

**OFFICIAL COORDINATION REQUEST FOR
NON-ROUTINE OPERATIONS AND MAINTENANCE**

COORDINATION TITLE – 19 IHR 13 Fish Release Pipe Install Outage and Unit 2 Turbine Testing

COORDINATION DATE – 07/30/2019

PROJECT- Ice Harbor

RESPONSE DATE – 08/13/2019

Description of the problem: Biological testing for Unit 2 at Ice Harbor Dam is scheduled for September-October of 2019. Biological testing will involve release of tagged and sensor fish into the turbine via and release pipe attached to the STS supports (Figures 1 and 2). Installation of the fish release pipe will require removing Unit 2 from operation for 2 to 3 days. We propose the installation to occur late September or early October. Release pipe removal will be in conjunction with STS removal. Also part of this MOC is to request a deviation from unit priority during the biological testing to operating Unit 2 if low flows only allow operation of a single unit.

Type of outage required

Turbine Outages– Total Unit 2 outage is estimated to be from 0700-1800 each day for 2 to 3 days during fish release pipe installation.

Impact on facility operation (FPP deviations)

Remove Unit 2 from operation for 2 to 3 days in late September or early October. The wide date range is requested to allow flexibility with project operations.

Impact on unit priority –

During the biological testing, we are requesting unit priority change from Unit 1 to Unit 2 if flows only allow operation of a single unit (Table 1). The Project will coordinate outages and unit test operations with BPA/RCC.

| Season | Operation | Unit Priority Order |
|---|---|-----------------------------------|
| March 1 – November 30 Fish Passage Season | Single-Unit Operation w/ NO Line Switching | 1, 2, 6, 5 |
| | Single-Unit Operation AFTER Line Switching Or, Multiple-Unit Operation | 1, 2, 3, 6, 4, 5 |
| September 16 – October 31 Unit 2 Biotesting | Single-Unit Operation w/ NO Line Switching | 2, 1, 6, 5 |
| December 1 – end of February Winter Maintenance | Single-Unit Operation w/ NO Line Switching | Any order for Units 1, 2, 5, 6 |

Table 1: Ice Harbor Dam Turbine Unit Priority Order.

Impact on forebay/tailwater operation – During the biological testing, we are requesting as close to 96ft of gross head as possible or a forebay elevation to be between 437.0 – 438.0 ft (these values are within the normal operating range on the 2019 fish operations plan; Table 2). Computational Fluid Dynamic models and physical models of the new unit were run at 96ft of gross head and running the study at the near the same elevation will provide comparability to the models.

| Project | Normal Operating Elevation Range (ft) ² | | MOP Elevation Range (ft) ³ | |
|------------------|--|---------|---------------------------------------|---------|
| | Minimum | Maximum | Minimum | Maximum |
| Lower Granite | 733.0 | 738.0 | 733.0 | 734.5 |
| Little Goose | 633.0 | 638.0 | 633.0 | 634.5 |
| Lower Monumental | 537.0 | 540.0 | 537.0 | 538.5 |
| Ice Harbor | 437.0 | 440.0 | 437.0 | 438.5 |

1. MOP elevations provided in feet above mean sea level (NGVD29).

2. September 1 – April 2.

3. April 3 – August 31.

Table 2: Normal and minimal operating pool (MOP) elevation ranges for lower Snake River projects¹.

Impact on spill – There is no anticipated impact on spill operations.

Dates of impacts/repairs

- 1) Fish release pipe install = 2-3 day period sometime during the week of 16 September-4 October 2019
- 2) Fish release pipe removal = 2-3 day period sometime during the week of 16 December 2019 with STS removal
- 3) Unit 2 operating priority for testing = 16 September-31 October 2019.

Length of time for repairs

Total Unit 2 outage is estimated to be for 2 to 3 days for fish release pipe installation. A unit priority change to operate and test Unit 2 up to 30 days is requested. Additional days may be needed may be necessary depending on flow conditions and study progress.

