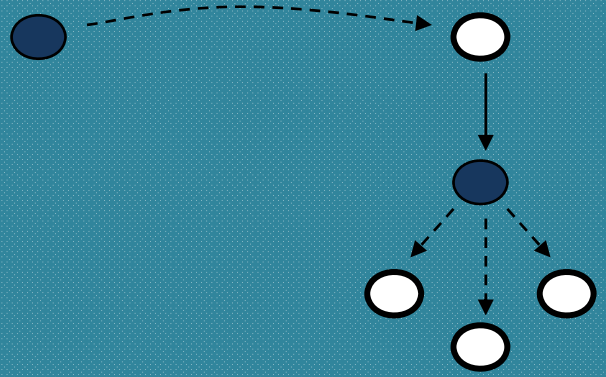
i2

Secondary spread of invasive aquatic plants depends on survival time during air exposure



Susan Knight[1]

Lindsey Bruckerhoff[2]

John Havel[2]

1-University of Wisconsin 2-Missouri State University,

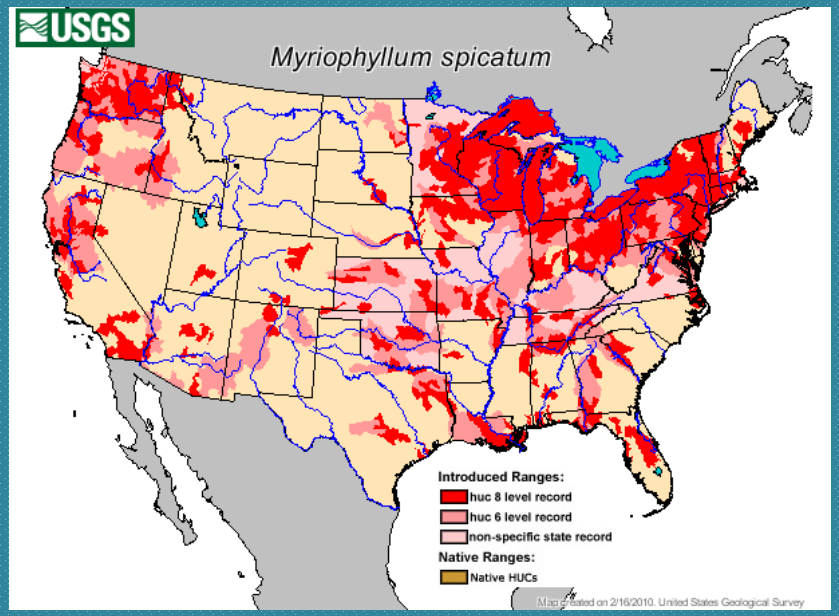
Slide 1

i2 Wordy title?

Nice pic of Susan!
itsguest, 2/11/2013

i3

Invasive aquatic plants are widespread and damaging to lakes



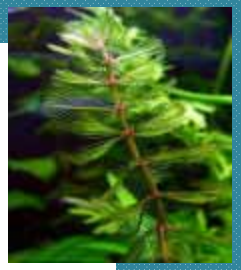
Slide 2

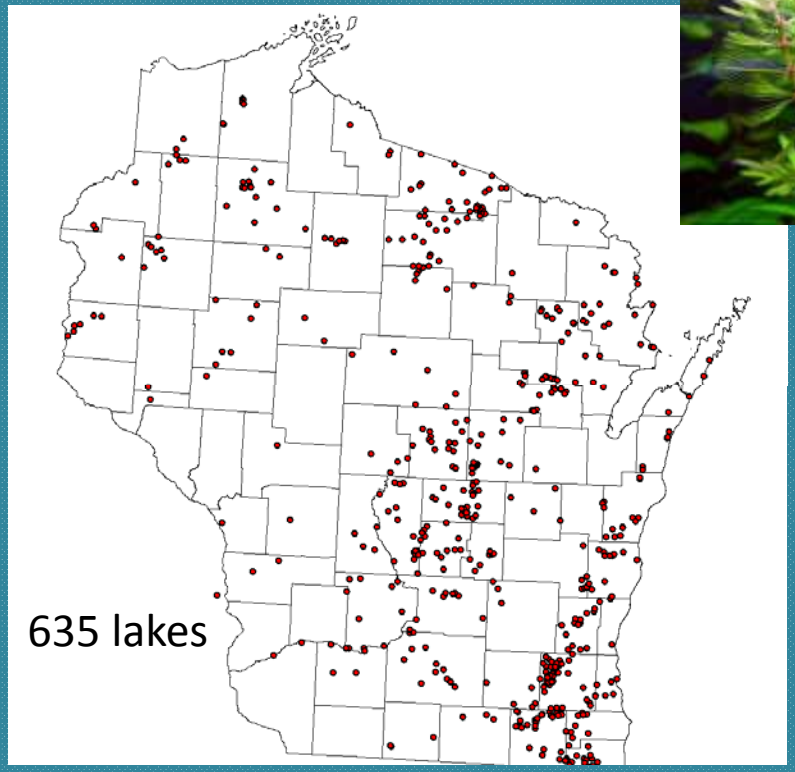
i3 made pics a bit bigger since you have the space
itsguest, 2/11/2013

