Hung out to dry:

Eurasian watermilfoil (*Myriophyllum spicatum* L.) fitness loss from desiccation during overland transport

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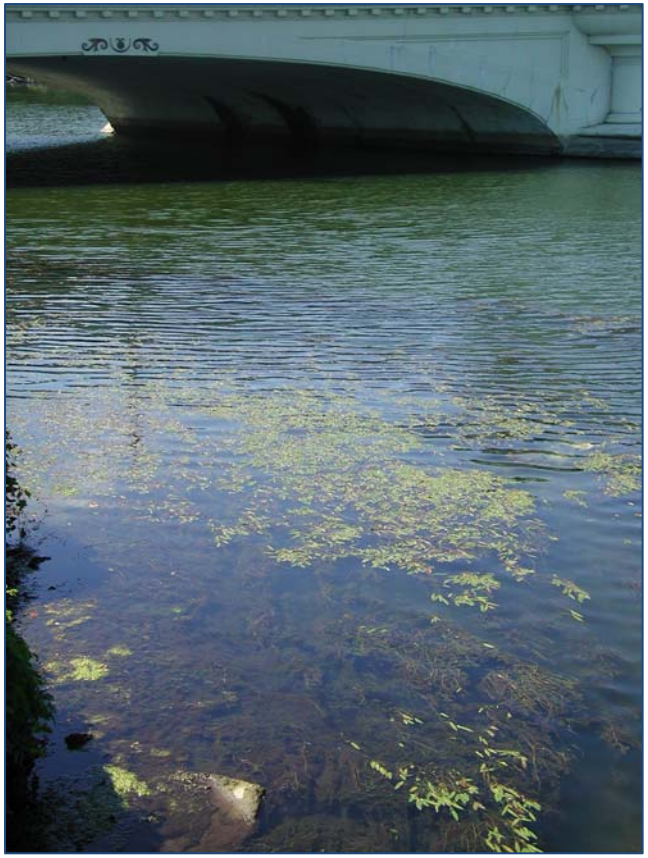

Introduction

- Many plants reproduce through vegetative propagation.
- Hull/trailer fouling is thought to substantially contribute to the spread of aquatic organisms between lakes
- **Vegetative propagation method and spread represent a key life history aspect in the study of aquatic invasive plants (i.e. Eurasian watermilfoil, hydrilla)**

Photo credit:
John Rothlisberger

Guiding Questions

What are the costs to aquatic invasive plant allofragments incurred during overland dispersal?

1. **Transport**: What is the magnitude of desiccation stress faced by plants in transport?
2. **Establishment**: How does desiccation affect root development upon introduction?
3. **Growth**: How does desiccation affect subsequent growth?

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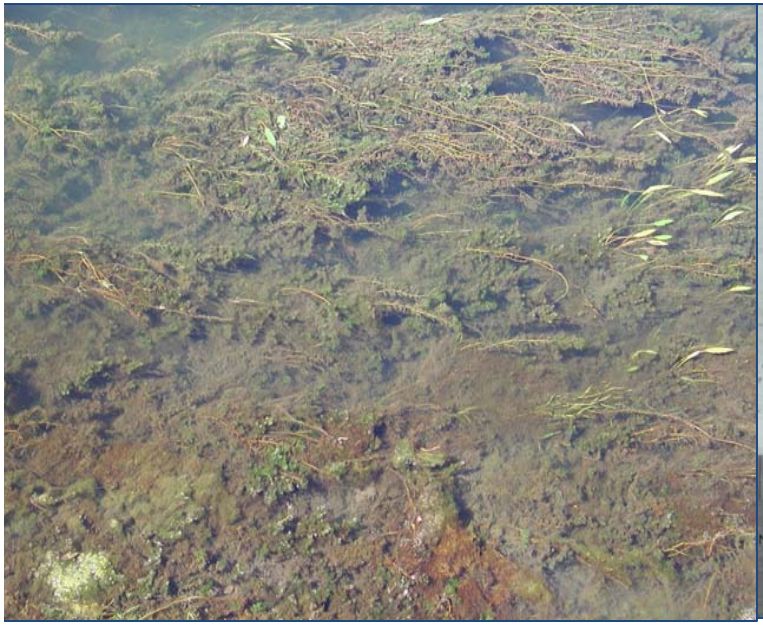
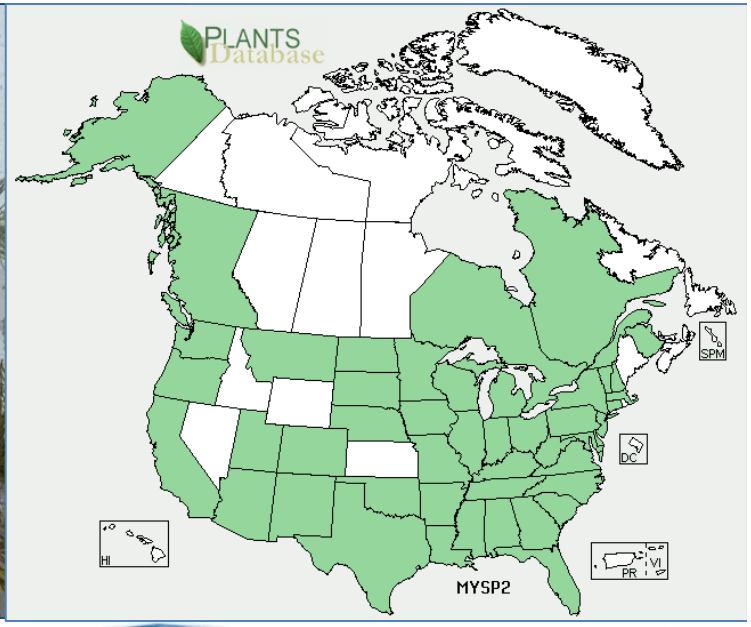
Model Organism: Eurasian water milfoil
(*Myriophyllum spicatum* L.)

