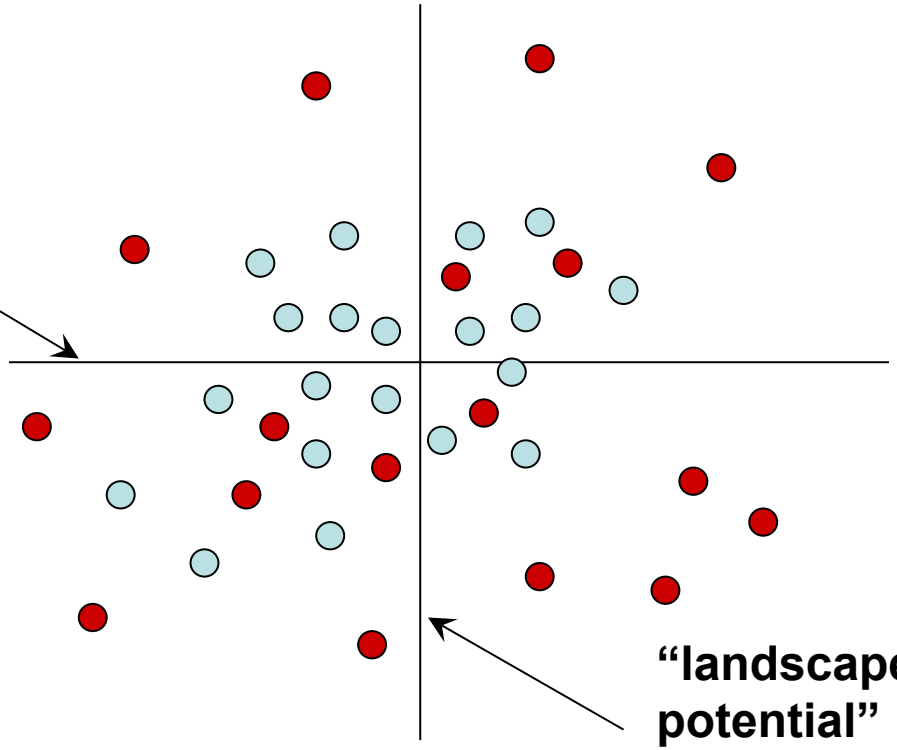
- Re-examine ~10 agricultural watersheds (including several of the original PLUARG watersheds), measuring:
  - **Nutrient loading**
    - Automated samplers and gauging at each site
  - **Land use/ land management**
    - Roadside/aerial surveys, farmer interviews
  - **Soil characteristics**
  - **Hi-resolution DEM surveys**

Multi-Watershed Nutrient Study (MWNS)

- Repeat process of determining representative regions and watersheds
  - Select new watersheds where necessary to span the ranges in the relevant features of agriculture

"Agricultural input" axis

- e.g. total nutrient application



"landscape potential"

(e.g. slope, soils)

Ontario


Today…how do we measure loading?