i4

Two invasive aquatic plants are prevalent in Wisconsin

Eurasian water-milfoil (EWM)
Myriophylum spicatum





Curlyleaf pondweed (CLP)
Potamogeton crispus

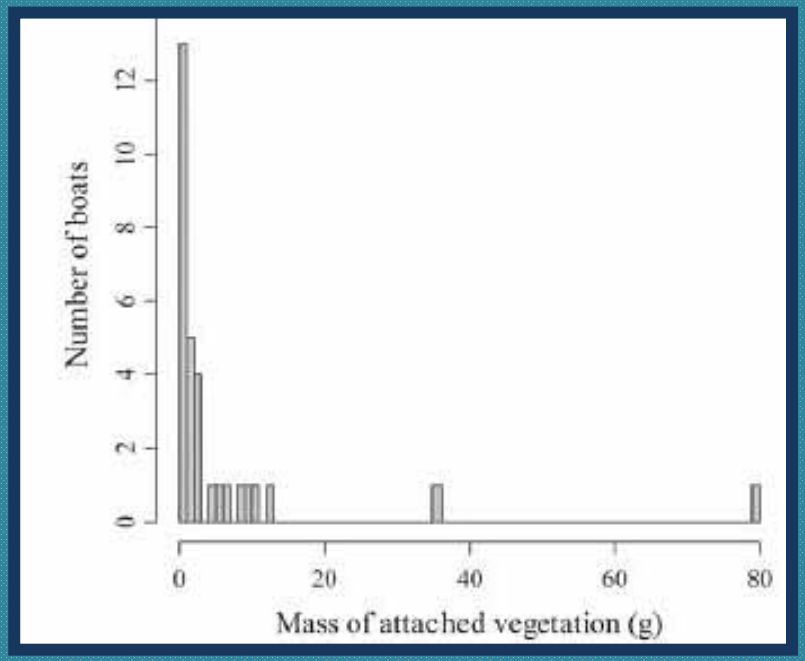
Wisconsin DNR SWIMS data for 2010, maps courtesy of A. Latzka

Slide 3

i4 I am happy to see better distribution maps! Thank you Latzka!
itsguest, 2/11/2013

i5

Some boats carry hitchhikers.



Rothlisberger et al. 2010 Fisheries 35: 121

Aquatic plants (Johnstone et al. 1985)

Zebra mussels (Johnson et al. 2001)

Zooplankton (Havel and Stelzleni-Schwent 2000)

Snails and other invertebrates (Rothlisberger et al. 2010)

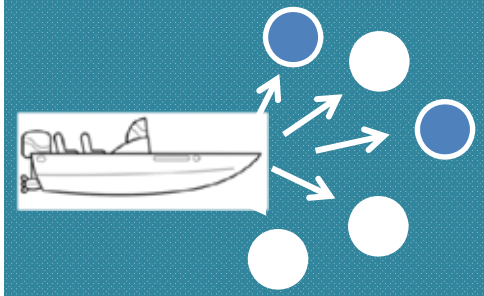
Slide 4

i5 I increased the contrast in the plot so it can be seen a little better, although still a little blurred

