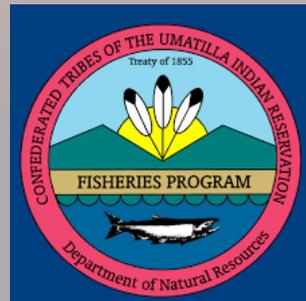
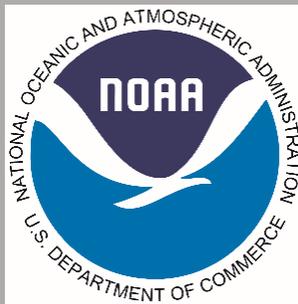


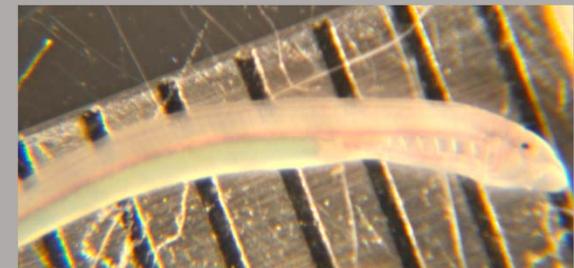
Early Development of Artificial Propagation Methods for Pacific Lamprey



Mary L. Moser, Alexa N. Maine,
Aaron D. Jackson, and Ralph Lampman



Collaboration is Key!



Brood Collection and Sexual
Maturation

Fertilization and Incubation

Disinfection and Transport Pitfalls and
Successes

Additional Studies

Brood Collection and Sexual Maturation



Adults Collected at Mainstem Dams
Held Overwinter
Genetic and Disease Sampling





Sorted Broodstock:

April 17

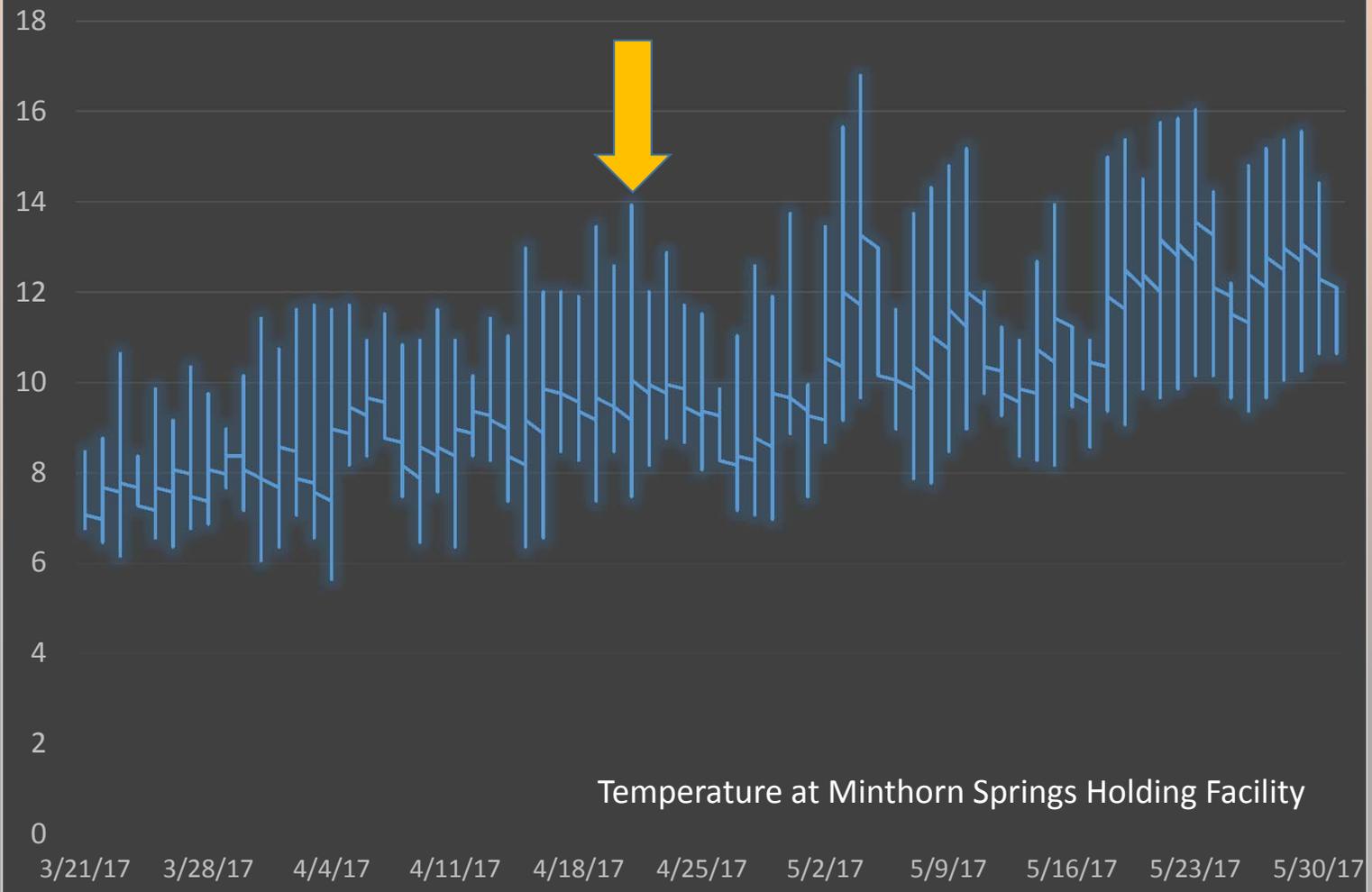
May 11

June 1

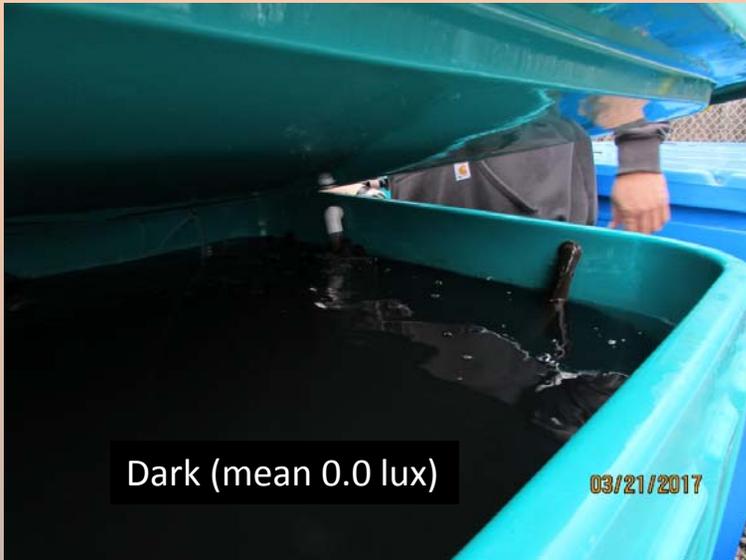




Temperature (°C)



