

Attachment 4

Presentation by Ann Gannam on Pacific Lamprey Research at the Abernathy Fish Technology Center



GOALS OF LAMPREY RESEARCH

To inform:

- Development of rearing protocols for fish held in captivity
 - For research
 - For later release
 - For captive culture

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



FACILITIES

Tank setup for research studies



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



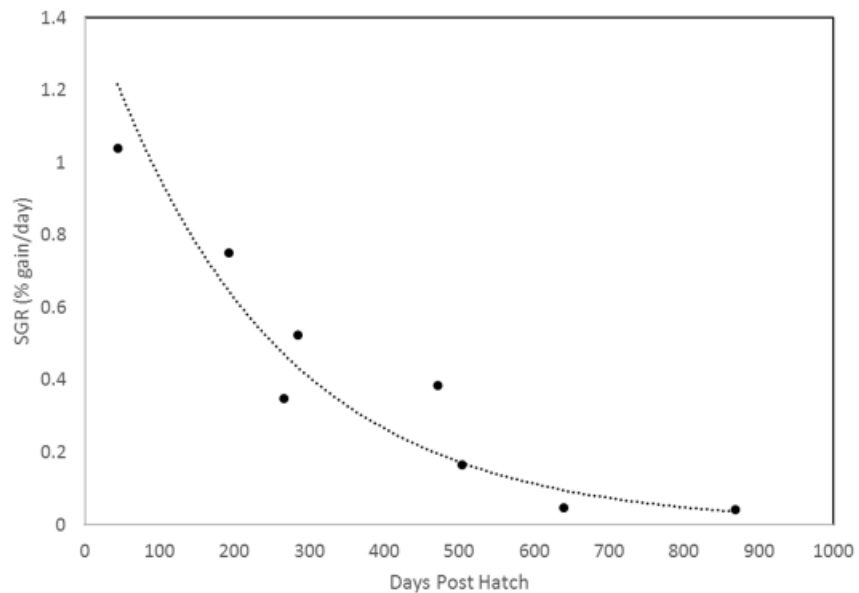
Additional room for studies that require the use of different water temperatures

TANKS :

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



Specific Growth Rate Trends as Lamprey Grow/Age



RESEARCH FY15-16

- Objective 1: Gain knowledge about first feeding requirements of Pacific lamprey ammocoetes by defining when critical first feeding needs to be administered
- Objective 2: Characterize the temporal pattern of mortality during the bottleneck period to understand when the mortality occurs



FINDINGS FY15-16

- Objective 1: By starting feeding two weeks earlier SGR was increased by 198% during the first feeding stage. DO was significantly lower and ammonia significantly higher in the 16, 24, and 31 DPH fed treatments.
- Objective 2: No difference in survival was seen over the four week study. Fish were checked every week. At the end of four weeks survival was $89.0 \pm 4.4\%$. Fish development was monitored and by 23 DPH all fish sampled had a complete digestive tract connection.

RESEARCH FY16-17

- Objective 1: Investigate the effects of water turnover rate on fish survival, growth and water quality
- Objective 2: Assess the effects of different substrate grain sizes on ammocoete survival, growth and water quality
- Objective 3: Investigate the effects of various tank cleaning schedules on ammocoete culture performance and water quality

FINDINGS FY16-17

- Objective 1: Tested high and low flow as well as static treatments. Survival in the static treatment was very low. Using low flow instead of high flow increased SGR by 11%. Using no flow decreased SGR by 36%.
- Objective 2: Substrate grain size was tested. Fine was <503 microns, Medium was 503-910 microns, large was >910 microns. Fish in the medium size substrate were significantly heavier than those in the large substrate. Nitrite was higher in the large substrate compared to the other two.
- Objective 3: Significant differences in growth were seen between cleaning frequencies; no cleaning, twice a week, every day and every two weeks. By cleaning less frequently, every two weeks, SGR increased by 22% over our previous method.

RESEARCH FY17-18

- Objective 1: Determine the effects of water temperature on survival and growth of first feeding and older ammocoetes
 - Conduct a trial with < 3 month old ammocoetes
 - Conduct a trial with 1 year old ammocoetes
- Objective 2: Investigate the effects of photoperiod on the growth and survival of 1 year old ammocoetes
- Objective 3: Test various diet regimes for rearing 1 year old ammocoetes using the standard diet, adding supplemental food items for each treatment

FINDINGS FY17-18

- Objective 1: Trial 1 Tested temperatures from 14.7 to 22.4 °C. Survival was high at all temperatures. Ammocoetes smaller when reared at high temperature (22.4 °C). SGR declined by 16% when reared in warm water. Changes to the fishes' lipid profile occurred due to temperature. Trial 2 is ongoing with older ammocoetes, ending in mid February.
- Objective 2: Photoperiod trial is ongoing, also ending mid February.
- Objective 3: Diet trial is ongoing, also ending mid February.

STUDIES FOR FY18

Collaborators-The Yakama Nation, NOAA Fisheries

- Further diet development
- Feeding frequency
- Sediment depth X stocking density
- Stocking density
- Long term grow-out of cultured ammocoetes



AMMOCOETES CURRENTLY ON HAND

Brood year	Total fish #	Mean length (mm)	Mean weight (mg)
2015	1004	62	466
2016	1834	45	215
2017	575	23	46



THANK YOU



Research funded by the Chelan PUD and the USFWS