

OFFICIAL COORDINATION REQUEST FOR NON-ROUTINE OPERATIONS AND MAINTENANCE

COORDINATION TITLE: 13BON B2CC hydrofoil PIT detector test

COORDINATION DATE-14 November 2013

PROJECT- Bonneville Dam

RESPONSE DATE- 11 December 2013 (FPOM)

Description of the problem: The corner collector at the 2nd Powerhouse of Bonneville Dam (B2CC) is an ideal location to field test the proof of concept for a full size hydrofoil PIT-tag system due to existing infrastructure, ease of installation, and cost savings. The B2CC provides existing PIT-tag detection that would enable assessment of the PIT-tag detection efficiency of a hydrofoil PIT-tag detection system. Other surface passage facilities in the Federal Columbia River Power System (FCRPS) lack PIT-tag detection that could be used to assess the detection efficiency of a hydrofoil PIT-tag detection system. Furthermore, the entrance width of the B2CC is 15 feet wide and the entrance to other surface passage structures is 50 feet wide. A smaller width surface passage test environment simplifies the approach and reduces the cost of evaluating the proof of concept prototype. A system that provides coverage for the B2CC would only require 4 hydrofoil antennas where as a system for other surface passage structures such as a Removable Spillway Weir (RSW) would require 18 hydrofoil antennas to provide a similar level of coverage because the width of the entrance is larger. Significant cost savings would result from developing and testing the hydrofoil PIT-tag system concept at B2CC compared to other surface passage structures. If the prototype performs well, the concept may be used to develop PIT-tag detection for a variety of surface passage structures.

The original FPOM request was discussed during the 14 March 2013 meeting for an evaluation during the summer 2013. FPOM concluded the test may go forward as coordinated and the next step was to get approval from Bonneville Project. Sands submitted an access request to the Bonneville project and permission was granted 1 May 2013. Award of a contract was delayed until September 17, 2013 resulting in a need to shift the evaluation schedule. This is a follow up MOC based on input from FPOM during the November 14, 2013 meeting. The study comprises a feasibility and compatibility phase followed by an in-water evaluation. The feasibility and compatibility evaluations would include a series of tests at Bonneville Dam and in the laboratory during the fall 2013. These tests would evaluate the hydrofoil concept system feasibility and compatibility with the existing B2CC system in the air and do not include in-water work. The follow up in-water evaluation would be from February to early May 2014.

This MOC is a follow-up request due to changes in the timing of outages and feedback from FPOM during the November 14, 2013 meeting.

Type of change in operations required: Three periods of change in operation of the B2CC are requested, short periods of B2CC operation in February 2014, begin operation of B2CC by 0800 on March 17, 2014 if not already operating, and one outage of up to 8-hours on approximately April 10, 2014 once spill for fish passage has begun at Bonneville Dam (Table 1). The project schedule is summarized in Table 2.

Table 1. Tentative changes in the operation of the B2CC in the Fish Passage Plan required for the evaluation.

Approximate Dates	Operational Change	Activity
~Feb. 3-14	Periodic operation	Installation, counter weight adjustment and orientation of the hydrofoil antennas.
March 17, 2014 0800	Open B2CC	Begin continuous operation of B2CC if not already operating.
early April (~April 10, 2014)	Up to an 8-hour outage	Remove hydrofoil PIT-tag antennas and monitoring equipment (DIDSON camera and equipment barge).

Table 2. Tentative project schedule.

Approximate Dates	Activity
September 17, 2013	Contract awarded.
October 16, 2013	Pre-work coordination meeting.
October 28-31, 2013	Feasibility test to assess compatibility and/or interference issues between an unshielded hydrofoil concept system and existing B2CC PIT-tag detection system.
February 2014	Install prototype forebay PIT-tag antennas and monitoring equipment (DIDSON cameras and equipment barge).
Begin when B2CC opens (between March 1 and March 17) and continue through April 10, 2014	Evaluate the B2CC passage distribution with the prototype forebay PIT-tag detection system installed and B2CC operating (treatment test condition). Evaluate the physical performance of the prototype forebay PIT-tag detection system.
April 3-9, 2014	Test debris response of hydrofoil antennas.
April 10, 2014	Remove prototype forebay PIT-tag detection system and monitoring equipment (DIDSON cameras and equipment barge).