Analysis of potential impacts to fish

1. 10-year average passage by run during the period of impact for adults and juvenile listed species, as appropriate for the proposed action and time of year;
 - a. The hatchery production is expected to be average. Wild production is expected to be less than the 10 year average because adult returns were low.

2. Statement about the current year's run (e.g., higher or lower than 10-year average);
 - a. Adult returns for 2019 are expected to be below the 10-year average because ocean conditions have been poor for the last several years.
3. Estimated exposure to impact by species and age class (i.e., number or percentage of run exposed to an impact by the action);
 - a. Approximately 14% of Chinook salmon (Figure 3) and 57% of adult steelhead (Figure 4) will pass Ice Harbor Dam from September 16 to October 31, and a rare adult sockeye (Figure 5) may pass during this time period according to the 10 year average (DART 2019). Adult salmon and steelhead are generally upstream-focused during this migration period, but fallback may occur for fish that overshoot their natal tributary or mill around in the forebay.
 - b. Bull trout passage is unknown during the outage and study period. The study will occur during the optimal bull trout spawning window which will reduce the likelihood of bull trout being in the vicinity of Ice Harbor Dam. The chances of a bull trout migrating downstream increase later in October as some adults migrate back into mainstem rivers to overwinter.
 - c. Approximately 7% of adult lamprey passing Ice Harbor may pass during the study period according to the 10 year average (Figure 6).
 - d. Very few juvenile fish are expected to pass the project during this time period. The 10 year average at Lower Monumental dams suggests numbers in the low 100s or less across species per day would be passing the Ice Harbor during this time (Figure 7).
4. Type of impact by species and age class (increased delay, exposure to predation, exposure to a route of higher injury/mortality rate, exposure to higher TDG, etc.);
 - a. Negligible impacts are anticipated for adults and juveniles of all species. Trumbo et al. (2014) analyzed adult passage at the south shore fish way from 2005-2013 (adult count, passage percentages, and passage timing derived from radio telemetry data for Chinook salmon and steelhead) relative to turbine operations. Analysis results identified no difference of biological significance in adult passage at the Ice Harbor south fishway relative to turbine unit 1 or unit 3 operating singly (Figure 8), which suggests that any of units 1-3 operating singly would provide adequate attraction flow for the south fishway and would not delay adult passage during the 2-day unit 2 outage or during priority operation for testing. Adult bull trout and lamprey migrating upstream are expected to be affected similarly to adult salmon and steelhead.
 - b. Outmigrating juveniles passing Ice Harbor during the outage and study period would generally pass through the powerhouse bypass or turbine units. Therefore, operating an existing unit during the unit 2 install outage is no change from the baseline condition. Based on computational fluid dynamics and physical modeling efforts during the turbine design process, it can be

assumed that unit 2 would provide safer turbine passage for outmigrating juveniles compared to the existing units during the study period. The draft tube ceiling has been lowered, effectively shifting the turbine boil downstream in the tailrace. This improves tailrace egress conditions for juveniles passing unit 2 as well.

- c. The same logic of safer passage may apply to downstream migrating bull trout, lamprey, and adult salmon and steelhead fallbacks based on flow quality/reduced turbulence within the turbine water passageway compared to existing units.

Summary statement - expected impacts on:

Downstream migrants

The change in priority is expected to have very little impact on juvenile salmonids, as the turbines will remain operating within 1% peak efficiency.

Upstream migrants (including Bull Trout)

The change in unit priority is not expected to impact adult passage.

Lamprey

This change should have little impact on lamprey passage.

Comments from agencies

Final coordination results

After action update

Please email or call with questions or concerns.
Thank you,

Karl Anderson, Fish Biologist
US Army Corps of Engineers
201 North Third Avenue
Walla Walla, WA 99362-1876
Phone: 509-527-7264
Email: karl.r.anderson@usace.army.mil

References:

Trumbo BA, MK Shuttles, JF Renholds, ML Ahmann and KE Crum. 2014. Ice Harbor Test Turbine Fixed Blade Runner Installation Considerations for Adult Salmonid Passage. Report of the US Army Corps of Engineers, Walla Walla District, Walla Walla, Washington.

