

OFFICIAL COORDINATION REQUEST FOR NON-ROUTINE OPERATIONS AND MAINTENANCE

COORDINATION DATE- 15 IHR 001 Ice Harbor Turbine Intake Vertical Distribution Study
([Updated 11 March 2015](#))

PROJECT- Ice Harbor Dam

Date of Action: [7 and 8 April](#)

RESPONSE DATE- 12 February 2015 (FPOM Meeting) [Updated for 12 March FPOM meeting](#)

Description of the problem: A research study is being planned for Ice Harbor Dam titled "Characterization of Juvenile Salmon Turbine Unit Intake Distribution" (Section 6.2.3 in the 2015 FPP Appendix A). This requires the installation of hydroacoustic transducers on the trashrack and the STS frame in turbine unit 1, slot B. Trashrack installation will require an outage for turbine units 1 and 2. Divers will install the trashrack transducers from the powerhouse forebay deck with a mobile crane and man-basket. STS installation will require Project support to raise the screen and dog it high for install on the bottom frame support and then lower it into place on schedule with the other screens for the fish passage season.

The dive was originally scheduled for 4-5 March, but has been rescheduled for [19-20 March with 21 March as a contingency day](#)~~7-8 April~~. The dive was delayed [from 4-5 March](#) to re-evaluate the installation plan [to ensure](#) that [equipment will](#) withstand [trash raking, and](#) account for uncertainty in time required to complete the dive, reduce the likelihood of spill [to accommodate spillbay 2 construction and turbine unit 3 commissioning](#). ~~The dive is now being planned to occur between 1200-1800~~ [Should the dive occur 7-8 April it will be scheduled for 0700-1900](#) each day to provide adequate dive time, ~~and reduce the potential for passage delay of wild adult steelhead~~. Transducer removal is tentatively proposed for August and will be coordinated separately.

An outage for units 1 and 2 concurrently requires the next priority unit to be operated. [Unit 3 is the second priority unit and will be back online during the dive window. Ice Harbor will also be spilling providing attraction flow to the north fishway.](#) ~~Typically, unit 3 would be operated; however, unit 3 is out of service through March, 2015 for maintenance. Unit 6 is the next priority unit and can operate singly without requiring line switching according to the Fish Passage Plan (USACE 2014); however, this is a less desirable operation for adult steelhead attraction to the south fishway.~~

Type of outage required: Units 1 and 2 will need to be out of service to accomplish the trashrack transducer install. The dive is expected to require approximately 10-15 hours [and is being scheduled for 0700-1900 on 7-8 April](#) ~~total and will occur between 1200-1800 on 19 and 20 March with 21 March as a contingency day.~~

Divers will remain on the upstream side of the trashrack which will not require the head gates to close off unit 1.

Impact on facility operation: The required Project support for transducer installation is currently being coordinated through District Operations and with the Ice Harbor Project. The dive is not expected to require Project support beyond holding safety clearances. Project support including the gantry crane will be required for the STS transducer installation and

placement and electrical connection for an equipment trailer. The STS install is planned to occur concurrent with the scheduled screen deployments the week of 23 March.

No specific turbine unit operations are being requested.

Proposed Schedule:

- Installation of trashrack transducers and unit outages: ~~March 19–21~~ April 7-8, 2015
- STS transducer and screen installation: March 26, 2014
- Spring study period: April ~~19~~ – May 31, 2015
- Summer study period: June 1 – July 31, 2015
- Equipment removal: First week of August

Length of time for repairs: NA

Expected impacts on fish passage:

Juvenile Passage: No adverse effects are expected for juvenile passage and survival during transducer installation due to a turbine unit priority change. ~~A negligible proportion of~~ Yearling Chinook and juvenile steelhead (~~≤ ~50 per day~~) ~~are passage is~~ expected to steadily increase at pass Ice Harbor beginning in early April, but ≤ 10% of the runs will pass by 15 April (Tables 1 and 2). The majority of fish pass via the spillway and bypass systems with < 5% of smolts passing the turbines at Ice Harbor (Ham et al. 2009). With an average Snake River discharge of 77 kcfs in April with 45 kcfs spill ~~March compared to~~ and up to three turbine units operating, It is expected that ≥ 80% of smolts will pass the spillway including the RSW (Ham et al. 2009). Therefore, a change in unit priority will leave units 3, 4, and 6 operating (barring maintenance outages) which are expected to shift passage from unit 1 to units 3 and 4 or draw more fish to the spillway, mid-late April where over 40,000 may pass per day. Those that are present in the unit 1 proximity may be rearing fall Chinook that are not yet actively migrating or early outmigrants. ~~Any juveniles present~~ are expected to avoid divers in the forebay and may not be present at dive depths of approximately 80 feet.

