

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

**COORDINATION TITLE:** 13BON51 NDE Lamprey Flume repairs with 13BON51 addendum at the end.

**COORDINATION DATE-** 24 July 2013

**PROJECT-** Bonneville Lock and Dam – Washington Shore Fish Ladder

**RESPONSE DATE-** 01 October 2013

**Description of the problem-** During the 2012-2013 IWW period, the U.S. Army Corps of Engineers (USACE) installed a prototype adult Pacific lamprey passage structure designed to improve lamprey passage at the Bonneville WA Shore north downstream entrance. Shortly following installation, one of the rods that provides structural support for the new Lamprey Flume System (LFS) failed, prompting installation of temporary bracing for adjacent rods and an investigation of the problem (**Figure 1**). USACE determined that vibration due to unanticipated hydraulic loading fatigued the broken rod and adjacent rods and that the mounting system for the LFS must be revised no later than Winter 2013-2014 to avoid complete failure of the system.

Structural failure could result in the system falling into the tailrace. This would create unacceptable hazards for fish passage, alter exit flow conditions for PH2 turbines, necessitate complex salvage operations, and result in increased time and resources lost in meeting important 2008 Columbia Basin Fish Accords obligations with respect to Pacific lamprey passage improvements.

The USACE design team and a contractor are working on a revised design for the mounting system, but details on this design and the required construction schedule are not yet available. As such, USACE must estimate, based on previous experience with LFS installation in the Powerhouse 2 (PH2) tailrace, operational requirements for construction. Key requirements that impact normal operation of fish passage structures and PH2 include:

- *Periods of no PH2 flow* (no turbine operations) during dive operations. Turbine flow may create tailrace conditions incompatible with the construction activities and creates unacceptable dive safety risks.
- *No operation of the juvenile bypass system* during dive operations. Outlets from the system create a boil in the construction area, resulting in unsafe diving conditions. Given the complexity of turning the system on and off, this means the bypass system must be OOS for the duration of the work period.
- *No operation of the North Downstream or North Upstream entrances* (NDE and NUE, respectively) of the Washington Shore Fish Ladder during the work period.

In addition to the mounting system modifications, USACE intends to address a variety of smaller-scale modifications to the LFS and adjoining Lamprey Passage Structure (LPS) during the requested outage. These include securing HDX-PIT antenna conduit, installation of permanent LPS pump brackets, and minor modifications to the LPS.

### **USACE requests the following operations:**

1. Modified operation of the WA Shore Fish Ladder from October 15 – November 12:
  - a. Partial operation, including South Upstream and Downstream entrances (SUE, SDE), with the North Downstream Entrance (NDE) and North Upstream Entrance (NUE) closed. Normal operation would resume beginning November 12.

- b. Floating Orifice Gates (FOGs) at the north end of the powerhouse (gates 14, 15, 17, and 18) must be closed to accommodate dive work. Normal operation would resume beginning November 12.
  - c. Anticipated work may include use of a floating plant at the north end of Powerhouse 2 and a crane mounted on the tailrace deck.
  
- 2. Powerhouse 1 will be priority from October 9 – November 14 during modified PH2 operations. Powerhouse 2 priority will resume when the juvenile bypass system resumes normal operation (item #3 below).
  - a. Powerhouse 2 units will be in and out of service to allow for safe dive operations and removal/installation of juvenile bypass screening. **The following dates/times are approximate and subject to change**
    - i. At this time, USACE anticipates 27 days needed to complete dive operations between the dates of October 15 – November 10.
    - ii. During this time PH2 is expected to be out of service from a period of 16 hours per day (0500 – 2100 hours) in order to: 1) Provide safe hydraulic conditions in the tailrace required to complete the repair work, and 2) allow sufficient time to complete all required clearance procedures (lock out/tag out).
    - iii. PH2 may generate (if flows allow) the remaining 8 hours (2200-0500 hours) of the day.
    - iv. In order to comply with WECC/NERC requirements any modifications to the final operation planned will required 72 hours advance notification to BPA (Real Time) and the Corps (RCC). If a change to the plan is required with less than 72 hours notice then Bonneville Dam (Control Room) will notify BPA (Real-Time) and Corps (RCC).
    - v. The following is an example of a dive operation that occurred February 26, 2013, associated with the LFS installation: 1) 0600 hours shutdown PH2 and lock out/tag out units, 2) 0830 – 1930 hours dive work, 3) no later than 2000 hours divers release clearances off lock box, and 4) no later than 2200 hours clearances lifted and generating.
    - vi. There will likely be days during this period when no diving will occur during the day. When this occurs, units will be available to run at all hours.
  - b. Per item #3 below, all units will be screened and the PH2 Downstream Migration Channel (DSM2) will be back in service no later than November 14.
  - c. If PH2 units are operated from October 15 – November 12, main units on the south end of the powerhouse will be prioritized to provide attraction flow to SUE and SDE.
  
- 3. Modified PH2 Juvenile Bypass System operation:
  - a. OOS from October 11 – November 12: Begin taking juvenile bypass system out of service on October 9 (removal of STSs), and have DSM2 dewatered on October 11 to allow staging of a floating plant and dive operations to begin on October 15. This assumes that it takes 2 days to remove STSs and 1 day to take the DSM2 OOS. STS removal and DSM dewatering are scheduled to occur Wed- Fri with no weekend/holiday work for that piece. The exact number of units with STSs removed will be left to the Project. Enough unscreened units will need to be available to pass flows exceeding PH1 capacity and miscellaneous flows.

- b. Reinstall STSs and have DSM2 back in service (through December 15, per FPP) no later than November 12. This anticipates BON deploying STSs in some units the week of 4 November. These units would be OOS until the DSM returned to service.
  - c. From October 11 – November 12, operate the PH2 Corner Collector (B2CC) if Powerhouse 2 units are operated without STSs to provide a PH2 surface passage route. The B2CC will remain open for two hours after PH2 units have been turned off. Flushing flow will remain on up to an additional hour. Flushing flow needs will be determined primarily by BON Project Fisheries.
4. If PH1 capacity is fully utilized (as per current FPP guidelines) and PH2 units are OOS during the day for dive safety, water exceeding PH1 capacity will be passed via the Spillway. Spill may or may not result from implementing this special operation depending on inflows, forebay space and powerhouse availability. When PH2 is OOS, BON would likely spill 0 - 23 kcfs (this assumes 9 units available at PH1 operating within 1% of best efficiency plus miscellaneous flows) in order to provide total project discharge of 100 - 125 kcfs needed to achieve an 11.5 ft chum tailwater elevation. *\*See comments below from Doug Baus (RCC, 8/12/2013).*
  5. Additional light construction activities, including modification of LPS components on the tailrace deck, handrail work, and other relatively benign/quiet activities, may occur within 50 ft of the fishway through the end of the normal Bonneville Dam IWW period (February 28).