- Originates in Europe and Asia; found throughout North America
- Perennial: overwintering shoots or from the root stock
- Forms dense mats on the surface, often with branched stems
- Propagates by fragmentation

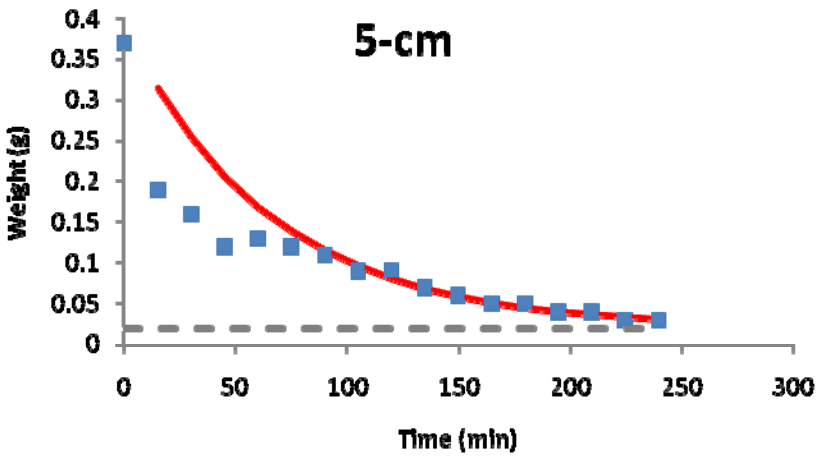


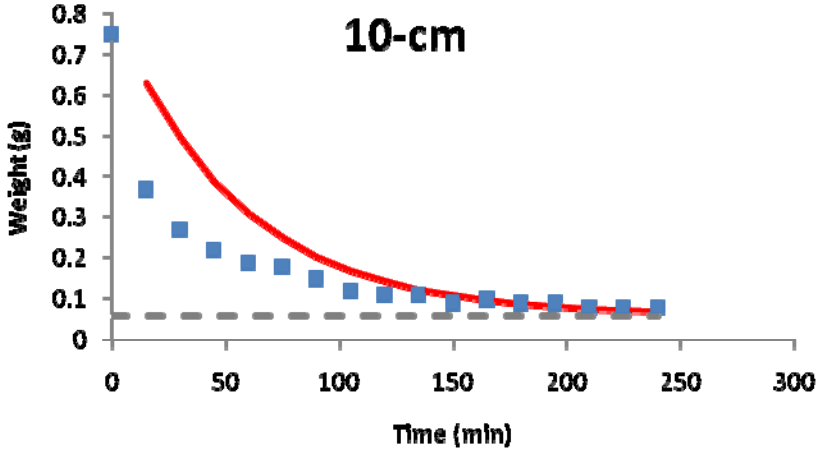


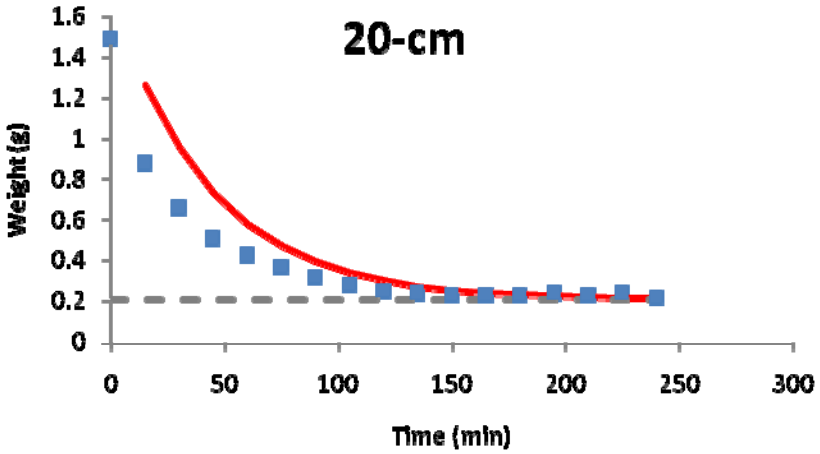
1. **Stress in Transport**: Methods

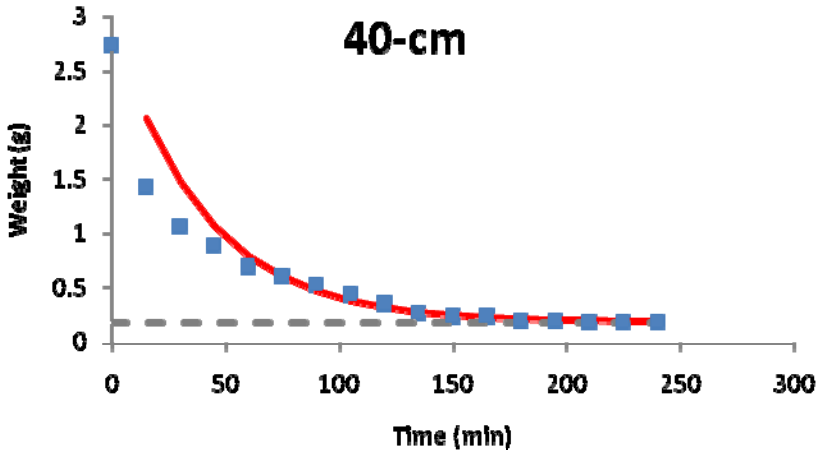
- EWM fragments (15 ea. @ 5, 10, 20, and 40 cm) placed on a flat mesh screen (to allow for air flow through)
- Used a box fan to simulate driving at approximately 35 m.p.h.
- Recorded initial wet weight and weight every 15 minutes for 4 hours (repeated measures).
- Recorded final dry weight after 1 week in drying oven