Temperature at Minthorn Springs Holding Facility



March 1 – June 1, 2017

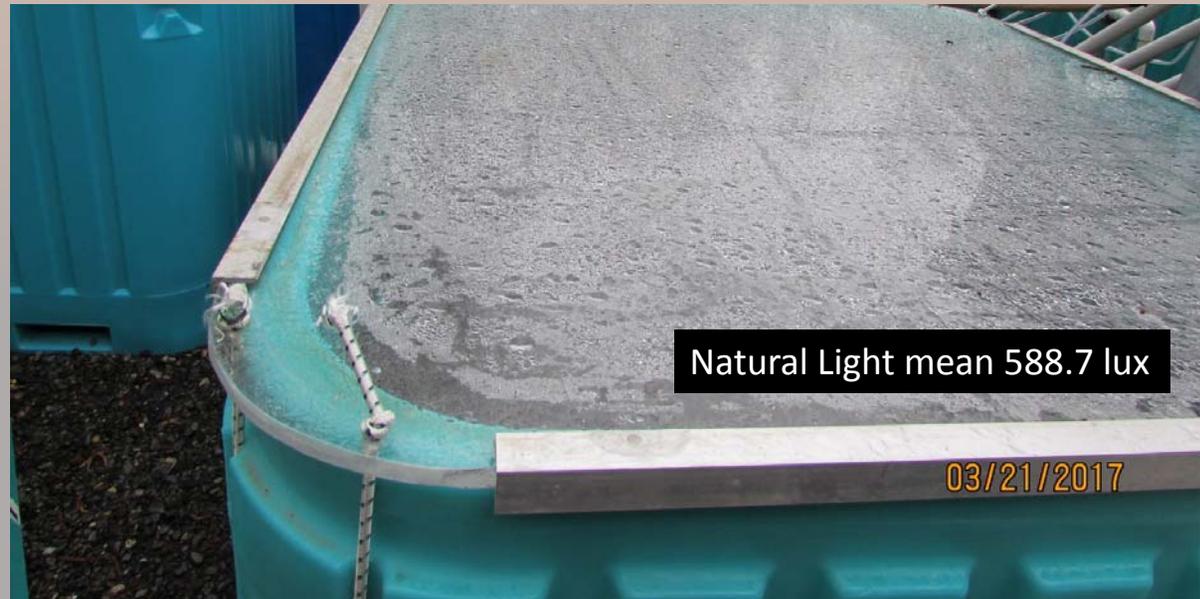
9, 1100 L tanks

130 adults/tank

Minthorn Springs, 19L/min

3 reps of 3 treatments

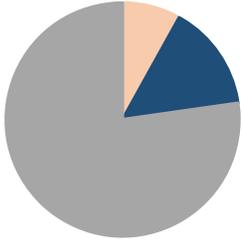
Temp 5.9 -17.0 C



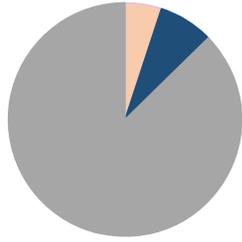


April

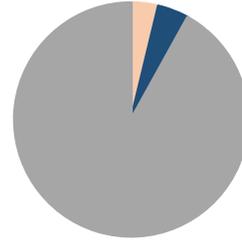
dark



artificial

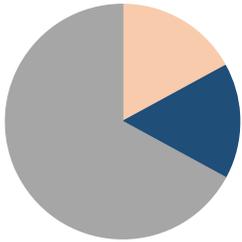


natural

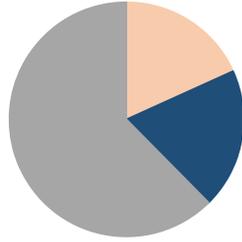


May

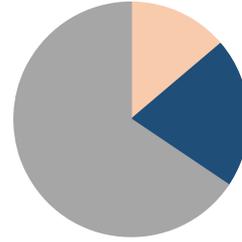
dark



artificial



natural



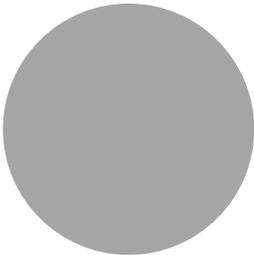
Mature Females Mature Males Immature

Mature Females Mature Males Immature

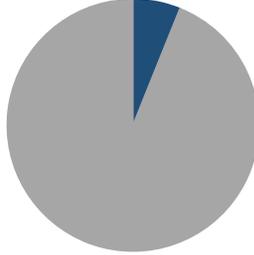
Mature Females Mature Males Immature

June

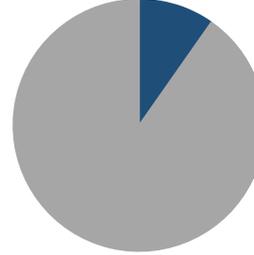
dark



artificial



natural



Fertilization and Incubation



Repeat Spawning of Both Sexes

Eggs Viable in Freshly Dead Females

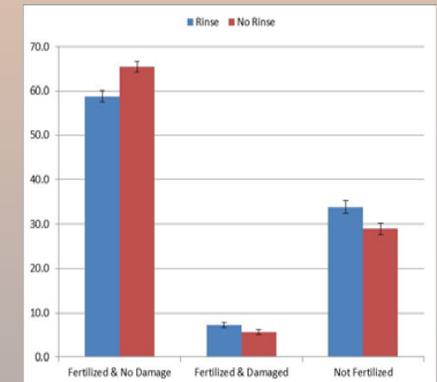
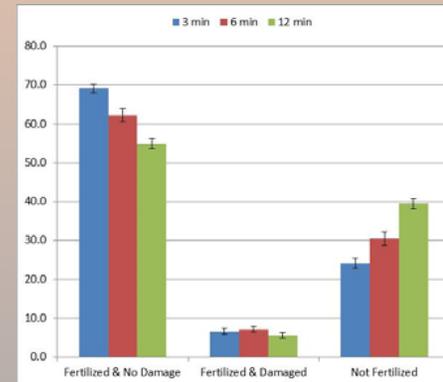
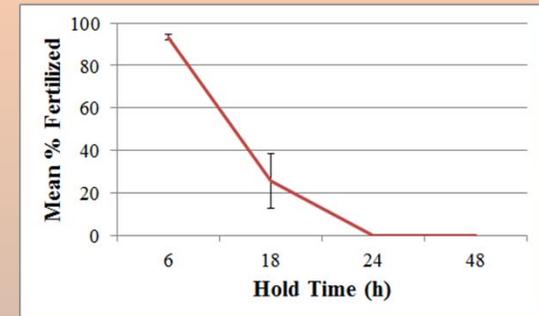
Gamete Holding to 24 h and beyond