**Type of outage required-** 1) Decreased ladder operation from October 15 – November 12 (outside of normal IWW period); 2) Restricted unit operations at PH2 from October 9 – November 14; 3) Modified juvenile bypass system operations from October 9 – November 14; 4) Operation of B2CC when unscreened units are run; 5) Spill to accommodate work; 6) Work within 50 ft of a fishway.

15 October- the B2CC will be closed to allow removal of the avian lines.

**Impact on facility operation-** Outage of the Washington Shore Fish Ladder and the PH2 juvenile bypass system requires assessment of impact on upstream and downstream fish passage. PH2 unit operations will be affected by this construction.

Throughout the repairs, the project will continue to operate the tailwater elevation within the established limits for wintertime rates of change (hourly limit of 3.0 ft/hour, normal daily limit of 7.0 ft/day, maximum daily limit of 10.0 ft/day).

**Length of time for repairs-** 9 October 2013 – 14 November 2013; Additional light construction activity in this location through 28 February 2014.

**Expected impacts on fish passage-** The proposed operations will likely increase fallback of and may result in minor migration delays for ESA-listed adult salmonids. Proposed operations were designed to reduce potential impacts. There will be little to no impact on Pacific lamprey.

1. Adult Salmonid Passage

*General Comments:*

The proposed operation involves partial operation (NDE and NUE entrances closed, reduced number of open FOGs) of the Washington Shore Ladder from October 9 –

November 12. All entrances will be open and normal operations will resume beginning November 12, with limited tailrace deck activity through the end of the normal IWW period (February 28). Coho salmon passage is the most important activity during the proposed work period, with fall Chinook and steelhead passage declining through October (**Figure 3**).

*Upstream Passage From 15 October through 12 November:*

Fall salmon and steelhead runs typically decline through the end of October at Bonneville Dam, though the proposed work would coincide with the latter half of the coho run. From October 15-21, daily passage averaged 1,375 for coho, 275 for steelhead, and 569 for Chinook since 2004 (**Figure 3**). Mean total passage during this week was 9,623 for coho, 1,928 for steelhead, and 3,981 for Chinook. By November 5-11, daily passage averaged 99 for coho, 77 for steelhead, and 83 for Chinook, with incidental chum passage. About 70.4% of total passage during October 15 – November 12 was via the Washington Shore Fish Ladder in recent years, though this was generally under a Powerhouse 2 priority operation (**Table 1**).

*Upstream Passage from 12 November through 28 February:*

During this period, the Washington Shore Ladder would be in full operation, with only relatively quiet construction activity conducted on the tailrace deck area. A crane positioned on the roadway deck may be used for light construction activities, such as modifications to the LPS and deployment of LPS pumps (**Figure 2**). This activity is not expected to impact salmon or steelhead passage.

**Upstream Passage Mitigation Measures:** Powerhouse 1 priority during this period (attraction flow), partial operation of the Washington Shore Ladder, and continued operation of the Bradford and Cascades Island fish ladders should help alleviate potential delay impacts on adult salmon and steelhead. USACE will monitor adult fish passage at the Washington Shore and Bradford Island count stations during this period.

*Fallback of Adult Salmonids:*

The primary concern regarding effects of the proposed operation on adult salmon and steelhead is increased risk of fallback via PH1 turbines or via the Spillway relative to normal FPP operations. Adult salmon and steelhead sometimes fall back over the dam via the Spillway, turbines, Juvenile Bypass System, B2CC, PH1 Ice and Trash Sluiceway, or the Navigation Lock. Several factors affect fallback behavior at Bonneville Dam, notably route of passage (Washington Shore vs. Bradford Island), spill operations (particularly for PH1-passed fish), guidance efficiency of bypass routes such as the B2CC and the PH1 Ice and Trash Sluiceway, and variations in behavior among species.

Data on route-specific fallback of salmon and steelhead at Bonneville Dam are limited. Boggs et al. (2004) summarized results of passage and fallback monitoring of adult Chinook salmon and steelhead at Bonneville Dam in 2000 (normal water year in the fall) and 2001 (low water year in the fall). This was prior to removal of the PH1 juvenile bypass system and improvements to the PH1 ITS. Fallback for fall Chinook and steelhead was positively correlated with increasing flow and spill and the authors noted that in 2001, spill never exceeded 50 kcfs during the passage season and didn't occur at all in the fall.

Overall fallback rates for fall Chinook and steelhead were lower for Washington Shore Ladder-passed fish (1.6-4.6% for fall Chinook, 1.5-2.5% for steelhead) than for Bradford Island-passed fish (5.7-6.3% for fall Chinook, 7.8-13.6% for steelhead) (Boggs et al. 2004). The most commonly used likely route of passage for steelhead was the Spillway in 2000 (83%) and the Navigation Lock in 2001 (37%). For fall Chinook, it was the Navigation Lock in 2000 (41%) and the spillway in 2001 (32%). Due to configuration changes at PH1 and small sample sizes, it is difficult to relate the 2000-2001 results to anticipated route use during the proposed construction period. However, 1.7-11.4% (n=1-4) of steelhead fallbacks occurred via the (pre-modification) PH1 ITS, compared to 11.4% (n=4, 2001 monitoring only) via the now-gone PH1 juvenile bypass channel. Similarly, 8.3-14.8% (n=3-5) of fall Chinook fallbacks occurred via the PH1 ITS, compared to 5.6% (n=2) via the juvenile bypass channel. If we assume that “juvenile bypass channel” fish would have passed via turbines if the bypass system were removed, this suggests a PH1 ITS fish guidance efficiency of approximately 50% for adult steelhead fallbacks and 60% for adult fall Chinook fallbacks at PH1.