We request intermittent operation of the B2CC to facilitate adjustment and orientation of the hydrofoil antennas during installation during early February 2014. B2CC would need to be opened and closed several times a day over approximately a 5 day period to determine the amount of counter weight and orientation of each hydrofoil as they are sequentially installed.

The draft Fish Passage Plan calls for the B2CC to operate during spill season and this is dependent on meeting a target of kelts at the JMF adult/debris separator with the count beginning on March 01. The tentative target is 2 kelts per day are observed at the JMF separators for 2 consecutive days for a cumulative total of 20 kelts which begins operation of the B2CC for the fish passage season. For the period of 2009 to 2013 the B2CC was opened between March 1 and April 13 and the kelts target was reached between March 14 and April 13 (Table 3). We request that if the kelts target has not been reached by 0800 on March 17, 2014 the B2CC would become operational on March 17, 2014 at 0800.

Table 3. Date of initial operation of B2CC and date kelts target was reached, 2009-2013.

Year	B2CC Opened	Reached kelts target	Notes
2013	1-Mar	22-Mar	Closed 3/13 and reopened 3/22
2012	19-Mar	19-Mar	

2011	14-Mar	14-Mar	
2010	17-Mar	25-Mar	Closed 3/23 and reopened 3/25
2009	13-Apr	13-Apr	

Closure of the B2CC would be required for removal of the hydrofoil PIT-tag antennas and monitoring equipment (DIDSON cameras and equipment barge, Figure 1) in early April (approximately April 10, 2014) after the spill for fish passage operation begins which is typically begins on April 10. It is expected that the outage would require no more than 8-hours to complete.

Impact on facility operation: The installation of monitoring equipment and open and closure of the B2CC will require operational support from the project. Project crane assistance for the installation and removal of monitoring equipment and the prototype forebay PIT-tag detection system will be coordinated with the project. Access to the intake area of the B2CC will be needed by the contractor on a regular basis between October 2013 and May 2014. Access to the BRZ in the vicinity of the B2CC will be needed for monitoring equipment installation and testing. Outages to the B2CC will be required to safely remove equipment. Table 2 is a tentative schedule for major study activities study.

Length of time for repairs: about one month.

Expected impacts on fish passage: Installation of equipment will occur prior to the fish passage season and is not anticipated to negatively affect fish passage. Removal of equipment will occur during the fish passage season.

B2CC outages to remove equipment will temporarily increase the number of fish passing through turbines and the juvenile bypass system and may affect smolt survival. Potential impact to migrating yearling Chinook salmon, coho salmon, sockeye salmon and steelhead smolts, steelhead kelt and adults have been estimated (See Tables 3-7).

The intermittent operation of the B2CC for orientation adjustment of the hydrofoil antennas during installation in early February is not anticipated to negatively impact smolt or adult passage.

The potential operation of the B2CC prior to reaching the kelt target in the FPP is not anticipated to negatively impact smolt or adult passage.

There is no anticipated impact to other studies at Bonneville Dam from February to May 2014. In the event that other studies are conducted at B2CC from February to May 2014 activities will be coordinated to minimize impacts.

Affects of B2CC 8-hour outages in early April:

Smolt Passage

The outage would be up to 8 hours but may be less than 8 hours and would be once the fish passage spill operation has begun. The anticipated B2CC outage would be on April 10 however the actual date would be dependent on the availability of project support. The overall impact to ESA listed smolts was estimated by applying the passage proportions and survival estimates from the Compass Model to the range and average daily smolt passage index (from Fish Passage Center) estimated during the previous 5 years (2009 to 2013). The outage impact to ESA listed smolts was estimated using the NOAA Fisheries 2012 “Estimation of Percentages for Listed Pacific Salmon and Steelhead Smolts Arriving at Various Locations in the Columbia River Basin”. Assumptions used for assessing the impact to smolts included: 1) passage distribution is similar across the day, 2) the 8-hour outage represents 1/3 of the daily passage

numbers, 3) the B2CC outage would affect passage distribution only for the 2nd powerhouse, 4) Compass Model passage distribution and survival for Coho and sockeye salmon were assumed to be the same as yearling Chinook salmon. Compass Model estimates and calculated assumptions are presented in Table 4. Numbers of affected smolts and additional mortality (overall and ESA listed fish) for the 8-hour closure of the B2CC on April 10 is presented in Tables 5.

