Characterization of riparian vegetation in agriculture drains impacted by Phragmites australis: A SW Ontario case study

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The characterization of riparian vegetation in agricultural drains impacted by *Phragmites australis*

Ryan Graham – MSc Student

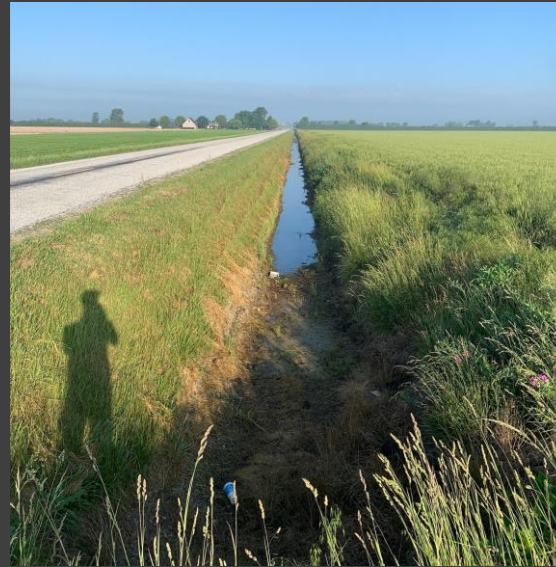Healthy Headwaters Lab (GLIER)

Dr. Catherine Febria

Importance of Agriculture Drain Systems

- Flood and Erosion Control

- Pollution Mitigation/ Nutrient Retention

- Carbon Sequestration

- Habitat

- Food

- Connectivity

- Only areas for these services

abca.ca

Phragmites and Drain Management

- *Phragmites australis* – its everywhere

- Cutting, Dredging, Spraying

- Management/Growth Cycles

Knowledge Gap

- What vegetational communities inhabit these drains?

- How does drain management impact vegetational communities?

- What type of interactions take place with who?
    - Native vegetation, Phragmites, and management

Research Question

- Which plant assemblages are found in areas with/without Phragmites?

- How does watershed position and other environmental variables impact communities?

Hypotheses

- Intensely managed drain systems will have lower native vegetative biodiversity and high evidence of invasive species

- When there are high levels of native biodiversity, the less impact from phragmites will be found

2021 Field Season

- **Vegetation Survey**

(1m strips (x3) inventoried + 1m2 biomass measured)

- **Physical Characteristics**

(Buffer Width, Slope, Canopy Cover)

- **Water Characteristics**

(Quality, Depth, Flow, Sediment)