Similar estimates are not available for estimating B2CC guidance efficiency for adult fall Chinook or steelhead, but survival and injury tests of balloon-tagged steelhead at the PH1 ITS and the B2CC suggested that both routes are benign (Normandeau Associates, 2011).

**Fallback Mitigation Measures:** Operation of the B2CC when operating unscreened PH2 units would provide an additional surface passage route for adult salmonid fallbacks at PH2. Improvements to the PH1 ITS have likely improved guidance and possibly survival of fall salmon and steelhead fallbacks through this relatively benign passage route. The PH1 ITS will be operated during the proposed construction period. The proposed spill pattern is attached at the end of this MOC.

2. Juvenile Salmonid Passage

The official juvenile migration season occurs from March 1 through November 30, though most downstream migration past Bonneville Dam between April 1 and September 1. Thus, the proposed juvenile bypass system outage and operation of Powerhouse 1 during the work period should have little impact on out-migrating juvenile salmonids. Operation of the B2CC when unscreened units at BON2 are operating will provide an alternative passage route for adult fallbacks and juvenile fish.

3. Chum Salmon Spawning

The minimum tailwater elevation required to provide adult chum salmon access to spawning habitat located downstream of the dam is expected to be approximately 11.5 ft. This tailwater level requires approximately 110-130 kcfs total project discharge depending on tidal and Willamette River influences. USACE will monitor TDG impacts of spill operations and will make best efforts to maintain TDG within State water quality standards. Any potential deviations from these standards will be coordinated through FPOM, TMT, and/or Oregon DEQ as appropriate. If these conditions are met, no impacts are expected. Chum spawning flows may be delayed until November 10<sup>th</sup>.

4. Bull Trout

This activity is not likely to impact bull trout, which are only occasionally seen at Bonneville Dam. Fish passage data from the Bonneville Dam fish ladders (Corps, unpublished) show only three sightings of bull trout moving through the fish ladders for 2000 through 2011 during the fish counting season (April 1 through October 31). These

sightings occurred between May 30, 2009 and June 2, 2009 and were reported as '12-inch bull trout moving upstream' through the count window on each occasion.

5. Pacific Lamprey

Adult lamprey passage at Bonneville typically peaks in June-July and declines through October, when most upstream lamprey passage activity ceases. Based on RT studies, continuing the Powerhouse 1 priority may provide some minor benefit for the few adult lamprey migrating during the proposed work period. Successful operation of the LFS is a priority for COE lamprey passage improvement efforts. Impacts of this operation on juvenile lamprey are unknown.

**Comments from USACE NWD Reservoir Control Center (RCC).**

*From Doug Baus (8/12/2013):* With 10 units in service PH1 hydraulic capacity would be 100 kcfs. During this operation only 9 units will be available (Unit 5 will be out of service) therefore hydraulic capacity will be reduced to 90 kcfs. Operating PH1 available units at Best Operating Point with the 115 kv line restriction would increase capacity 5 kcfs therefore PH1 hydraulic capacity operating at BOP could be 95 kcfs (9 units + BOP operation). During this period if we do not operate at BOP PH1 capacity with 9 units would be 90 kcfs. BON miscellaneous flows are 12 kcfs (B2CC, PH1 ITS, BI Fish Ladder, CI Fish Ladder, WA Shore Fish Ladder). Total project discharge (PH 1 @ 9 units + BOP + misc flows ) would be 107 kcfs. Achieving an 11.5 ft tailwater for the chum operation that starts the first ten days of November when a sufficient number of chum arrive requires BON project discharges of 100-125 kcfs depending on tidal effects/Lower River inflows. If the chum operation is initiated prior to the anticipated flume repair date of November 12 BON will be required to maintain a minimum 11.5 ft tw.

**Comments from agencies.**

**NOAA Fisheries (Fredricks)-**

If PH1 capacity is fully utilized (within 1% of best efficiency and within cavitation limits, per FPP) and PH2 units are OOS for dive safety, water exceeding PH1 capacity will be passed via the Spillway. *I would not want to see BOP operation at this time since this would have the tendency to increase adult fallback through the turbine units.*

The proposed operations will likely increase fallback of and may result in minor migration delays for ESA-listed adult salmonids. Proposed operations were designed to reduce potential impacts *There is little doubt that running PH1 hard during the day and stopping PH2 will result in increased fallback of adults through turbine units. We just don't know to what extent. Also, if we were to minimize the impacts, we wouldn't run PH1 as hard (something like 50 kcfs spill with remainder thru the powerhouse). This would minimize fallback while providing a better route for fallback. Gas levels at this spill level would not be an issue for chum or any other listed species in the river at this time. I not suggesting you have to proposed this, just that there are likely lower (fish) impact approaches to this issue.*

Improvements to the PH1 ITS have likely improved guidance and possibly survival of fall salmon and steelhead fallbacks through this relatively benign passage route. The PH1 ITS will be operated during the proposed construction period.

*These two should be turned around. I would expect the higher ITS flow to improve guidance but likely not improve survival since we did nothing to improve the transport conditions through the drop in the channel.*

**August 2013 FPOM-** 13BON51 Washington Shore Lamprey flume repairs. Tackley and Welton introduced the MOC. Welton covered the planned installation of the new hangers. This work requires divers. Fredricks asked why the DSM must be out. Welton explained the discharge is a problem for divers. NUE and NDE will need to be closed as well. **ACTION: Hausmann will confirm the monolith gates can be closed and bulkheads won't be needed. He will also inquire about the possibility of turning the DSM on/off each day.**

Baus discussed the chum tailwater requirements and when those requirements go into effect. Baus asked if BOP was being coordinated as well. It was noted BOP wasn't mentioned in the MOC... but it should be. If we need to maintain 11.5' tailwater the first week of November, then that water may need to pass through the spillway. Baus also noted the B2CC gasses the river and is there a need for a special spill pattern. Bettin asked about the end date of 12 November instead of the November 9<sup>th</sup> date being discussed in other forums. Tackley responded that he calculated the amount of time the work would take and it ran all the way until the 12<sup>th</sup>.