DART (Data Acquisition in Real Time). 2019. Adult Passage Graphics & Text. Columbia Basin Research, University of Washington, Seattle, Washington. Available at: http://www.cbr.washington.edu/dart/query/adult_graph_text. 25 July 2019.

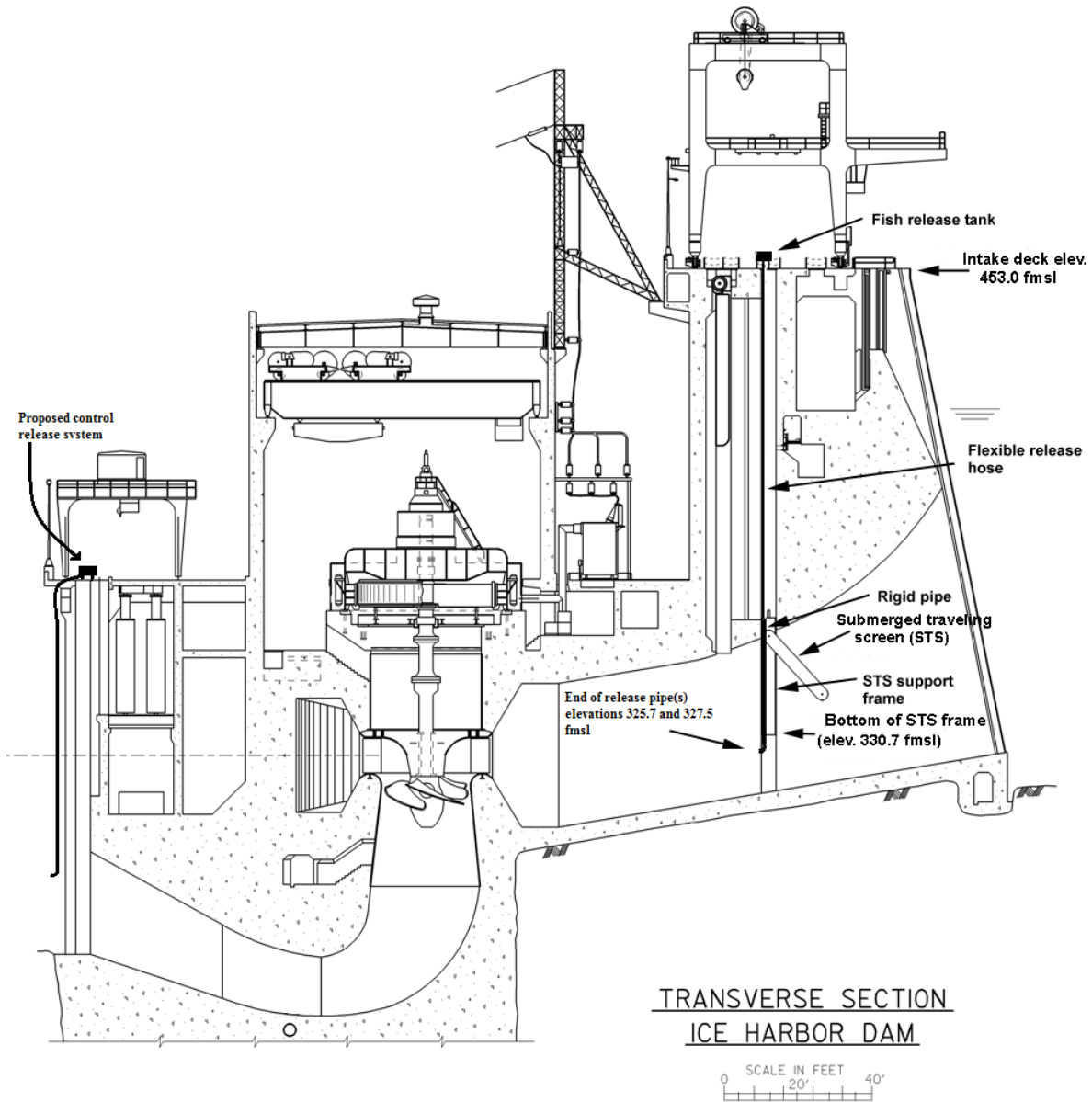
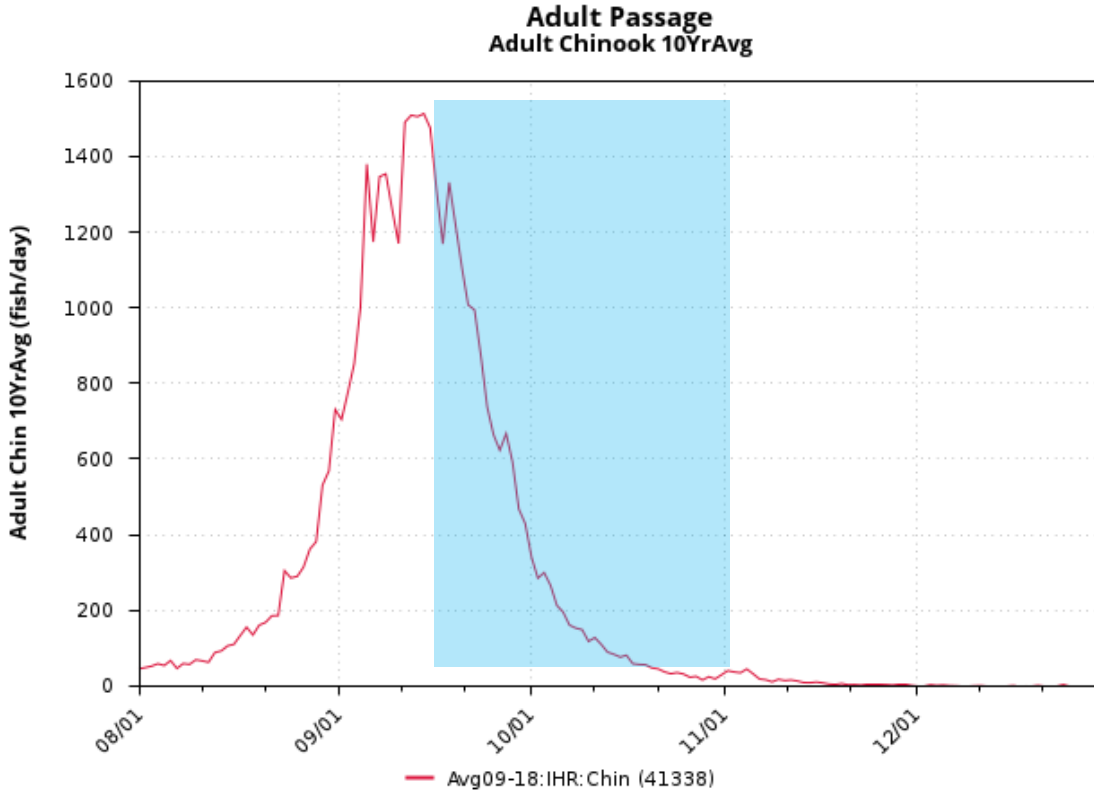