Table 4. Assumptions by species used to estimate the impact of closing the B2CC on smolts. The B2CC outage is anticipated to affect passage distribution for the 2nd powerhouse only.

	subyearling Chinook	Yearling Chinook	Coho	Sockeye	Steelhead
B2CC survival	99.0%	100.0%	100.0%	100.0%	100.0%
B2 Turbine survival	86.0%	94.8%	94.8%	94.8%	87.9%
JBS survival	95.5%	98.0%	98.0%	98.0%	95.4%
B2CC Operating					
B2CC passage	44.4%	32.5%	32.5%	32.5%	70.7%
B2 Turbine passage	41.7%	43.8%	43.8%	43.8%	15.0%
JBS passage	13.9%	23.7%	23.7%	23.7%	14.3%
B2 survival	93.1%	97.3%	97.3%	97.3%	97.6%
B2CC Closed					
B2 Turbine passage	75.0%	65.0%	65.0%	65.0%	17.0%
JBS passage	25.0%	35.0%	35.0%	35.0%	83.0%
B2 survival	88.4%	95.9%	95.9%	95.9%	94.1%
Change in B2 survival	-4.7%	-1.3%	-1.3%	-1.3%	-3.4%
% ESA listed	37.7%	15.5%	1.5%	0.9%	72.4%
Change in ESA listed survival	-1.8%	-0.2%	0.0%	0.0%	-2.5%

Table 5. Estimated Bonneville Dam smolt passage and additional mortality resulting from closing the B2CC for 8-hours on April 10 (passage was based on the 5-year period 2009-2013).

	subyearling Chinook	Yearling Chinook	Coho	Sockeye	Steelhead
Dam passage (2009-2013)	331 to 1,219	307 to 2,440	156 to 11,601	0 to 218	158 to 1,152
B2CC passage in 24h	74 to 273	57 to 456	29 to 2,169	0 to 41	66 to 484
B2CC passage in 8h (affected)	25 to 91	19 to 152	10 to 723	0 to 14	22 to 161
Estimated additional mortality	0	0	0 to 1	0	0 to 1
Estimated additional mortality (ESA listed)	0	0	0	0	0 to 1

Kelts and Adult Salmon Passage

The outage would be up to 8 hours but may be less than 8 hours and would be once the fish passage spill operation has begun. The anticipated B2CC outage would be on April 10 however the actual date would be dependent on the availability of project support. The overall impact to steelhead kelts and adults was estimated by applying the passage distribution and survival estimates from the report titled *Route-Specific Passage and Survival of Steelhead Kelts at the Dalles and Bonneville Dams, 2012* by Rayamajhi et al. 2013. The numbers of kelts and adults that may be affected by the proposed 8 hour B2CC outages on April 10 was estimated from the monthly counts of kelts and adults observed on the Bonneville Powerhouse separator during the previous 5 years (2008 to 2012; Rick Martinson, PSMFC, personal communication). Approximately 75% of the adults that cross the separator are observed (Rick Martinson, PSMFC, personal communication), so the monthly counts were adjusted up for approximately 25% that are not observed. Daily passage numbers were not available so daily passage numbers were estimated as the daily portion of the monthly total count. Assumptions used for assessing the impact to kelts and adults included: 1) passage distribution is similar across the day (Weiland et al. 2009 did not observe a diel passage pattern), 2) the 8-hour outage represents 1/3 of the daily passage numbers, 3) the B2CC outage would affect passage distribution only for the 2nd powerhouse, 4) passage distribution and survival was assumed similar for kelts and adults salmon. Passage and survival estimates and calculated assumptions are presented in Table 6. Numbers of affected kelts and adults and additional mortality for an 8-hour closure of the B2CC on April 10 is presented in Table 7.

Table 6. Assumptions used to estimate the impact of closing the B2CC on steelhead kelt or adult salmon. The B2CC outage is anticipated to affect passage distribution for the 2nd powerhouse only.