itsguest, 2/11/2013

Factors controlling secondary spread

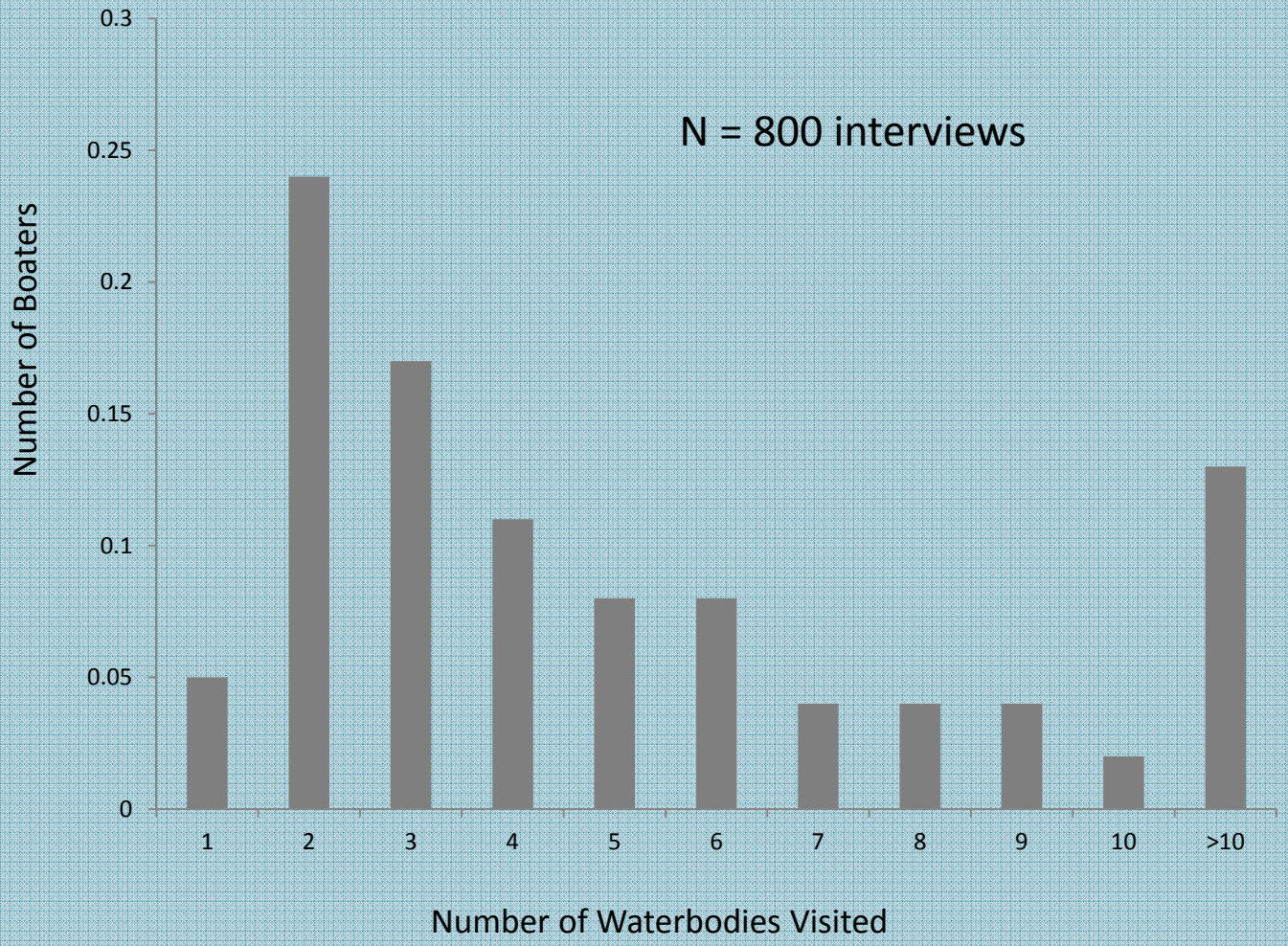
Encounter



Carry

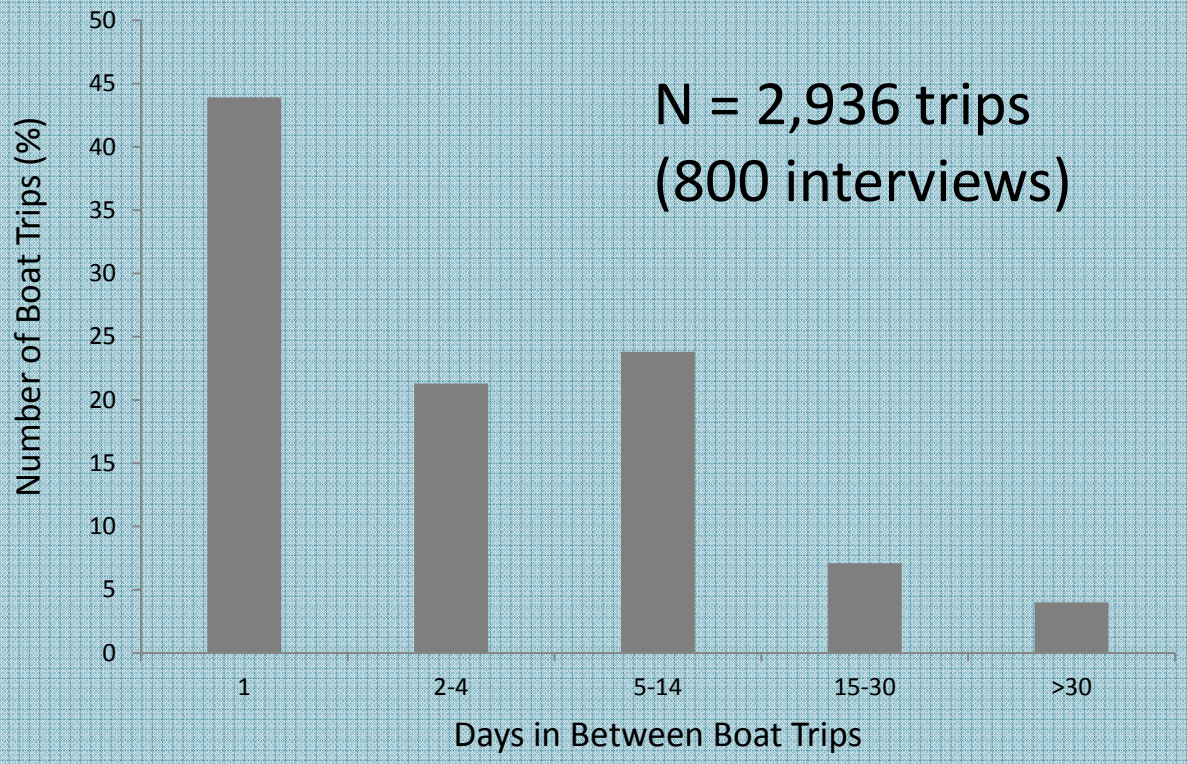
Colonization

Most boaters visit multiple lakes.



Summer 2011 Wisconsin data
B. Beardmore, pers. com.

Boats are out of water for short periods.

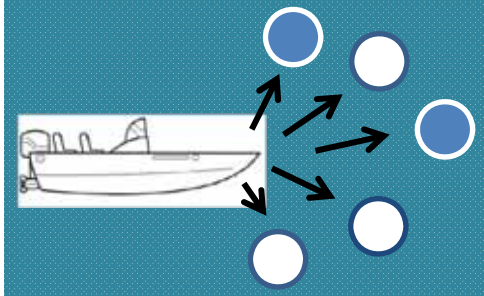


N = 2,936 trips
(800 interviews)

Summer 2011 Wisconsin data
B. Beardmore, pers. com.