- **Management History/Timeline**
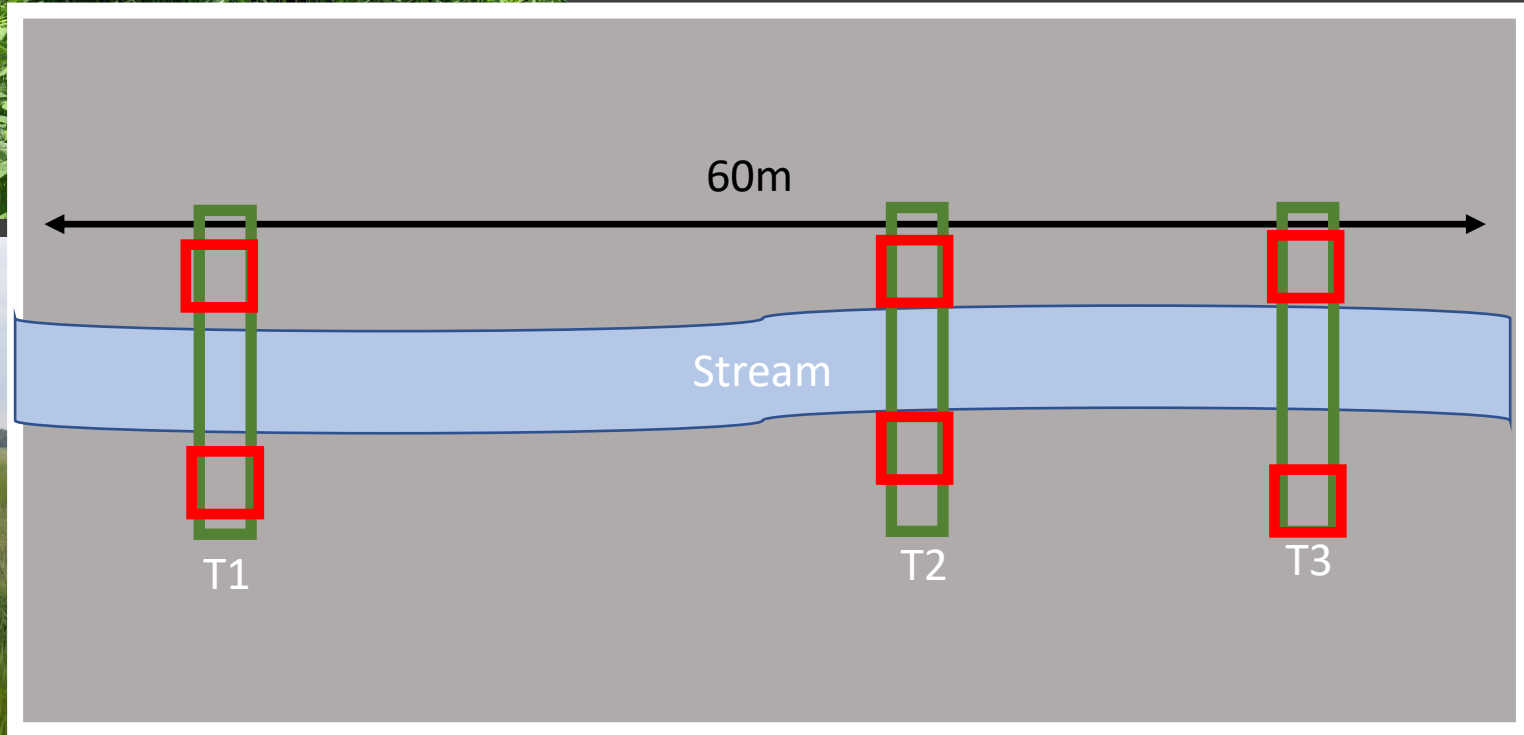
THE HEALTHY HEADWATERS LAB
Great Lakes Institute for Environmental Research
University of Windsor, Canada

2021 Field Season

- **Vegetation Survey**

(1m strips (x3) inventoried + 1m2 biomass measured)

60m

Stream

T1   T2   T3

Sites

- 10 Surveyed in Spring and Fall plant blooms

- 6 Roadside and 4 Field/Forest

- Most drain systems had *Phragmites*, however 'impact' differed across sites.

- Wide management regime and unique histories

  - Gradients
    - Type of drain
    - Impact from *Phragmites*
    - Management regimes

