

Larval Pacific lamprey *Entosphenus tridentatus* are not susceptible to common fish rhabdoviruses of the Pacific Northwest

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Overview

- Background
- Reasoning
- What we did
- Results & Conclusions



A Little Bit About Pacific Lamprey



- Anadromous
- Adults return to freshwater to spawn
- Critical larval stage lasts 4-6 years
 - Similar habitat as Pacific salmon so experience similar habitat problems
- Metamorphosis
- Ocean migration



Historically

- North American and Asian Pacific Coast and the Columbia River Basin
- Source of nutrients
- Serve an important role in Native American tribes
- Possible indicator of ecological health

Presently

- Half of Northern Hemisphere lamprey considered vulnerable, endangered, or extinct
 - Dams
 - Habitat degradation
 - Poor water quality
 - Exotic species
 - Direct eradication
- Native Americans are losing
 - Cultural heritage
 - Traditional fishing opportunities
 - Have to travel long distance to fish



Information and Education

<http://www.fws.gov/pacific/Fisheries/sphabcon/lamprey/index.cfm>

- Conservation Initiative • Management • People

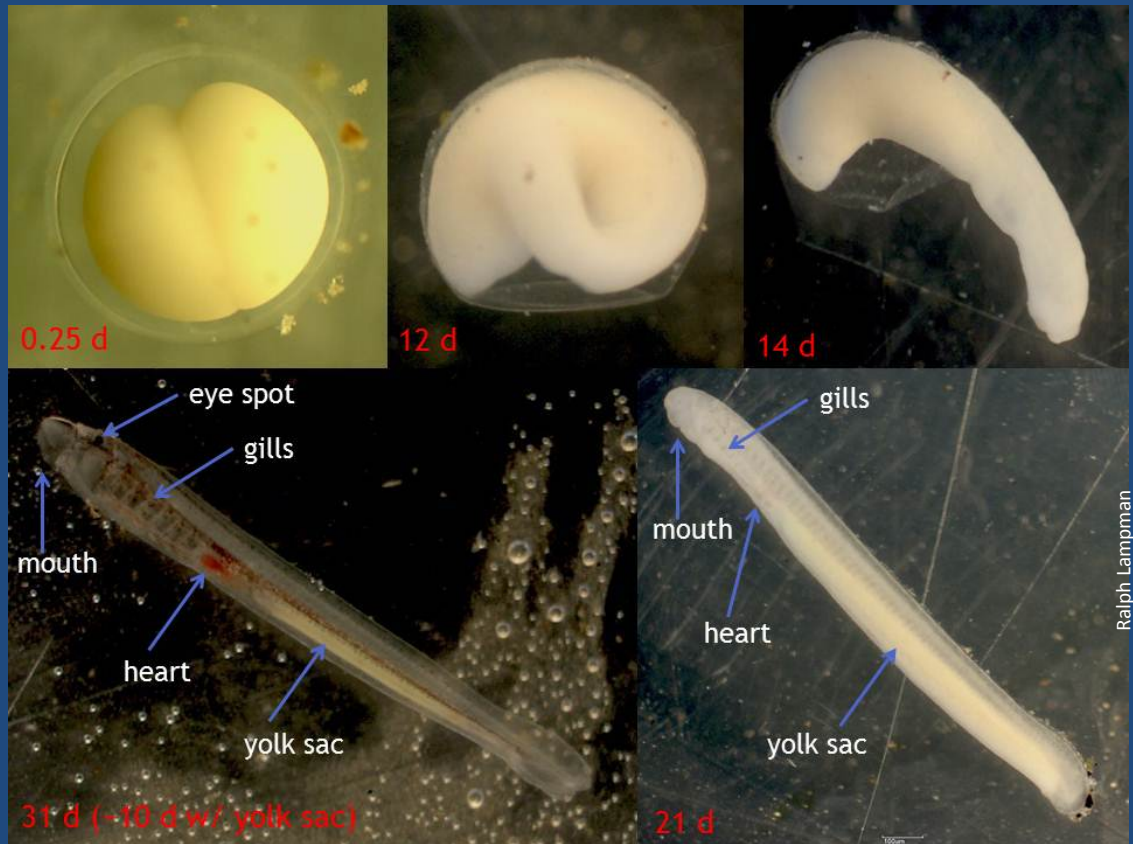
Reasoning

- Eagle Creek National Fish Hatchery
- Prosser Yakama Tribal Hatchery
- Unknown pathogen susceptibility
- Vector