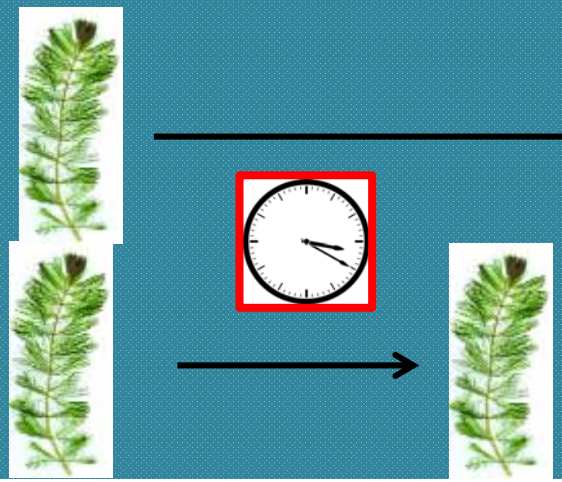
Factors Controlling Secondary Spread

Encounter



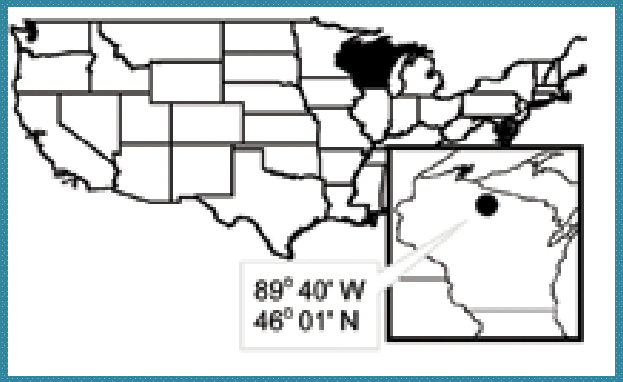
Carry

Colonization



<u>Experiments</u>:
Survival time out of water by species and size of "wad".

Field experiments at UW Trout Lake Station



9 experiments during summer, 2011 & 2012

Strict procedures for containment

i6

During each experiment:

Fresh collection

Isolation

Cut stems to 20 cm

Measure apical tip length

Dry to different time endpoints (n=10 ea)

