OFFICIAL COORDINATION REQUEST FOR
NON-ROUTINE OPERATIONS AND MAINTENANCE

COORDINATION TITLE- 24BON010 MOC B2FGE Post Construction Evaluation 2024
COORDINATION DATE- 20April2024
PROJECT- Bonneville Lock & Dam
RESPONSE DATE- 11April2024

Description of the problem

The Corps' Bonneville Powerhouse 2 Fish Guidance Efficiency (B2FGE) Program completed structural modifications to gatewells of units 11-18, at Bonneville Lock & Dam in November 2023. See SRWG 2024 Implementation Plan (PNNL, 2024) and Research Summary SPE-P-24-1 for more background information on the B2FGE Program.

The Corps plans on implementing the B2FGE study during the spring and summer of 2024. Testing results will provide meaningful data to assist in informing the evaluation of nearly 20 years of regional forum coordination on operations and project modifications to improve conditions for juvenile salmonids at Powerhouse Two (PH2). With every year comes unique circumstances ranging from extremes in water years (e.g. low vs high water year) to unplanned events/outages/etc. Despite the unplanned outages of 9 out 10 units at Powerhouse One (PH1) as noted in recent coordination, the Corps plans on conducting the B2FGE study because hydraulic conditions at BON and operating conditions at PH2 will meet the study design objectives to evaluate modifications of PH2 units associated with this test.

The study will use biological fish condition monitoring at the Juvenile Monitoring Facility (JMF) collected for the Smolt Monitoring Program (SMP) to compare the distributions of descaling and mortality of juvenile migrants at the middle and upper 1% peak efficiency turbine operating range for spring (20 April -05 June) and summer (08 June – 20 July), 2024. These study ranges cover the approximate dates at which the SMP sample changes from being mostly dominated by yearling Chinook to subyearling Chinook salmon (https://www.cbr.washington.edu/dart/query/smolt_hrt).

A randomized block study design will be used to expose juvenile fish to the designated treatments (middle vs. upper 1% operations) to help differentiate the influence of factors not directly related to the treatment comparisons (e.g., river flow, temperature, fish size/species/number, etc.) that vary throughout the season from the influence of operational treatments of interest. The block-treatment study design will result in ten 24-hour SMP samples during mid 1% peak efficiency range operations and ten 24-hour SMP samples during upper 1% peak efficiency range operations during spring and nine 24-hour SMP samples during both mid and upper 1% range operations in summer. All fish sampled in the JMF during each treatment and season will be combined to produce spring middle 1% descaling and mortality rates, spring upper 1% descaling and mortality rates, summer middle 1% descaling and mortality rates, and summer upper 1% descaling and mortality rates. Descaling and mortality rates will be compared between middle and upper 1% operations separately for spring and summer.

In addition to the study outlined above, an impingement study to evaluate potential fish impingement on the Vertical Barrier Screens (VBSs) of a single unit will occur on selected dates through the spring and summer test periods. This study involves the use of acoustic underwater cameras (sonars) and spot checks using the STS/VBS video inspection truck. The sonars will be deployed in gatewells 15A (modified) and 15C (unmodified) during specified operations in the middle and upper 1% peak efficiency range. Acoustic camera sampling will occur over a 24hr period (≈0700 to 0700) once per week during the study periods. Unit 15 is the unit of choice for this evaluation due to the extensive research of flow conditions and fish passage that has been conducted historically at Unit 15. However, if a Unit 15 outage occurs during the impingement evaluation, Unit 16 will be the next in priority for this evaluation. In addition, to ensure Units 15 (or 16) are operating at the time of the scheduled impingement evaluations, the turbine unit priority order will need to be adjusted on impingement evaluation days.

The mobile imaging sonars will be deployed using a portable A-frame crane with electric winch attached to a weighted aluminum frame. The frame will be lowered to the desired elevation near 58 ft msl (16 ft deep) and oriented to sample along the VBS face. The sonar location within the gatewell will be similar for 15A, 15C, 16A, and 16C throughout the spring and summer sampling periods and oriented to sample the bottom northern portion of the VBS, which corresponds to the regions of highest through-screen velocity as measured by Alden (2022).