1. **Stress in Transport**: Results









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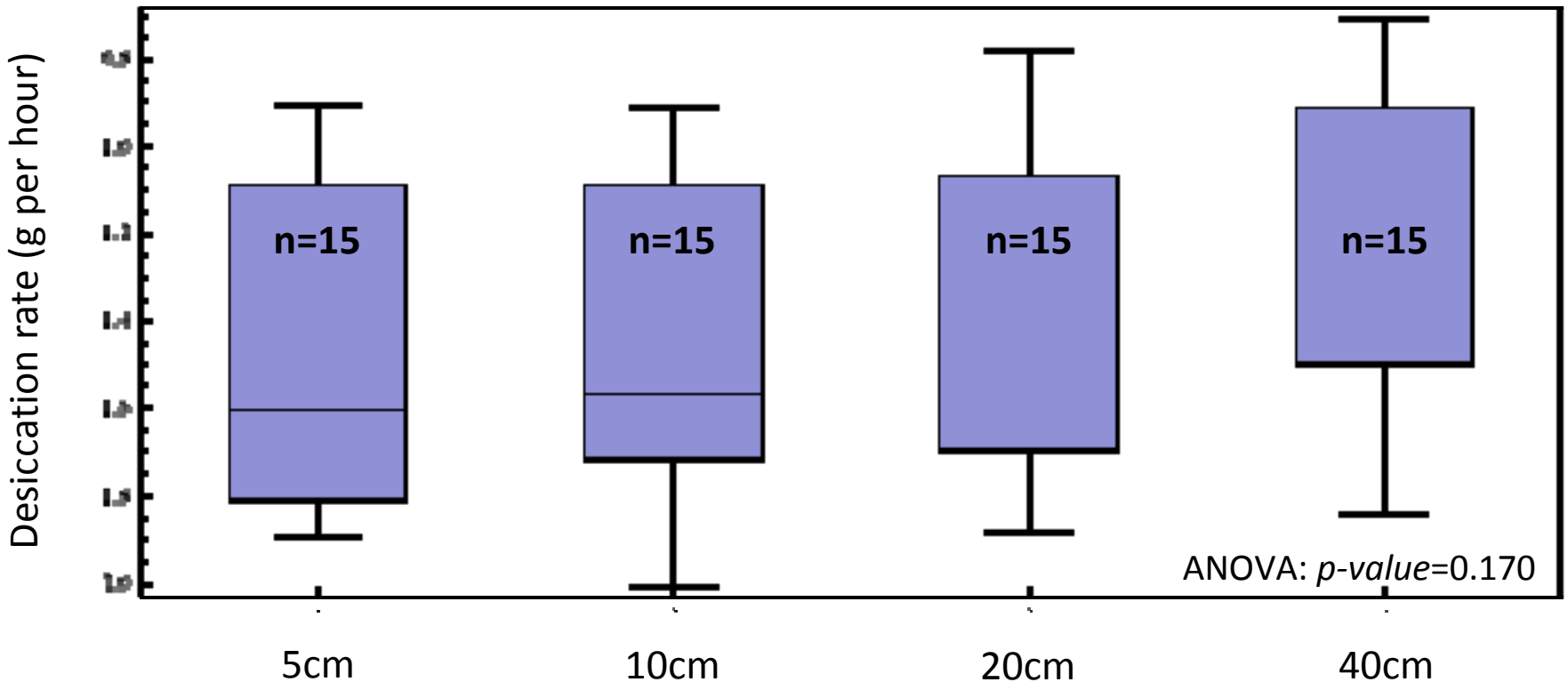

1. **Stress in Transport**: Conclusions

- Individual fragments show considerable water loss over as little as 3 hours of desiccation (>85%), and by 4 hours approximately 99% of wet weight is lost.
- There is no evidence for differences in desiccation rates between variable fragment lengths.

- **But we're left with the question of whether water loss translates into variation in the likelihood of fragment survival and establishment…**

