

# Wetland Shrub Growth Response to Soil Moisture in the Context of

## Wetland Restoration

Hannah Ormshaw, Tim P. Duval



### 1. Background

In Southern Ontario, wetland restoration to mineral thicket swamp communities is common. There is a **lack of research, however, on how wetland shrub species respond to changes in soil moisture availability over time, under a post-restoration soil moisture regime.** Growth success of wetland plants is not necessarily linearly correlated with increasing soil moisture. Certain species may exhibit a threshold for the wetness they can tolerate in terms of optimal growth conditions.

### 2. Objectives

- Directly observe wetland shrub growth responses to soil moisture availability
- Determine tolerances of shrub species to varying wetness and the practical application of this information



### 3. Restoration Context

- 2.5 ha field which is currently fallow agricultural land
- Located in the Peel Plains physiographic region, within the Mount Pleasant development area (44.7° N, 79.8° W).
- The Credit Valley Conservation Authority is developing a **Natural Heritage System** of continuous wetland and riparian features along the East Huttonville Creek, which **this site will be a part of.**
- Site-specific restoration efforts involve planting native wetland shrub species and blocking drainage of water out of the site

### Acknowledgements

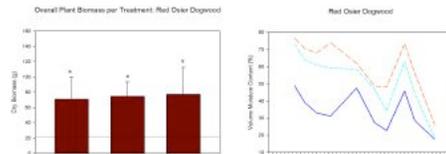
**For Site Access and Support**  
Credit Valley Conservation, Ontario Ministry of Natural Resources, Mattamy Homes, City of Brampton

**Principal Investigator**  
Tim P. Duval

**Lab Technician**  
Phil Ruzd

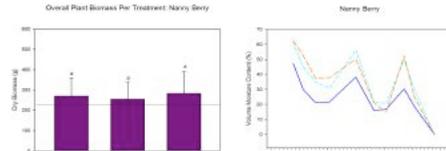
**Field Assistants**  
Danielle Radu, Bryn Fraser, Ahren Atkinson, Courtney Soden, Tammy Duong, Je-Hyeong Hong, Mike Harris, Matt Malone

### *Comus sericea*



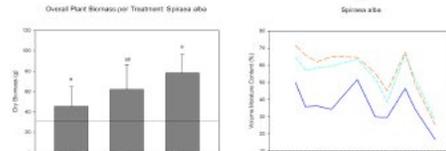
- No difference between treatments
- 26% difference in moisture between treatments
- 200% increase in biomass

### *Viburnum lentago*



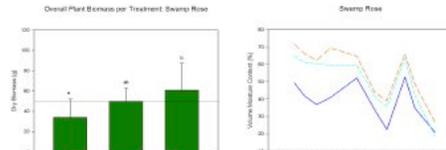
- No difference between treatments
- No significant increase in growth

### *Spiraea alba*



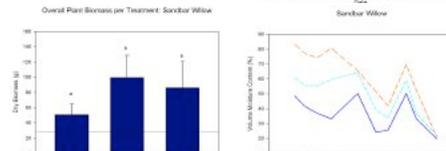
- Natural and wettest treatments significantly different
- 20% difference in soil moisture

### *Rosa palustris*



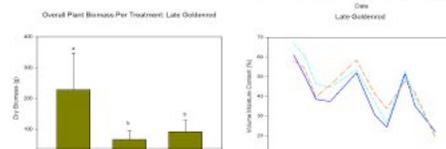
- Natural and wettest treatments significantly different
- Poor overall growth in drier soils

### *Salix exigua*



- Wet and wettest treatments both significantly different from natural
- Poor growth in drier conditions
- Consistently higher wetness in barrier treatments
- Threshold for level of wetness

### *Solidago altissima*

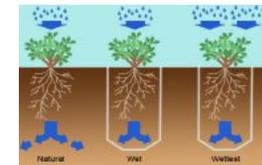


- Wet and wettest treatments both significantly different from natural
- Natural conditions much preferred
- 10% increase in moisture has significant impact on growth

### 4. Methods

#### Three treatments

- **Natural**: replicates site soil conditions
  - **Wet**: Plastic barrier to stop leakage of rain water
  - **Wettest**: Barrier + doubled water supply
- Measured soil moisture, stem height, stomatal conductance, and biomass



### 5. Biomass Partitioning

- Common Elderberry, Late Goldenrod, and Bog Goldenrod show significant differences in above and belowground biomass between certain treatments

### 6. Predictions for Restoration

- **Experiment allows for prediction of site restoration outcome**
- Late goldenrod die-off
- Success of dogwood or nanny berry shrubs
- Other species success linked closely to amount of water supplied

### 7. Take-away Message

- Certain plants respond differently to increasing soil moisture levels
- This can be used to create appropriate planting plans for specific restoration projects based on expected hydrologic regimes

### To Know More:

hannah.ormshaw@mail.utoronto.ca