Figure 1: Cross-section of powerhouse and turbine showing the 2007 and proposed treatment release locations for juvenile Chinook salmon at Ice Harbor. Control fish will be released just downstream of the exit from the draft tube. Source U.S. Army Corps of Engineers.



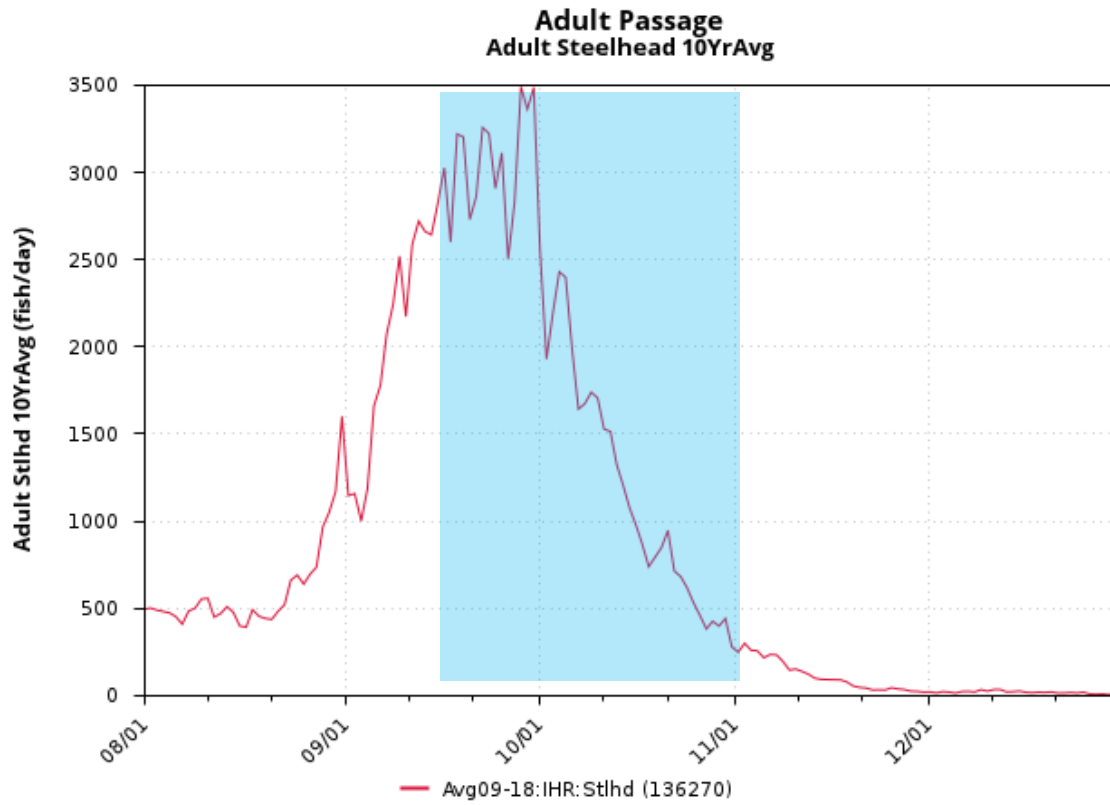
Figure 2: Planned fish release pipes design and method of attachment to traveling fish screen frame (top left photo) 30 inches off-center toward the north. Normandeau recommends that pipe design and installation (provided by Corp) follow that utilized previously in the 2007 study. The exit end of release pipes were curved (top right photo) and oriented in a downstream direction when installed. Normandeau will provide the same type of induction system and release hoses (bottom photo) used in 2007.



