

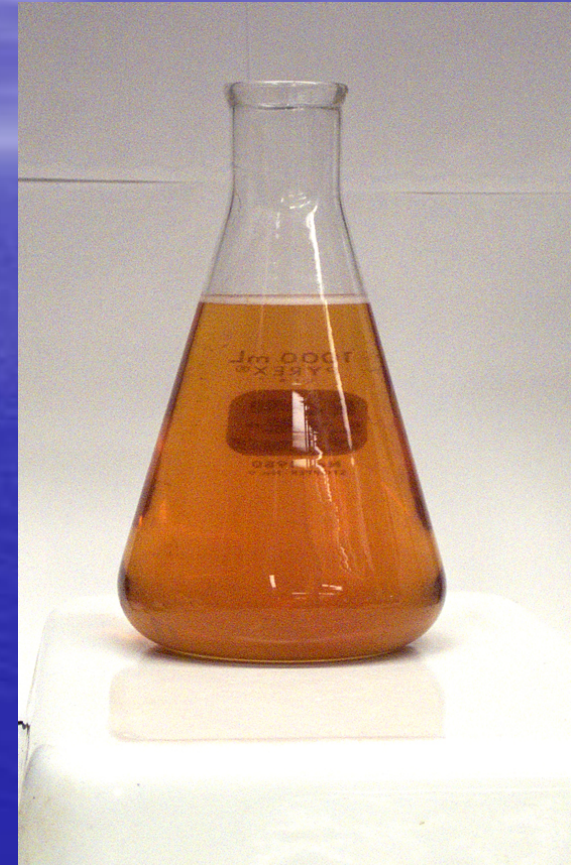


**Land-water linkages: Land use factors regulating tributary loadings of material**

Marguerite A. Xenopoulos  
Trent University

# DOC: Key factor for shaping aquatic ecosystems

- 1) Transfers energy to the aquatic food web
- 2) Metal mobility and toxicity
- 3) Attenuates visible and UV light
- 4) Controls mixing, thermoclines



# Landscape control of DOC

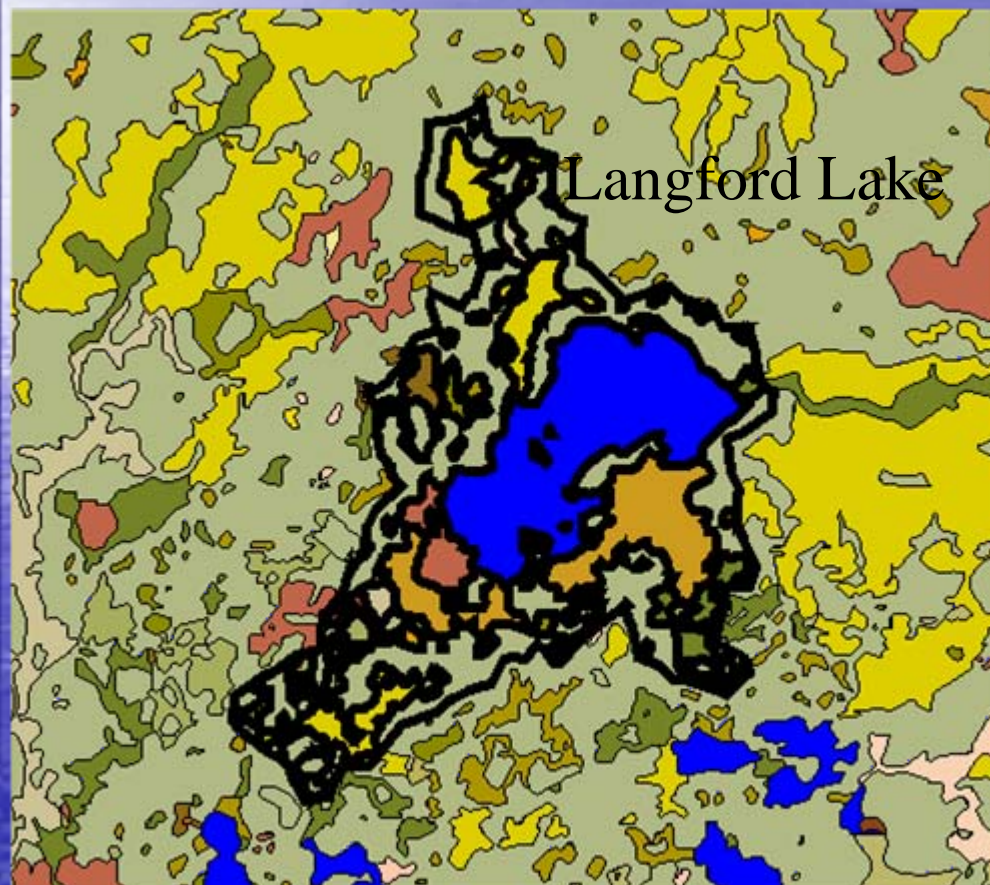
- **Sources:**
  - Stream inflows
  - Wetlands
  - Uplands
  - Groundwater, atmosphere
- **Relationship with catchment characteristics**
- **Export related to wetlands (wetland type?)**