Short Gamete Contact Times

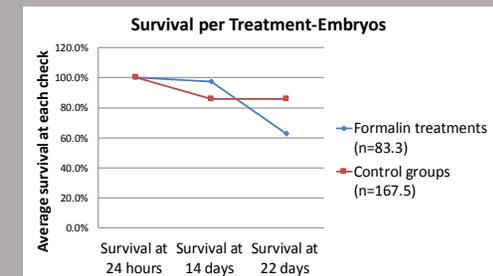
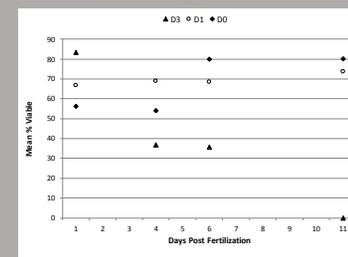
Eggs Sensitive to Physical Damage

Methods to Reduce Egg Adhesion

Egg Disinfection



1-2 min in 1% pineapple juice



Repeat Use of Individuals

Eggs Viable in Freshly Dead Females

Gamete Holding to 24 h and beyond

Short Gamete Contact Times

Eggs Sensitive to Physical Damage

Methods to Reduce Egg Adhesion

Egg Disinfection

CHAPTER TWENTY TWO

DEVELOPING TECHNIQUES FOR ARTIFICIAL PROPAGATION AND EARLY REARING OF PACIFIC LAMPREY (*ENTOSPHEBUS TRIDENTATUS*) FOR SPECIES RECOVERY AND RESTORATION

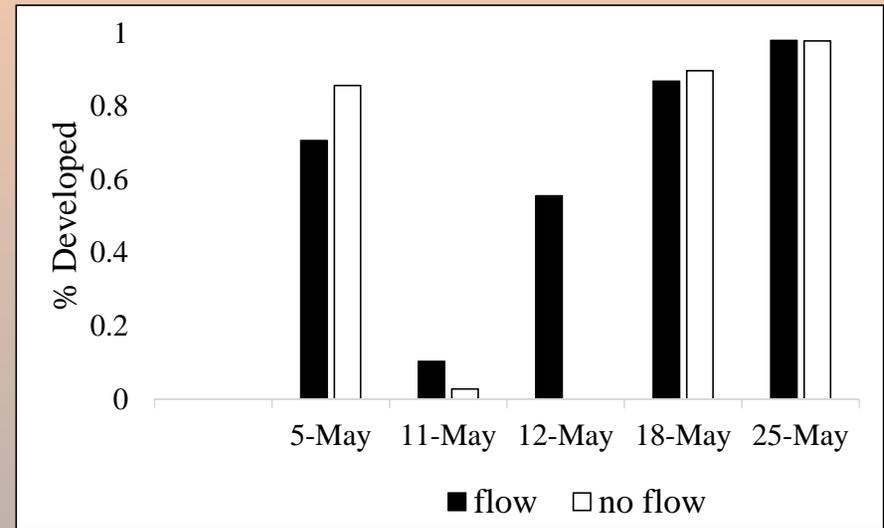
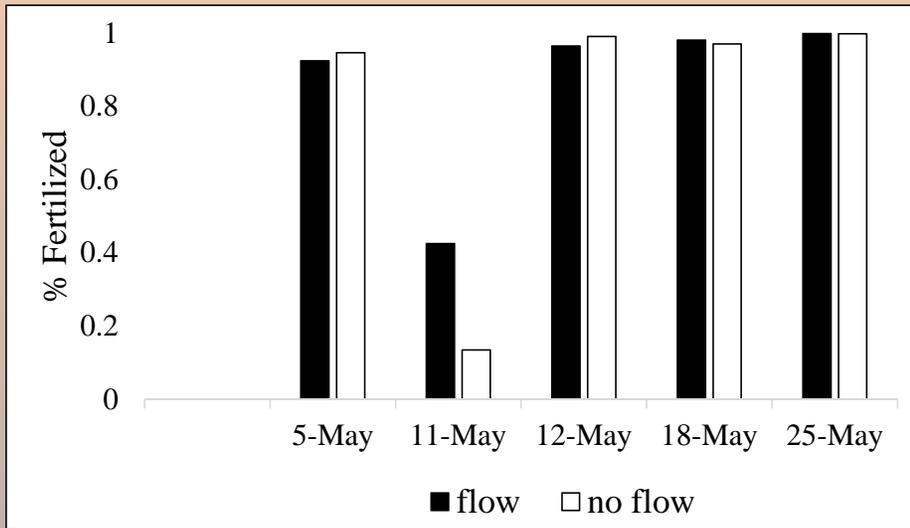
RALPH LAMPMAN, MARY MOSER,
AARON JACKSON, ROBERT ROSE,
ANN GANNAM AND JAMES BARRON

