

MERWIN UPSTREAM PASSAGE ADULT TRAP EFFICIENCY – WINTER STEELHEAD

2017 Final Annual Report



Prepared for:

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Aquatic Coordination Committee Meeting – January 11, 2018

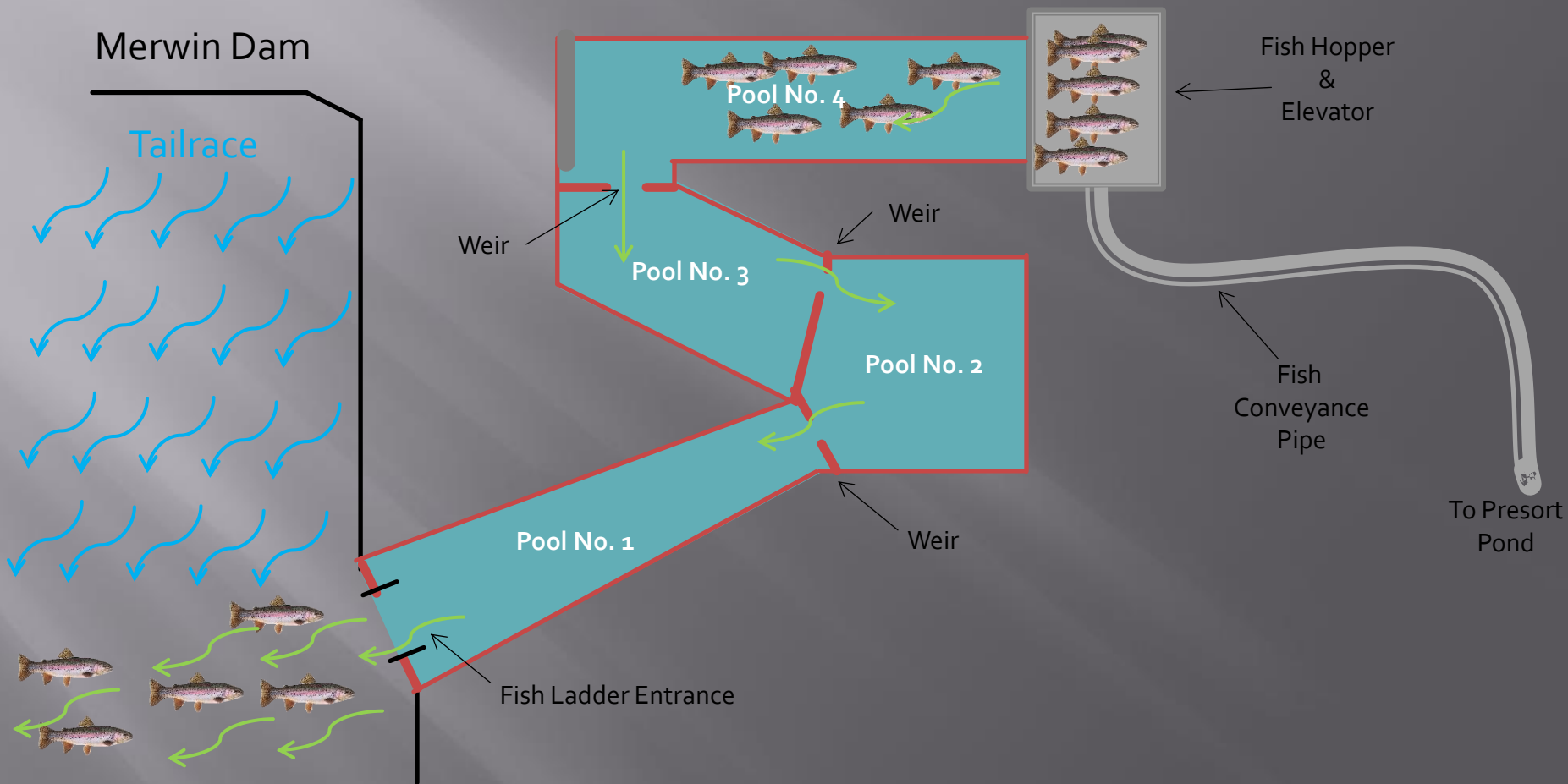
- Overview of Adult Trap Efficiency Evaluation
- Review results of the third year of study (winter steelhead)
 - Discuss effectiveness of new fyke
- Talk over additional information needs and 2018 evaluation (winter steelhead)

Merwin Upstream Collection and Transport Facility

- ▣ Merwin Fish Trap has 5 main structures
 - Attraction Water Supply (AWS) System
 - Fish Ladder
 - Fish Lift and Conveyance System
 - Presort Pond
 - Fish Sorting and Transport Building



Merwin Fish Ladder and Conveyance System



Project Phases

- ▣ New Merwin Trap designed as a phased project to ensure that migrating adults are not delayed
 - Phase I – 400 cfs attraction flow, Entrance 1
 - Phase II – 600 cfs attraction flow, Entrance 1
 - Phase III - 600 cfs attraction flow, Entrance 1 & 2
 - Phase IV - 800 cfs attraction flow, Entrance 1 & 2