S.Nolan, 2021
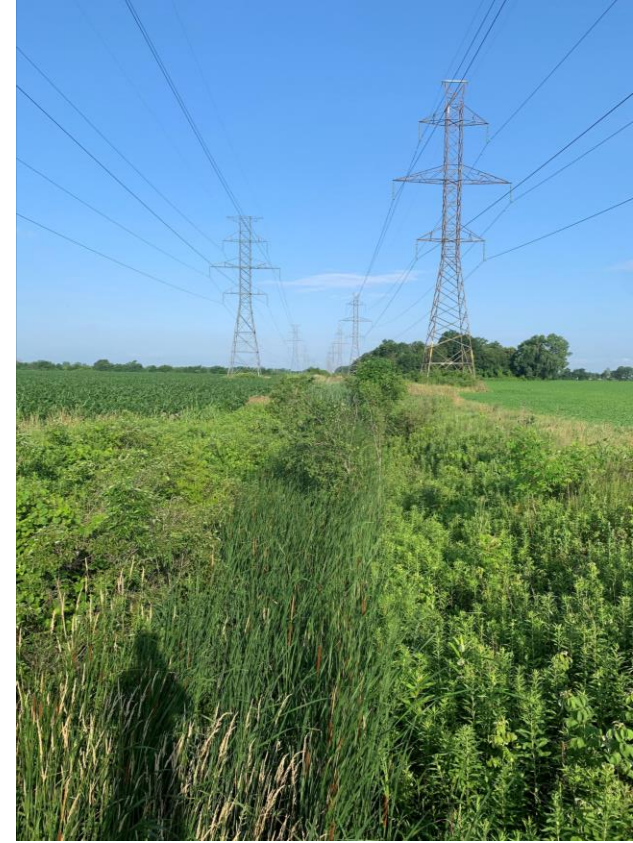
Management Gradient

- Managed Yearly ---- > Managed 10+ years
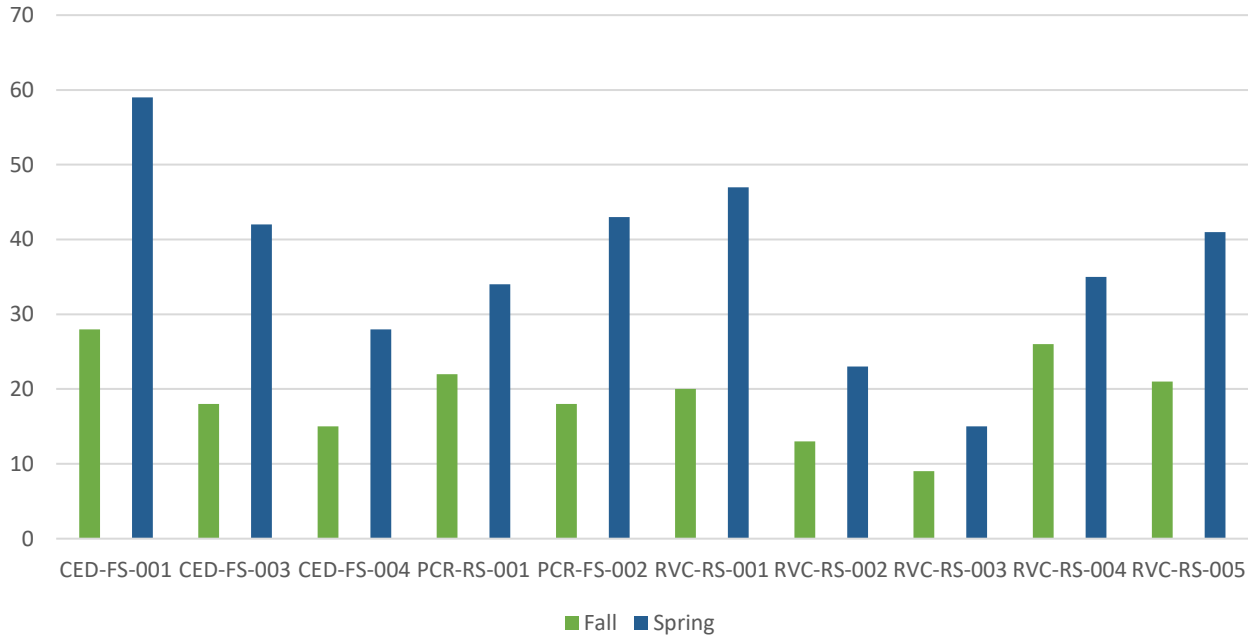- Roadside and Fieldside

2022 Data Analysis

- Digitizing, Organizing, Finalizing

- Environmental Variables
- Vegetation Lists for each site, transect, and quadrat
- Abundances & Presence/Absence
- Water Quality Variables

