



2014 CSRB Applied Research

Evaluation of *Heterelmis comalensis* under “low flow” conditions.

Background Information

- Limited knowledge of how drought impacts subterranean or hyporheic taxa¹.
- Survival of the 7 Year Drought suggests that they can survive in interstitial habitat or inside of springs during times of low flow or flow cessation at spring upwellings².
- *H. comalensis* lacks characteristics typical of subterranean obligates.

1. Boulton, A.J. 2003

2. Bowles *et al.* 2003

Background Information

- Adult *H. comalensis* obtain oxygen through a plastron, which allows them to be an entirely aquatic species.
 - Water high in dissolved oxygen and sufficient water pressure is necessary for plastron function.
 - Suggests that adult *H. comalensis* may not survive during periods of low flow or flow cessation.
- *H. comalensis* larvae are better equipped to survive periods of low flow³.

Purpose: Phase I

- Preliminary testing of various “substrates” and test chambers for Phase II and Phase III experiments.
 - “Ant farm” style test chamber
 - Clear substrate
 - *Microcylloepus pusillus*



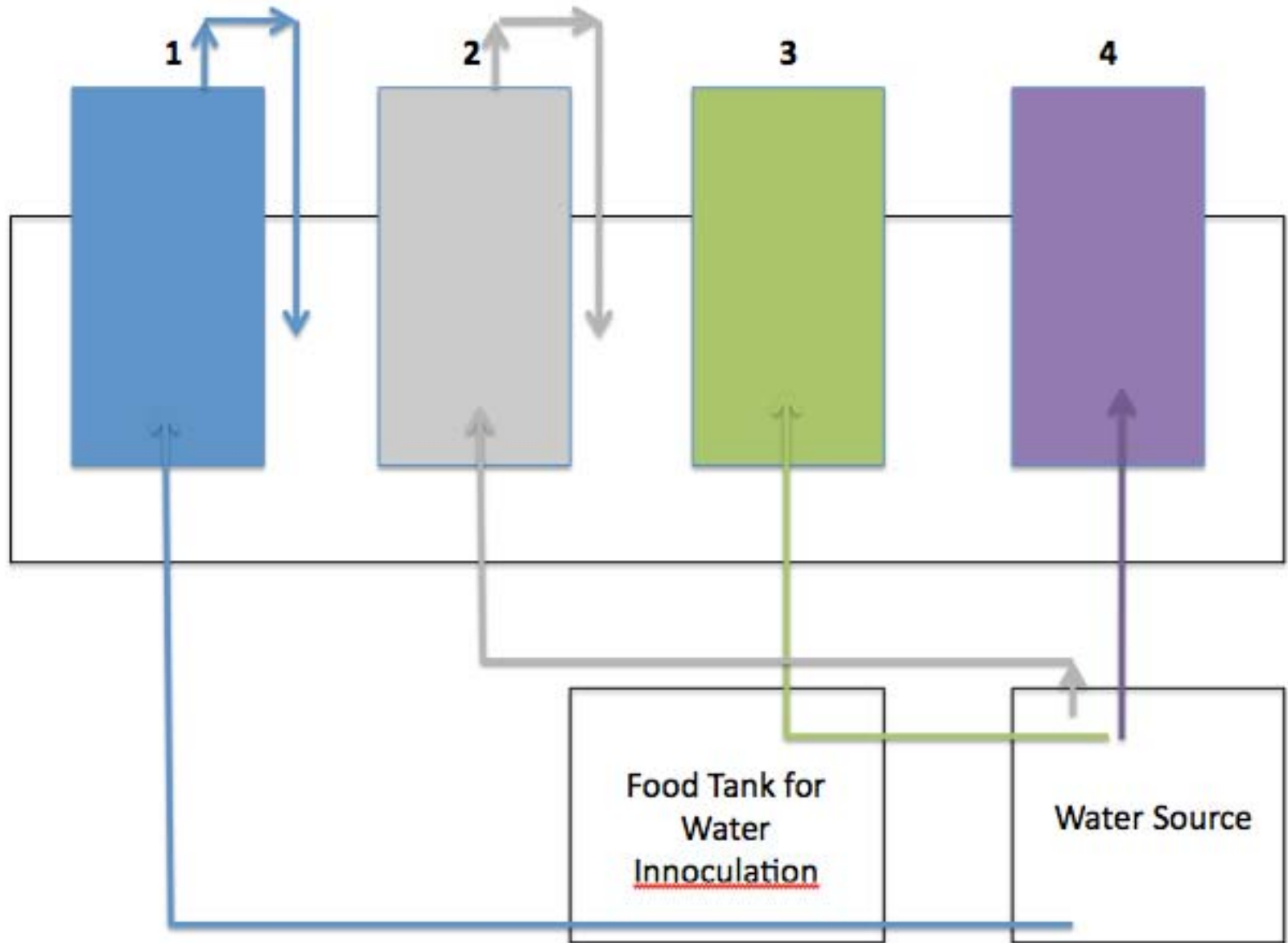
Purpose Phase II