Fredricks disagreed with the Fish Impacts section. He said there is going to be an impact. There will be increased fallback through unscreened units. Fish passage efficiency without screened bypass at PH2 will be impacted. Fredricks isn't as concerned about the 105% gas limit during the proposed time of year. He wants the adult and juvenile impacts acknowledged in the MOC. He suggested running the B2CC could mitigate the juvenile impacts. Fallback must be considered and recognized. Fredricks noted there is still a fair amount adult fish passage during the first two weeks of November. He expressed concern about operating turbine units at night and then turning them off during the day. This could potentially strand them in the PH2 tailrace.

Bettin asked how the structure would fail, if it did. Welton said when hanger rod 5 broke, the flume dropped onto the lateral supports and displaced some weight on hanger rod 6. Bettin asked "if you cannot accomplish all of the work in the work window being discussed are you considering an option of waiting until the following winter maintenance period and risk failure?" Bettin also asked about how long the structure is expected to be in place. Tackley said we need to have it in place at least three years to test passage efficiency. Bettin asked if there would need to be an outage to remove the structure as well.

Bettin asked if it was possible to leave screens in and turn the DSM on and off each day. **Hausman said he would look into that.** Another thing to explore if flows are low is to leave some screens in place and not run those units. This would allow the project to return to full operation of the second powerhouse sooner at the end of the lamprey flume repair. . A decision to move forward or not needs to be made soon.

Baus asked about the fluctuations of tailwater elevation. The contracts usually state there will be normal tailwater fluctuations and during the fall/winter months, this could be several feet. Welton said he isn't sure but what the contractor will use as far as barges and cranes.

**Coordination call scheduled for 1500 on 12 August.**

**NOAA Fisheries-** From: Gary Fredricks - NOAA Federal [<mailto:gary.fredricks@noaa.gov>]

Sent: Friday, August 23, 2013 10:04 AM

To: Trevor Conder - NOAA Federal; Sean Tackley; Bettin, Scott W (BPA) - KEWR-4; Ritchie Graves - NOAA Federal

Subject: Re: BON Lamprey flume BPA edits

Ok, I've reviewed the suggested changes and there are a few issues that concern me and I want to make clear the items in the coordination that I am most concerned about: 1. There should be no operation of unscreened units at PH2 without the bypass in operation, 2. the corner collector needs to be in operation the entire calendar period during which PH2 is being operated without screens (i.e., it needs to be running even when the units are not running if units are run at any time during the day). Turning it on and off all the time doesn't adequately provide for fish pulled into the forebay by any previous unit operation. 3. PH1 shouldn't operate at BOP or any other level above the 1% range during this altered (non FPP) operation. This is to minimize the pull of adults to PH1 (which normally wouldn't operate at this time). As a reminder to everyone, ESA coverage for lamprey work is a bit on the thin side and the burden of proving that this work will not result in unanticipated take is on the action agencies. Thanks, Gary

**NWP Dive Safety-**

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

From: Benoit, Richard A NWP

Sent: Tuesday, September 03, 2013 9:39 PM

To: Richards, Natalie A NWP; Apple, Scott A NWP

Cc: Tackley, Sean C NWP; Manny, D. Todd NWP; Schwartz, Dennis E NWP; Mackey, Tammy M NWP; Welton, Brent C NWP; Moynahan, Kevin NWP

Subject: BONN WA Shores Lamprey Flume - no-flow diving condition (UNCLASSIFIED)

Importance: High

Classification: UNCLASSIFIED

Caveats: NONE

Natalie, Scott and Team:

After extensive team discussions and careful work-plan review, the NWP Office of Dive / ROV Operations and Safety has determined in-water work by divers during execution of the upcoming Bonneville Washington Shore Lamprey Flume modification contract must be facilitated in a "NO-FLOW" environment.

This decision is based on:

1. Safety of divers and dive-support team;
2. Review of in-water work execution during original flume installation;
3. Review of water conditions and associated challenges during project's caisson installation / removal;
4. Situational awareness regarding dangers to divers in work area due to spontaneous upwelling's and unpredictable movement of reciprocating currents;
5. Unacceptable dangers to divers created by water movement during tool use, critical lifts and installation of:

- Supports weighing approximately 1,000-1,100 pounds;
- Hanger rod assemblies weighing approximately 90 pounds;
- Placement of installation jig (approximately 1,000 pounds);
- Installation of 28 Undercut Anchors;
- Application of splash zone epoxy for coating repairs on lifting tabs;
- Use of Tools; Hammer drill, under cut tool, core drill, oxy lance, torque wrench;
- Installation of conduit and anchor clips for PIT Tag Antenna;
- Multiple wedge anchors;



- Aluminum I-beam (2 beams side by side);
- Guide sleeves;
- Orifice plates; 16 inches OD, ID- varies.

The dive office understands and appreciates the challenges of providing divers and their support team a "NO-FLOW" work environment during in-water work. However, we are all in agreement that worker safety must take precedence over all considerations. Given the complexities of this project, the only acceptable environment conducive to a required level of worker safety is a "NO-FLOW" water condition in the diver's work area.

If you have any questions, please feel to contact me. Please feel free to forward as appropriate.  
Thank you Ad Vitam ... Rick

**BON Chief of Operations.** -----Original Message-----

From: Schwartz, Dennis E NWP

Sent: Monday, September 30, 2013 3:02 PM

To: Mackey, Tammy M NWP; Tackley, Sean C NWP

Subject: RE: FPOM: Official Coordination MOC 13BON51 BON NDE lamprey flume repairs (UNCLASSIFIED)

Tammy,

You may want to also put in this form the need to close the B2CC for approximately 2-3 hours on the morning of 15 OCT to allow the contractor to take down the avian float line. The riggers are going to unwind it and then the contractor is going to bring the float line to the shore to be brought out of the water. My understanding is that the riggers are clipping and pulling in all of the avian wires the week of 8 OCT.

Dennis E. Schwartz

Hydro Electric Power Operations Manager

Bonneville Lock & Dam

**CRITFC-**

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

From: Tom Lorz [mailto:lorz@critfc.org]

Sent: Tuesday, September 24, 2013 2:51 PM

To: Mackey, Tammy M NWP

Subject: [EXTERNAL] Re: FPOM: Official Coordination MOC 13BON51 BON NDE lamprey flume repairs (UNCLASSIFIED)

Depending on how you deal with comments we may need/should have a call think Wednesday. Turbine range at PH1 should be better defined after reading later in the comments section it is apparent that it is the 1% peak efficiency, and not BOP or generation limit. Also it says the PH1 sluiceway will be operating; is this true if not that changes how we should operate, IE when possible PH2 should be the priority powerhouse if the sluiceway is out. Main key is to reduce adult fallback and putting all the flow through PH1 is not the best way to do that.