- Unknown Species

Preliminary Results

Total of Identified Species per Site
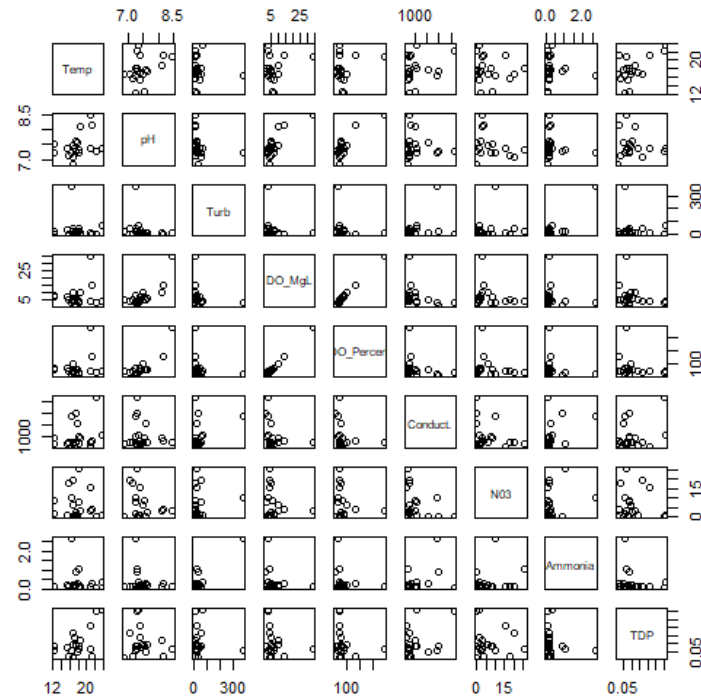

Legend: ■ Fall ■ Spring

- 59 Species found in one drain!
- Unknown grasses = 1 species

- Further analysis will group species;
  - Grasses, Sedges, Annual Flowering, Aquatic emergent/submergent, etc.

Analysis/Statistics

- Data is being explored using RStudio
  - Using multivariate statistics; PCA, CCA, RDAs, etc.

- Patterns across;
  - Site
  - Transect
  - Quadrats

- Preliminary Environmental Variables (Pairs, above)

- Presence/Abundance, Species Counts

- Combining it all in the future!
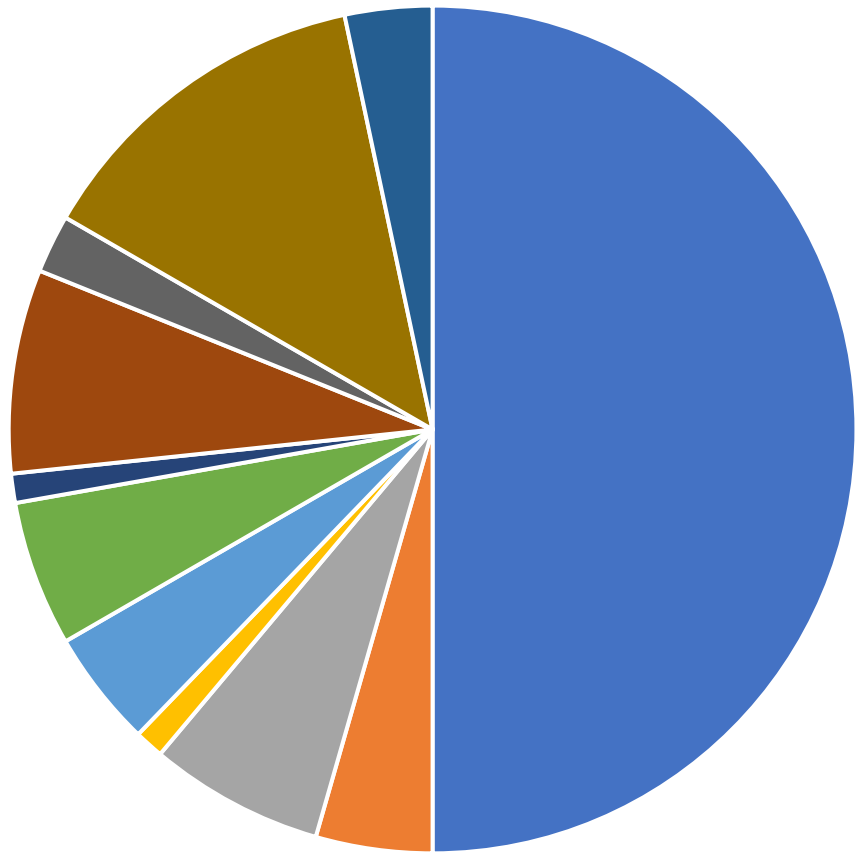
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- Preliminary Environmental Variables

