

OFFICIAL COORDINATION REQUEST FOR NON-ROUTINE OPERATIONS AND MAINTENANCE

COORDINATION TITLE- 14 IHR 003 Ice Harbor Ogee & Deflector Modification

COORDINATION DATE- April 10, 2014

PROJECT- Ice Harbor Dam

RESPONSE DATE- FPOM April 10, 2014

Description of the problem

A Removable Spillway Weir (RSW) was installed at Ice Harbor Dam (IHR) spillbay 2 in 2005. Juvenile salmonid passage and survival evaluations have included volitional passage and survival using radio telemetry (2005 to 2009), a direct injury and survival and sensor fish evaluation (2005), and a hydroacoustics vertical distribution (2005 and 2006). Up to 74% of the juvenile steelhead, 59% of the yearling Chinook salmon and 74% of the subyearling Chinook salmon typically pass IHR through the RSW. The direct injury and survival evaluation in 2005 identified high injury levels for fish passing close to the spillway ogee. The hydroacoustics vertical distribution evaluations indicated that at least 11% of spring migrants and 25% of summer migrants entered the RSW close to the ogee surface and may be passing through the high injury zone. Paired release radio telemetry survival estimates for juvenile steelhead and subyearling Chinook salmon passing through the RSW has been above the BiOp performance standard for dam passage. However, the majority (4 out of 5) of paired release radio telemetry survival estimates for yearling Chinook salmon have been below the BiOp performance standard. Comparisons between direct injury studies at other dams, as well as hydraulic analysis using Computational Fluid Dynamics (CFD) models, physical hydraulic models, and sensor fish data led to the conclusion that the slope of the spillway chute and the angle of the deflector were the likely causes of the high injury rates observed at the IHR RSW in 2005 and the low estimates of survival for yearling Chinook salmon. During the fall of 2014 and winter of 2014/2015 the ogee of IHR spillbay 2 is being modified to decrease the slope and increase the radius of the transition to the deflector. A contract for the construction was awarded during the spring 2014.

Construction activities associated with the IHR Spillbay 2 ogee and flow deflector modification will require extensive onsite efforts over the approximately 8-month long construction schedule. While some of the construction activities can occur during normal project operations, some activities will require alteration of normal project operations. Spillbay 2 will require extensive concrete drilling, cutting, demolition, etc. to provide sufficient anchor points for the new concrete as well as smooth transitions between existing and new concrete.

No disruption in spill for juvenile passage, called for in the USACE's Fish Passage Plan (2014), is anticipated. However, spillbays 1 through 3 are anticipated to be out of service for involuntary spill from 15 September 2014 through 1 March 2015 due to construction activities. To ensure completion of the ogee and deflector modification prior to the start of the 2015 spill for juvenile fish passage the COE proposes an earlier start of the in-water work window at IHR of 1 November 2014 and to begin concrete drilling, cutting, and demolition activities above the water on September 15, 2014.

The requested change in project operations and in-water work window is needed to provide sufficient time for the contractor to remove existing concrete, install new concrete, and allow the new concrete to cure prior to the start of the juvenile fish passage season which typically commences April 1.

Type of outage required

- Spill bays 1 through 3 out of service from 15 September 2014 through 1 March 2015 for construction activities associated with the modification of the Ice Harbor Dam spillbay 2 ogee and deflector.
- The IHR in-water work period changed from starting on 16 December 2014 to 1 November 2014.

Impact on facility operation

- Spill bays 1 through 3 out of service from 15 September 2014 through 1 March 2015.
- The IHR in-water work period start 1 November 2014.

Dates of impacts/repairs: 15 September 2014 through 1 March 2015

Length of time for repairs: 8 months

Expected impacts on fish passage

No impact to juvenile salmonid passage is anticipated provided the construction is completed on schedule in spring of 2015. Construction activities include concrete drilling, cutting, and demolition in spillway bay 2 and may generate excessive noise levels which could impact adult passage. Construction activity locations (in-water versus out of water work) and timing were chosen to minimize passage impacts to adult salmonids. The construction activity schedule was developed based on the previous 10-year run timing for fall Chinook salmon and adult steelhead at IHR (Table 1 and Figs. 1-2); fishway approach and entrance behavior for radio tagged adult fall Chinook salmon and adult steelhead from 2001-2005 and the diel fishway approach and entrance timing for radio tagged adult fall Chinook salmon and adult steelhead from 2001-2005 (Figs. 3-4).