**BPA and NWP -**

From: Bettin,Scott W (BPA) - KEWR-4 [mailto:swbettin@bpa.gov]

Sent: Wednesday, October 02, 2013 04:12 PM

To: Mackey, Tammy M NWP; Tackley, Sean C NWP  
Cc: Baus, Douglas M NWD; Wright, Lisa NWD; Klatte, Bernard A NWP; Schwartz, Dennis E NWP  
Subject: [EXTERNAL] RE: FPOM: Official Coordination MOC 13BON51 BON NDE lamprey flume repairs (UNCLASSIFIED)

One other piece I would like to add to the coordination form is waiving the slow roll criteria (BON-36 5.7). The units in the second powerhouse will be out for more than 12 hours since the diving is normally longer than that. The 12 hours was an arbitrary number so I would like to remove it for this operation since not all units are capable of starting with a slow roll from the control room. My understanding is that we will only have one operator to remove clearances and start units so removing this will preserve the time we need to move any additional water. -s

**From: Mackey, Tammy M NWP** [<mailto:Tammy.M.Mackey@usace.army.mil>]

Sent: Wednesday, October 02, 2013 4:32 PM

To: Bettin, Scott W (BPA) - KEWR-4; Tackley, Sean C NWP

Subject: Re: [EXTERNAL] RE: FPOM: Official Coordination MOC 13BON51 BON NDE lamprey flume repairs (UNCLASSIFIED)

Ben and I talked about this. BON Fisheries has expressed concern about sturgeon during this time of year. Twelve hours should no longer be in the FPP; the Project slow rolls during every start up. With the furloughs, this will likely not be discussed until the next FPOM.

Tammy

**From: Bettin, Scott W (BPA) - KEWR-4** [<mailto:swbettin@bpa.gov>]

Sent: Wednesday, October 02, 2013 4:45 PM

To: Mackey, Tammy M NWP; Tackley, Sean C NWP

Subject: RE: [EXTERNAL] RE: FPOM: Official Coordination MOC 13BON51 BON NDE lamprey flume repairs (UNCLASSIFIED)

12 hours is in the printed copy of the 2013 plan. Can we ask Natalie to shorten her work window? We are already down to less than eight hours if we require a slow roll on all the units. -s

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

**From: Tackley, Sean C NWP**

Sent: Thursday, October 03, 2013 2:40 PM

To: BPA Scott Bettin; Mackey, Tammy M NWP

Subject: RE: FPOM: Official Coordination MOC 13BON51 BON NDE lamprey flume repairs (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Hi Scott,

While we all understand the desire to minimize the time it takes to get units up and running, NWP bios (Mackey, Hausmann, Stansell, Tackley) are concerned about sturgeon impacts and do not recommend waiving the slow roll start guidance. Furthermore, as Tammy mentioned below, several key FPOM members are currently on furlough. This constrains our ability to consult with NOAA Fisheries and others regarding further changes that might impact fish passage. Between this, the stated comment period in the original MOC, and the fast-approaching construction start date, it is time to close the door on changes to the MOC (with the exception of November B1

ops). I'm sure little issues will pop up in the weeks to come, and of course, we'll all be back at the table as needed.

Thanks,  
Sean

10 October 2013 conference call to discuss PH1 operations in November. Call started at 1443.  
BPA- Bettin, Lut  
RCC- Baus, Wright  
PM-E- Tackley, Rerecich  
OD-TF- Mackey  
OD-B- Hausmann, Schwartz

Looking at being able to put about 88-95kcfs through PH1 in November, with nine units available.

Addressing the concerns of drawing more fallback to PH1 by operating at BOP, with would be about 105kcfs through the powerhouse, Rerecich suggested going to BOP would likely not affect forebay hydraulics significantly. It was suggested it may be better for the fish to go through the unit operating at a better geometry, though there are concerns about pressure and strike.

Bettin commented on the cost of the flume repair and the proposed operation. He had sent the information in an email as well (below).

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

*From: Bettin, Scott W (BPA) - KEWR-4 [mailto:swbettin@bpa.gov]*

*Sent: Thursday, October 10, 2013 2:32 PM*

*To: Tackley, Sean C NWP; Langeslay, Mike J NWP; Baus, Douglas M NWD; Wright, Lisa NWD; Hausmann, Ben J NWP; Mackey, Tammy M NWP; Klatte, Bernard A NWP; Schwartz, Dennis E NWP; Rerecich, Jonathan G NWP; Lut, Agnes (BPA) - KEWR-4; Kanbergs, Karlis NWD*

*Cc: Sweet, Jason C (BPA) - KEWR-4; Harwood, Holly C (BPA) - TEP-TPP-3*

*Subject: [EXTERNAL] Potential operating costs associated with the lamprey flume repair.*

*Some of you have been asking for the potential power costs associate with the lamprey flume repairs. The cost of running the corner collector and the cost associated with not running outside 1% in November appear to be around \$200,000 each. For some reason the conference line for the call is not working. We will stand by for a new number. -s*

- NOAA (Fredricks) does NOT recommend BOP operation after November 1, as they believe this will increase fallback risk for adult fall Chinook and steelhead. The purpose of the call was to discuss the discrepancy between NOAA's current position and what is outlined in the MOC.

- The AA's question whether the ~10 kcfs difference (please verify) in total B1 flow when operating at BOP would result in a greater fallback risk (is this a detectable difference?). If not, the biological question is whether we have reason to believe that the BOP or 1% operation has "safer" geometry for adult fallbacks.

- Additional information is needed to resolve these questions. The AA's and FPOM may ultimately have to rely on professional judgment in this case, as empirical data are lacking.

- The government shutdown limits our ability to complete coordination with NOAA on this matter. Tackley recommends deferring to NOAA's judgment and previous comments in the event that these questions aren't resolved before November 1 or whenever conditions would trigger changing to BOP. Bettin will see if this is acceptable to BPA.