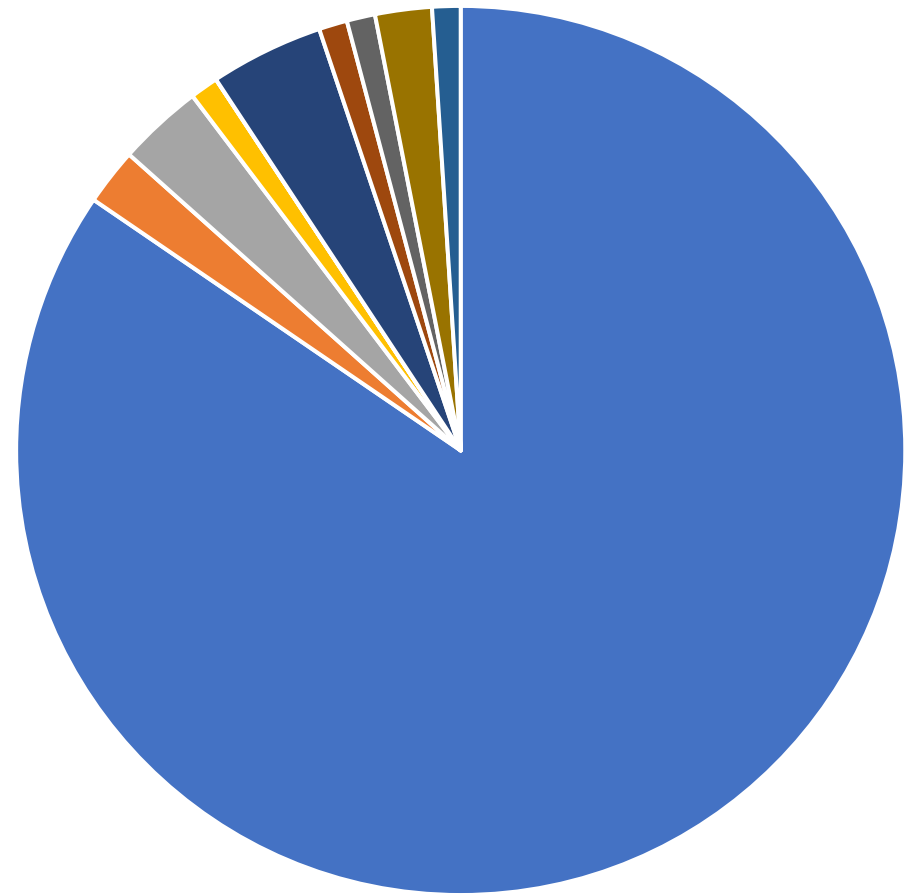- Presence/Abundance, Species Counts

- Combining it all in the future!