	Steelhead kelt and adult salmon
B2CC survival	95.0%
B2 Turbine survival	60.0%
JBS survival	60.0%
B2CC Operating	
B2CC passage	74.4%
B2 Turbine passage	12.8%
JBS passage	12.8%
B2 survival	86.0%
B2CC Closed	
B2 Turbine passage	50.0%
JBS passage	50.0%
B2 survival	77.4%
Change in B2 survival	-8.6%

Table 7. Estimated numbers of steelhead kelts and adult salmon that may be affected and additional mortality resulting from closing the B2CC for up to 8-hours on April 10 (passage numbers are estimated from 2008-2012).

	Kelts	Adults
Estimated B2CC passage 24h	0 to 1	4 to 41
Estimated B2CC passage 8h (affected)	0	1 to 14
Estimated additional mortality	0	0 to 1

Comments from agencies:

14 March 2013 FPOM- 13BON05 B2CC hydrofoil PIT detector test. (Attached). Laughery provided a .ppt presentation. Installation will require the B2CC be closed for two days. Laughery is looking at an ERDC trip in April to look at the TSW model. Sands submitted a request for access request letter to BON. NWW is waiting on approval from BON before going forward with the contracting to start fabrication and installation. Fredricks said there is the coordination that is occurring today and then further coordination regarding details about timing and deployment. Hausmann said the BON concerns are primarily debris and the impact to the slot filler. Currently there is not a good way to free debris since it is very rare that anything gets hung up at the B2CC. CRITFC is ok with the installation as long as it doesn't significantly impact B2CC operations. Hevlin thanks Fredricks for working out the bugs on this project in NWP rather than at LWG. Fredricks said he figured it would impact less fish at the B2CC than at a TSW at LWG. Fredricks also noted that this test is scheduled for a time when sub-yearlings pass and sub-yearlings do not use the B2CC as much as the spring fish. There will not be any additional fish tagged to pass through this system. FPOM is in agreement with moving this test forward

14 November 2013 FPOM- **13BON89 (updates 13BON05). Not approved.** NWW hydrofoil test in B2CC. Hockersmith explained the schedule changed. A contract was awarded in September. NWW has been coordinating with BON to proceed with testing. Requests include opening the B2CC by 17 March, if the kelt trigger hasn't been met; an eight hour closure in April; an eight hour closure in May.

Fredricks expressed concerns about the potential impact to kelt passage and the juvenile spring migrants. He also expressed concern about the outages in April and May, especially the one in May. He asked why the schedule previously coordinated for 2013 couldn't be used for 2014. Fredricks is more comfortable testing the sub-yearling run (which generally doesn't use the B2CC in the summer) rather than killing ESA fish in the spring. Hockersmith said the problem with just delaying a whole year include modification to two contracts and equipment availability. Fredricks then commented on the "controls". He said the proposed controls are not controls. He would like to see a block design. Hockersmith said the block design would be difficult. Fredricks then asked about the need for the biological portion of the testing. Sands said testing at BON is really a worst case scenario; if it works at BON it should work at LWG (location of final installation).

Lorz asked why this prototype isn't going in at LWG. Hockersmith said four hydrofoils can span the entire B2CC as opposed to needing 16 for a RSW. There is also redundancy with the B2CC PIT tag detector. Fredricks said there is lower risk at BON, where only a portion of fish pass the B2CC as opposed to the bulk of the fish passing the LWG RSW. Lorz countered that testing early in the year would avoid that issue at LWG. He strongly suggested testing it where you plan to install it because this would not be needed at the B2CC. Sands said the support structure needed to suspend the hydrofoils at LWG would be more expensive and difficult.

FPOM recommends the April outage occur after spill starts. Lorz said to take all of the equipment out in April so the May outage isn't needed. Petersen said she will take the 17 March opening back to BPA. Hausmann noted there may be a need to take out Unit 12 to allow boat access to the log boom.

ACTION: Sands and Hockersmith will look at the options, update the MOC and send it back to FPOM.