- Bettin noted that prior to chum operations, we can accommodate the 1% operation without additional cost up to a total river Q of 135 kcfs (assuming no turbines are lost in the interim); we may not 'need' to operate at BOP.
- A follow-up FPOM discussion will occur ASAP once the government shutdown ends. IF the post-November operation questions is not resolved prior, the AA's will have a conference on October 31. Waiting until the end of the month will help ensure that the inflow forecasts are more accurate.
- If NWP personnel (Tackley, Rerecich, and Mackey) are furloughed, RCC (Baus and Wright) will work with NWW (Bailey and Moody) on resolving this coordination issue.

#### INFO NEEDS

- B1 forebay conditions under high flow scenarios (Ebner?)
- Direct injury and survival of adult salmonids via turbines

Info needed: Is there more information on how many fish we would attract if we spill instead of run the turbines outside 1% as specified in the FPP.

The second point is that BOP is not what we are talking about. In the FPP The restriction is in or outside 1%. The BOP table, in the FPP, is just what we run to in the spill season if we are trading generation from one powerhouse to the other. In this instance we are talking about the 1% season which is November 1 through March 1 at BON. During that season the turbines can be run up to generator limit/cavitation limit. -s

#### **Final results-**

This coordination went forward as written, with the issue of PH1 turbine unit operation range left to be addressed if needed. As it was, the divers completed their work on 30 October and the DSM returned to service on 31 October.

From about 1500 on 31 October until 1230 on 1 November BON operators prioritized screened PH2 units, followed by PH1 units and then unscreened PH2 units with the B2CC.

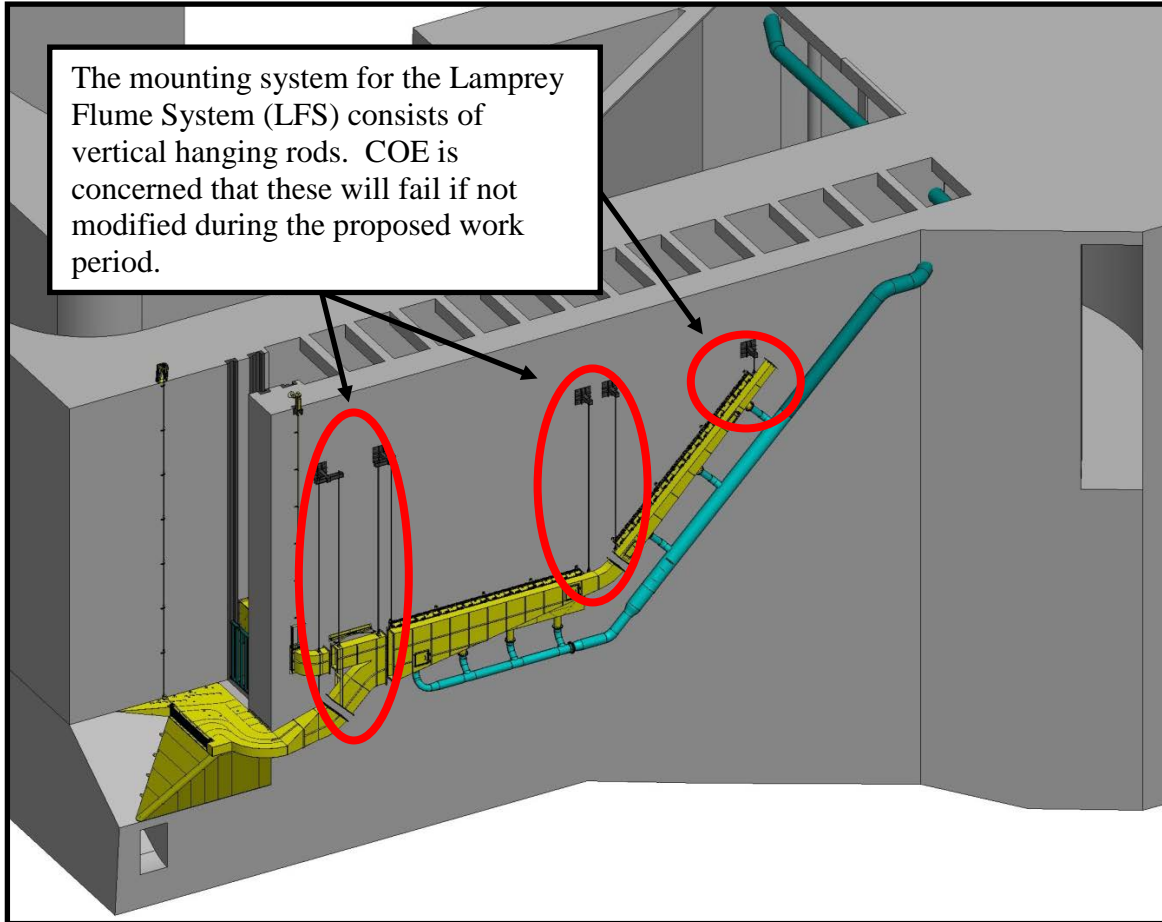
By 1600 on 31 October there were four PH2 units screened. Up to three PH1 units were operated up to 1230 on 1 November.

At 1100 on 31 October, forebay remained at or above 72.5' and increased to 74' by 0900 on 1 November.