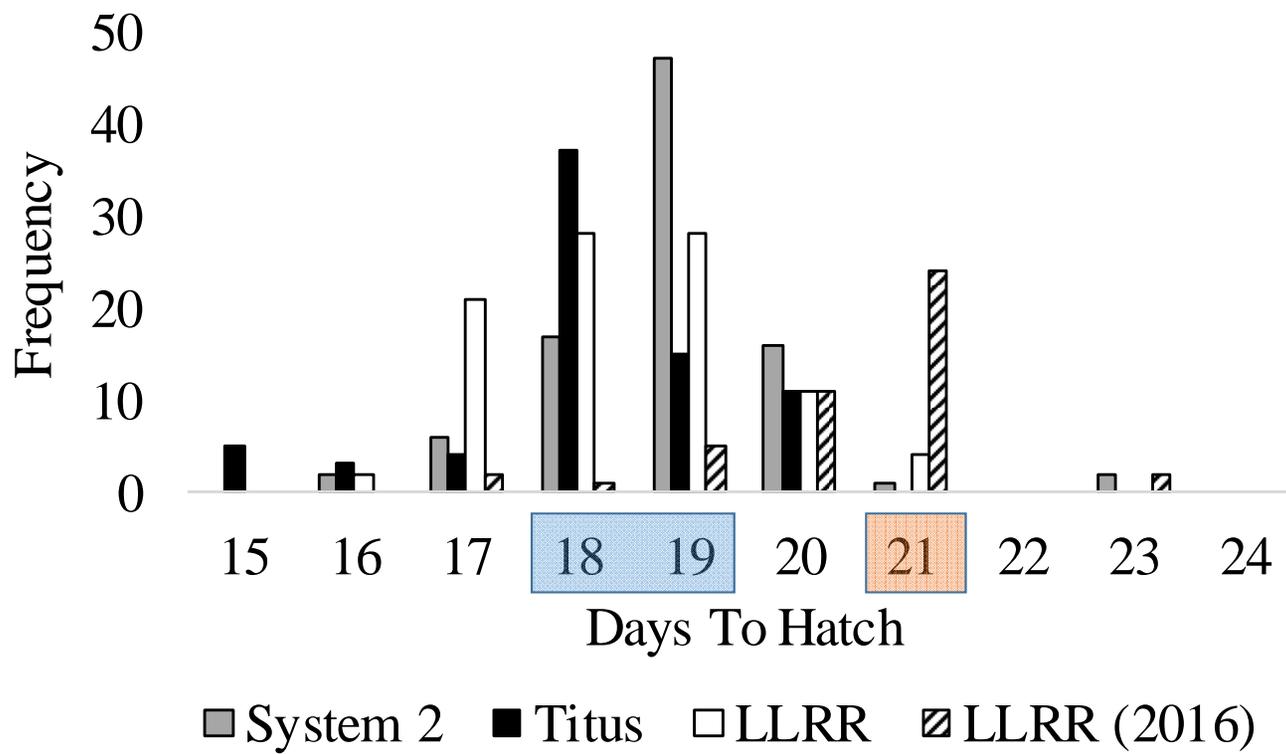
Introduction

Of highest importance to the lower Columbia Basin Native American tribes is the focus on protection and enhancement of “First Foods” such as water, salmon (*Onchorynchus* species), Pacific lamprey (*Entosphenus tridentatus*), deer (*Odocoileus* species), cous root (*Sagittaria latifolia*), and huckleberry (*Vaccinium parvifolium*). These foods are central to the perpetual cultural, economic and sovereign benefit of the tribes. Lamprey