Sonar samples will be supplemented by conducting spot checks of impingement using the optical video cameras on the STS/VBS video monitoring truck during standard STS/VBS inspections performed by project staff. A digital video recorder will be attached to the truck feed to record and document the spot check results in the gatewells.

Type of outage required

No outages are required to support the study.

Impact on facility operation (FPP deviations)
See below for specified FPP deviations.

Impact on unit priority
Section 4.1 Turbine Unit Priority Order
Impingement test operations will result in PH2 units being operated out of unit priority order as defined in FPP Table BON-13.

Normal FPP PH2 Unit Priority - 11, 18, 12, 17, 13, 14, 15, 16
During specified impingement evaluations - 11, 18, 15, 16, 14, 12, 17, 13

Impact on forebay/tailwater operation
Forebay operation: To allow B2 units to operate within the upper 1% peak efficiency treatment flow range during periods when overall project head is near 57' or greater, a lower forebay operating range (71.5' – 73.0') may be needed within the normal forebay operating range. This operating range is because BON PH2 units have a generator limit that restricts turbine output at higher project heads. These values are represented in FPP Table BON-15.

No impacts on tailwater operation.

Impact on spill

PH 2 units under the test schedule operation blocks of middle and upper 1% peak efficiency range may be out of criteria as defined in FPP Section 4.2.1.2.b / Table BON-14 Sequential Steps to Pass Increasing Flow per Temporary PH2 Operating Range Guidelines in section 4.2.1.2.b. Refer to **Table 1** for potential impacts on spill during B2FGE testing.

Table 1. Potential Impacts on Spill during B2FGE Test Periods

Total Q (kcfs) *	FPP PH2 Operation	FPP/FOP Spill Operation	Test Mid-Point	Test Upper 1%
Up to 293	Mid-Point	FOP (150)	No effect	Spill < 150 (-3k/unit)
293 - 317	Upper 1%	FOP (150)	Forced spill > 150 (+3k/unit)	No effect
317 - 347	Upper 1%	Forced > 150, up to 180	More forced spill (+3k/unit)	No effect
Above 347 **	Mid-Point **	Forced > 180 **	No effect	Less forced spill (-3k/unit)

* Assumes all 8 PH2 units are available + 1 PH1 unit at BOP + 12 kcfs misc flow (B2CC, ladders, etc).
** Only applies during the "juvenile trigger". If the "adult trigger" is in effect, all flow above 317k will be additional forced spill.

Dates of impacts/repairs
Spring: 20 April – June 05, and Summer: 08 June – 20 July 2024.

Length of time for repairs
A detailed operation schedule with middle and upper 1% flow ranges defined at specific times and dates will be provided to Bonneville Dam Operations and an RCC teletype will be issued.