- ▣ Adult Trap Efficiency (ATE) serves as trigger for implementation of future improvements (Phases)
 - 98% Collection Efficiency

Adult Trap Efficiency

- Beginning in spring 2015
- Assess trap efficiency and behavior of upstream migrating adults
 - Winter Steelhead
 - Chinook
 - Coho
- Radio Telemetry - 150 of each species
- Monitoring stations throughout tailrace and downstream of Merwin Dam

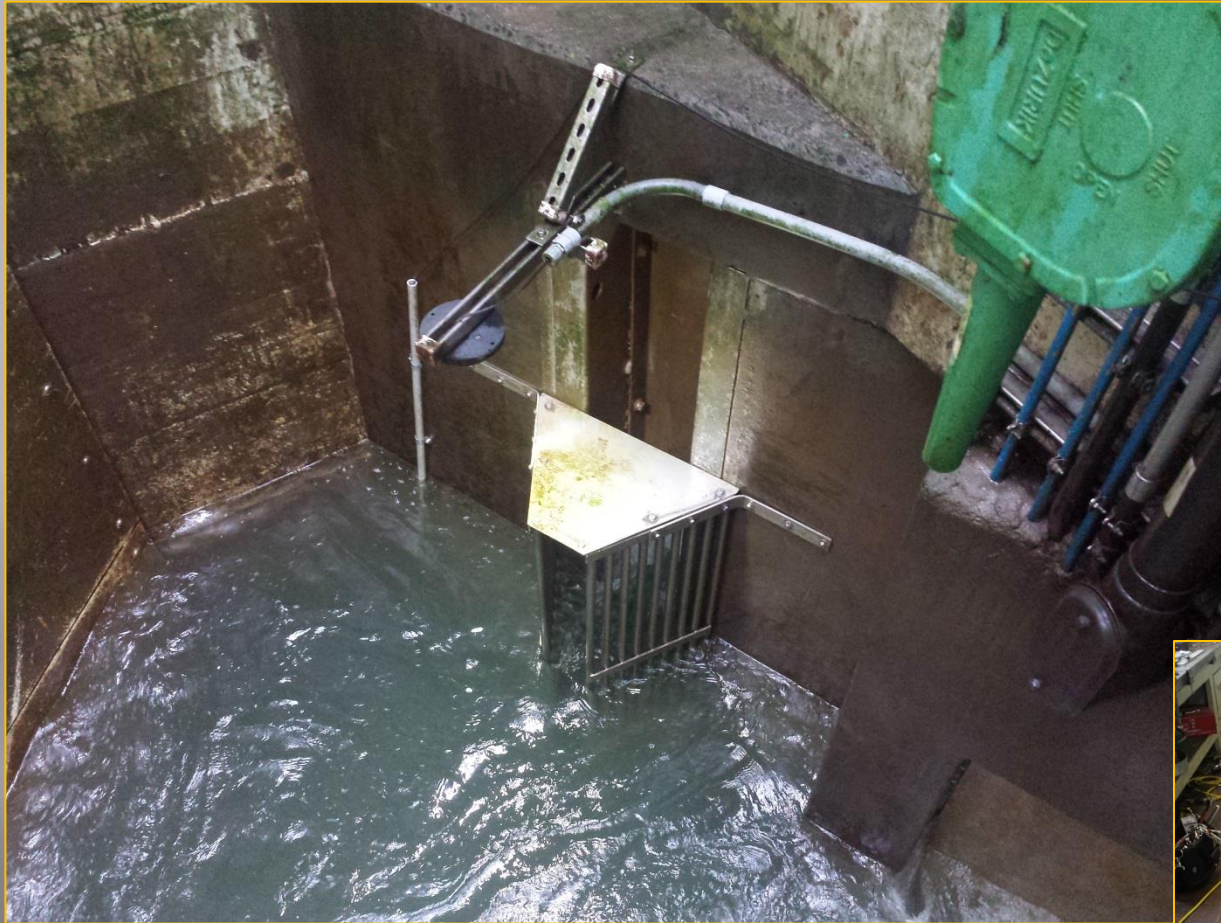


Table 1. 2017 values for P_{EE} , ATE_{test} , and T_i . Sample sizes (N) reflect the total number of tagged fish that were released in each study year. Key results from the 2017 study pertaining to the core passage metrics for winter steelhead

Study Year	Species	N	P_{EE} (BCA 95% CI)	ATE_{test} (BCA 95% CI)	T_i
2015	Winter steelhead	148	86% (79-90%)	61% (51-67%)	29%
	Spring Chinook	40	90%	38%	58%
	Coho Salmon	35	23%	9%	61%
2016	Winter steelhead	148	93% (87-96%)	73% (65-80%)	21%
	Spring Chinook	N/A	N/A	N/A	N/A
	Coho salmon	N/A	N/A	N/A	N/A

- $P_{EE} = \text{Entrance Efficiency}$ (proportion of fish that enter the tailrace that successfully pass into the trap entrance).
- $ATE_{test} = \text{Adult Trap Efficiency}$ (proportion of fish that enter the tailrace that were successfully captured).
- $T_i = \text{Trap Ineffectiveness}$ (proportion of fish that enter the trap that were not successfully captured).

