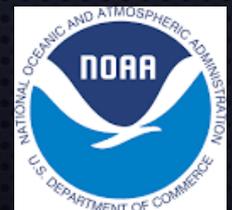


# PACIFIC LAMPREY RESEARCH AT THE ABERNATHY FISH TECHNOLOGY CENTER



ABERNATHY FISH TECHNOLOGY CENTER, LONGVIEW, WA



# GOALS OF LAMPREY RESEARCH

## To inform:

- Ammocoete stocking decisions with regards to release locations in streams
- Development of rearing protocols for fish held in captivity
  - For research
  - For later release
  - For captive culture
  - For refugia?

Having the ability to rear ammocoetes in captivity may help limit mining of wild populations

# PREVIOUS RESEARCH STUDIES

COLLABORATORS-THE YAKAMA NATION, NOAA FISHERIES

1. MONITORING OF EARLY LARVAL DEVELOPMENT AND MORTALITY PATTERNS
2. TIMING OF FIRST FEEDING
3. EFFECTS OF WATER EXCHANGE RATE WITH WATER QUALITY
4. TANK CLEANING REGIMEN EVALUATION WITH WATER QUALITY
5. SUBSTRATE GRAIN SIZE EVALUATION WITH WATER QUALITY
6. TEMPERATURE: LONG TERM EFFECTS ON EARLY LARVAL STAGE (13, 16, 19 & 22 C)



# ADDITIONAL STUDIES

1. FEED EVALUATION
2. RATION SIZE AND AMMOCOETE DENSITY FACTORIAL EXPERIMENT
3. RATION EVALUATION WITH WATER QUALITY
4. VITAMIN AND MINERAL SUPPLEMENTATION
5. REARING IN HATCHERY EFFLUENT
6. TAGGING EVALUATION: PIT, VIE, AND CWT (HANSON ET AL. 2017)
7. VALIDATION OF EXISTING SCREENING CRITERIA (OSTRAND 2007)
8. IMPACT OF IRRIGATION DIVERSIONS ON LAMPREY (PETERSON ET AL. WORK IN PROGRESS)

# TODAY'S FOCUS

- Feed evaluation
- Timing of first feeding
- Rearing in hatchery effluent



# FACILITIES

Tank setup for research studies



Tank detail: banjo screen, water inflow, air stone and substrate



Additional room for studies that require the use of different water temperatures

TANKS :

- 38 liter capacity
- Play sand substrate
- 500 micron effluent screen
- External standpipe