# GIS wetlands connectivity

Upper Great Lakes Region  
Ottawa National Forest



11-6-02



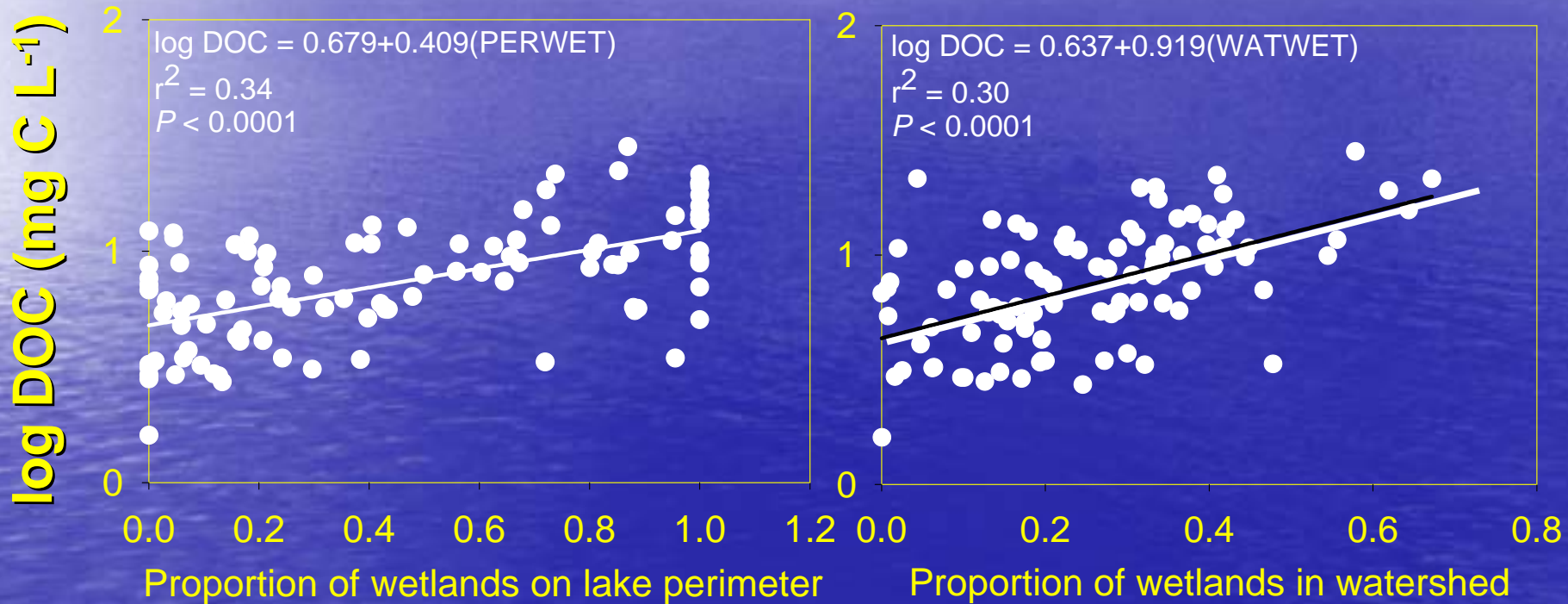
Langford Lake



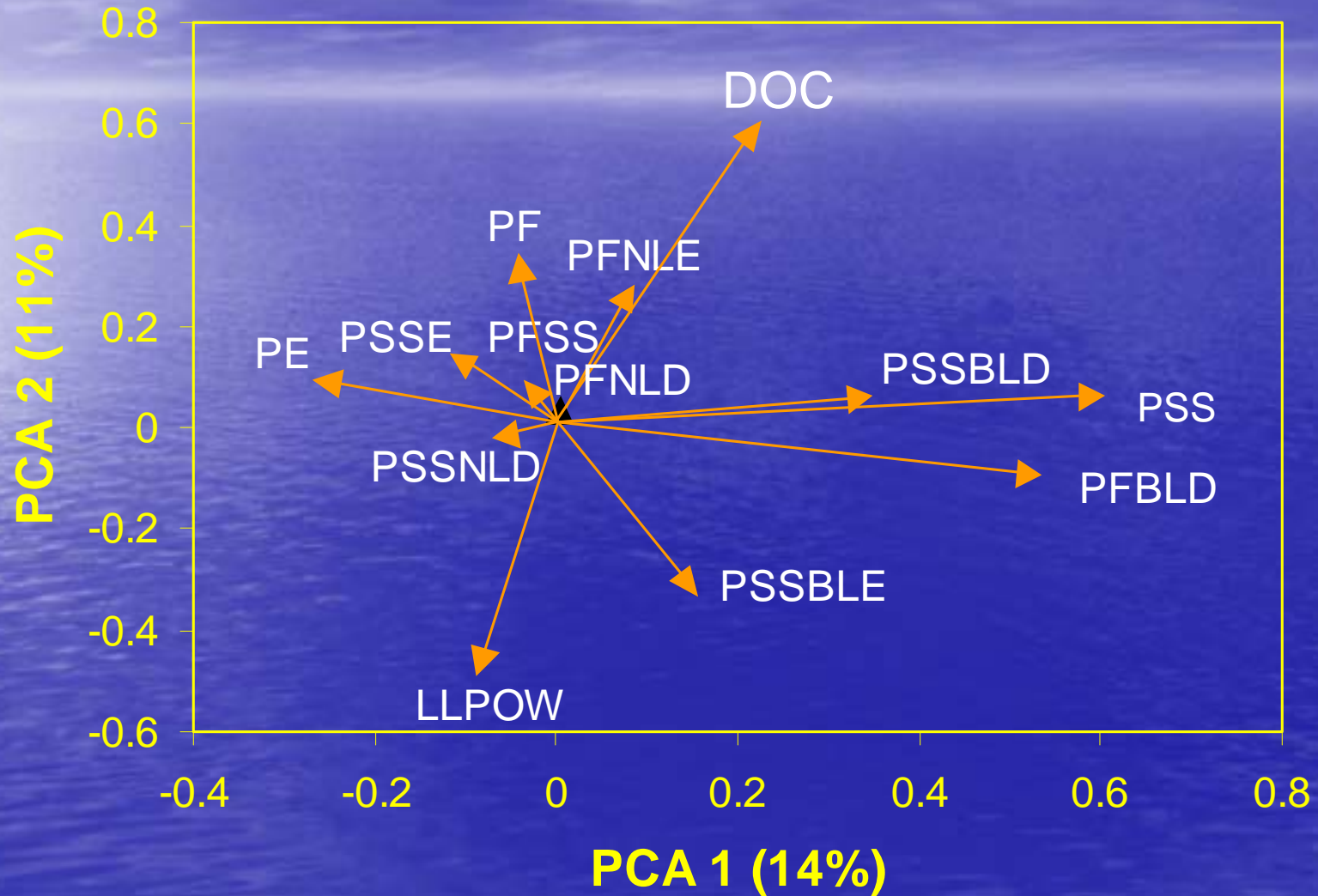
Paulding Lake

Data from National Wetlands Inventory

# Location and type of wetlands



# Wetland type and DOC



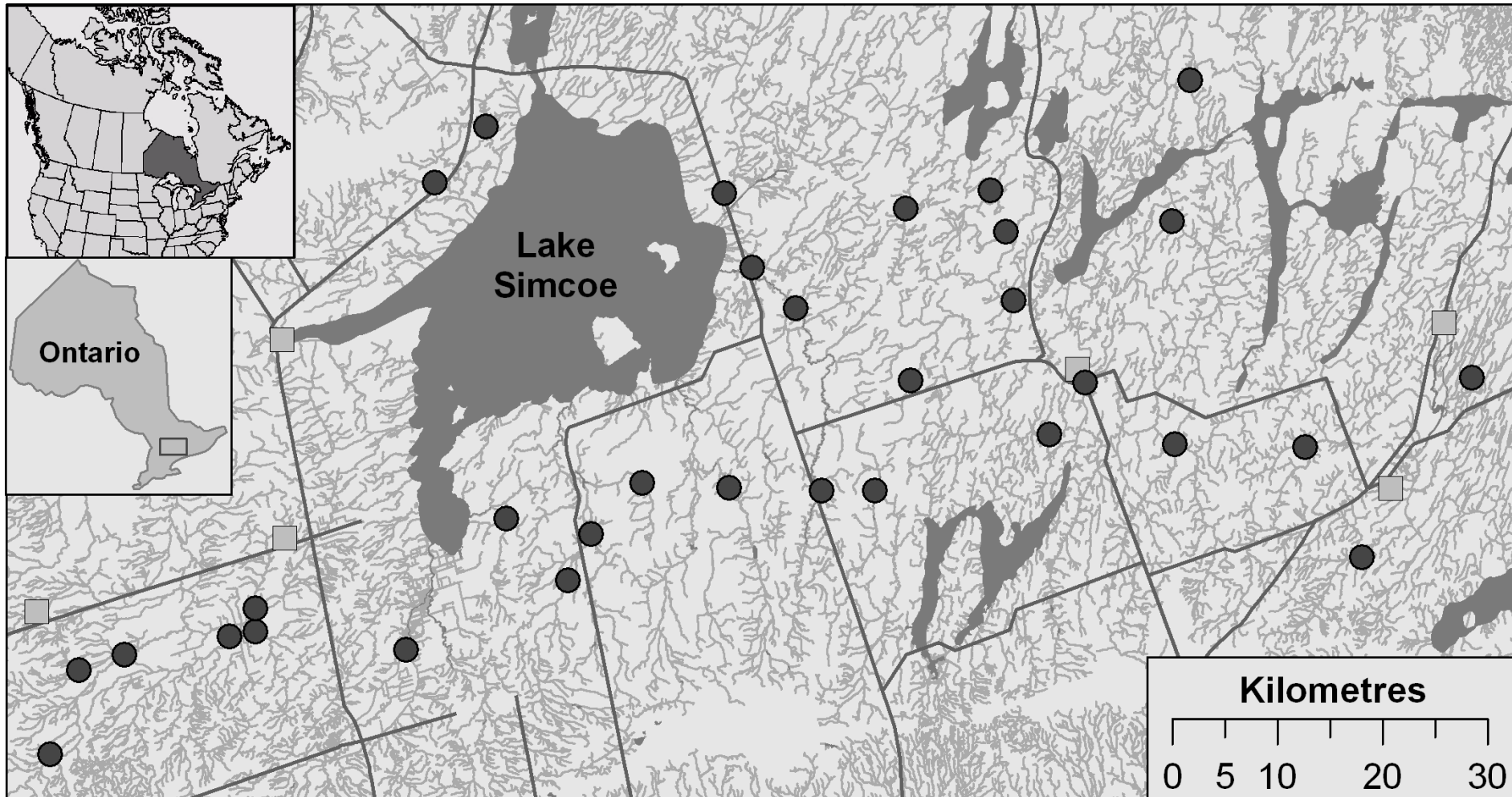
# Understanding changes in the biogeochemical cycles from land use effects