- Phase II will attempt to address the following questions:
 - Is adult *H. comalensis* survival more dependent on the presence/absence of flow or the presence/absence of a food source?
 - How do flow and food availability influence the distribution of beetles in the tank?

Experimental Design: Phase II

- Factorial Design
- 30 day trials with 48 hour habituation period prior to the start of each trial.
- Assess mortality and distribution
- Standard water quality measurements
- Repeated 3 times
 - 6 replications of each factor

Experimental Condition Number	Factors	
	Flow	Food Availability
1	Yes	Yes
2	Yes	No
3	No	Yes
4	No	No

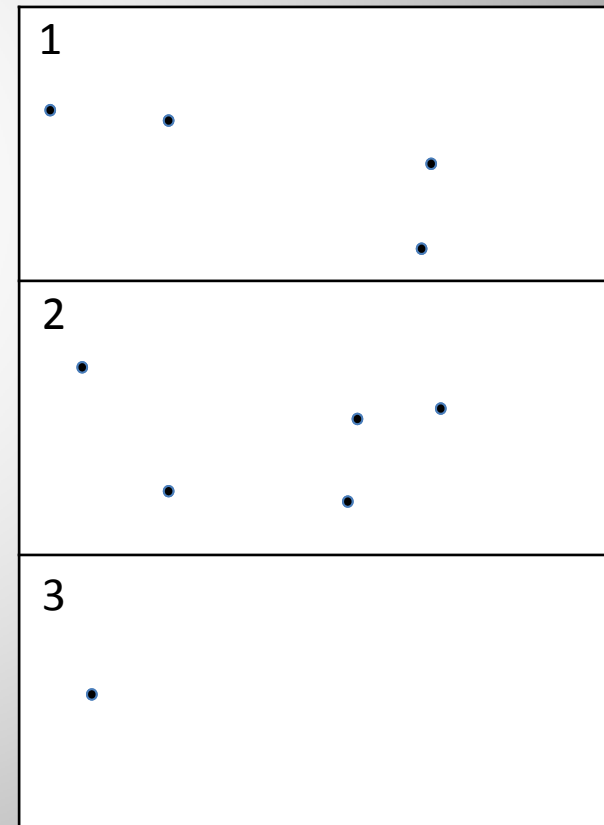


Methods: Phase II

- Distribution Monitoring
 - “Divide” tank into 3 equal sections
 - Record distribution (as #) of beetles in each section
 - Every 48 hours
 - Concurrent with water quality measurements.

Day	Treatment	Section	# of Beetles
1	1	1	4
...		2	5
30		3	1

Example of data collection spreadsheet



Example of tank divisions

Statistical Analysis: Mortality

- Factorial ANOVA
 - Response variable:
 - Mortality
 - Main Effects:
 - Food availability
 - 2 levels (Yes or No)
 - Flow
 - 2 levels (Yes or No)