Pool 1-2 Fyke



- ❑ V-Style Fyke installed between Ladder Pools 1 & 2
- ❑ Constructed of 304 SS 1" bar on 1" spacing with a transitional gap of approximately 6"



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2017	Winter steelhead	150	83.5% (77-90%)	76.3% (70-84%)	8.6%
	Spring Chinook	N/A	N/A	N/A	N/A
	Coho salmon *				

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Fyke Hole



Total River Flow $< \sim 7,000$ cfs



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Total River Discharge – 2015, 2016, 2017

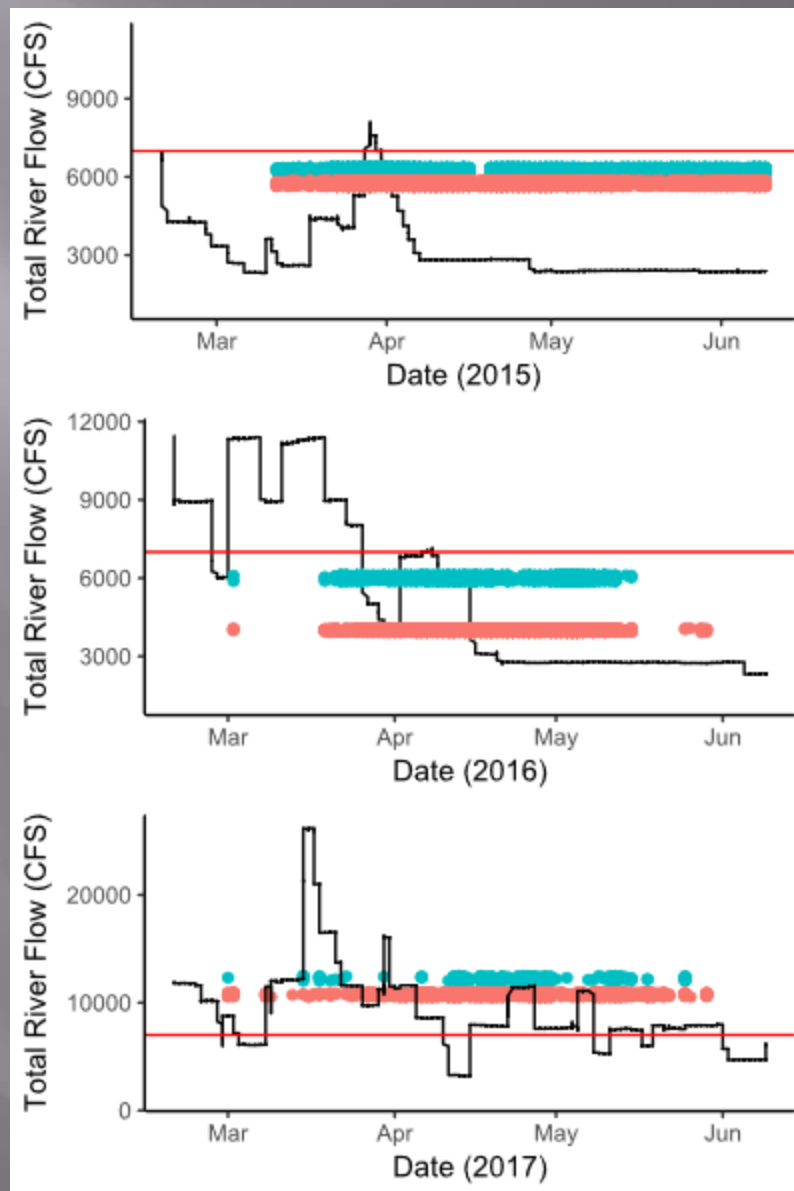


Figure 23. Total river flow over time for three years of study. Solid black line indicates discharge. Red and blue dots indicate individual detections at the Approach and Entrance sites, respectively. Data for total river flow was collected from USGS (USGS 2017). See Appendix A, Figures A-1 to A-4 for plots of all operational variables across years.

Accounting for study bias?

- ▣ The use of trap non-naïve fish and associated behavioral influences?
- ▣ Natural straying rates and fallback?
- ▣ The use of hatchery origin fish – e.g., using BWT fish rather than NOR fish from the upper basin?

2018 Evaluation

Winter Steelhead

- ▣ Radio telemetry
- ▣ Same monitoring site arrangement as previous studies
- ▣ Two groups of test fish:
 - Trap naïve group – collected, tagged and released in the lower river
 - Trap non-naïve group – collected after passing through facility, tagged, and release below bridge (same as previous years)
- ▣ Same data processing and analysis as previous years. Compare passage metrics among groups