Options are:

- 1. Scrap the control and pull everything in early April.**
- 2. Pull the hydrofoils and leave the DIDSON until mid June.**
- 3. Push back the entire test until the summer of 2014.**

CRITFC- -----Original Message-----

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

Sent: Thursday, November 21, 2013 8:43 AM

To: Mackey, Tammy M NWP

Subject: [EXTERNAL] Re: 13BON89 NWW hydrofoil test in B2CC (UNCLASSIFIED)

This is fine, will still state the obvious that LGR is a better location to install or numerous reasons that I have previously outlined, but if the COE and NOAA are ok with this I will not object as long as this does not impact kelt operations and we only have one shut down on or around April 10th after spill has started and no second shut down later in May. tom

NWW and NOAA

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

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

Sent: Friday, December 06, 2013 7:56 AM

To: Mackey, Tammy M NWP

Cc: Trevor Conder - NOAA Federal; Lorz, Tom; Laughery, Ryan O NWW; Hockersmith, Eric E NWW; Zyndol, Mirosław A NWP

Subject: [EXTERNAL] Re: FPOM: Official Coordination 13BON89 and 13JDA04 (UNCLASSIFIED)

Tammy,

Regarding the BON MOC: I appreciate the detail in this MOC and I agree that the work as now proposed should have little impact on juvenile salmon. However, I'm not so sure about the impact on kelt passage. They need to be prepared to pull the system if we see evidence of significant avoidance by kelts (via the Didson monitoring or perhaps the separator counts).

Thanks, Gary

On Mon, Dec 9, 2013 at 1:15 PM, Hockersmith, Eric E NWW <Eric.E.Hockersmith@usace.army.mil> wrote:

Gary,

Per our conversation at NWW FFDRWG I looked into the previous B2CC kelt passage behavior research.

In 2007 and 2008 PNNL used hydroacoustics to enumerated Bonneville Dam passage distribution for kelt. In 2008, they also examined the passage behavior of kelt in front of the corner collector. The behavior of 172 kelt were examined and 48% moved downstream and into the corner collector while 52% swam towards the B2CC, but subsequently swam back upstream away from the B2CC entrance. Median time that kelt remained in the DIDSON field was 2 seconds for fish passing into the B2CC and 3 seconds for fish that did not pass. Maximum detection time for passed and unpassed fish was 8 and 27 seconds, respectively. As a result of the water velocity in front of the B2CC, no milling behavior was observed.

Eric Hockersmith

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

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

Sent: Tuesday, December 10, 2013 6:08 AM

To: Hockersmith, Eric E NWW

Cc: Mackey, Tammy M NWP; Trevor Conder - NOAA Federal; Lorz, Tom; Laughery, Ryan O NWW

Subject: Re: [EXTERNAL] Re: FPOM: Official Coordination 13BON89 and 13JDA04

(UNCLASSIFIED)

Thanks Eric, This puts things in perspective. It will likely be difficult to see if there is much of an issue with the hydrofoils unless there is a huge negative response. I guess I'm most interested to see how the fish behave just as they encounter the hydrofoil line. The point where they reject the entrance (if they do) would be of interest and could perhaps be compared to the previous work. How quickly would we be able to get results from the Didson observations? Thanks, Gary

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

From: Hockersmith, Eric E NWW

Sent: Tuesday, December 10, 2013 1:53 PM

To: Gary Fredricks - NOAA Federal

Cc: Mackey, Tammy M NWP; Trevor Conder - NOAA Federal; Lorz, Tom; Laughery, Ryan O NWW; Sands, Jack D NWW

Subject: RE: [EXTERNAL] Re: FPOM: Official Coordination 13BON89 and 13JDA04

(UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Gary,

I spoke with the contractor they will have a data connection with the site that can transmit 4-10 hrs/d total or 2-5 hrs/d/cameras (they will be using 2 DIDSON cameras). Alternatively, they could have the data retrieved manually and processed locally.

Since the focus is on kelts, large targets, they thought they could use software (the EchoGram tool within the DIDSON software) to automate processing. They thought they could put a technician on full time for this effort and could process 8-12 hrs of real-time data each day of kelt size targets only. The COE will be modifying the contract for a reduction in scope due to eliminating the control data collection and analysis of control data. The COE will need to discuss the cost changes for reduction in scope and adding a technician to process the data in real time for kelt with the contractor. The number of hours per day and days per week to evaluate kelt in real time will be distributed throughout the day and dependent on cost.