Henry F. Wilson and M.A. Xenopoulos

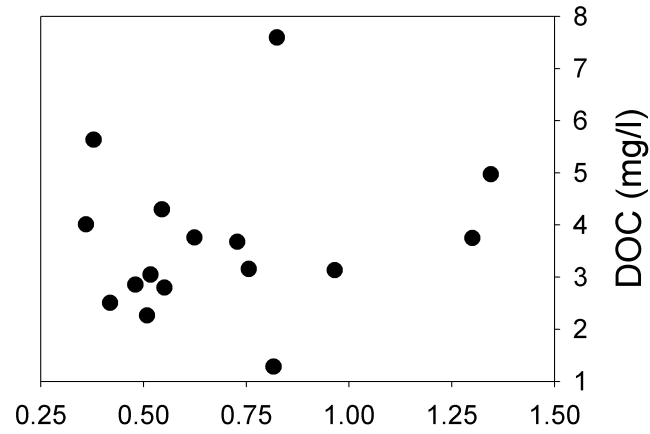
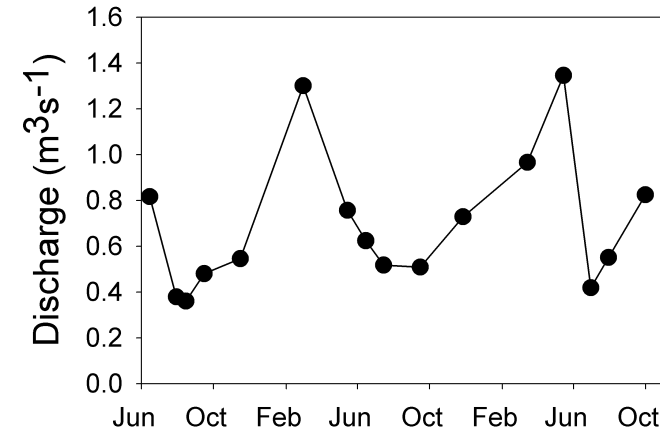
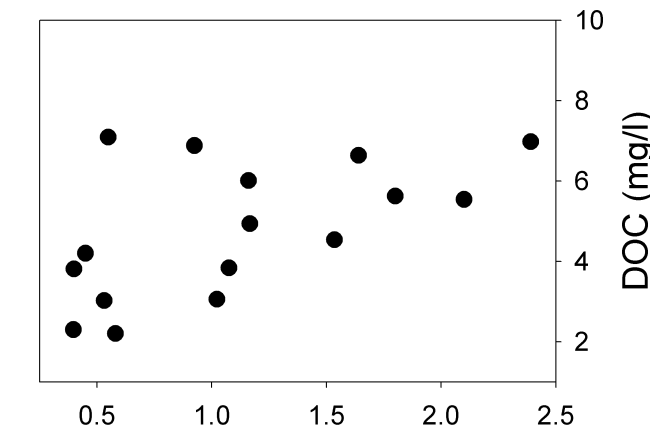
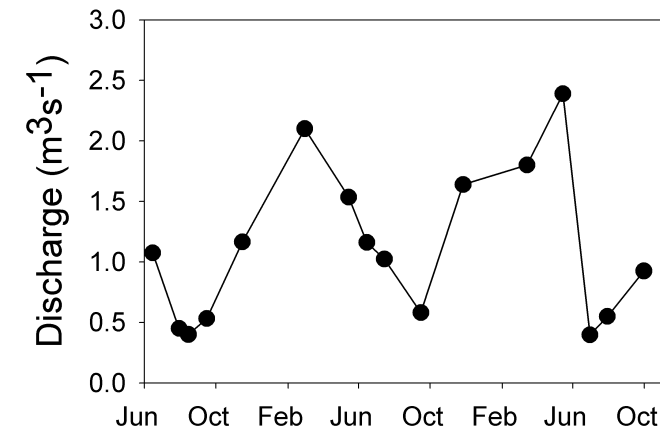
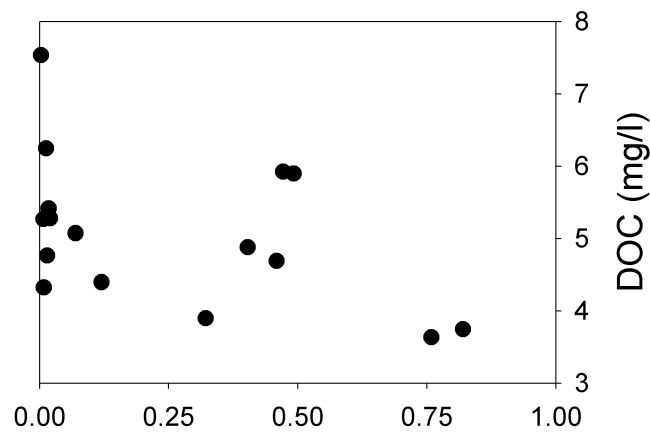
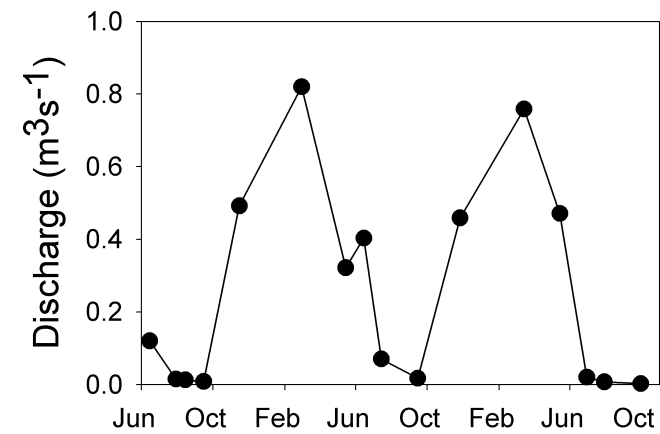