Adult Passage: Based on eight previous years of window count data (2007-2014) it is expected that on average ≤ 50 (range = 3 - 104) wild adult steelhead may pass the Ice Harbor south fishway each day during the ~~19-21 March~~ 7-8 April unit outages (Table 34; Figures 1 and 2). Steelhead approach the south shore fishway at Ice Harbor along the south powerhouse or at the south entrance. Bjornn et al. (1998) reported that approximately 64% of steelhead still approached the south powerhouse with a single north powerhouse turbine unit in operation (either unit 5 or 6). It was also reported that mean passage time for steelhead was approximately 4 hours longer during north powerhouse operations. Trumbo et al. (2014) reported no significant difference in passage time for adult steelhead and Chinook passing Ice Harbor when unit 1 or 3 were operated singly (Figure 3). This analysis included all fish detected in the south fishway at the south shore which encompasses fish entering at any location along the powerhouse and the north entrance. With unit 3 providing south fishway attraction flow it is reasonable to assume no measurable impact on adult steelhead passage with a unit 1 and 2 outage. ~~While it is reasonable to assume no longer than a four hour delay in upstream passage with a single north powerhouse priority unit in operation (Bjornn et al. 1998), scheduling unit~~

~~outages between 1200-1800 will reduce the potential delay in steelhead passage by providing south fishway attraction flow from unit 1 during the early morning high passage time (Figure 4).~~

Comments from agencies:

-----Original Message-----

From: Trumbo, Bradly A (Bradly) NWW
Sent: Tuesday, March 10, 2015 1:06 PM
To: BPA Scott Bettin; Setter, Ann L NWW; Moody, Gregory P NWW
Cc: Trumbo, Bradly A (Bradly) NWW
Subject: RE: UPDATED MOC 15IHR001 Ice Harbor Turbine Intake Characterization Study (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

As of yesterday, we can no longer dive 19-21 March. Unit 3 commissioning begins on the 19th and line 2 must be taken out of service for this. This would mean units 1-4 are out of service with a dive, so we are working on the dive 7-8 April when unit 3 is online and we can spill. I need to send another MOC revision...

Brad

-----Original Message-----

From: Bettin, Scott W (BPA) - KEWR-4 [<mailto:swbettin@bpa.gov>]
Sent: Tuesday, March 10, 2015 12:48 PM
To: Setter, Ann L NWW; Moody, Gregory P NWW
Cc: Trumbo, Bradly A (Bradly) NWW
Subject: [EXTERNAL] FW: UPDATED MOC 15IHR001 Ice Harbor Turbine Intake Characterization Study (UNCLASSIFIED)

Any chance they could do the diving this Friday. I know it's short notice but the flows are what we need right now and the units will be out to do the line work. -s

From: Christman, Locke A (BPA) - PGSP-5
Sent: Tuesday, March 10, 2015 12:34 PM
To: Bettin, Scott W (BPA) - KEWR-4
Cc: Berry, William A (BPA) - PGSP-5
Subject: RE: UPDATED MOC 15IHR001 Ice Harbor Turbine Intake Characterization Study (UNCLASSIFIED)

Scott,

Units 1 and 2 will be offline for a line outage (Dart #953591) on Friday March 13 from 0700 – 1400. Could the test equipment be installed at that time?

As a side note: As of now we could ask for some switching that would keep one of these units in service if we really think we need it. Adding this equipment installation would eliminate that possibility.

Regards,

Locke
Locke Christman
Power Operations Specialist
Bonneville Power Administration

PGSP-5
503-230-3899
[lachristman@bpa.gov](mailto:lchristman@bpa.gov)

From: Bettin,Scott W (BPA) - KEWR-4
Sent: Tuesday, March 10, 2015 11:59 AM
To: Christman,Locke A (BPA) - PGSP-5
Subject: FW: UPDATED MOC 15IHR001 Ice Harbor Turbine Intake Characterization Study (UNCLASSIFIED)

From: Bettin,Scott W (BPA) - KEWR-4
Sent: Tuesday, March 10, 2015 11:59 AM
To: Christman,Locke A (BPA) - PGSP-5
Subject: FW: UPDATED MOC 15IHR001 Ice Harbor Turbine Intake Characterization Study (UNCLASSIFIED)