Rehydrate and grow 1-2 weeks

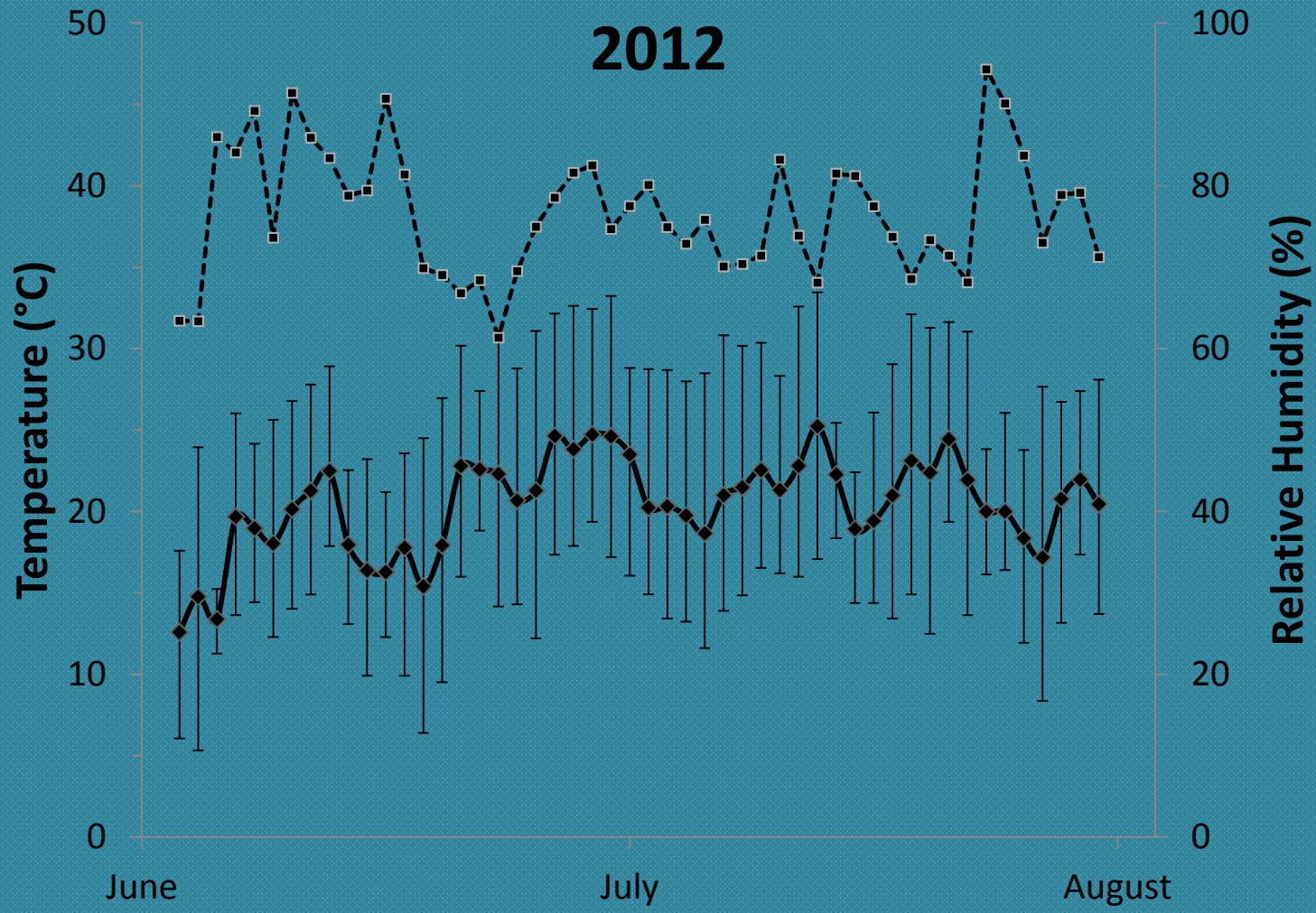
Re-measure apical tip length

“Alive” = significant positive growth

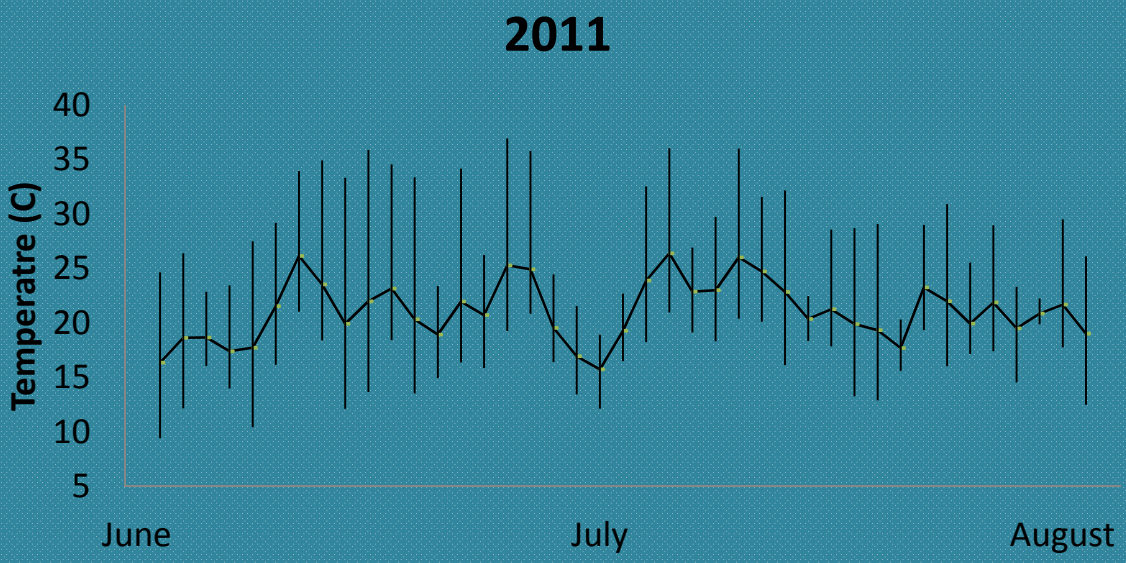
Slide 11

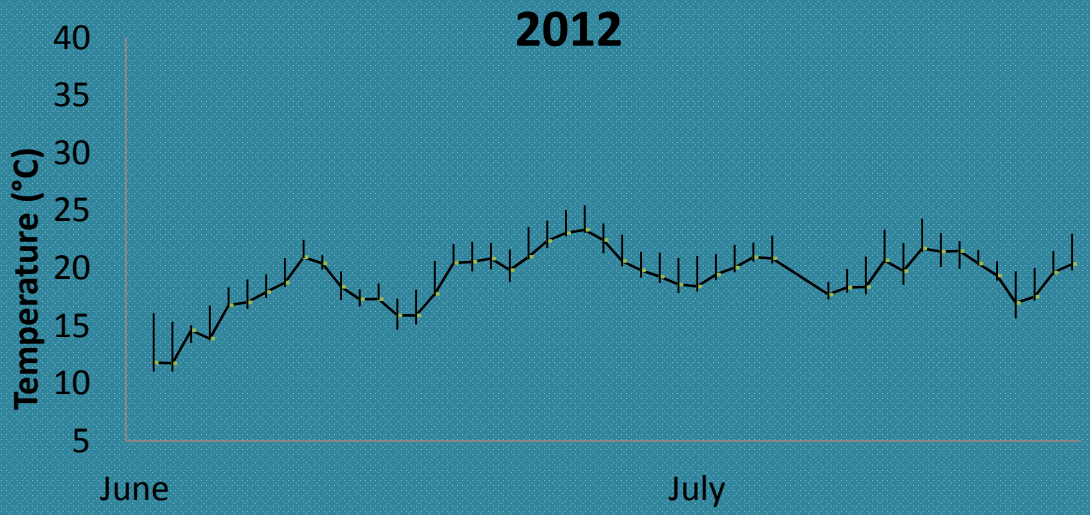
i6 What do you mean by isolation? Maybe say sorting or leave out?
itsguest, 2/11/2013