The most likely location where construction activities could impact adult salmon and steelhead passage is the north powerhouse fishway entrance due to its proximity to spillbay 2.

Approximately 26% (range 20-27%) of the adult fall Chinook salmon approach the north powerhouse entrance and 5% (5-15%) enter the fishway at this location (Table 2; Keefer and Caudill, 2014). Approximately 33% (range 26-36%) of the adult steelhead approach the north powerhouse entrance and 8% (4-13%) enter the fishway at this location (Table 3; Keefer and Caudill, 2014).

From 15 September 2014 through 12 October 2014 construction activities that could impact adult passage would be restricted to between the hours of 1600 and 0630 above elevation 347.20 in the spillway stilling basin which would be out of water work. From 13 October 2014 through 30 October 2014 construction activities that could impact adult passage would be restricted to between the hours of 1300 and 0630 above elevation 347.20 in the spillway stilling basin which would be out of water work. From 1 November 2014 through 28 February 2015 there would be no restrictions on the time of day or location (i.e., in-water versus out of water work) for construction activities.

Table 1. Percent of the run that had past Ice Harbor Dam on specific dates based on passage from August 1 through December 31 for adult fall Chinook salmon and adult steelhead over the previous 10-years (2004-2013).

	fall Chinook salmon	steelhead
15-Sep	39-65%	20-47%
12-Oct	94-99%	85-92%
1-Nov	100%	95-100%

Table 2. Distribution of fishway approaches and entries by radio-tagged fall Chinook salmon at Ice Harbor Dam (2000-2005). ‘Unknown S Shore’ refers to events that were likely at open but unmonitored orifice gates. Total unique fish = 301; annual range = 26-95 (Keefer and Caudill, 2014).

Opening	Year						Total
	2000	2001	2002	2003	2004	2005	
<u>Fishway approach (n)</u>	263	424	603	421	210	279	2,200
North	8%	10%	9%	10%	10%	6%	9%
N Powerhouse	27%	27%	20%	32%	25%	26%	26%
S Shore	51%	56%	55%	42%	45%	51%	51%
Unknown S Shore	13%	6%	16%	16%	21%	17%	14%
	126	245	312	203	113	116	1,115
<u>Fishway entry (n)</u>							
North	10%	10%	20%	16%	12%	10%	14%
N Powerhouse	9%	7%	5%	5%	15%	5%	5%
S Shore	53%	56%	45%	42%	30%	42%	46%
Unknown S Shore	28%	28%	30%	36%	43%	42%	33%

Table 3. Distribution of fishway approaches and entries by radio-tagged steelhead at Ice Harbor Dam (2000-2004). ‘Unknown S Shore’ refers to events that were likely at open but unmonitored orifice gates. Total unique fish = 1,653; annual range = 82-513 (Keefer and Caudill, 2014).

Opening	Year					Total
	2000	2001	2002	2003	2004	
<u>Fishway approach (n)</u>	1,842	1,737	2,644	1,057	327	7,607
North	9%	10%	10%	7%	9%	9%
N Powerhouse	36%	32%	32%	31%	26%	33%
S Shore	52%	50%	47%	47%	44%	49%
Unknown S Shore	4%	8%	11%	15%	21%	10%
	783	661	891	456	144	2,935
<u>Fishway entry (n)</u>						
North	8%	6%	11%	10%	10%	9%
N Powerhouse	13%	8%	4%	6%	9%	8%
S Shore	59%	65%	51%	49%	33%	55%
Unknown S Shore	21%	21%	34%	36%	48%	28%