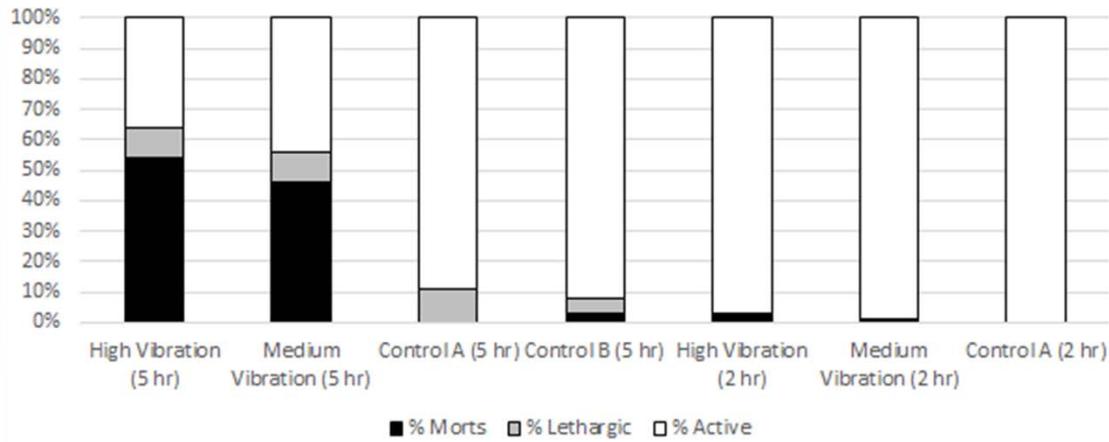
Lampman, R., M. L. Moser, A. D. Jackson, R. K. Rose, A. L. Gannam, and J. M. Barron. 2016. Developing techniques for artificial propagation and early rearing of Pacific Lamprey (*Entosphenus tridentatus*) for species recovery and restoration. In A.M., Orlov and R. J. Beamish, editors: Jawless Fishes of the World. 2 volumes. Cambridge Scholars Publishing, Cambridge, UK.

Effects of Flow



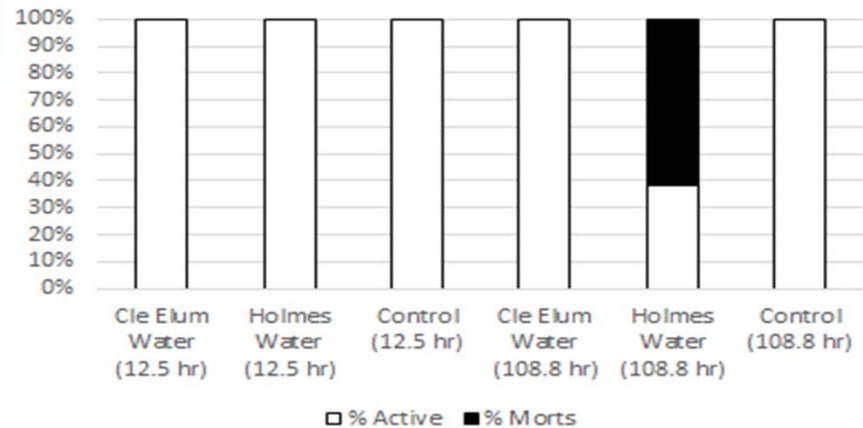


Vibration Study



First Feeding Larvae

Water Change Experiment



Additional Studies With Early Larvae:

Temperature and Salinity Tolerance of Prolarvae (very tolerant)

Substrate Requirements of Early Larvae (need substrate)

Effects of Food Particle Size on First-Feeding Larvae (smaller is better)

Density Effects on Growth and Survival (resilient to very high densities, but with growth consequences)





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Emma Stevens, Rondi Nordal, Chris Dailey, Justin Pearson and Walla Walla Community College staff

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Tyler Beals, Davey Lumley, Patrick Luke (Yakama Nation),

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