They want to install some test equipment at IHR which will require two units out for divers. Here's Bills assement on whether or not we will need to spill to accomplish that. The goal so far has been to put the Ogee project in spillbay 2 ahead of everything else. -s

From: Berry,William A (BPA) - PGSP-5
Sent: Tuesday, March 10, 2015 11:34 AM
To: Bettin,Scott W (BPA) - KEWR-4
Subject: RE: UPDATED MOC 15IHR001 Ice Harbor Turbine Intake Characterization Study (UNCLASSIFIED)

With this work, two units for 6 hours, and the currently scheduled outages IHR could pass about 54 kcfs. In yesterday's CVST IHR's inflows for 3/19 - 3/21 were 57 - 59 with the highest on 3/19. IHR is a small pond so even counting on some fill it looks doubtful to do this work without spill.

If the trash raking scheduled for 3/18 - 3/20 is limited to units already out of service IHR could pass about 62 kcfsd and the prospects of managing this work without spill move up to doable (with the present inflow forecast).

The unit outage for the installation has not been scheduled.

From: Bettin,Scott W (BPA) - KEWR-4
Sent: Monday, March 09, 2015 2:31 PM
To: Berry,William A (BPA) - PGSP-5; Bartlett,Kristine L (BPA) - PGSP-5; Christman,Locke A (BPA) - PGSP-5
Subject: Fw: UPDATED MOC 15IHR001 Ice Harbor Turbine Intake Characterization Study (UNCLASSIFIED)

They need two units out to install this equipment. Will we be able to pass the flow without spilling on those dates?

Final results:

Thank you,

Brad Trumbo
Fishery Biologist
Walla Walla District
bradly.a.trumbo@usace.army.mil
509-527-7253

Table 1. Migration timing characteristics for yearling Chinook salmon passing Lower Monumental Dam (DART 2015). Data not available for Ice Harbor.

Year	Passage Dates								Middle 80% Days
	First	1%	5%	10%	50%	90%	95%	Last	
2005	04/02	04/04	04/08	04/11	04/23	04/29	04/30	05/01	19
2006	04/07	04/10	04/25	04/28	04/29	05/01	05/01	05/01	4
2007	04/01	04/05	04/08	04/08	04/14	04/30	05/01	05/01	23
2008	04/01	04/11	04/13	04/16	04/23	04/30	04/30	04/30	15
2009	04/01	04/06	04/09	04/09	04/14	04/28	04/29	05/01	20
2010	04/01	04/14	04/17	04/17	04/23	04/29	04/29	04/29	13
2011	04/01	04/13	04/16	04/22	04/28	05/01	05/01	05/01	10
2012	04/03	04/03	04/09	04/12	04/27	04/30	04/30	04/30	19
2013	04/01	04/01	04/07	04/13	04/22	05/01	05/01	05/01	19
2014	04/01	04/22	04/29	04/29	04/30	05/01	05/01	05/01	3

Table 2. Migration timing characteristics for juvenile steelhead passing Lower Monumental Dam (DART 2015). Data not available for Ice Harbor.

Year	Passage Dates								Middle 80% Days
	First	1%	5%	10%	50%	90%	95%	Last	
2005	04/02	04/07	04/08	04/10	04/16	04/30	05/01	05/01	21
2006	04/04	04/13	04/25	04/28	04/29	05/01	05/01	05/01	4
2007	04/01	04/05	04/14	04/14	04/26	05/01	05/01	05/01	18
2008	04/01	04/16	04/18	04/19	04/26	04/30	04/30	04/30	12
2009	04/01	04/06	04/12	04/16	04/25	04/30	04/30	05/01	15
2010	04/03	04/17	04/20	04/20	04/26	04/29	04/29	04/29	10
2011	04/01	04/04	04/07	04/16	04/25	05/01	05/01	05/01	16
2012	04/03	04/03	04/06	04/15	04/27	04/30	04/30	04/30	16
2013	04/01	04/07	04/10	04/13	04/22	04/28	05/01	05/01	16
2014	04/01	04/22	04/29	04/29	04/30	05/01	05/01	05/01	3

Table 3. Window counts of wild adult steelhead passing the Ice Harbor south fishway during the first ten days of April, 2007 – 2014.