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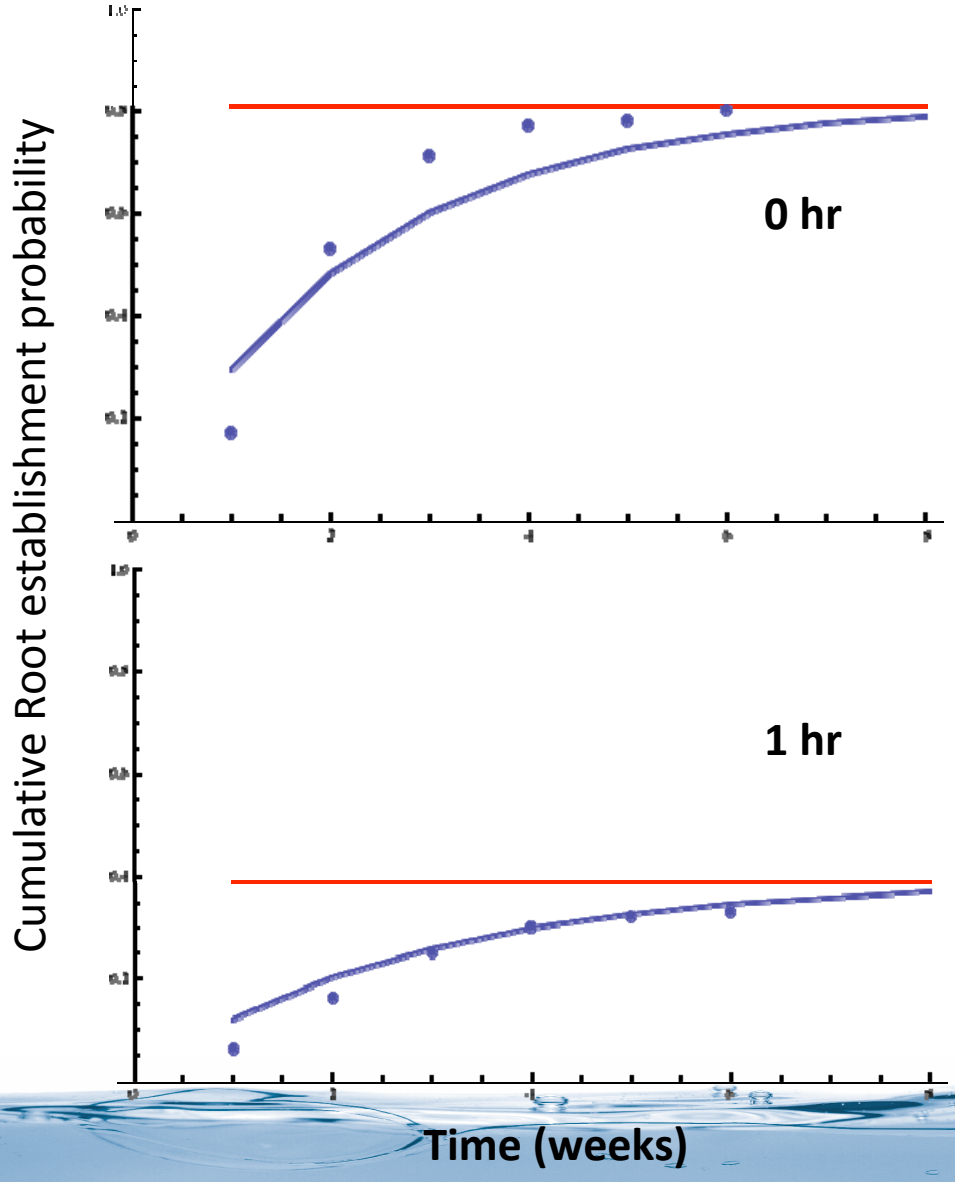
2. Establishment: Methods

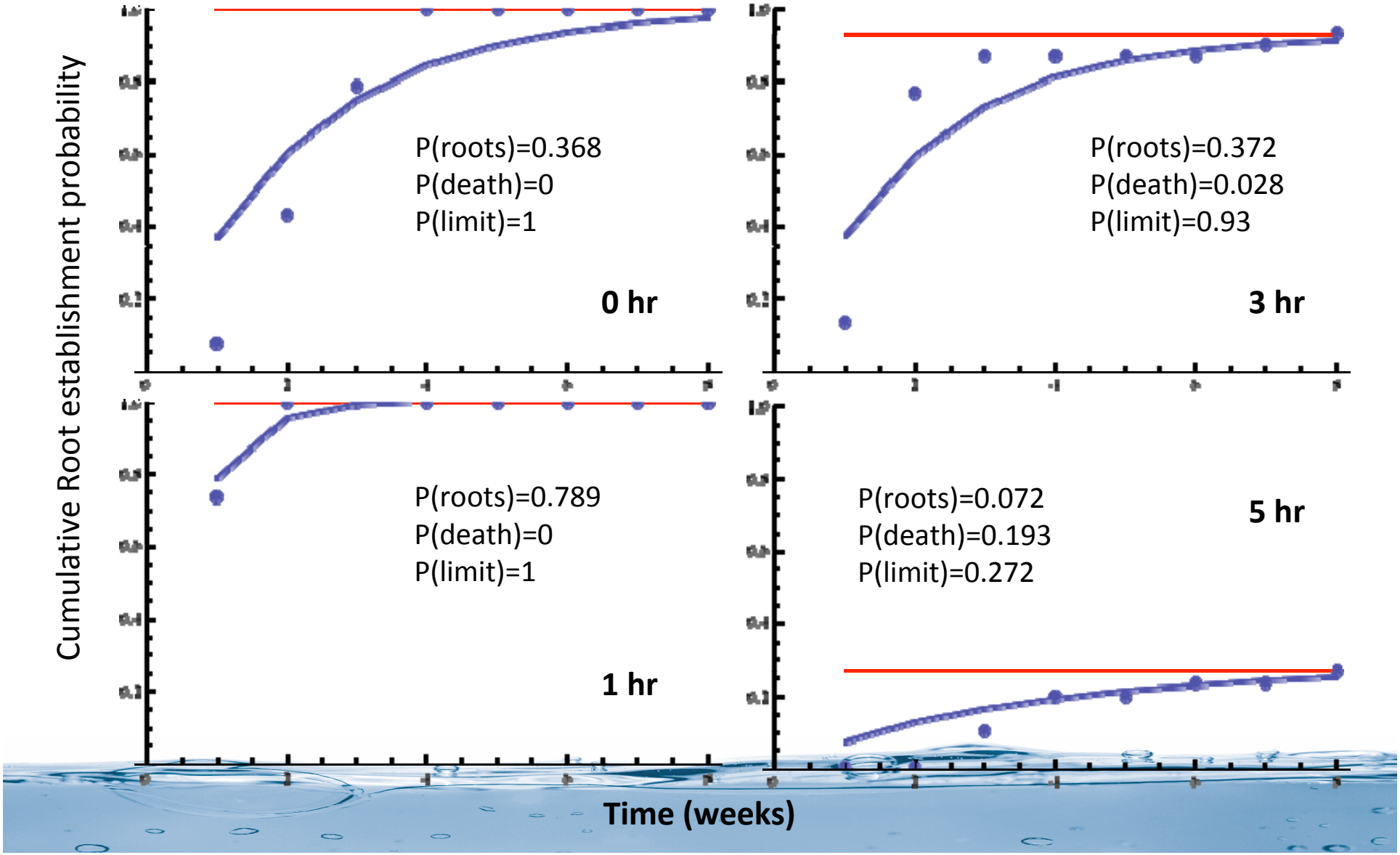
- EWM fragments (3cm-24cm) and bunches dried (0-24hr) as before
- Placed in jars with mesh screen cover to allow for containment and water flow
- Recorded root emergence, death weekly for 6 weeks