# 1. FEED EVALUATION

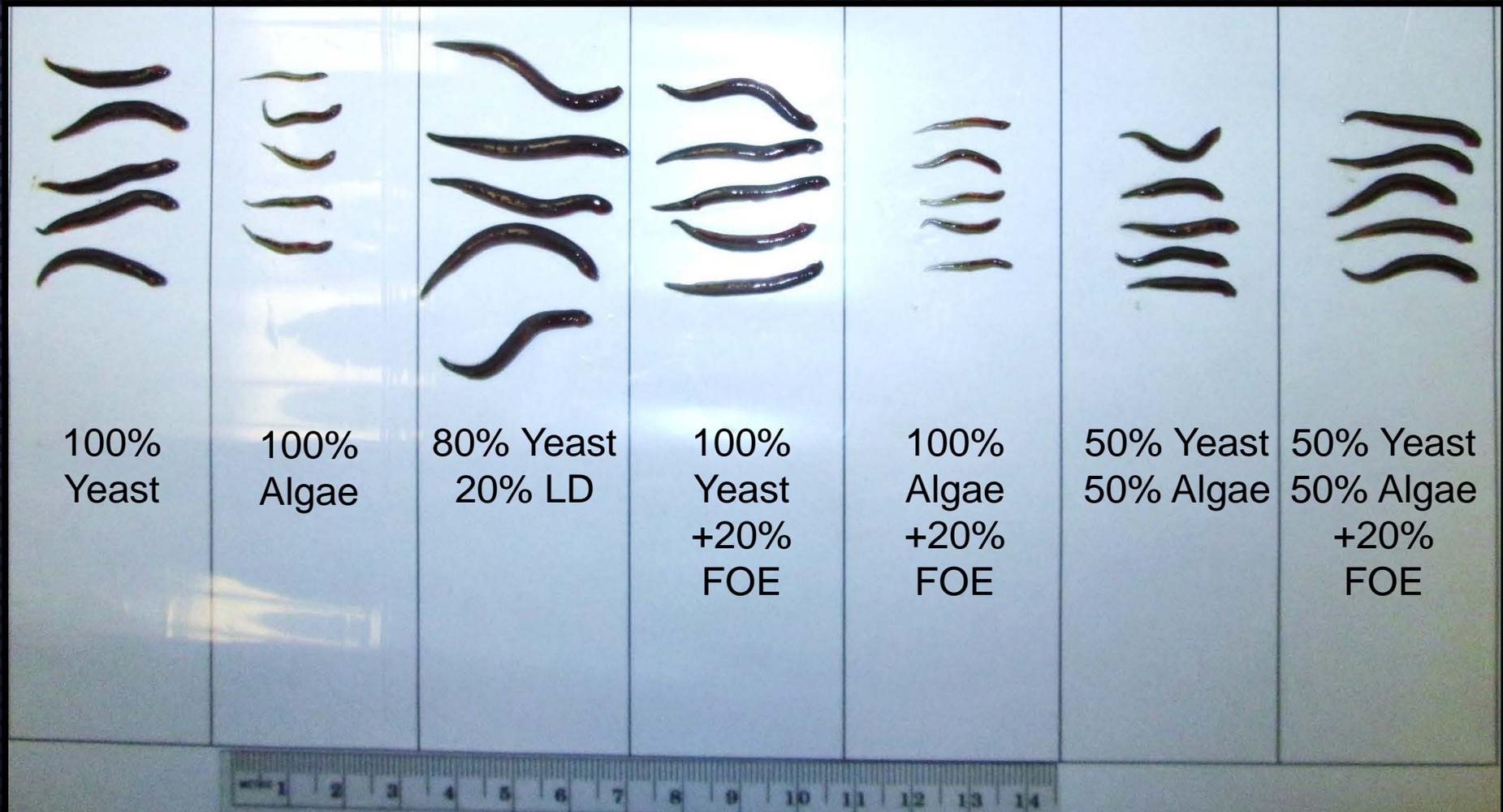
- To hold ammocoetes for research or to grow them for release a feed is needed that will promote optimal growth and condition

Ingredients selected for testing (total of 7 diets):

- ✓ Yeast
- ✓ Micro-algae blend-Shellfish Diet 1800 (Reed Mariculture)
- ✓ 50% Yeast/50% Algae blend
- ✓ Fish oil emulsion (FOE) paired with the first three diets
- ✓ 80% Yeast/20% larval feed (Otohime)



# Results: Ammocoetes after 16 weeks



## 2. TIMING OF FIRST FEEDING

- An important question for any fish species raised from egg, when should feeding start?
- Feed was presented to the ammocoetes at day 16, 24, 31 or 45 post hatch



# Results: First feeding

Days Post Hatch (DPH) to First Feeding	Survival (%)
16	94.2 ± 3.7
24	95.3 ± 1.3
31	89.1 ± 2.3
45	88.6 ± 7.3
p-value	0.208

# Results: First feeding

Days Post Hatch (DPH) to First Feeding	Total Length (mm)
16	13.2 ± 0.9 <sup>a</sup>
24	12.4 ± 0.6 <sup>a</sup>
31	9.7 ± 0.6 <sup>b</sup>
45	7.8 ± 0.3 <sup>c</sup>
p-value	<0.001