www.cbr.washington.edu/dart

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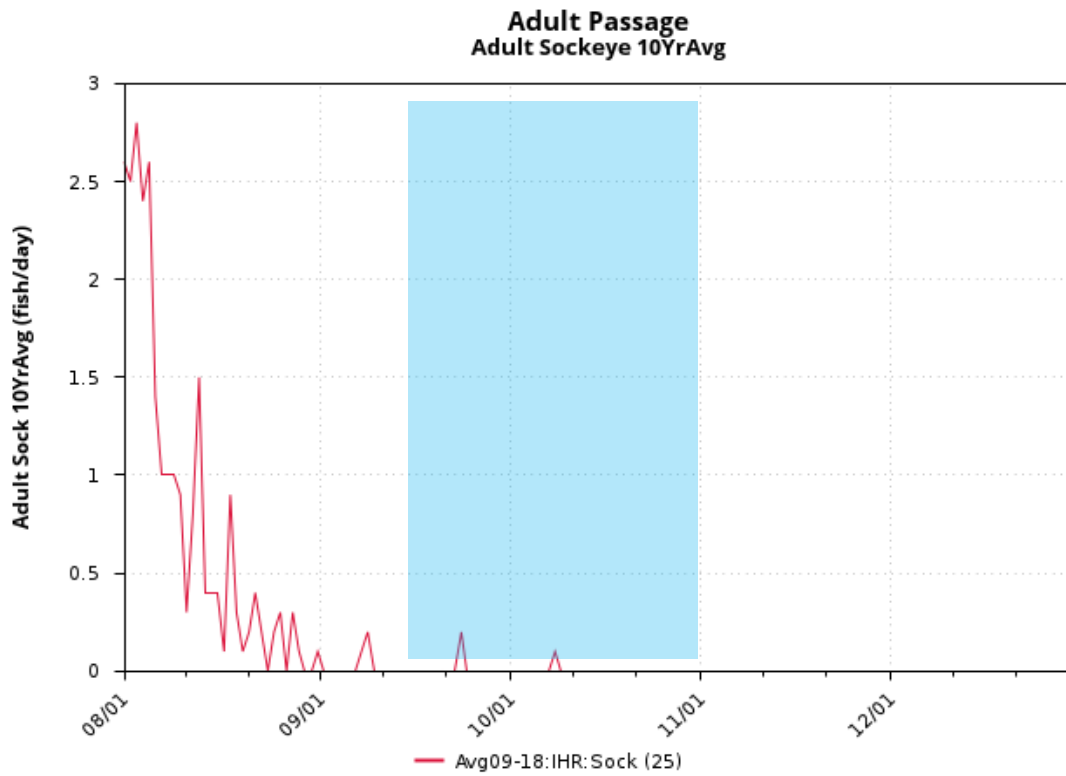
Figure 3. 10-year average adult fall Chinook passage at Ice Harbor Dam during the outage and study period (DART 2018). The blue shaded area is the approximate study window.



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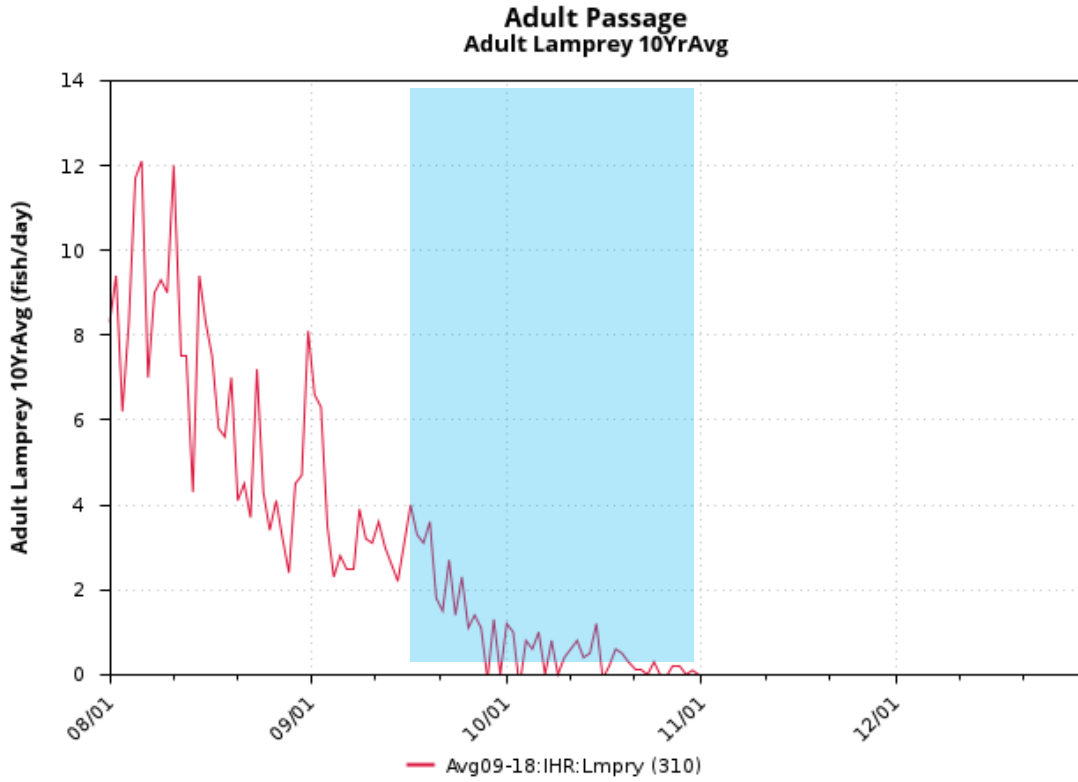
Figure 4. 10-year average adult steelhead passage at Ice Harbor Dam during the outage and study period (DART 2019). The blue shaded area is the approximate study window.