2. Establishment: Results (Fragments)



3 hr: 100% death
5 hr: 100% death
24 hr: 100% death

2. Establishment: Results(Bunches)



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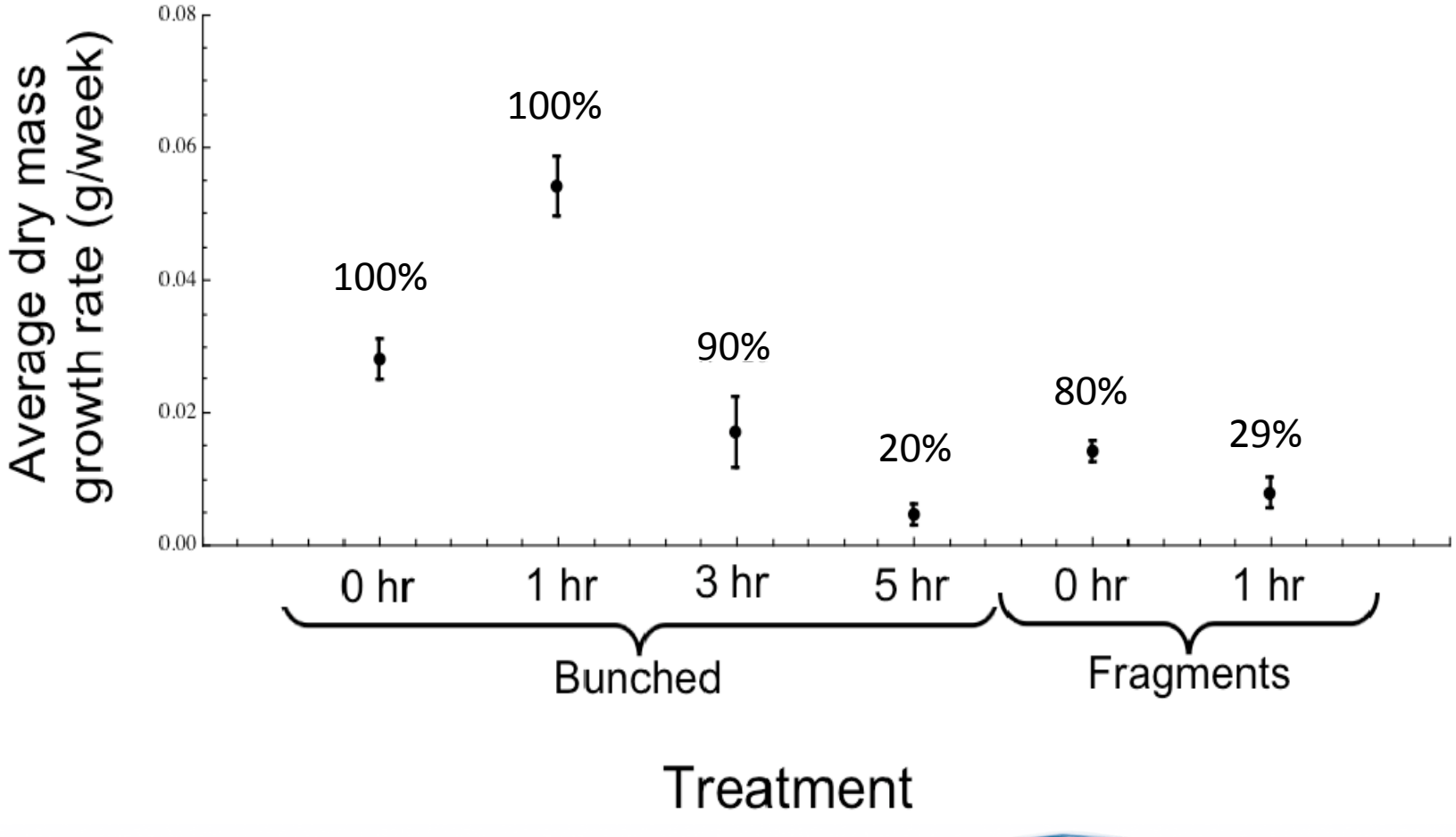
Results: Growth