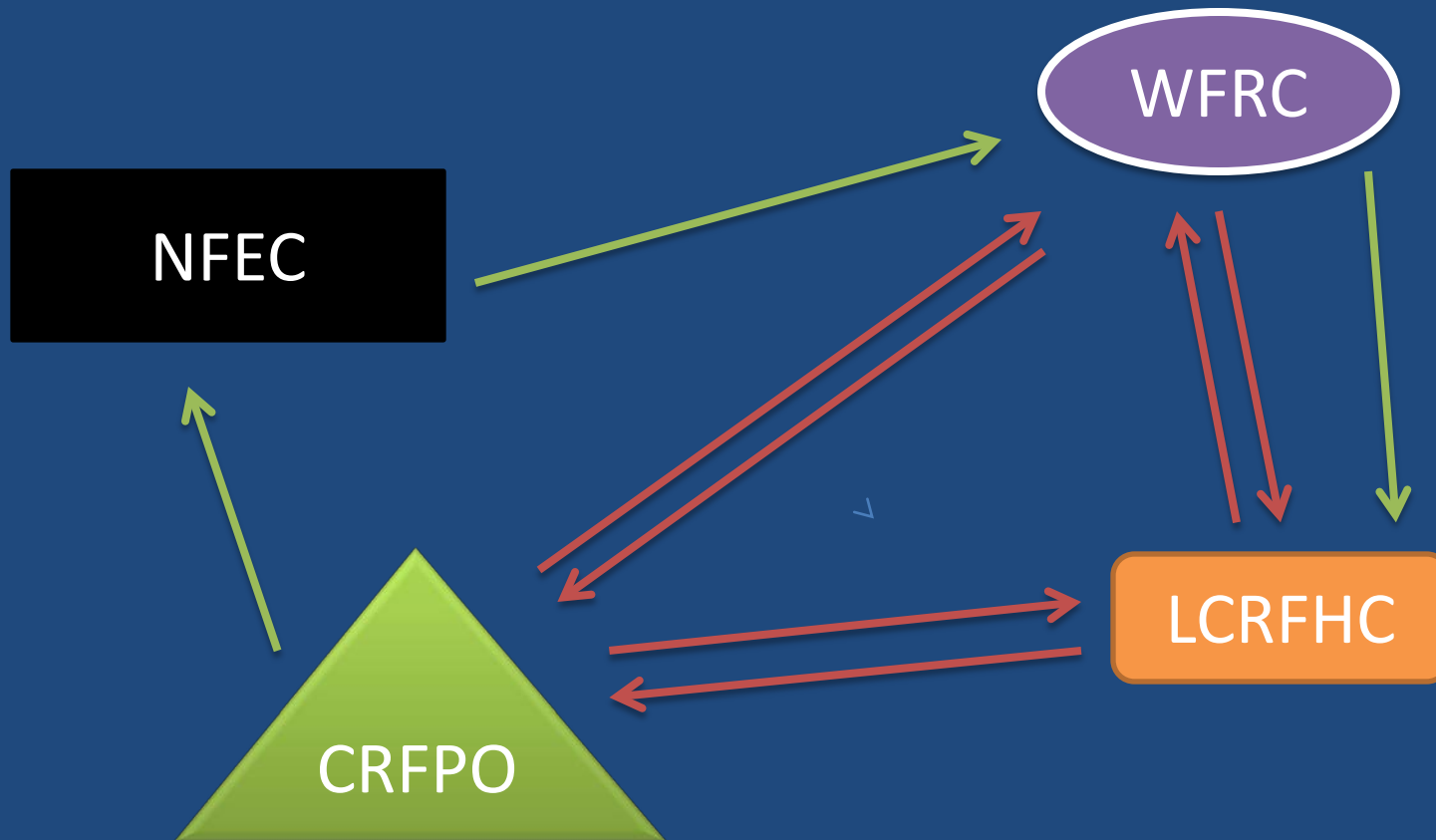


Unknowns

- Rearing
- Disease
- Proactive
- VHSV & IHNV



A Day in the Life....



...Unsuspecting Lamprey



WFRC



- Acclimated 7 days
- Unfed
- Natural photoperiod under ambient lighting
- 12°C in sand-filtered, UV treated, aerated
- No sediment or substrate

IHNV & VHSV

- Round Butte IHNV
 - Round Butte State Hatchery
 - 1975 from adult Steelhead
- Salmon River IHNV
 - Salmon River State Hatchery
 - 2007 from diseased juvenile steelhead
- Pacific NW VHSV
 - BC sea-pens
 - 1999 from Atlantic Salmon



Immersion



- Immersion
- 10 fish/tank, 2 doses of each virus in triplicate
- $(6 \text{ tanks/virus}) \times (3 \text{ viruses}) \times (10 \text{ fish}) = 180$
- Triplicate control = $(3 \text{ tanks}) \times (10 \text{ fish}) = 30$