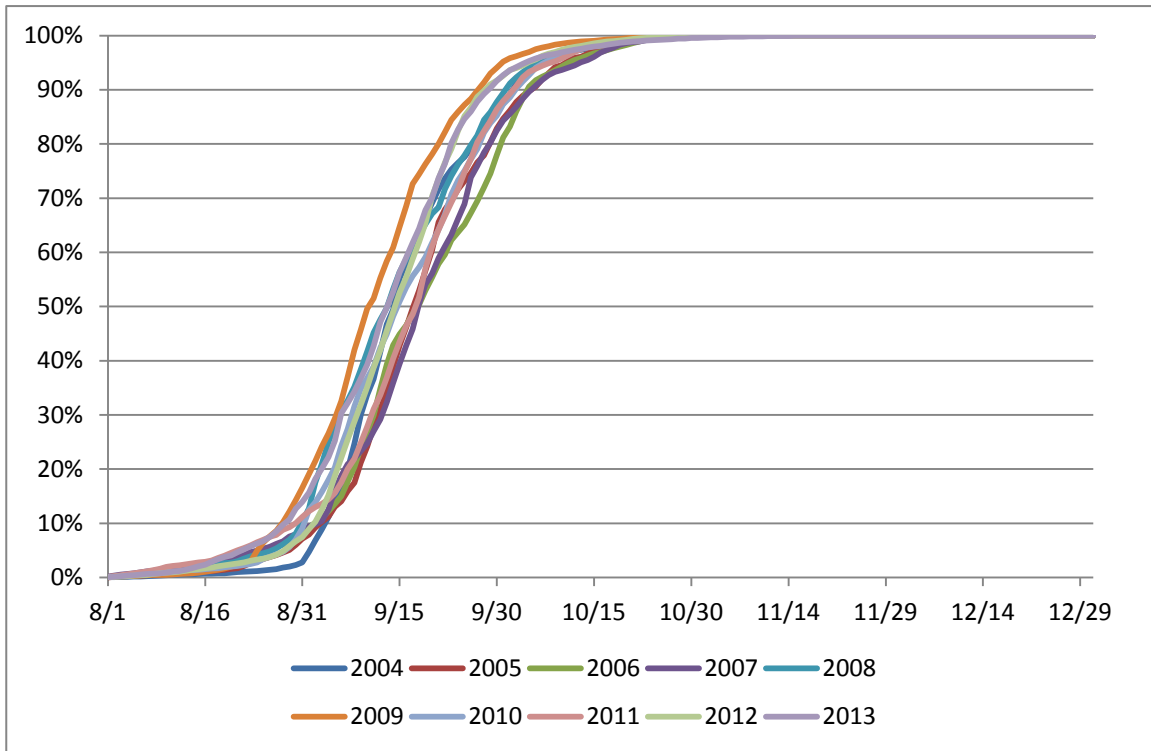


Figure 1. Passage distribution for adult fall Chinook salmon at Ice Harbor Dam for the previous ten years (2004-2013) from August 1 through December 31.

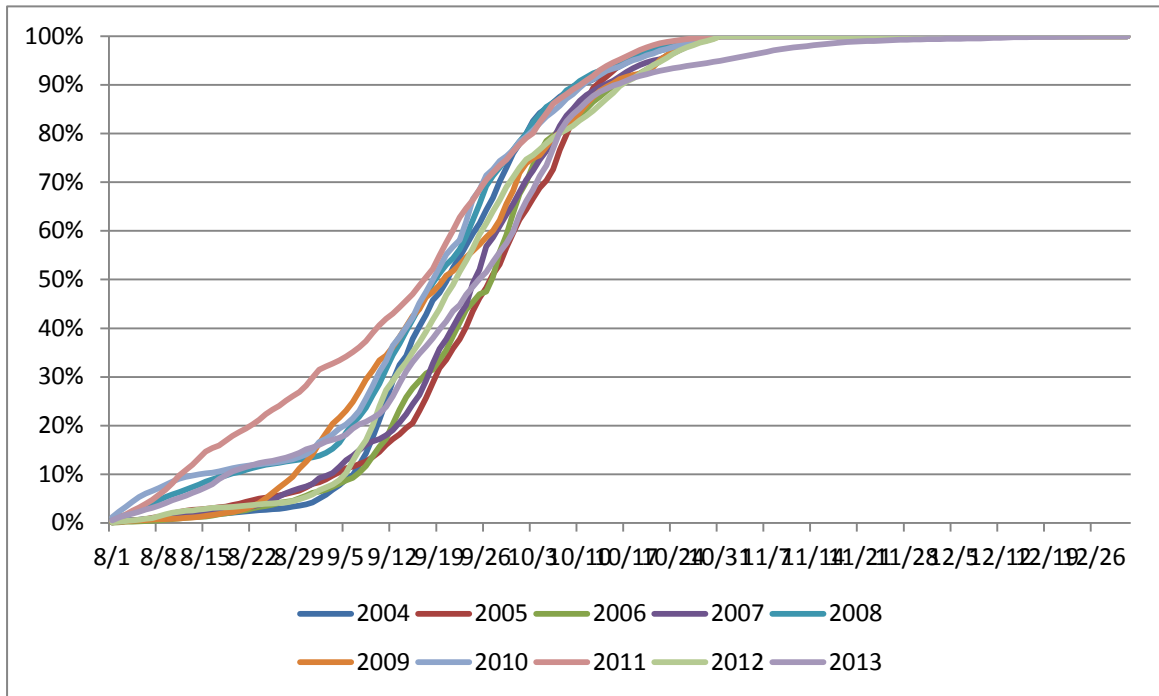


Figure 2. Passage distribution for adult steelhead at Ice Harbor Dam for the previous ten years (2004-2013) from August 1 through December 31.