### 3. REARING IN HATCHERY EFFLUENT

- Can ammocoetes use effluent from fish culture?
- How will this food source affect lamprey body composition?
- Will the ammocoetes sequester nutrients from the effluent and improve the water quality?
- Lamprey received the control diet (80% yeast + 20% larval diet); steelhead tank effluent; or both



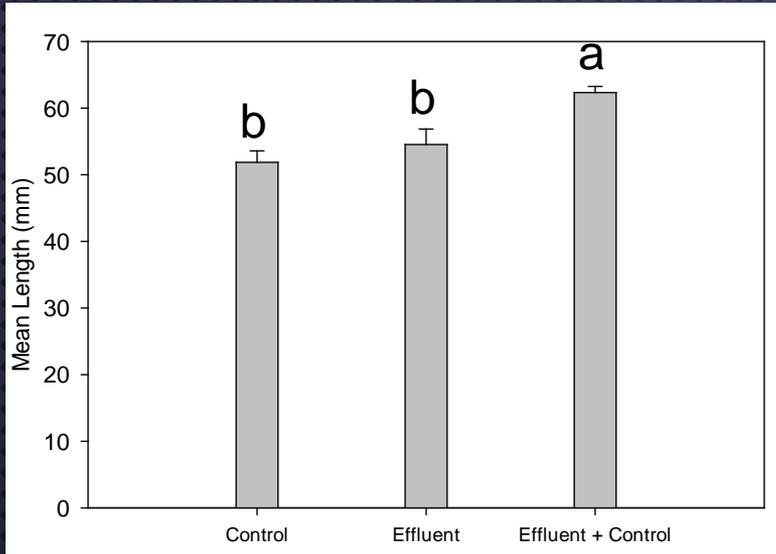
# Results: growth and survival

- At the end of 9 weeks, survival in all treatments was above 90%

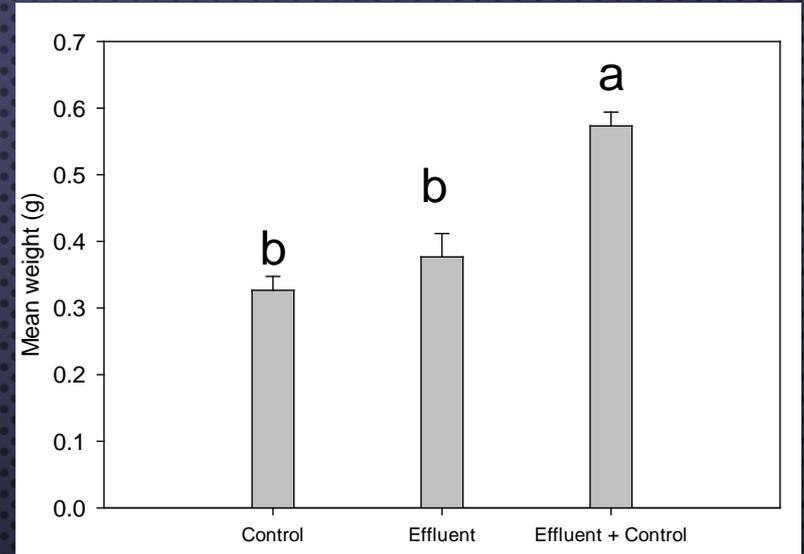


# LAMPREY GROWTH

## Length



## Weight



# Results: body composition

Treatment	Protein (%)	Lipid (%)
Control	10.0 ± 0.3a	2.3 ± 0.2b
Effluent	8.7 ± 0.4b	3.8 ± 0.7ab
Control+Effluent	9.8 ± 0.2a	5.8 ± 0.5a

# ONGOING AND FUTURE STUDIES

Collaborators-The Yakama Nation, NOAA Fisheries

- Further diet development
- More temperature experiments: long term effects on older ammocoetes (1 ½ - 2 yr. olds)
- Photoperiod evaluation
- Long term grow-out of cultured ammocoetes (BY 2015)



# THANK YOU



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Research funded by the USFWS and Chelan PUD