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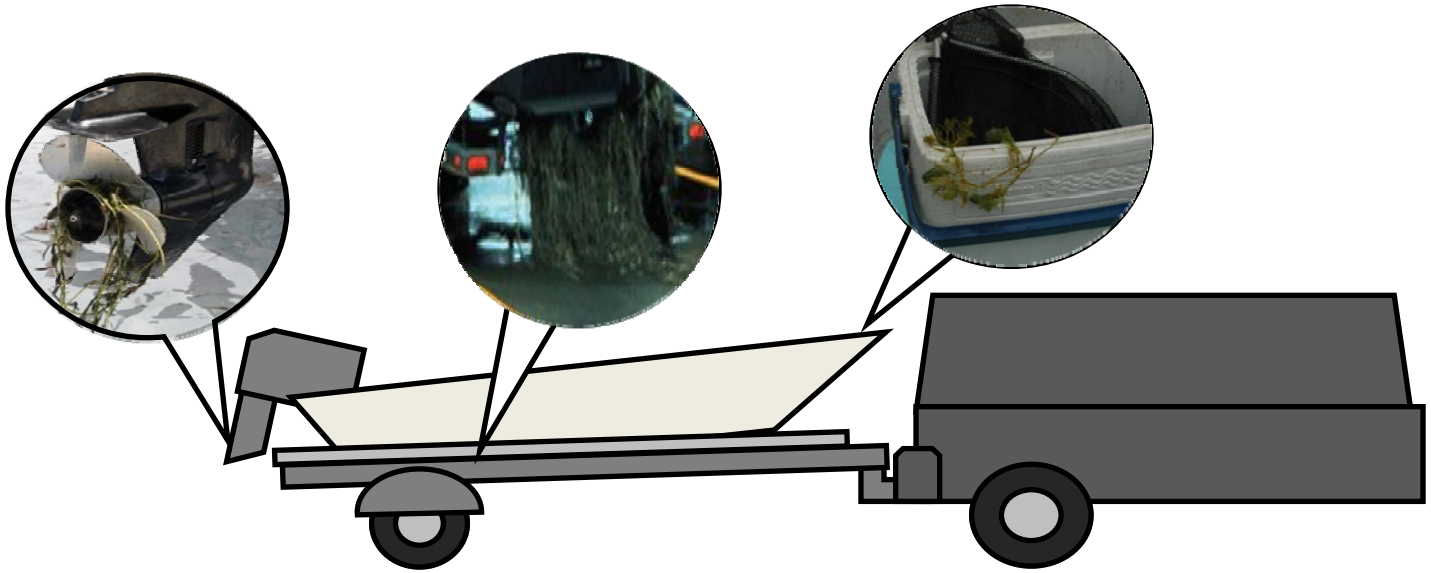
Summary and Conclusions

- Desiccation decreases the probability of root production, increases the probability of death, extends the time until roots are produced. These factors reduce the **probability of establishment**.