Photos: Henry Wilson

# Study site



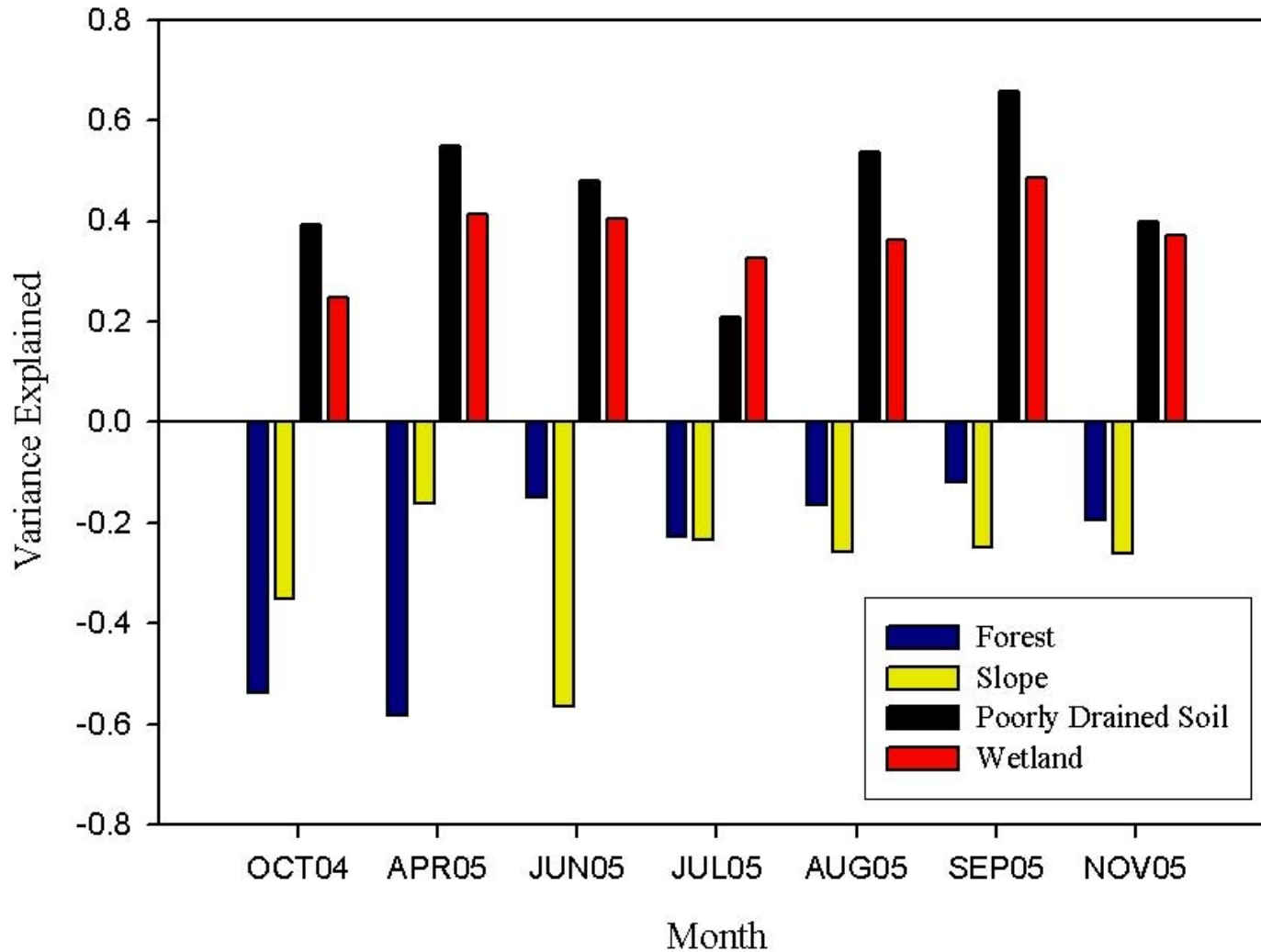




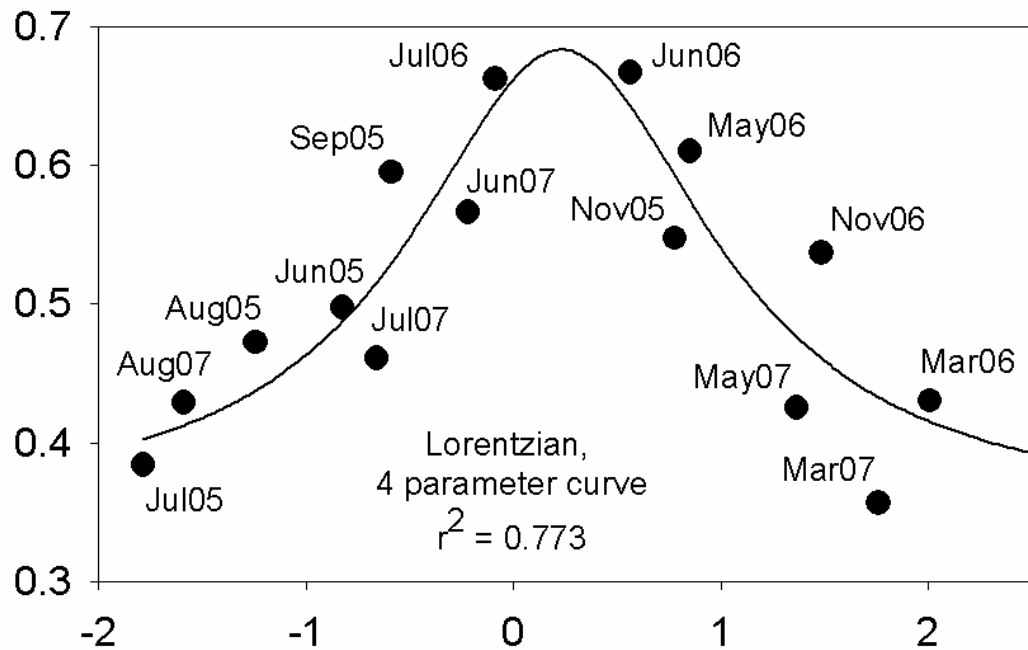
# Discharge and DOC

Wilson and Xenopoulos  
In press, Ecosystems

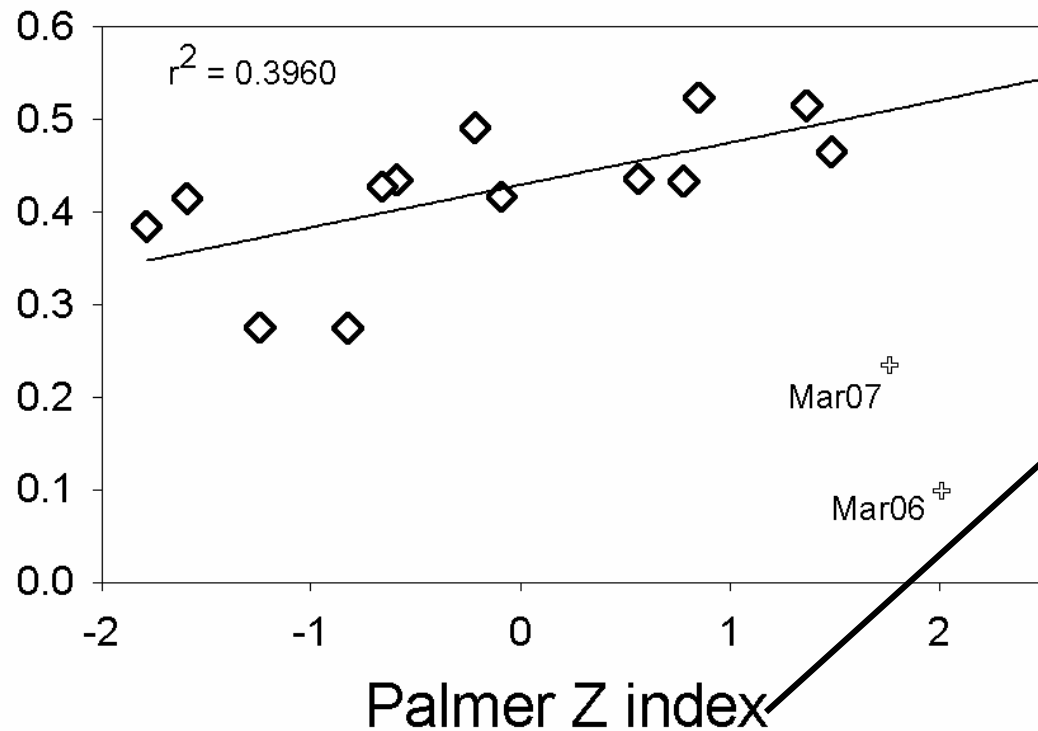
## Seasonal changes in univariate relationships between DOC concentration and best landscape predictors