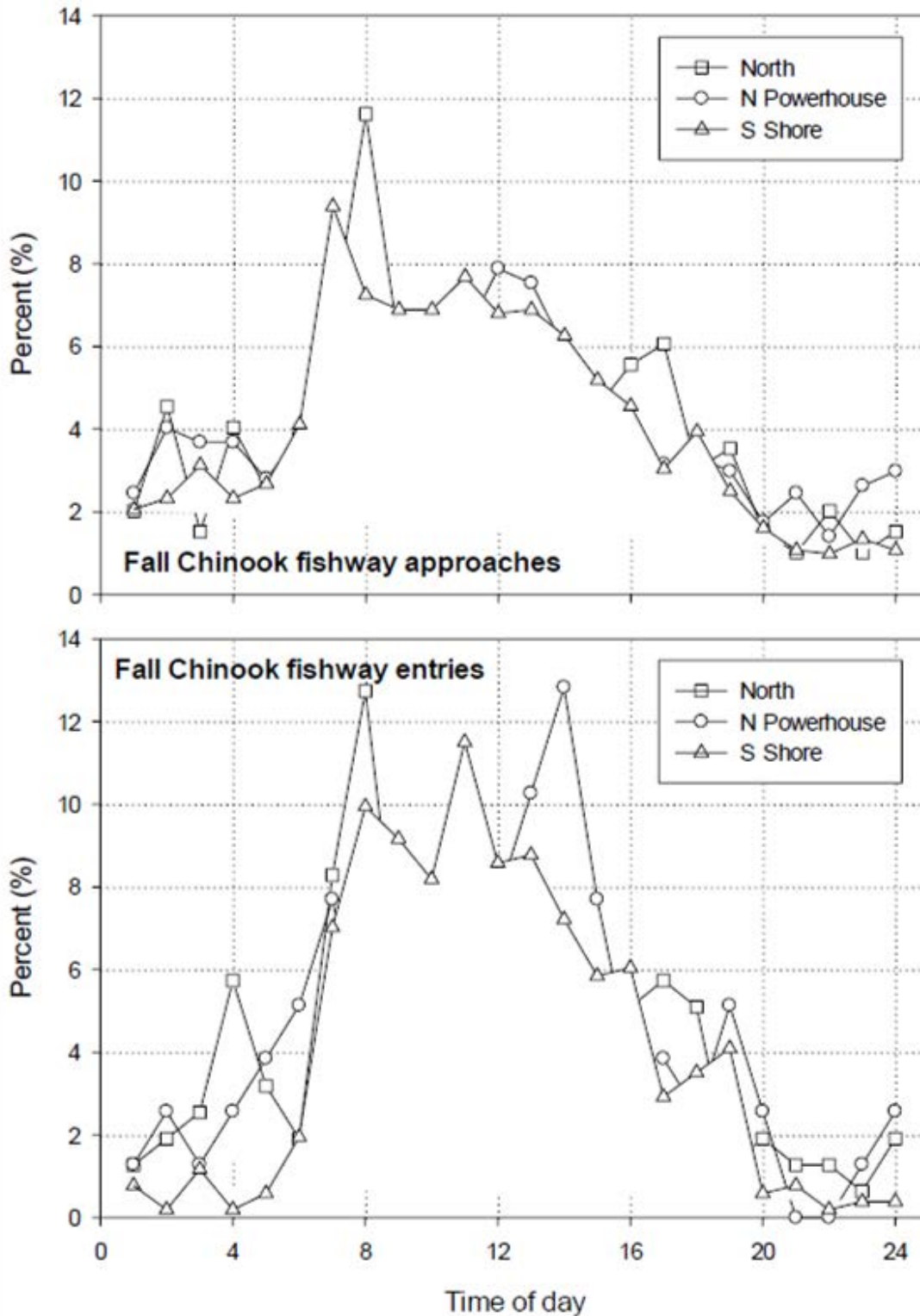


Figure 3. Hourly percent of fishway approaches (top) and fishway entries (bottom) by radiotagged fall Chinook salmon at Ice Harbor Dam (2000-2005). Data shown are percent of all events at each site separately. Total unique fish = 301; annual range = 26-95 (Keefer and Caudill, 2014).