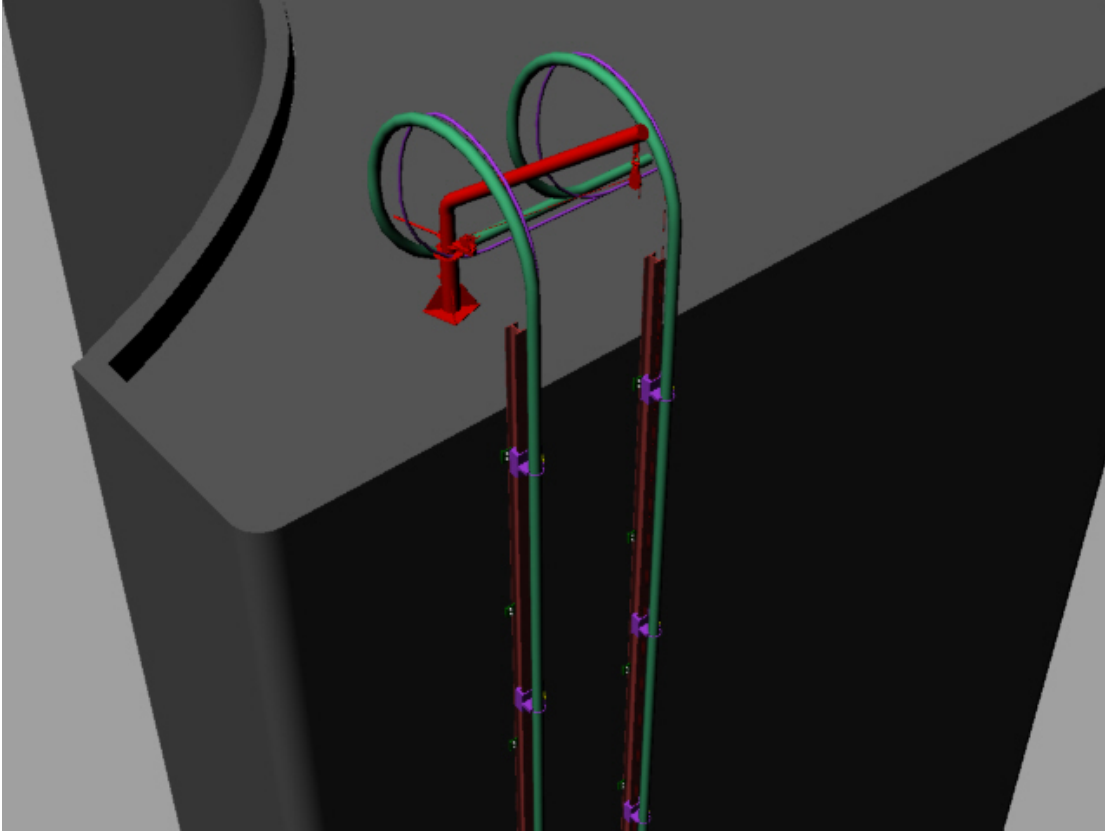
At this time, PH2 is the priority powerhouse and a minimum of 72.5' forebay restriction is in effect.

Please email or call with questions or concerns.  
Tammy Mackey/ Sean Tackley

**Figure 1.** Isometric rendering of the Lamprey Flume System (LFS) with gravity flow water supply system. During the proposed work period, COE intends to modify the mounting/support system for the LFS, secure HDX-PIT conduit, and install permanent mounting hardware for the pumps that supply water to the adjacent LPS (not shown).



**Figure 2.** Conceptual design for permanent LPS pump system. A davit will be used to raise and lower pumps (including hoses shown in green and electrical conduit shown in purple) down i-beams via trolleys. Pumps supply water to the LPS ramp and collection tanks at the top of the Lamprey Flume System. Installation during the proposed work period would involve securing i-beams to the west wall of the WA Shore monolith (in place of current temporary pump system). Design details will be shared with FPOM as they are developed.



**Table 1.** Passage of adult salmonids at Bonneville Dam from October 15 through November 12 (2004-2012 counts).

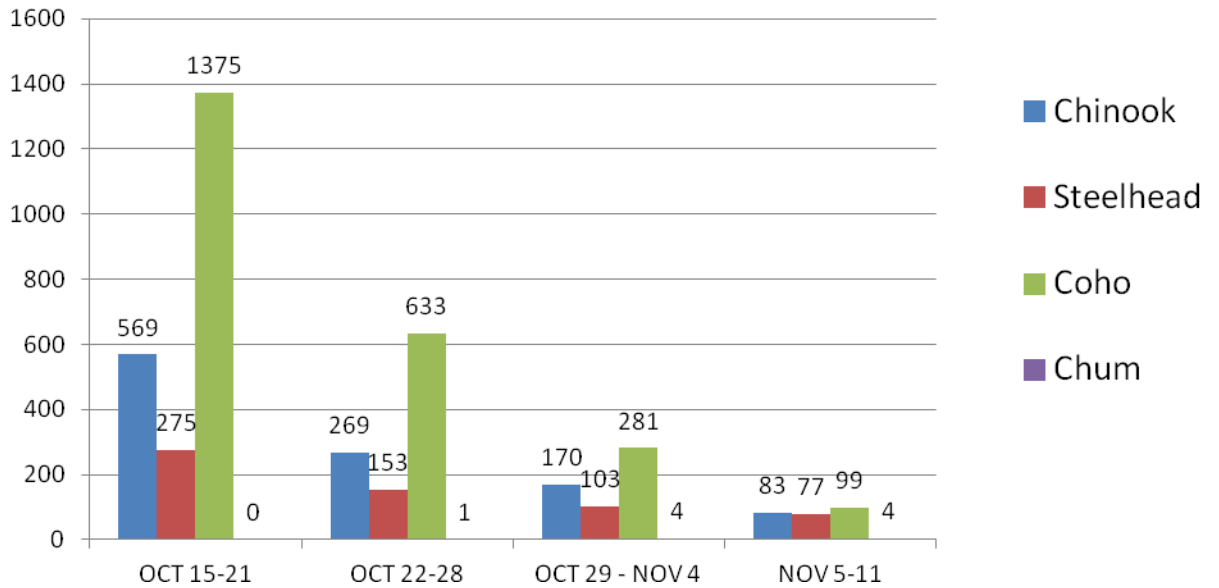
<b>Passage at Bradford Island Fish Ladder (October 15 - November 12)</b>							
<b>Year</b>	<b>Chinook</b>	<b>Steelhead</b>	<b>Coho</b>	<b>Chum</b>	<b>Ladder Total</b>	<b>BON Total</b>	<b>% of Total BON</b>
2004	3218	1083	2293	4	6598	27881	23.7%
2005	3512	2719	2781	87	9099	20594	44.2%
2006	4044	1296	5005	11	10356	35310	29.3%
2007	1938	712	3160	21	5831	28855	20.2%
2008	1201	537	2977	17	4732	20083	23.6%
2009	1040	1171	6419	12	8642	53011	16.3%
2010	1561	783	5315	16	7675	31455	24.4%
2011	5945	1853	3682	11	11491	19074	60.2%
2012	1656	1578	1648	4	4886	19835	24.6%
<b>Mean</b>	<b>2679</b>	<b>1304</b>			<b>7701</b>	<b>28455</b>	
<b>% Mean Passage</b>							<b>29.6%</b>