Coefficient of determination



% Poorly drained soils

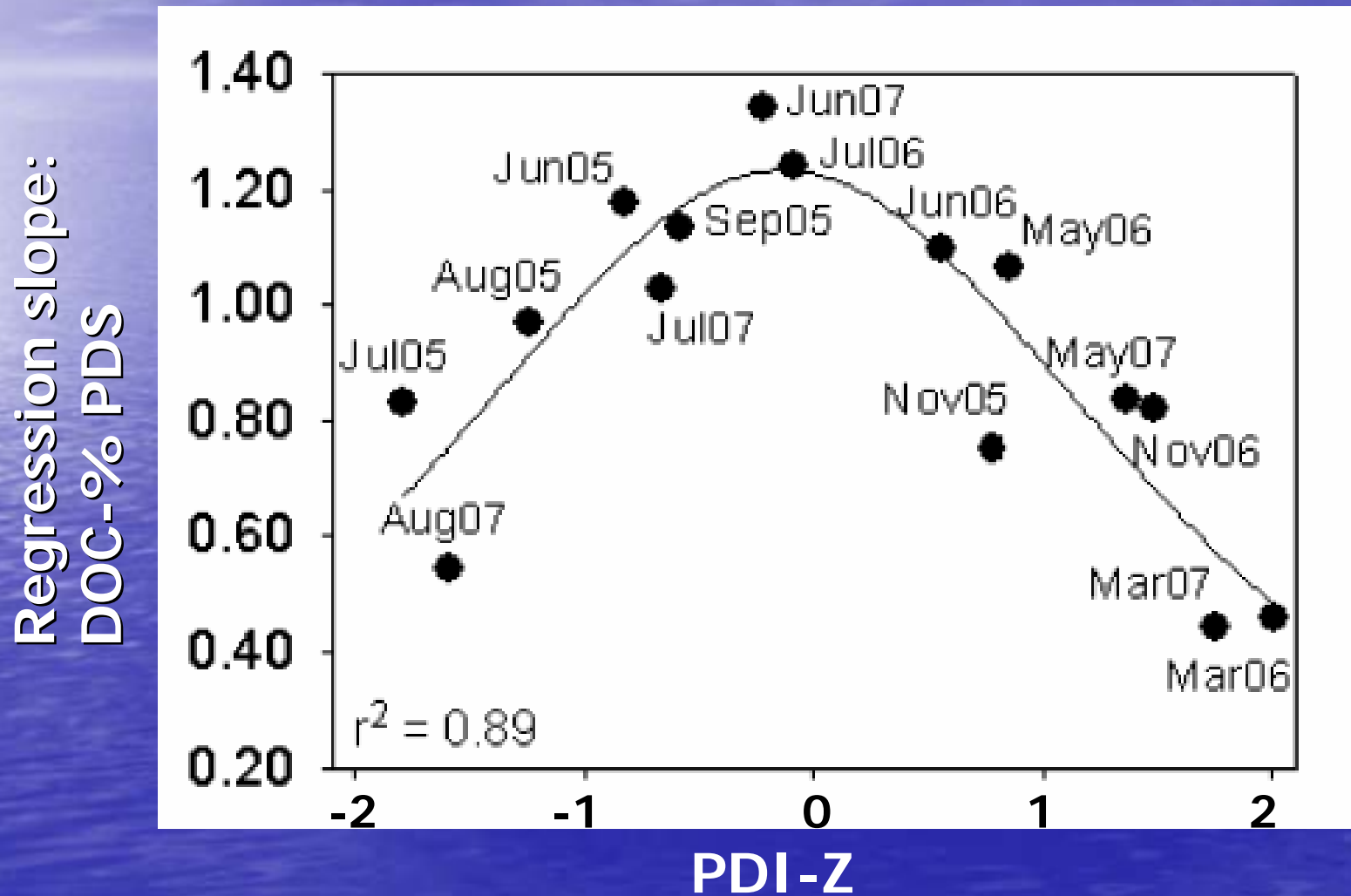


% Wooded area

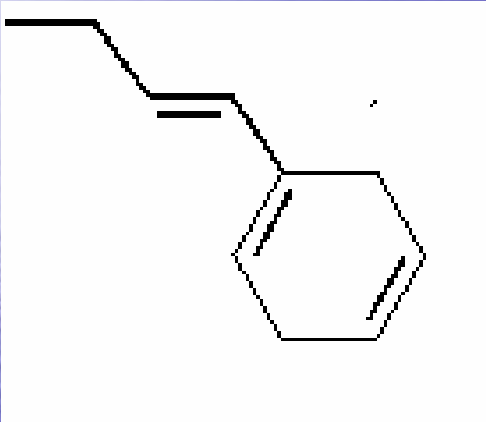
Exponentially related  
to discharge

Wilson and Xenopoulos  
In press, Ecosystems

# Hydrological connectivity



# DOC quality