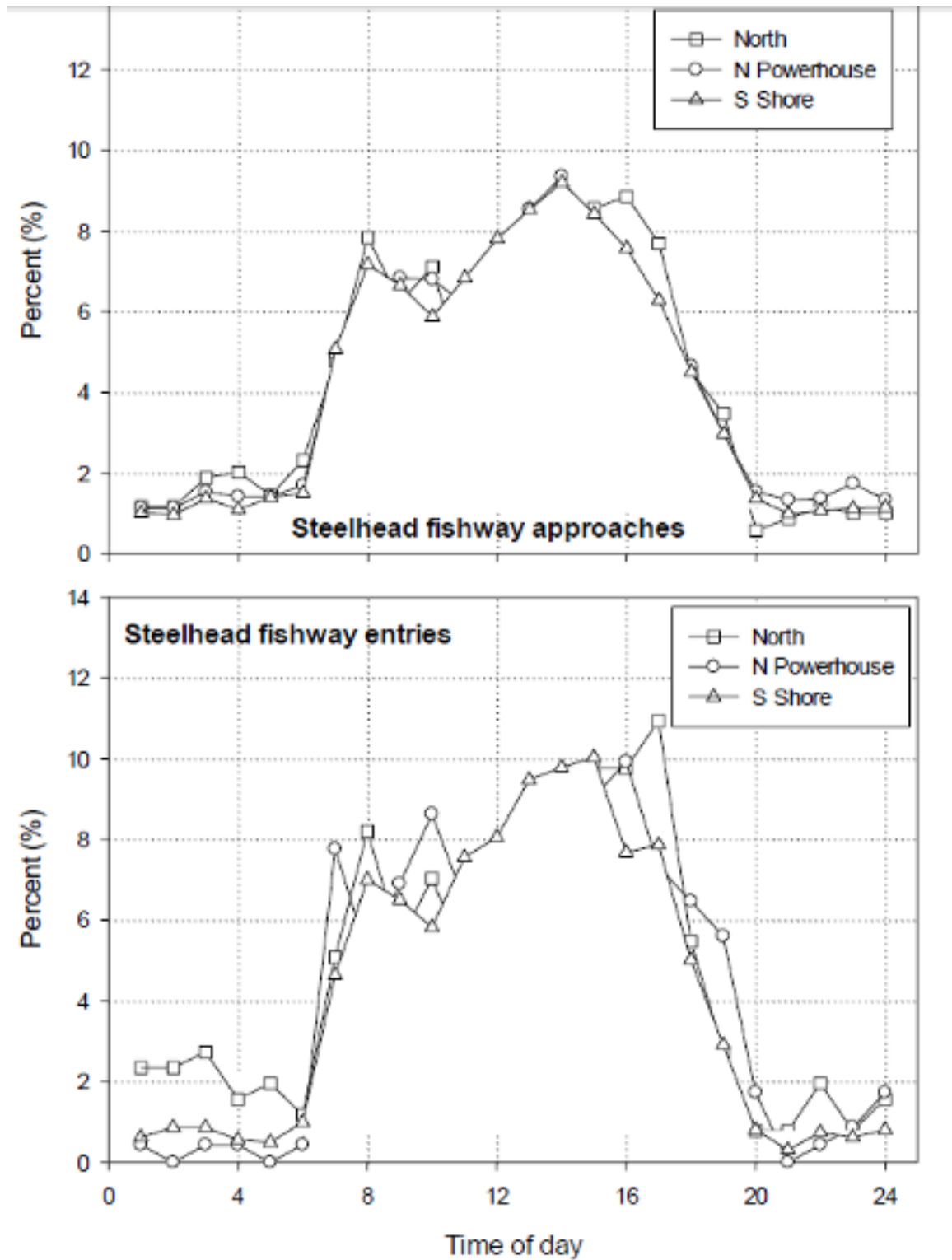


Figure 4. Hourly percent of fishway approaches (top) and fishway entries (bottom) by radiotagged adult steelhead at Ice Harbor Dam (2000-2004). Data shown are percent of all events at each site separately. Total unique fish = 1,653; annual range = 82-513 (Keefer and Caudill, 2014).