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;**

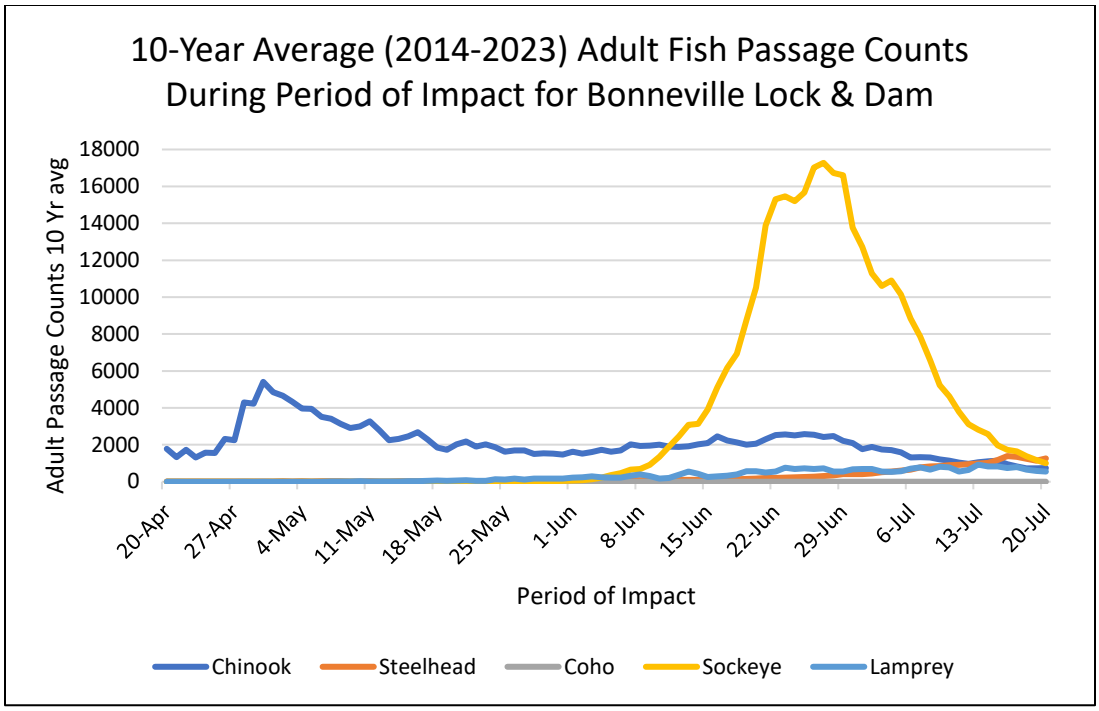

Figure 1. 10-year average (2014-2023) adult fish passage counts during the period of impact at Bonneville Lock & Dam for the B2FGE post-construction evaluation occurring between April 20 – July 20th. Data obtained from Columbia River DART.

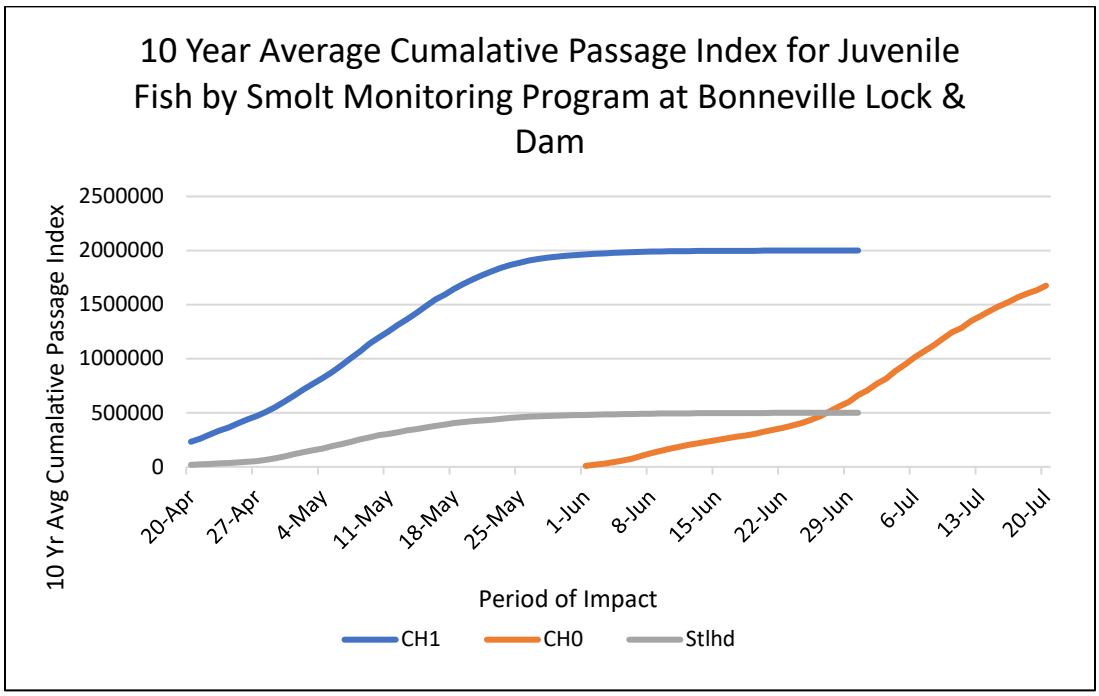

Figure 2. 10-year average (2014-2023) cumulative juvenile fish passage index for yearling Chinook (CH1), subyearling Chinook (CH0), and Steelhead at Bonneville Lock & Dam from the Smolt Monitoring Program. Data obtained from Fish Passage Center.