Unknowns Species
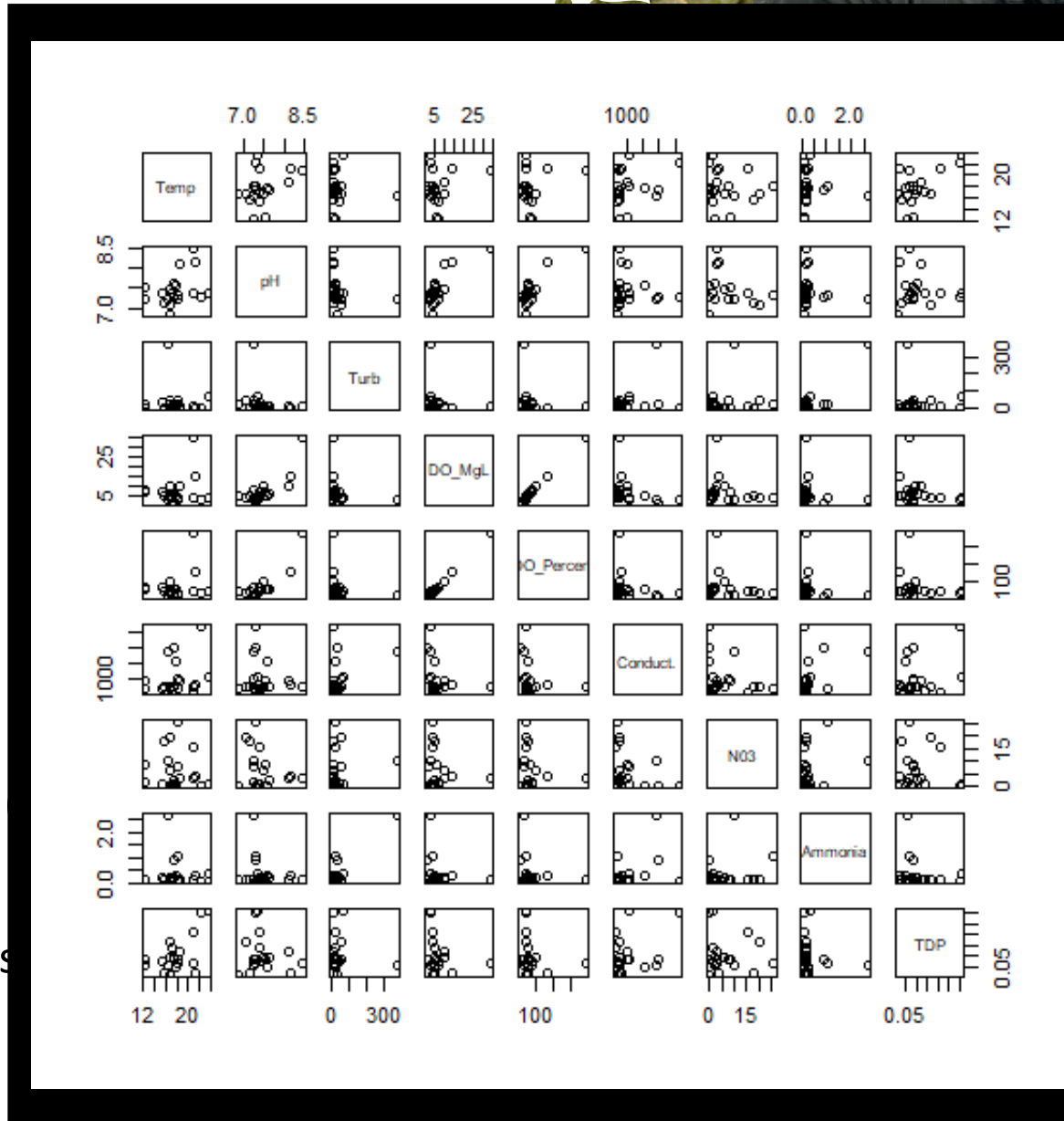
Legend:
- Grass
- Sedge
- Aster
- Goldenrod
- Avens
- Clover
- Tree/Shrub
- Aquatic
- Moss
- Named
- Unknown/Un-Identified

Fall Unknown Species

Spring Unknowns Species

Research Goal

Understanding the relationship between native vegetation, Phragmites and drain management in agricultural systems

What else can grow here?

Thank you for listening!

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Healthyheadwaterslab.ca

Photos: Shayenna Nolan @Shayennaa