Work locations

The contractor is planning to begin construction at the upper end of the work area. The initial work area at its lowest point should be approximately 36 feet up the slope from the water in the tailrace. That work should be accomplished in the period 9/15-10/12.

Activity in the lower work area (prior to in-water work) should begin the week of 10/13 and continue through the third week of November. That work area will extend from 3-5 feet off the water (depending on tailrace elevation) up to 36 feet off the water. See Figure 5 for the planned work locations.

Construction schedule:

Any work the contractor can do prior to 1 November will decrease the risk of adverse impact to completion date due to weather-related shutdowns through the winter season.

- 15 September through 30 October only work above elevation 347.20 in the spillway stilling basin which would be out of water work.
- 15 September through 12 October concrete drilling, cutting, demolition, etc. would be performed only between the hours of 1600 and 0630
- 13 October through 30 October concrete drilling, cutting, demolition, etc. would be performed only between the hours of 1300 and 0630
- In-water work 1 November through 28 February
- The contractor will proceed with the work furthest from the water during the period 15 September through 12 October. See Upper Work Area in Figure 5.
- The contractor does not plan to proceed with work near the water surface until the period 13 October through 1 November. See the Lower Work Area in Figure 5.

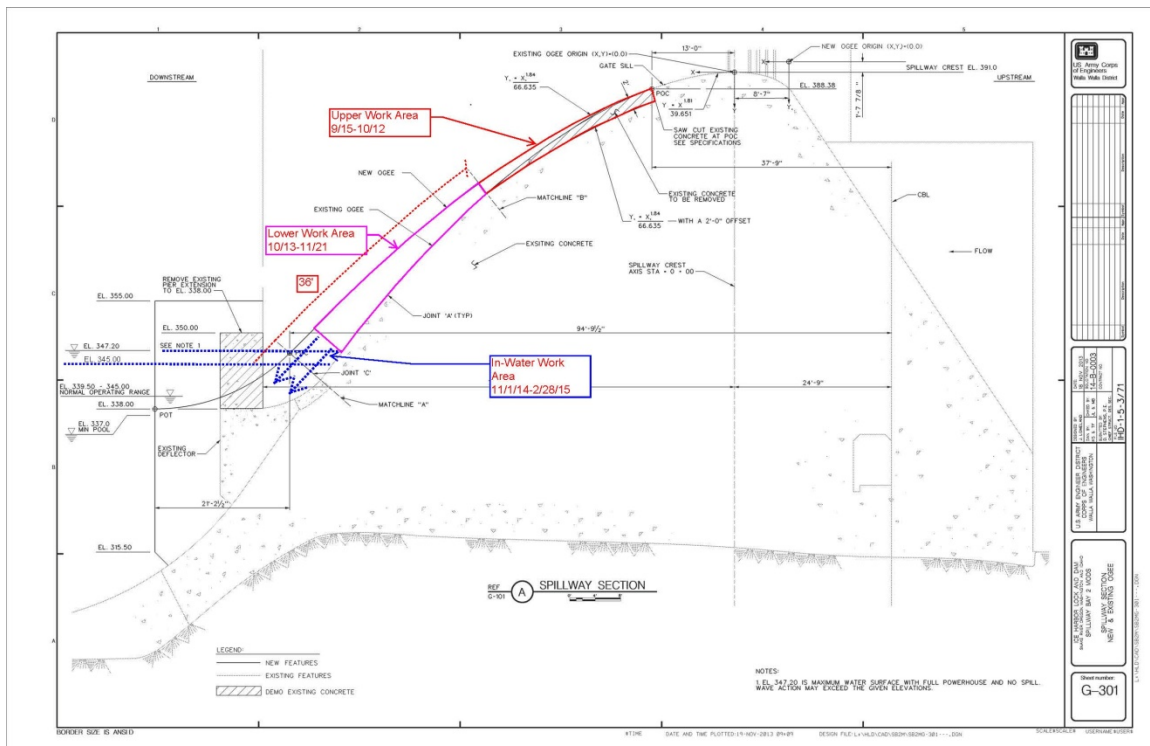


Figure 5. Planned work locations.

References

Keefer, M. and C. Caudill. 2014. Letter Report: Ice Harbor Dam: Distribution of Fall Chinook and steelhead at fishways, 31 March 2014. To USACE, Walla Walla District, Walla Walla, WA.

Comments from agencies

Final results

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

Greg Moody
509-527-7124