2. **Statement about the current year's run (e.g., higher or lower than 10-year average);**

- Based on WDFW's 2024 adult forecasts obtained from: https://wdfw.wa.gov/sites/default/files/2024-01/2024-spring-summer-forecasts.pdf
- Compared to the 10-yr avg BON passage obtained from DART at https://www.cbr.washington.edu/dart/query/adult_daily

  2024 Spring Chinook upriver total (121,000) are forecasted to be higher than the 10-yr avg of 112,443.

  2024 Summer Chinook (53,000) are forecasted to be lower than the 10-yr avg of 94,886.

  2024 Total Columbia Sockeye (401,700) are forecasted to be higher than the 10-yr avg of 315,420.

  2024 Total Upriver Steelhead (126,200) are forecasted to be lower than the 10-yr avg of 162,989.

3. **Estimated exposure to impact by species and age class (i.e., number or percentage of run exposed to an impact by the action);**
   - The study period of 20 April through 20 July covers roughly the 25-yr median of the 80% range of historic run timing for predominant juvenile outmigration at BON.
   - No adult impacts expected.
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.);**

   No impacts expected.

Summary statement - expected impacts on:

Downstream migrants

The purpose of this study is to determine if the structural improvements completed in the gatewells A&B of B2 units have resulted in acceptable fish passage conditions at the middle and upper 1% peak efficiency range, therefore, at this time it is unknown if there are negative impacts to downstream migrants when implementing the test schedule.

For the impingement evaluation, sonar equipment will be deployed in a single unit's gatewells (slots A&C) for 24 hours, once per week during the study periods. The sonar platform can be seen in **Figure 3**. The sonar platform will be deployed in the middle of the gatewell slot, roughly 16 feet below the water surface near el. +58' which is near the central region of the VBS. Fish that enter the gatewells during the 24-hr impingement evaluation may encounter the sonar mounting platform. However, fish should be able to swim away from the equipment as velocities near el.+58' are relatively small in magnitude (Alden 2022) at this elevation while the unit was running at 18.2kcfs, which is greater flow condition than what this study is proposing.

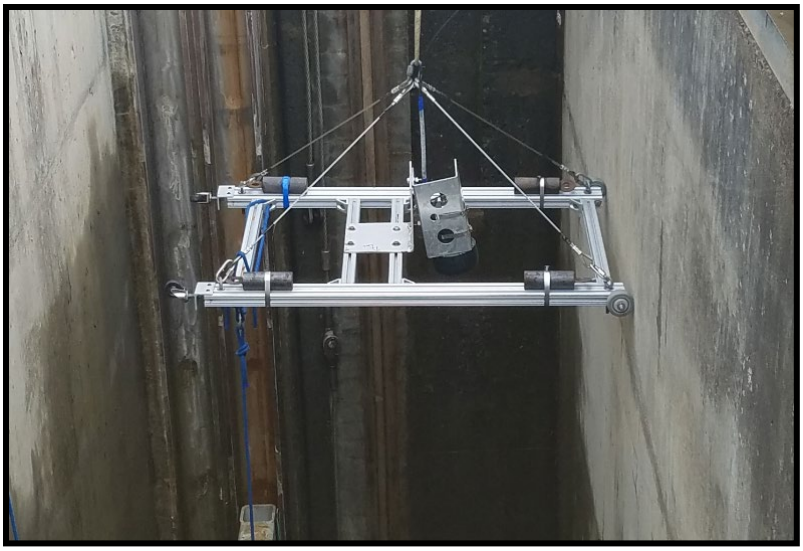

Figure 3. Photograph of sonar mounting platform. Photo from of PNNL (2024).

Upstream migrants (including Bull Trout and Lamprey)
No impacts to adult salmonids, bull trout, or lamprey ladder entry or migration since Powerhouse 2 remains the priority powerhouse and both end units (11 & 18) remain at the top of the unit priority list to aid in attraction to the adult ladder monolith entrances in the Powerhouse 2 tailrace. Lamprey nighttime operations that begin 01 June (FPP Section 2.4.2.13.vi) will not be impacted by the B2FGE test schedule.