Weather for drying was mild and humid

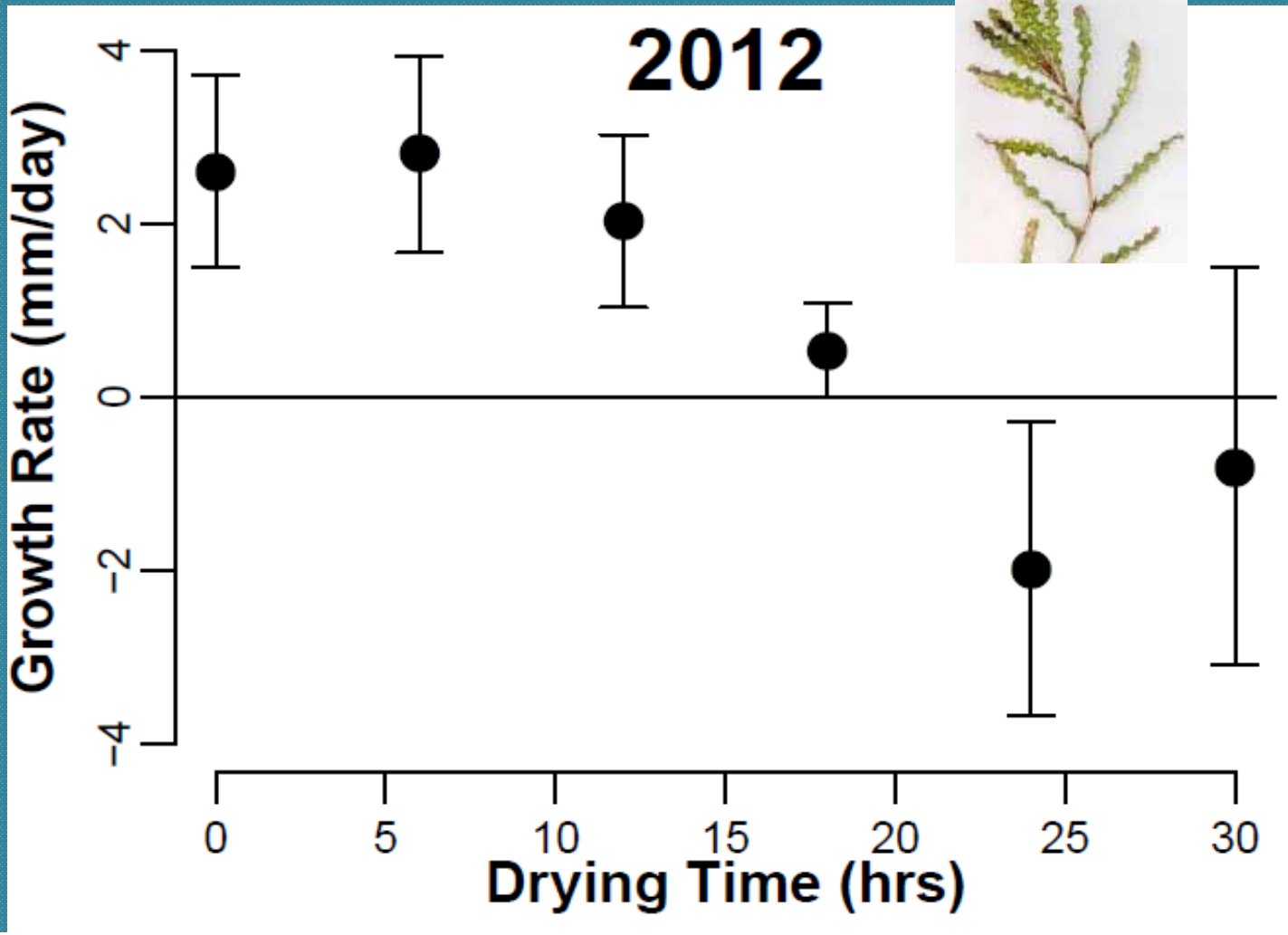


Temperature during rehydration depended on our method.