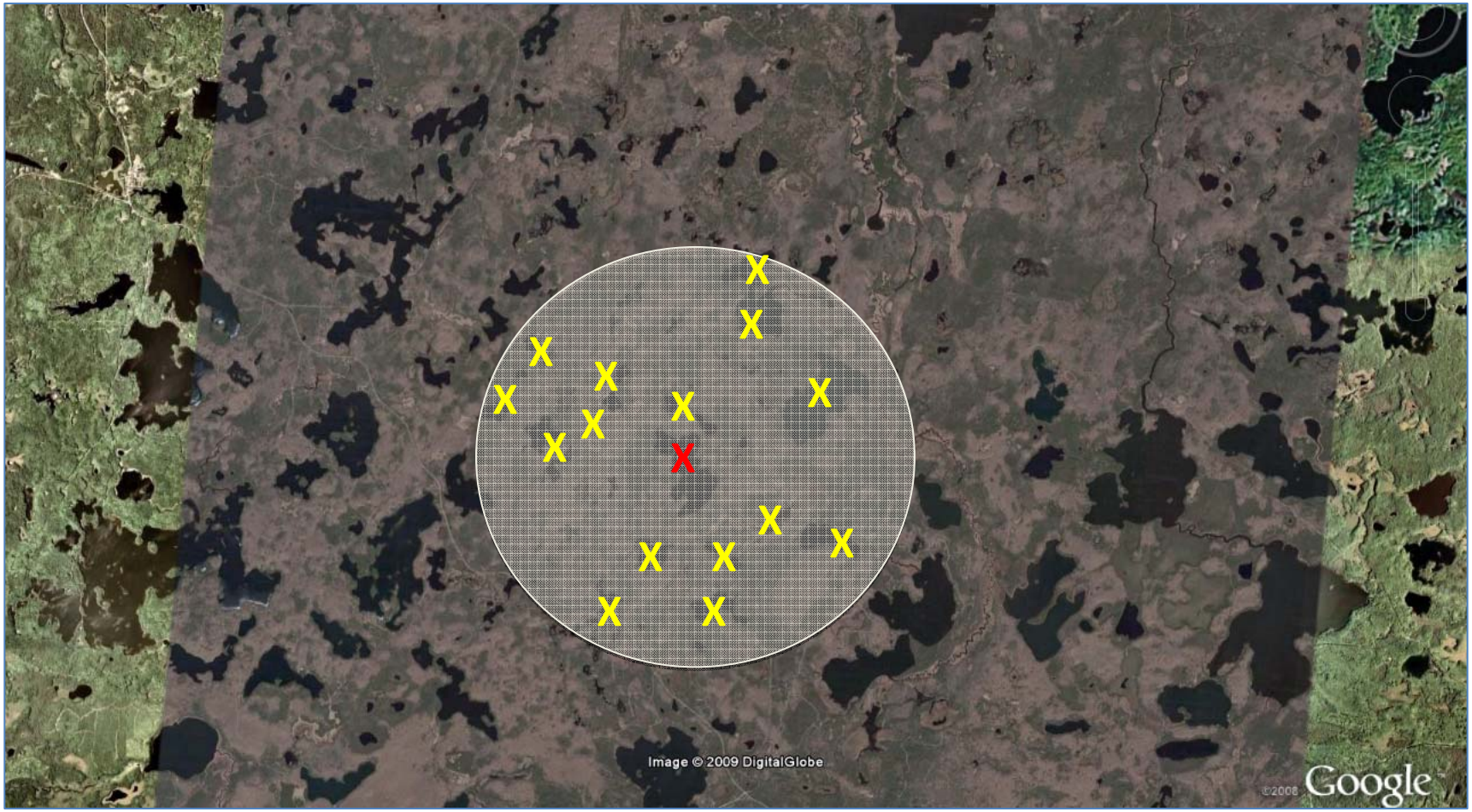
- Using knowledge about the costs incurred by aquatic invasive species in transport can aid in management.

Management Implications

- Boat inspection and cleaning
  1. Need to target locations on boats and trailers that form low desiccation bunches of EWM (Anchors, rollers, propellers)
  2. Need to target boaters visiting multiple lakes in the span of hours



Management Implications



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Questions?