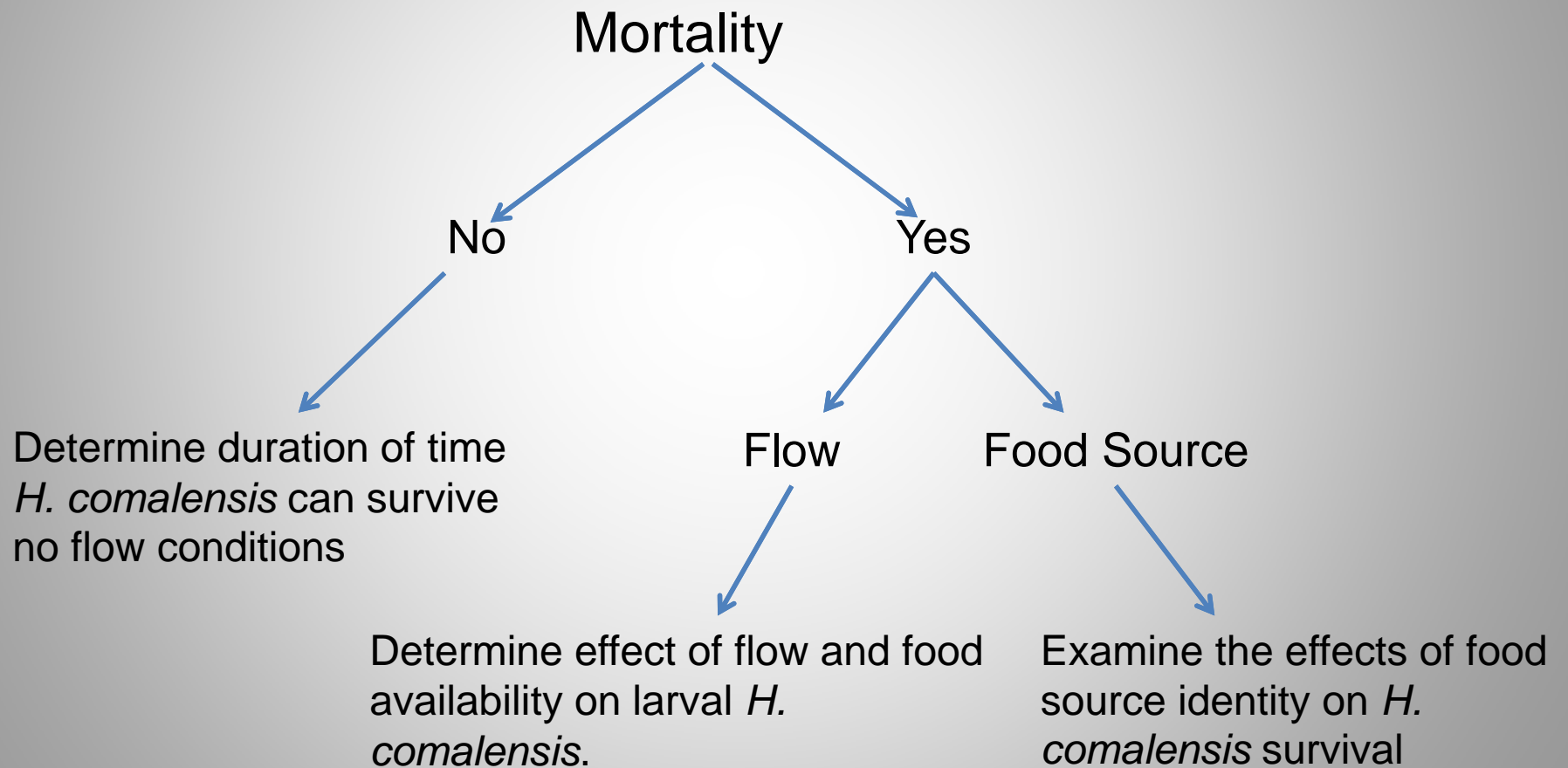
		Flow	
		Yes	No
Food	Yes	n=3	n=3
	No	n=3	n=3

Statistical Analysis: Distribution

- Determine if spatial habitat use is influenced by experimental conditions
- Chi-Squared Test of Independence
 - Determine if distribution among sections is different from a random distribution.
- Response Variable:
 - Average number of beetles in each section

Purpose: Phase III

- Dependent on Phase II results



Expected Contributions

- Determine if any relationship exists among flow and food availability and Comal Springs riffle beetle survival.
- Contribute important information to the HCP about the Comal Springs riffle beetle's response to low flow events.

Questions or Comments?