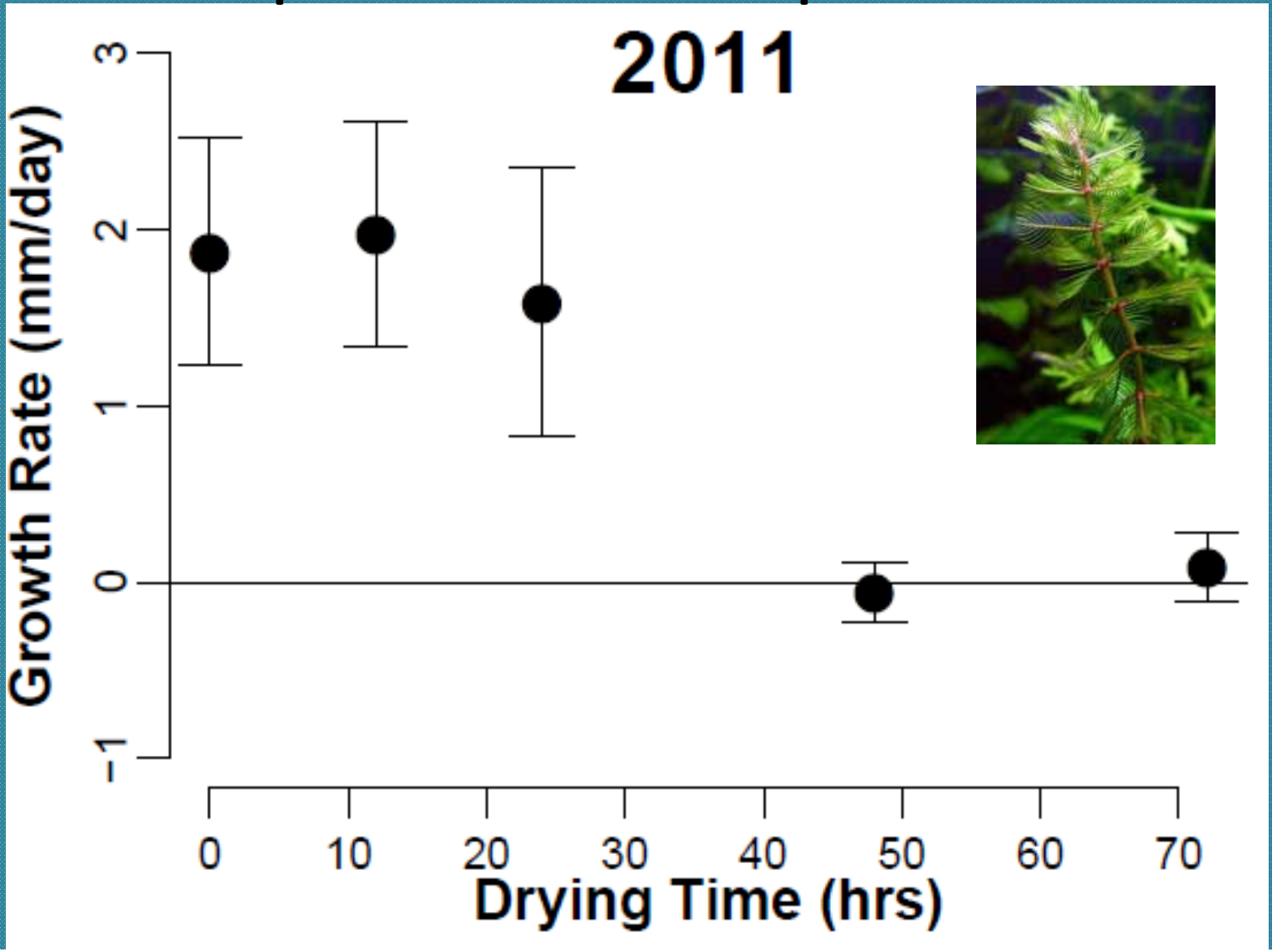




CLP stems exhibited positive growth up to 18hr of drying.