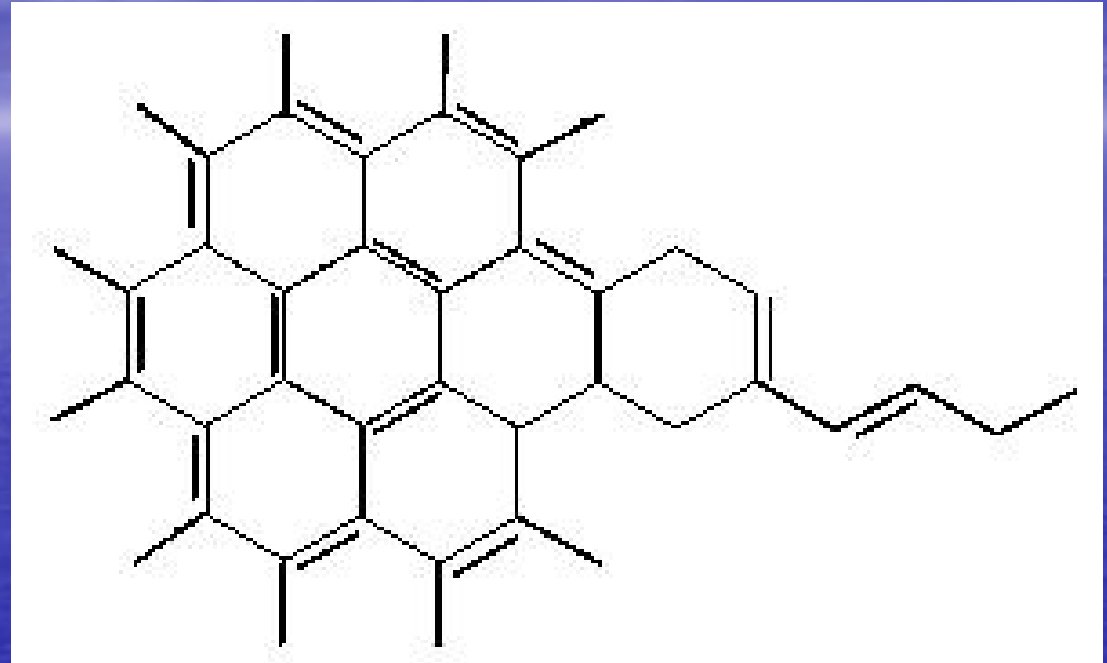


**‘Autochthonous’**

**Source: algae, bacteria**

**Labile**

**Molecular size: small**



**‘Allochthonous’**

**Source: plants, soils**

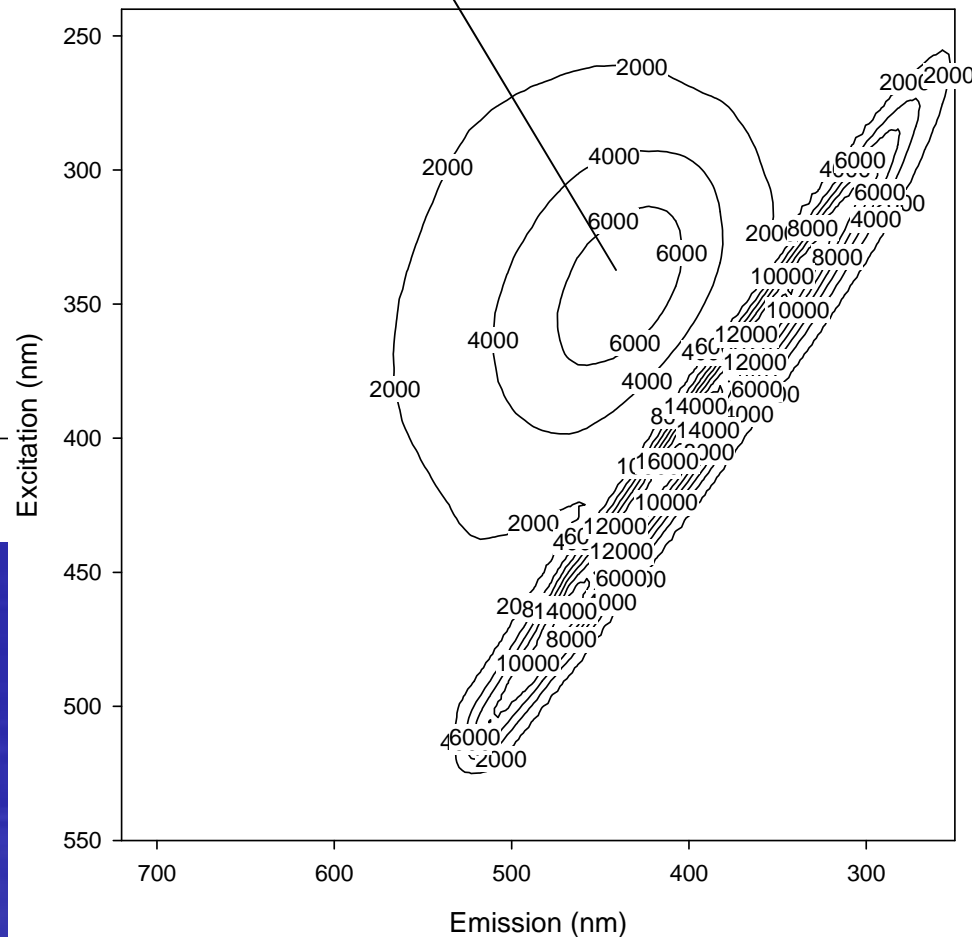
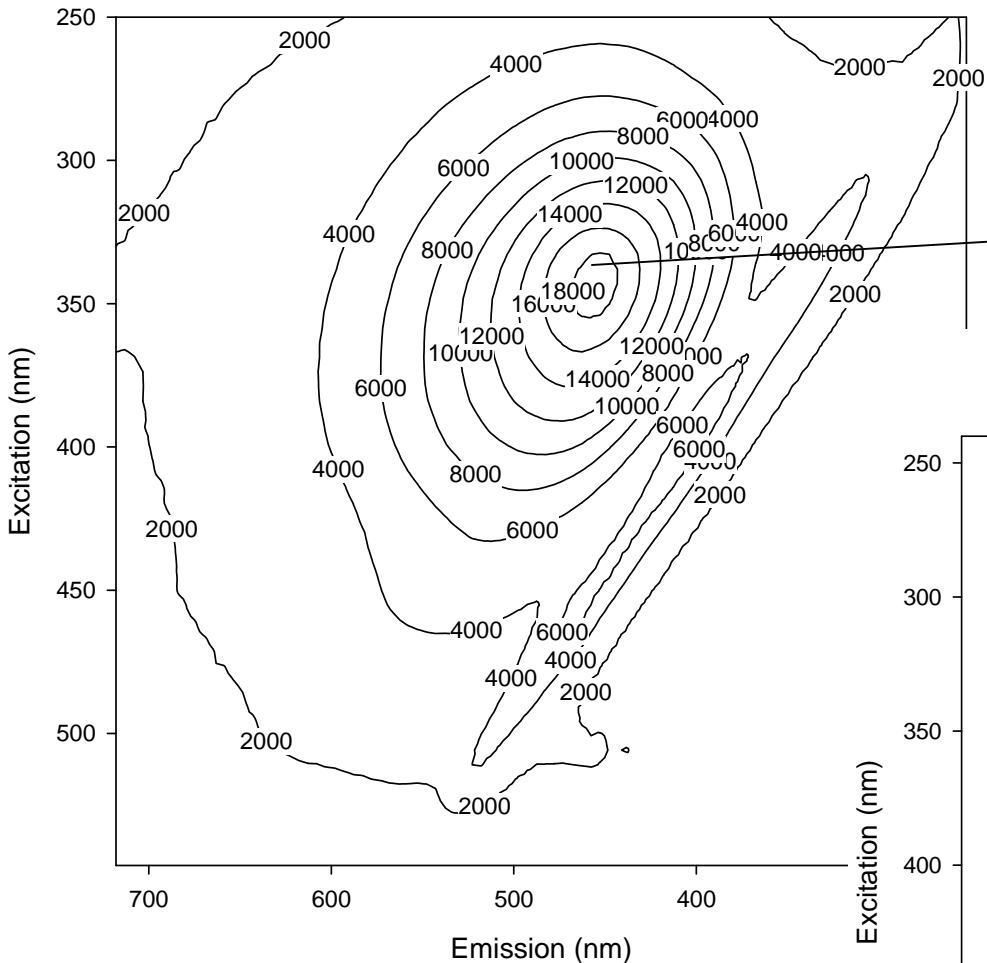
**Refractory**