<b>Passage at Washington Shore Fish Ladder (October 15 - November 12)</b>							
<b>Year</b>	<b>Chinook</b>	<b>Steelhead</b>	<b>Coho</b>	<b>Chum</b>	<b>Ladder Total</b>	<b>BON Total</b>	<b>% of Total BON</b>
2004	6624	2806	11853	0	21283	27881	76.3%
2005	3710	3430	4327	28	11495	20594	55.8%
2006	7766	5817	11272	99	24954	35310	70.7%
2007	4252	2802	15925	45	23024	28855	79.8%
2008	2921	1818	10571	41	15351	20083	76.4%
2009	4235	5389	34682	63	44369	53011	83.7%
2010	4790	1891	17022	77	23780	31455	75.6%
2011	4354	660	2563	6	7583	19074	39.8%
2012	5675	2363	6869	42	14949	19835	75.4%
<b>Mean</b>	<b>4925</b>	<b>2997</b>			<b>20754</b>	<b>28455</b>	
<b>% Mean Passage</b>							<b>70.4%</b>

**Figure 3.** Mean daily salmon and steelhead passage at Bonneville Dam during the proposed work period (2004-2012).

### Mean Daily Salmonid Count at Bonneville Dam (2004-2012)





# Use for Lamprey Repair Work

Note: The gate openings are provided in 1/2 foot increments of verticle lift. One gate stop equals a 1/2 foot gate opening. The total discharge is based on the spillway rating curves revised in February 2005.

Bonneville Spillway Discharge Distribution Patterns																			
Spillway Bay Number																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Gate Stops	FB=74.0 Total Spill (cfs)
vertical gate opening (ft.)																			
0.5	0																	1	1,150
1	0																	2	2,275
2	0																	4	4,456
2	2																	8	8,913
2	2	2																12	13,369
2	2	2	2															16	17,825
2	2	2	2	2														16	17,825
2	2	2	2	2	2													20	22,281
2	2	2	2	2	2	2												24	26,738
2	2	2	2	2	2	2	2											28	31,194
2	2	2	2	2	2	2	2	2										32	35,650
2	2	2	2	2	2	2	2	2	2									36	40,107
2	2	2	2	2	2	2	2	2	2	2								40	44,563
2	2	2	2	2	2	2	2	2	2	2	2							44	49,019
2	2	2	2	2	2	2	2	2	2	2	2	2						48	53,476

**COORDINATION TITLE- 13BON51 addendum 1**

**COORDINATION DATE- 31 October 2013**

**PROJECT- Bonneville Lock and Dam**

**RESPONSE DATE- 1 November 2013 by noon.**

**Description of the problem-** Lamprey operations have concluded two weeks early. The Project is moving forward with returning the DSM to service today (31 October) and will have screens in units 12-14 by COB. If riggers are able to come in tomorrow, we may have all but one unit screened. As this is the end of hunting season, there are many riggers on leave and the ability to get a crew for screen installation on Friday won't be known until 1300 today. If riggers are not available to come in tomorrow, PH2 will return to normal (fully screened) operation by COB on 5 November.

The issue at this time is powerhouse priority. NOAA Fisheries would prefer we switch to PH2 priority as soon as possible since they feel fish survival through that powerhouse is better than through PH1.

**Option A** is to switch powerhouse priority to PH2 and open the B2CC when unscreened units are operated.

**Option B** is to keep the forebay elevation at a minimum 74'-74.5' so the ITS chaingates remain in criteria. The FPP criteria for the automated gates is 2.5' over the gate. When forebay elevation drops to 72', the ITS is out of criteria. The lower limit on the automated gates is set at 70'.

**Option C** Place a hard constraint minimum of 72.5' msl on the forebay. This allows at least 2.5' of flow over the automated ITS gates. This hard constraint would remain in place until 5 November. Switch powerhouse priority this afternoon once the PIT tag testing in B2CC is done, and run the screened units as they become available. The unscreened units in PH2 will be last on first off and require the B2CC to run if they are on. The extra two hours of running the corner collector would no longer be in place since screened units will be running to provide a route for adult passage.

**Option D** Similar to Option C except unit priority would be PH2 screened units, PH1 units then unscreened PH2 units.

**Type of outage required-** No outage required, just a switching of powerhouse priority and forebay restriction.

**Impact on facility operation-**

**Option A-** PH2 would be the priority powerhouse with screened units as priority over unscreened units. The B2CC would be open only when unscreened PH2 units operate. Flushing would still occur.

**Option B-** The Project would have a 74' hard constraint minimum forebay. PH1 units would remain priority units.

**Option C-** The Project would have a 72.5' hard constraint minimum forebay. PH2 would be the priority powerhouse with screened units as priority over unscreened units. The B2CC would be open only when unscreened PH2 units operate. Flushing would still occur.

**Option D-** The Project would have a 72.5' hard constraint minimum forebay. PH2 would be the priority powerhouse with screened units as priority followed by PH1 units, then PH2 unscreened units. The B2CC would be open only when unscreened PH2 units operate. Flushing would still occur.

**Dates of impacts/repairs-** 31 October through 5 November.

**Length of time for repairs-** Up to six days but if riggers are available on Friday, the duration may be shorter.

**Expected impacts on fish passage-** We will be returning PH2 as the priority powerhouse and returning the DSM to FPP criteria while improving ITS operation with a hard forebay constraint.

**Comments from agencies**

**NOAA Fisheries (via phone)-** strongly prefers A but willing to accept B. Could accept C if FB elevation is 74'. Need for increased forebay is to provide better flow over gates 1A and 1B if ITS is primary downstream route.

**BPA (via phone)-** could not agree to 74' but willing to go to 72.5' to keep all gates within FPP criteria. Preferred Option D as that priority was used to take the DSM down and is what is in the original MOC.

**Final results-** From about 1500 on 31 October until 1230 on 1 November BON operators prioritized screened PH2 units, followed by PH1 units and then unscreened PH2 units with the B2CC.

By 1600 on 31 October there were four PH2 units screened. Up to three PH1 units were operated up to 1230 on 1 November.

At 1100 on 31 October, forebay remained at or above 72.5' and increased to 74' by 0900 on 1 November.

At this time, PH2 is the priority powerhouse and a minimum of 72.5' forebay restriction is in effect.

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

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Columbia River Coordination Biologist  
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