Day	Year								Mean
	2007	2008	2009	2010	2011	2012	2013	2014	
1	46	29	16	41	62	61	16	10	35
2	36	22	38	62	104	7	25	13	38
3	29	17	33	45	52	3	66	13	32
4	28	18	61	45	49	-1	61	20	35
5	28	44	51	33	50	7	82	35	41
6	27	26	26	46	11	21	51	6	27
7	37	40	13	50	7	23	73	28	34
8	34	90	17	54	2	8	66	25	37
9	17	51	39	38	2	5	50	17	27
10	21	58	40	15	10	27	47	24	30

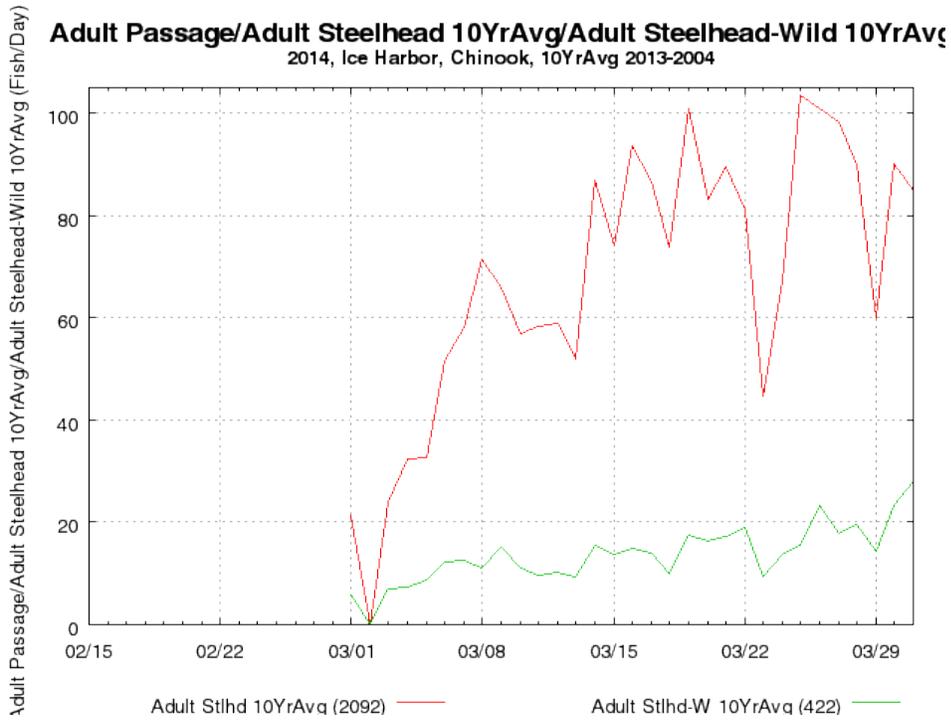


Figure 1. Ten year average daily adult steelhead passage at Ice Harbor Dam.