References:

Harnish, R., Ham, K., & Mueller, R. (2024). *Study Design and Implementation Plan for Bonneville Dam Powerhouse 2 Gatewell Improvement Post Construction Evaluation Draft Report*. Pacific Northwest National Laboratory Prepared for United States Department of Energy under Contract DE-AC05-76RL01830.

Columbia River DART, Columbia Basin Research, University of Washington. (2024). Adult Passage Counts Graphics & Text. Available from https://www.cbr.washington.edu/dart/query/adult_graph_text

Fish Passage Center, FPC (2024). FPC Smolt Monitoring Program Data. Cumulative Passage Index with Average Run Timing for Past Years. Available from https://www.fpc.org/smolt/smolt_queries/Q_smolt_cumulativepassindex_dataquery.php

Washington Dept. of Fish and Wildlife (2024). WDFW. 2024 Forecast and Model Runs. Columbia River forecasts accessed at https://wdfw.wa.gov/fishing/management/north-falcon/forecasts

Comments from agencies

April 11 FPOM minutes

1.1.1. 24BON010 MOC B2FGE Post Construction Evaluation 2024 – Lorz said it's fine but thinks there is still problems with this test, no Spring Creek evaluation this year since fish have already been released, and he believes the test will not answer all needed questions. Wertheimer said let's see what the results say and assess data gaps at that time. Conder is 100% supportive of the test going forward but is concerned as the study was set up to coincide with the Spring Creek releases and anticipates further discussions as testing will not be going above the upper 1%.

May 9 FPOM minutes

3.3.1.3. 24BON010 MOC B2FGE Post Construction Evaluation 2024 – Evaluation is underway and going according to schedule. There is one month remaining until the switch over to summer testing. Testing is going well despite the low flows. First sonar impingement evaluation was this morning,

July 11 FPOM draft minutes – Rerecich requests to continue daily sampling over the 70ºF threshold

3.3.1.3 Update for FGE – Rerecich (USACE) said they need as much sampling as possible for FGE testing at BON PH2. Testing will continue until 0700 on 20 July. Temps are 69º currently but once we get to the 70º trigger the ask is to continue to sample as normal until test completes on 20 July. Or second best is every other day at a normal sample rate. Switch to bypass on the odd day. Van Dyke (ODFW) asked how they would account for temp impacts. Rerecich (USACE) indicated PNNL would need to look at the data and address temp increase impacts. Rerecich relayed info from SMF Bio, Ballinger, stated that at 73º there would be changes in fish behavior in the sample tanks but does not object to normal sampling if temps remain very close to 70F trigger to support the remaining days of FGE study, as long as this request does not continue indefinitely. Rerecich (USACE) said operations at the dam would remain the same. Ebel (IDFG) said the SMP has a permit, and this might be broader than asking FPOM for a change to the FPP. Ebel (IDFG) said that SMP needs to be address and asked if it was discussed with the SMP and the FPC. He also asked if there was enough fish for statistical power for their test. Rerecich said the summer period could be short on fish, due to low flows and few units operating. Conder (NOAA) said they would support continuing at 71º and if temps go over that switching to every other day sampling. Van Dyke is not sure there is enough information to support changing from the FPP criteria and recommends every other day sampling. Van Dyke said he wants to ensure this is documented in the report.
Morrill and Van Dyke also encouraged investigating the permit with SMP and PNNL to ensure they are aligned. **ACTION:** Rerecich will check with Ballinger and PNNL concerning permitting prior to proceeding with normal sampling at a 71º threshold.
Morrill (WDFW) sees no issues supporting continued sampling as needed for testing.
Lorz (CRITFC) will go with Conder's (NOAA) recommendation.
Webex CHAT from Ben Hausmann (BPA) to everyone: 10:46 AM
It sounds like we're only talking about the potential for 4 days of sampling at 70 degrees. I think the minimal risk makes sense for the integrity of the FGE study.

From: Madson, Patricia L CIV USARMY CENWP (USA)
Sent: Tuesday, July 16, 2024 6:50 AM

Subject: FPOM Official Coordination: B2 FGE sampling efforts

FPOM representatives,

Here is the update on the B2 FGE sampling efforts during elevated river temperatures.