**Molecular size: large**

# Is all carbon created equal?

Typical humic-like components

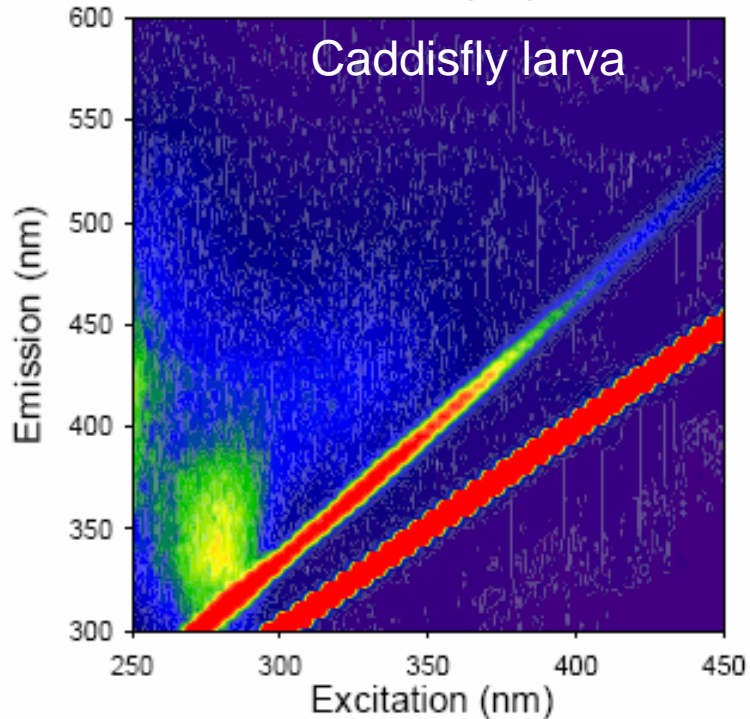
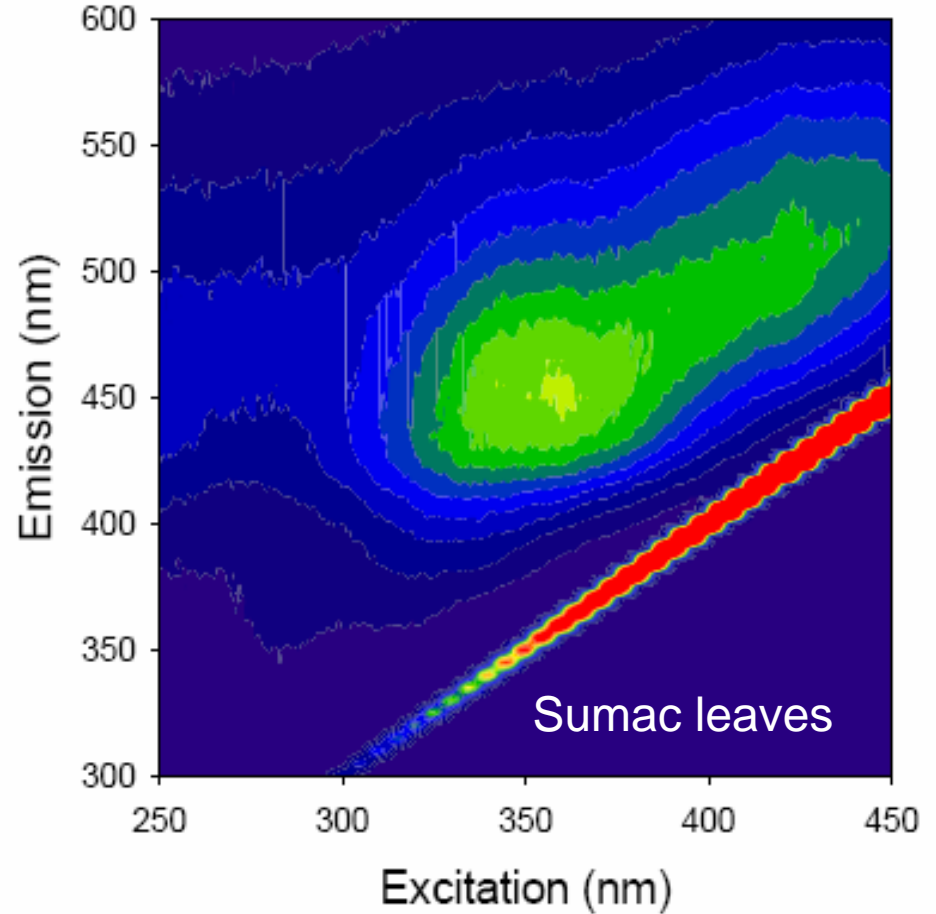
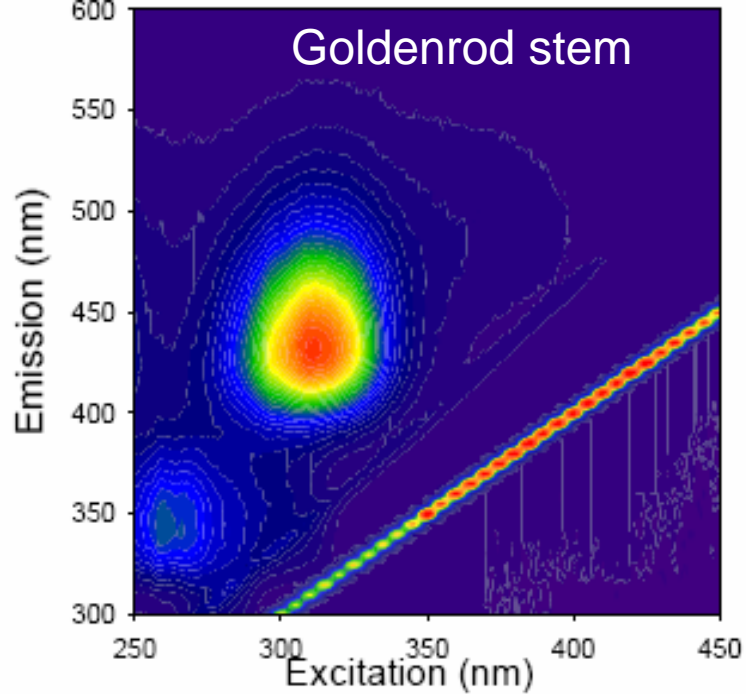
site 16



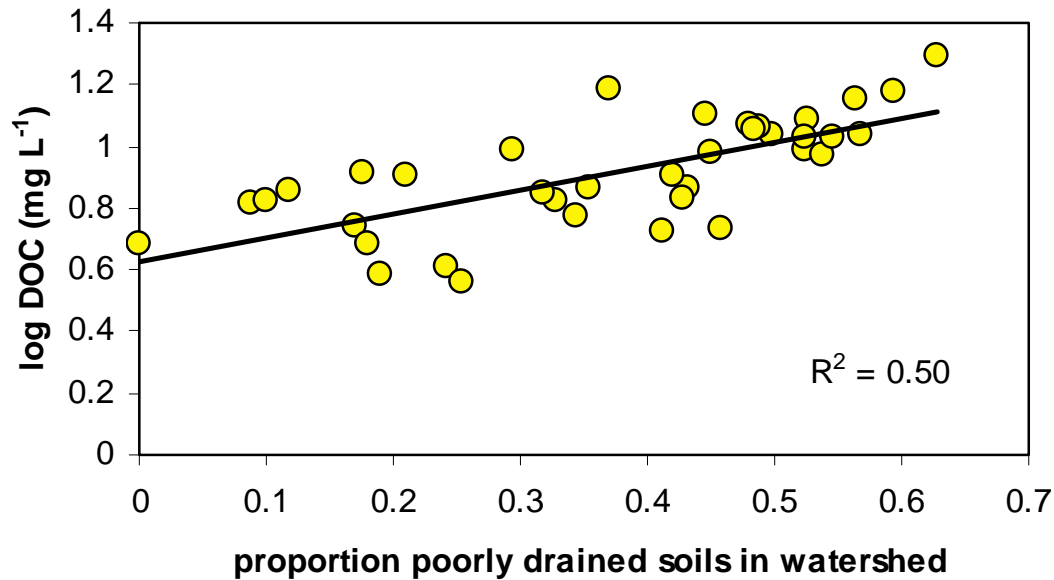
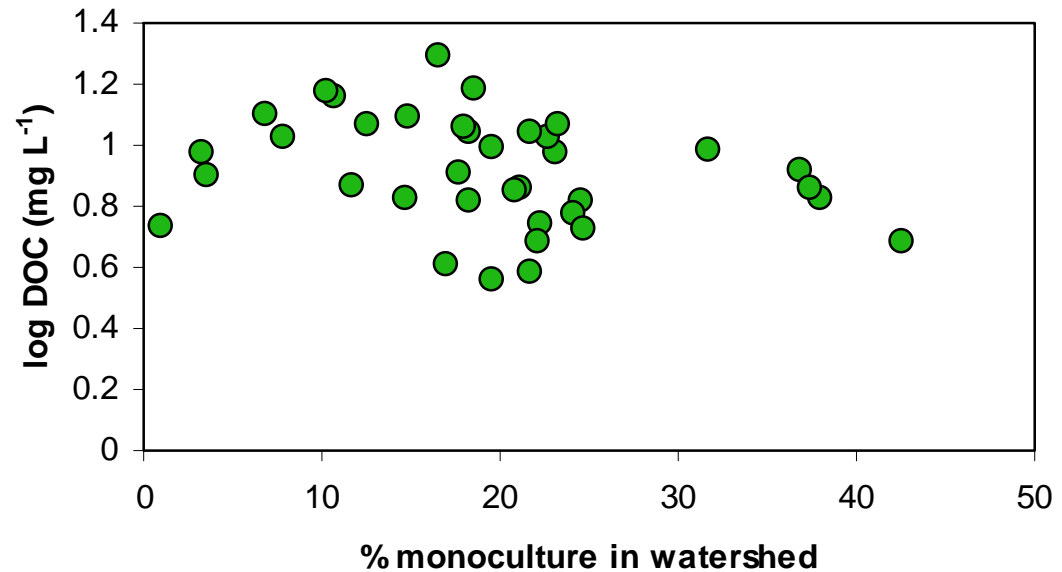
site 20