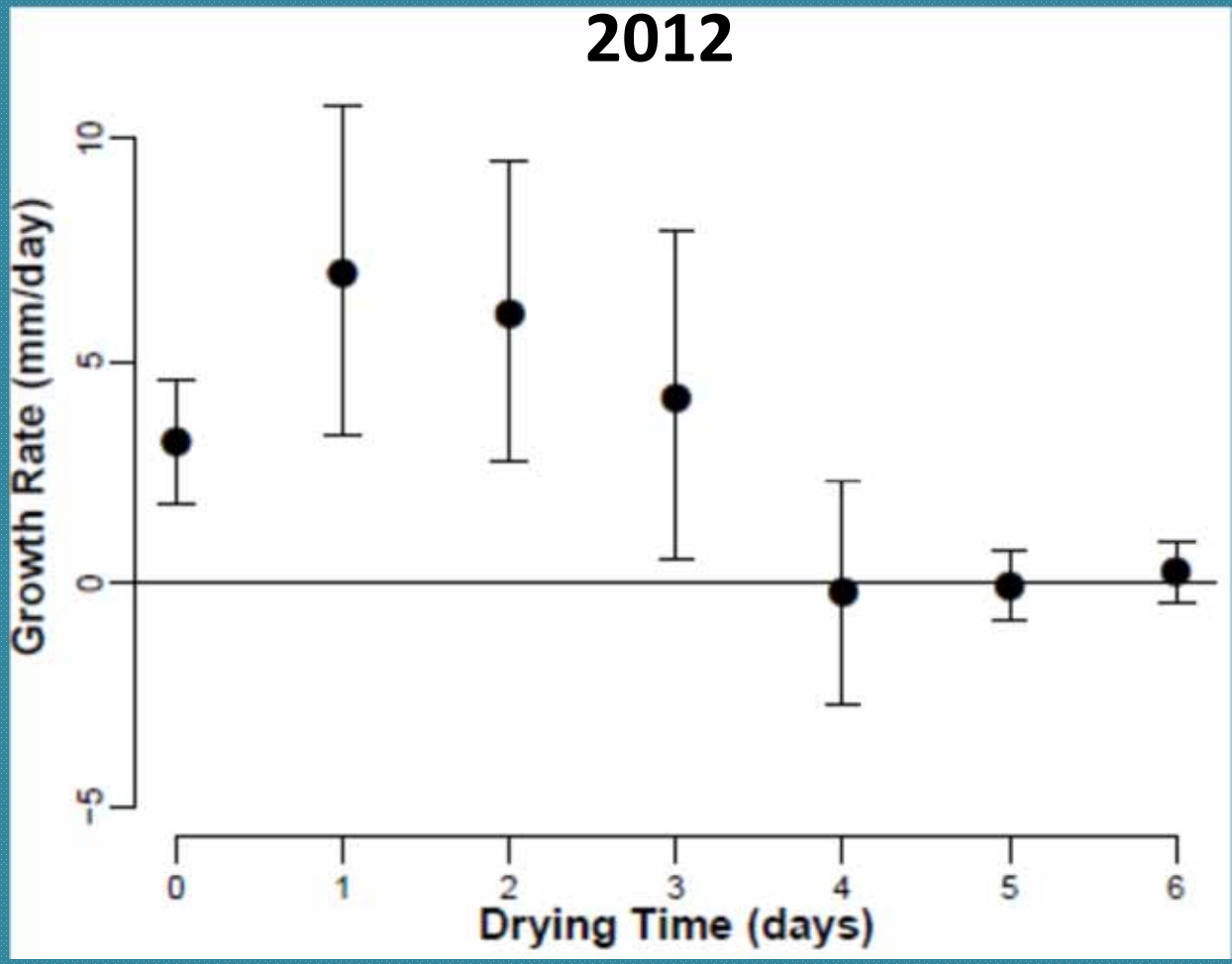


EWM stems exhibited positive growth up to 24hr of exposure.



Coiling experiments

Coiled EWM exhibited growth up to 3 days of air exposure.

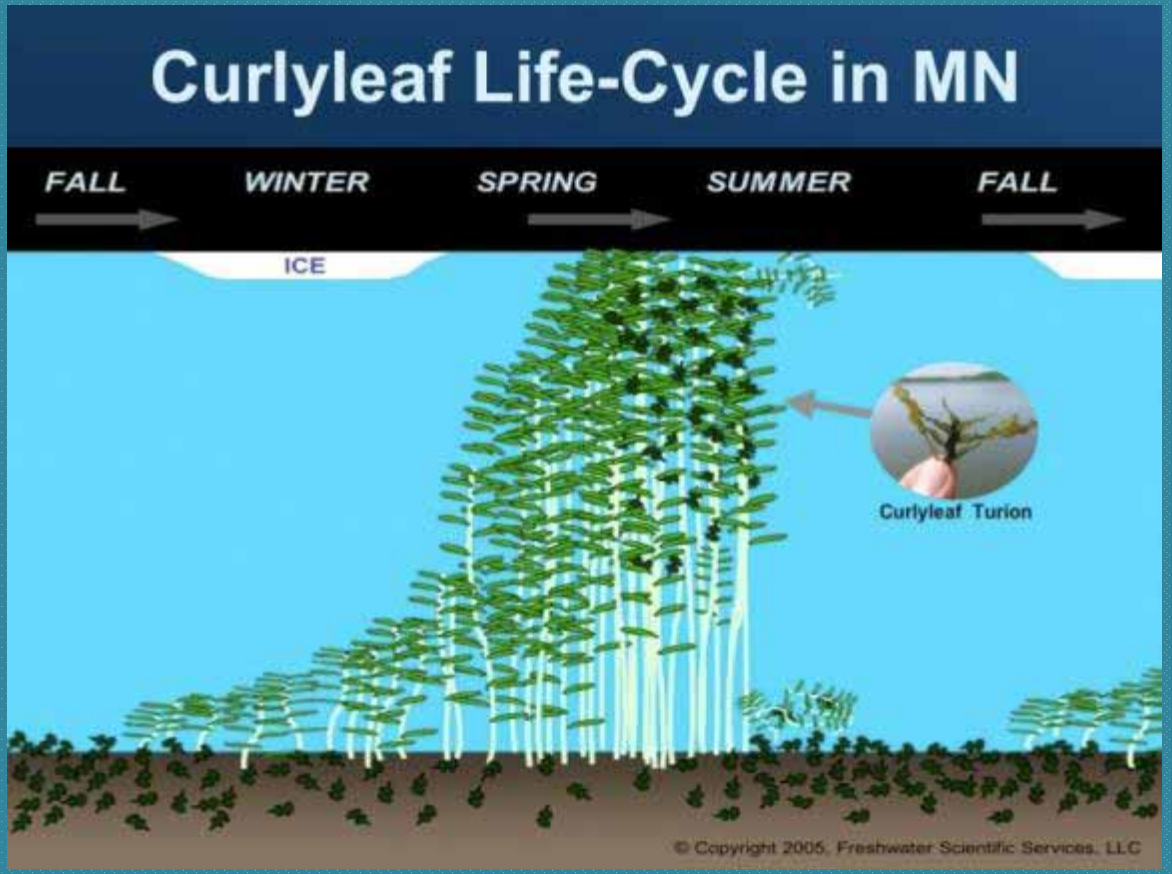


What life history stages can be transported?

Eurasian watermilfoil

Curlyleaf pondweed

turion



CLP turion experiment

After air drying 2 weeks, 10% of turions sprouted (vs. 50% in control).

Conclusions

- Under mesic summer conditions, single stems of EWM and CLP can survive about 1 day out of water.
- Coiling plants extends the survival time of EWM to 3 days.
- Many boaters visit multiple lakes during these time intervals.
- The dormant turions of CLP can likely survive much longer periods out of water and are produced at a time when boating activity is high.

Acknowledgments

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Wisconsin DNR

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Ben Beardmore

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