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Figure 5. 10-year average adult sockeye passage at Ice Harbor Dam during the outage and study period (DART 2019). The blue shaded area is the approximate study window.



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Figure 6. 10-year average adult lamprey passage at Ice Harbor Dam during the outage and study period (DART 2019). The blue shaded area is the approximate study window.

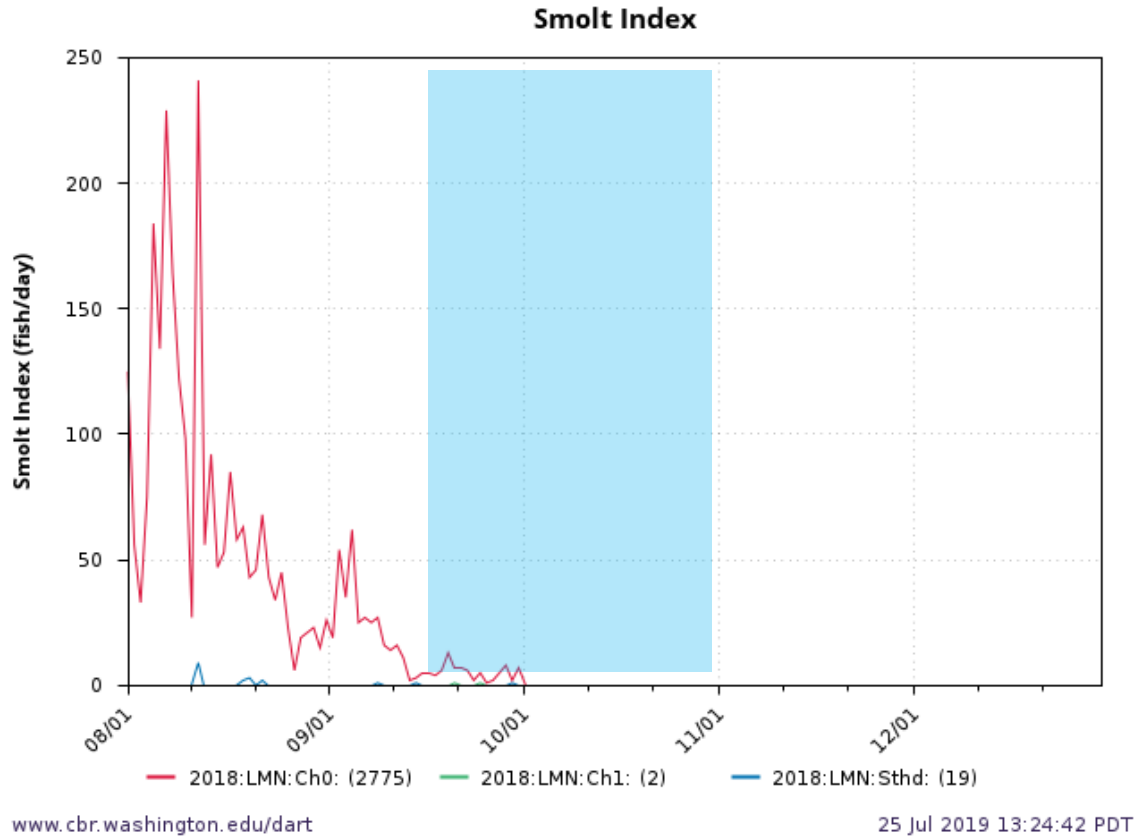


Figure 7. 10-year average juvenile passage at Lower Monumental and Little Goose dams during the outage and study period. Passage numbers are not estimated after October 1 at Lower Monumental Dam or after November 1 at Little Goose Dam. The blue shaded area is the approximate study window.