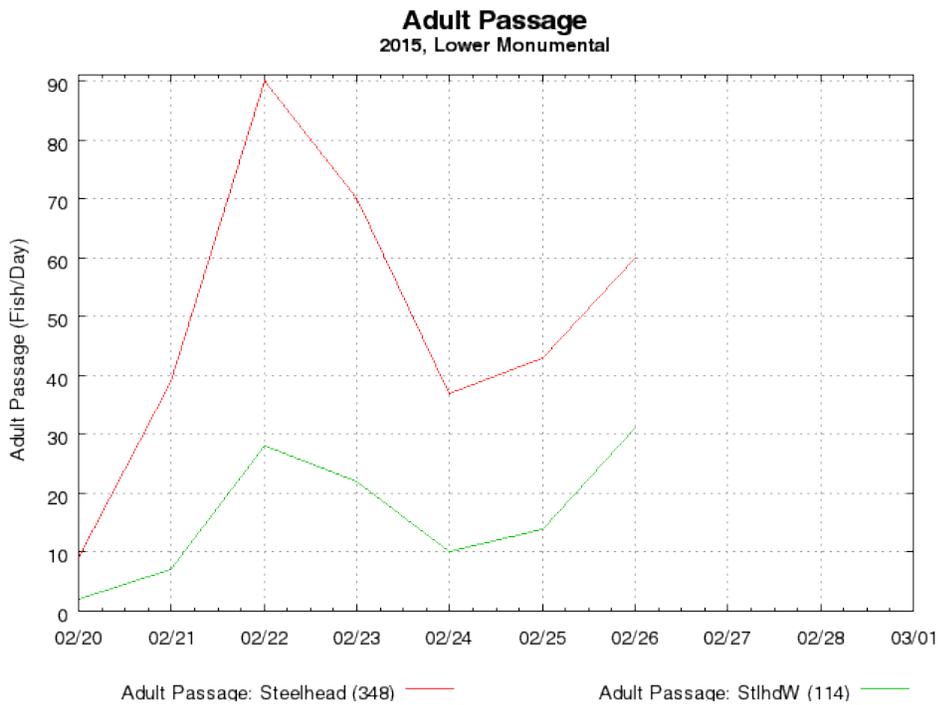


Figure 2. 2015 daily adult steelhead passage at Lower Monumental Dam. Data not yet available for Ice Harbor, but counts at Lower Monumental are expected to be indicative of current year passage at Ice Harbor.

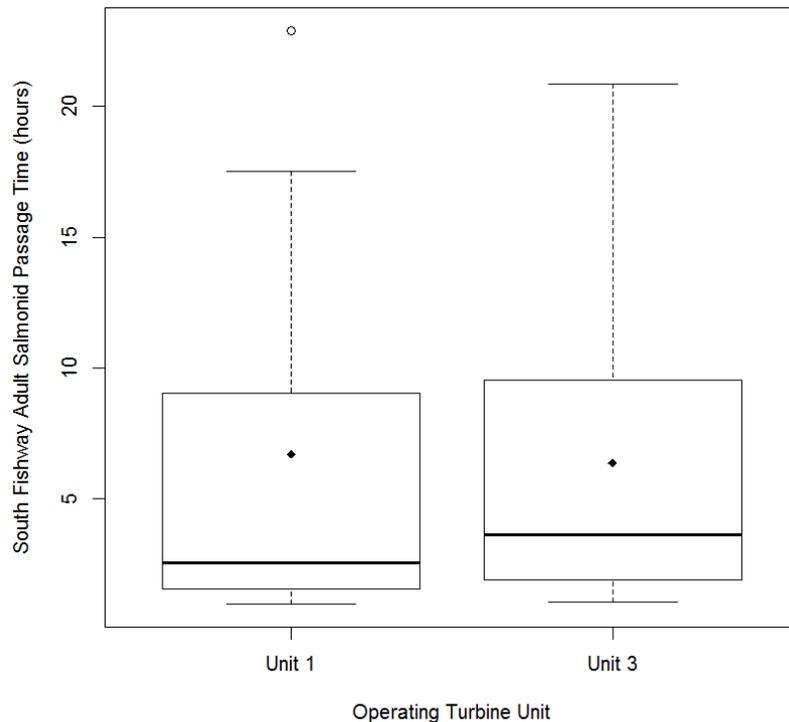


Figure 3. Ice Harbor Dam south fishway adult salmonid passage time for 2004, 2009 and 2013 combined. First detection was just downstream of the tailrace entrance and last detection was within the south fishway entrance. Boxes represent 25th and 75th percentiles with the solid black line representing the median (50th percentile) and the diamond represents the mean. Whiskers represent 10th and 90th percentiles and dots represent 5th and 95th percentile outliers. Unit 1 had a shorter median passage time, but the means are nearly the same and no statistically or biologically significant difference was found in passage times between the single priority operating unit.

~~**Figure 4.** Diel B-run steelhead passage at Ice Harbor Dam. Leaving unit 1 in service during the morning hours to 1200 on March 4-5 should reduce potential passage delays.~~

References:

Bjornn, TC, KR Tolotti, JP Hunt, PJ Keniry, RR Ringe and CA Peery. 1998. Migration of adult Chinook salmon and steelhead past dams and through reservoirs in the lower Snake River and into tributaries. Report of the US Geological Survey and the University of Idaho to the US Army Corps of Engineers, Walla Walla District, Walla Walla, Washington.

Columbia River DART. 2015. Columbia Basin Research, University of Washington. Available from <http://www.cbr.washington.edu/dart>.

Ham, KD, CII Arimescu, MA Simmons, JP Duncan, MA Chamness and A Solcz. 2009. Synthesis of Biological Research on Juvenile Fish Passage and Survival 1990–2006: Ice Harbor Dam. Report of the Pacific Northwest National Laboratory to the US Army Corps of Engineers, Walla Walla District, Walla Walla, Washington.

Trumbo, BA, MK Shutters, 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.