## 3D EEM

# Is all carbon created equal?

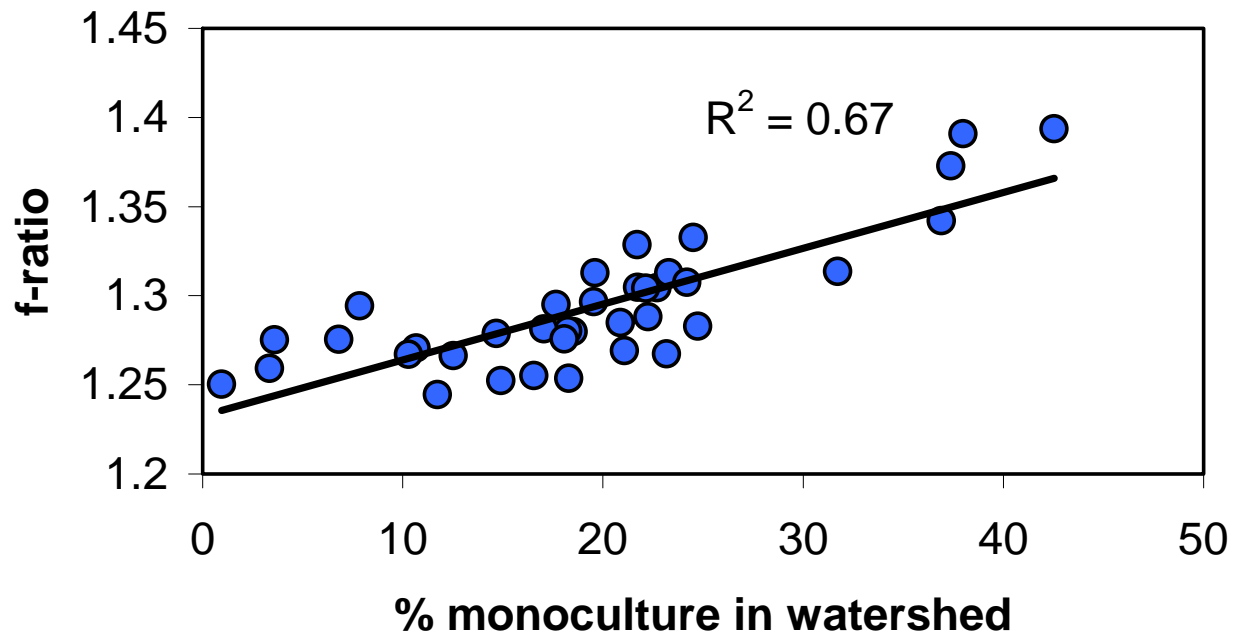


# DOC and agriculture land use



Wilson and Xenopoulos,  
unpublished

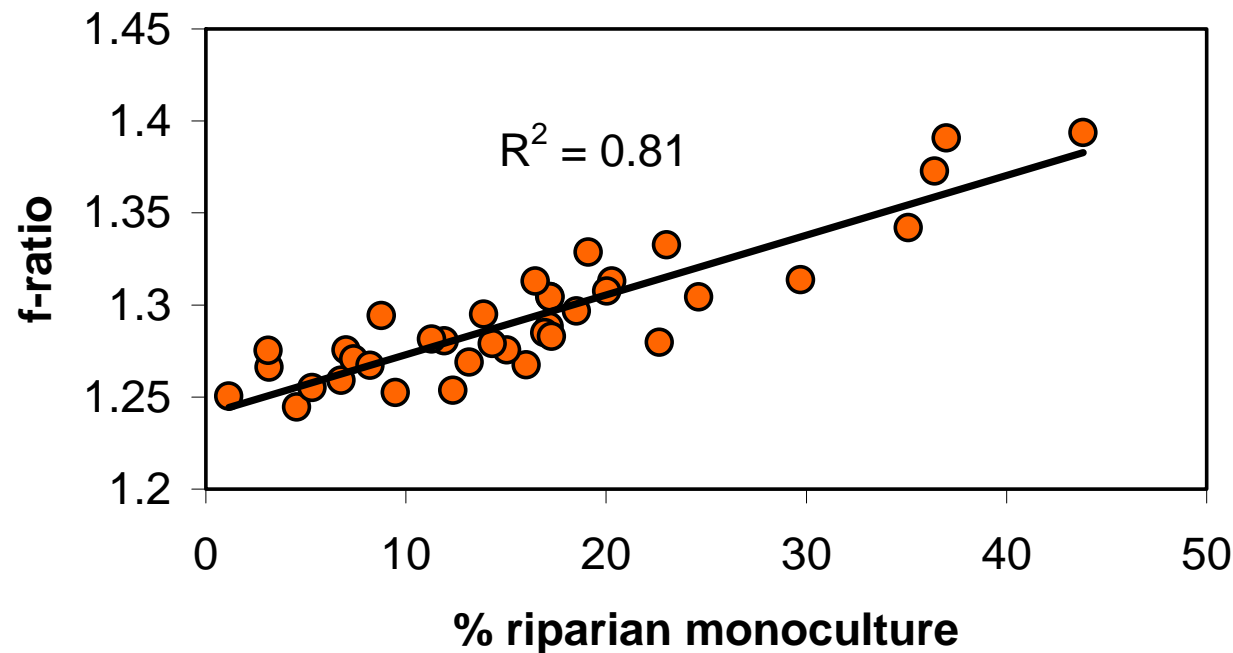




In-stream



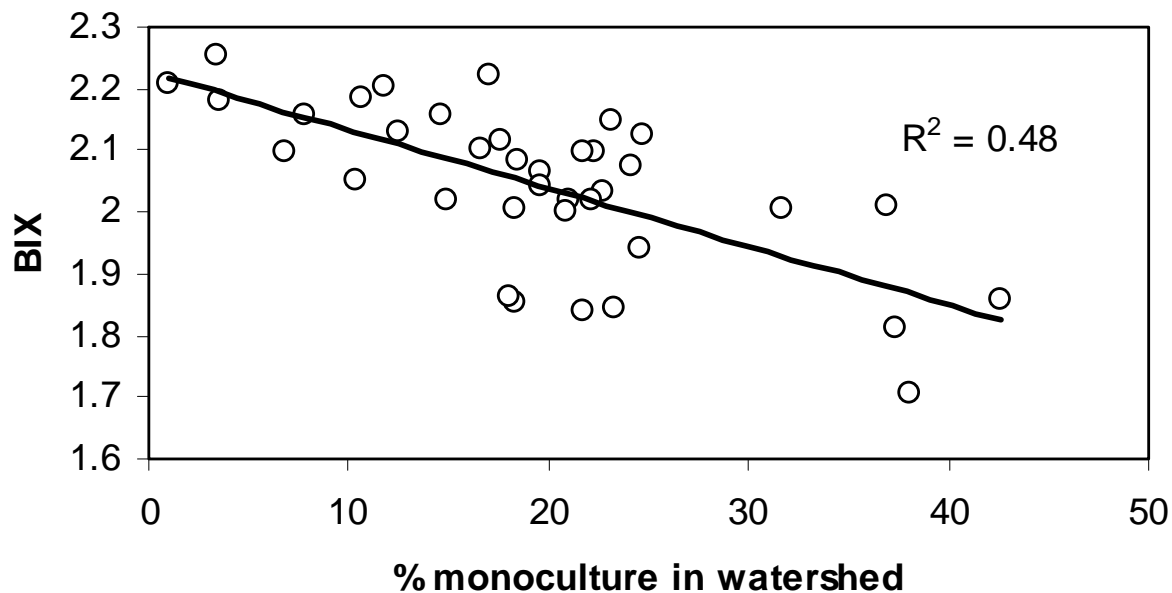
Terrestrial



Wilson and Xenopoulos,  
unpublished

# Summary

- All EEM indices (e.g., f-ratio, E280, BIX) point to a less aromatic, reduced humification, more autochthonous, microbially-derived carbon in agricultural catchments
- Related to increased processing but also associated with increased water C:N



Bulk DOC related to moisture conditions, wetlands

DOC character related to land use