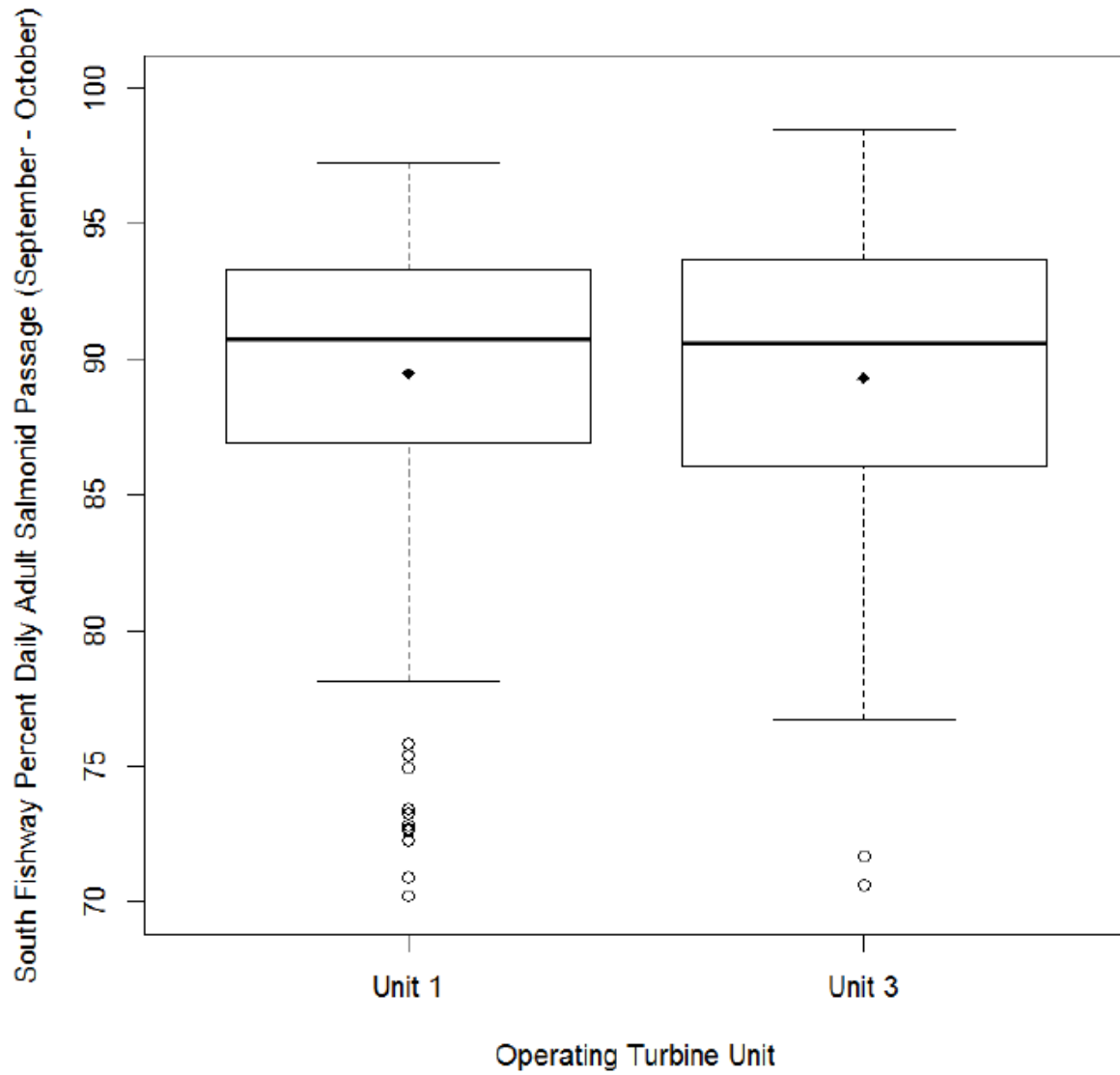


Figure 8: Ice Harbor Dam south fishway daily percent adult salmonid passage during the September – October no-spill period, 2005 – 2013.