On July 15, we met the 70F threshold per the FPP to trigger high river temperatures sampling protocols at the BON SMF.

On July 11th, we coordinated with FPOM that if we reached 70F we would continue to sample as normal until water temperatures reached 71F. This will allow the USACE and the PNNL to continue to support the B2 FGE testing. The B2 FGE sampling effort will be complete at 0700 on July 20th. The USACE POC has coordinated with SMF staff about permits and take numbers associated with the extended sampling efforts. If you have additional questions or concerns, please contact Jon Rerecich (Jonathan.g.rerecich@usace.army.mil, 503-808-4779).

1.4. BON JMF Sampling at Water Temperature > 70°F.

a) Daily average river temperatures will be obtained from the Corps website for Lower Columbia River projects[1]. Project Fisheries will use the Project thermometer in the sample holding tank for official reporting requirements, instantaneous temperatures and when online data are unavailable.

b) Daily index sampling will be reduced to every-other-day index/condition monitoring.

c) The upper switchgate is used to select between sample and bypass mode.

d) Sample sizes will be reduced to approximately 100 fish per day.

e) Monitoring for gas bubble trauma (GBT) symptoms will continue.

f) An instantaneous temperature of ≥ 70°F taken from 0630–0700 hours will trigger a change in sampling mode after Project Fisheries notify SMP Biologists.

g) Normal index sampling may resume when daily average temperatures are ≤ 69.5°F.

h) If there is a research need to sample at temperatures > 70°F, coordination with FPOM will be initiated by the researcher through the Corps District POC.

i) If SMP and Project Fisheries biologists suspect a bypass system problem during high temperature sampling, additional sample collection may occur. FPOM will be notified ASAP and provided with updates as problem resolution attempts proceed.

1.5. BON JMF Bypass Mode Operation (or when no PDS Monitors).

a) The upper switchgate will be in bypass mode.

b) The Emergency fish release valve will be open.

c) All rotating gates will be set to bypass.

d) The bypass flume gate will be raised.

e) Project Biologists will inspect the facility daily.

Patricia L. Madson
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Fisheries Field Unit
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c: (541) 645-0619

FPOM Website:
http://pweb.crohms.org/tmt/documents/FPOM/2010/

From: VANDYKE Erick S * ODFW <erick.s.vandyke@odfw.oregon.gov>
Sent: Tuesday, July 16, 2024 11:48 AM

Subject: [Non-DoD Source] RE: FPOM Official Coordination: B2 FGE sampling efforts

Thank you for the update. ODFW did not endorse the USACE plan to forego temperature issues during B2 FGE sampling, or endorse the proposed change in sampling protocol during the FPOM discussion. I explicitly recommended to follow the rules that shift to every-other day sampling first and to check-in with 1) the permit holder (different than individual or staff at the facility), and 2) the regulators that issued the permit(s). Did USACE reach out to Fish Passage Center or Smolt Monitoring Program? Was NOAA/ODFW permitting staff consulted about the decision to sample every day without change when temperatures exceeded the permitted threshold? I would appreciate additional information be provided that inform if the other recommendations provided during the FPOM meeting were carried out and a list of actual contacts that were carried out after FPOM. Regards.

Erick Van Dyke
Oregon Department of Fish and Wildlife
Ocean Salmon and Columbia River Program
Fish Passage/Mitigation Technical Analyst
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Cell: 503-428-0773
erick.s.vandyke@odfw.oregon.gov

Final coordination results – Concurrence.

After Action update –

August 8 FPOM draft minutes

3.3.1.3.24BON010 MOC B2FGE Post Construction Evaluation 2024 – Completed on 20 July PNNL is working on post study data analysis report due at the end of Jan 2025.
Lorz asked if they adhered to the schedule in the implementation plan.
Cates informed FPOM that the plan was adhered to.

Impacts during high temperature sampling described in "24BON035 MFR SMF High Temperature Sampling Protocol Deviation to Support B2FGE Post-Construction Evaluation".

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

Rebecca Cates
Fish Passage Section
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