Injection



- 1st Experiment (41 day)
 - 10 fish/tank x 3 viruses = 30 fish
 - 10 control fish
- 2nd Experiment (6 day)
 - 6 fish x 3 viruses = 18 fish
 - 2 control fish

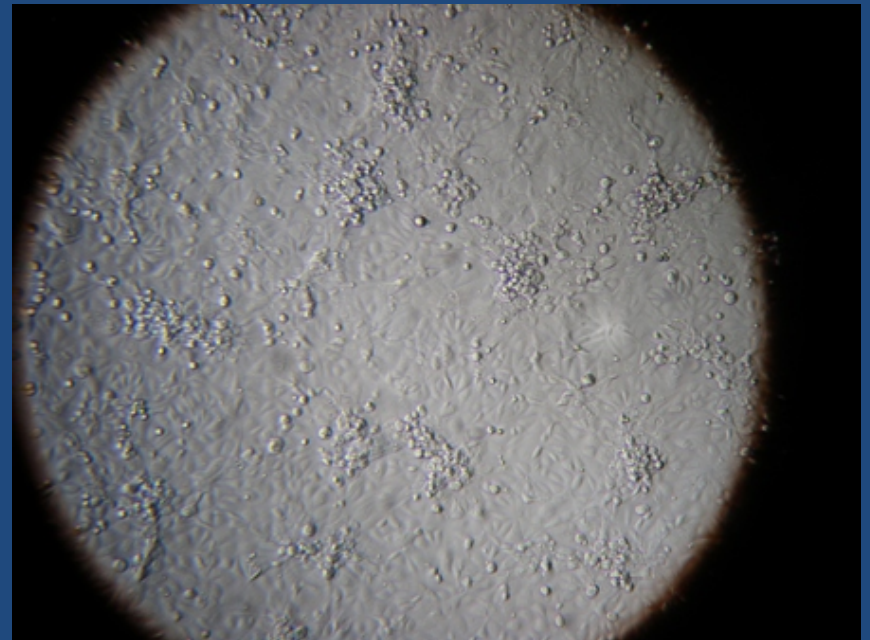
Observation



- Tanks observed daily
- Survivors sampled
 - 6 days
 - 12 days
 - 41 days
- Mortality frozen

Evaluation

- Received from WFRC
- Inoculated onto CHSE and EPC
- Observed for CPE
- Results calculated in pfu/g of fish



No Virus

- Immersion
 - 180 fish
 - Low Mortality
 - Negative for virus
- 1st Injection
 - 30 fish
 - some mortality (handling)
 - Negative for virus



...And We Did



Gael Kurath

- IHNV (Round Butte) – Negative
- IHNV (Salmon River) – 3+/3*
- VHSV – 2+/4 Positive*
- Morts (Frozen)
 - 2+/6 positive
 - 1 IHNV (Salmon River)
 - 1 VHSV
 - Not quantifiable*

* Well below dose injected

Larval Pacific lamprey are unlikely to serve as hosts, maintain or transmit IHNV or VHSV

- No virus detected in immersion trails
- No evidence of
 - infection
 - virus replication
 - persistence
- No clinical evidence of disease
- Low or no mortality



Questions?



The Numbers

- Lamprey Injected with ~6666 pfu/g
- Recovered from Lamprey after challenge
 - Salmon River IHNV 396, 410, 2488 pfu/g
 - VHSV 296, 692 pfu/g

What Do The Viruses Represent?

- Round Butte IHNV was from the U clade
 - Ubiquitous throughout British Columbia, Washington & Oregon
 - Not particularly pathogenic to Pacific Salmon
- Salmon River IHNV was from the M clade
 - Commonly found in Steelhead, often diseased, in the Lower Columbia River and Olympic Peninsula
- Pacific Northwest VHSV is the IVa type
 - Found in the Northern Pacific and Northern Atlantic
 - Not pathogenic to Pacific Salmon

Pesky & Problematical

- Just figuring out how to hold and challenge
- Assumptions
 - That lamprey would have similar disease signs as Salmonids
 - And that freezing affects would be similar as well
- Ability to recover virus from frozen samples
 - Virus lost to freezer
 - Frozen samples were more toxic to cells
 - Would have been better to screen fish as they die
- Timeline not established with one injection treatment
 - Not really a big issue in my mind because not a likely mode of transmission

What next?

- Aside from figuring out what the rearing parameters are...
- Will an infection in larval lamprey transmit to other cultured species
 - Could be important at places that have Salmonids spawning directly in hatchery effluent.
- Other?