Bottom line is, I think the contractor can provide real time monitoring for kelt passage at the corner collector during the hydrofoil evaluation and the COE can provide this information to the appropriate parties. Until we move into negotiations on the contract modification I can't say how many hours per day because at this time we don't know the cost.

Eric Hockersmith

BPA

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

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

Sent: Wednesday, December 18, 2013 4:39 PM

To: Mackey, Tammy M NWP; Klatte, Bernard A NWP; Setter, Ann L NWW

Subject: [EXTERNAL] RE: FPOM: Official Coordination 13BON89 and 13JDA04 (UNCLASSIFIED)

I can agree with opening the corner collector on March 17 as long as it does not start any earlier than that date. This is normally when the trigger has been met with the current level of monitoring but there are also times when it can start at a later date. -s

Final results: Approved at the 11 December 2013 FPOM

Figure 1. Equipment barge for monitoring B2CC passage using DIDSON cameras. Photos are from a study conducted in 2008.

Monitoring equipment
Bracing to hold barge in place



Equipment barge

B2CC opening

Figure 2. Plan view of hydrofoils and frame mounted to B2CC slot filler.

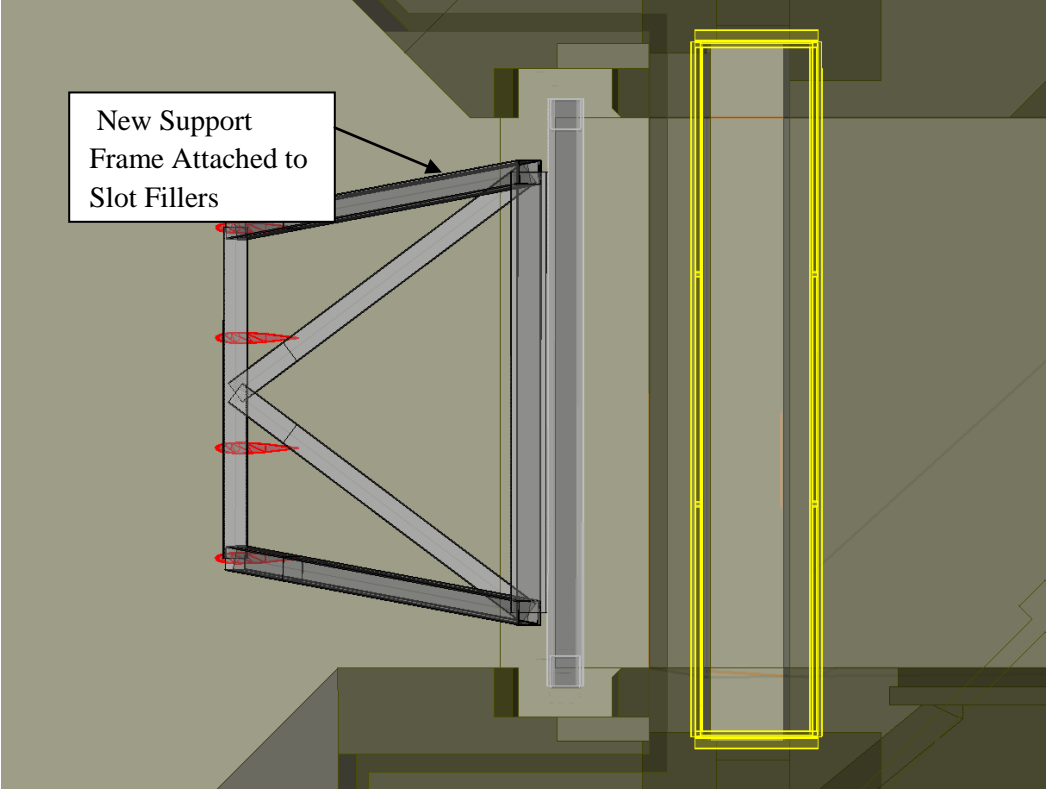


Figure 3. Section view of hydrofoils rotated to B2CC closure gate.

