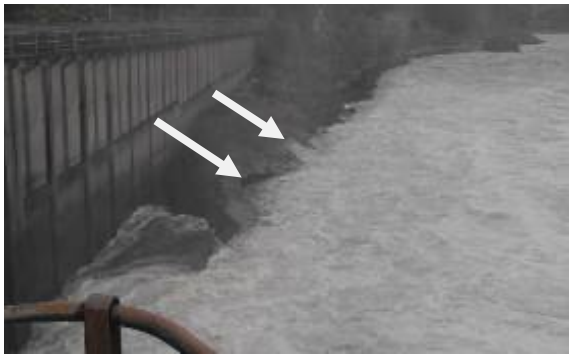
OFFICIAL COORDINATION REQUEST FOR
NON-ROUTINE OPERATIONS AND MAINTENANCE

COORDINATION TITLE- 16BON49 summer spill change
COORDINATION DATE- 29 June 2016
PROJECT- Bonneville Lock and Dam
RESPONSE DATE- 7 July 2016

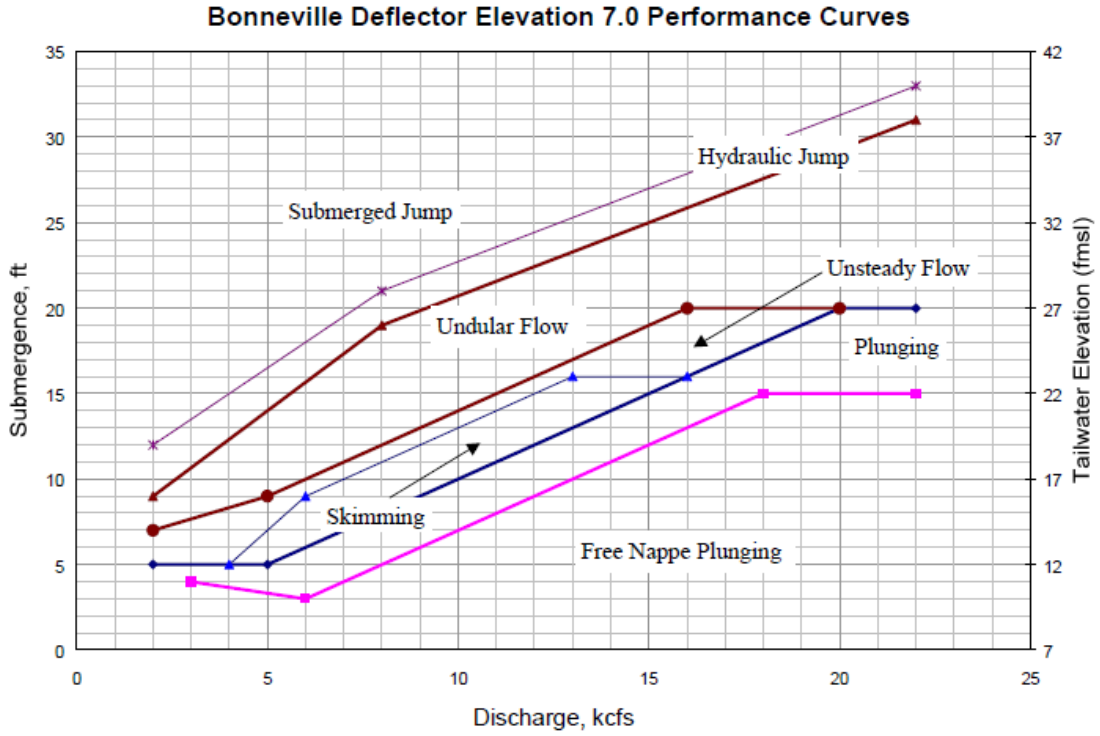
Description of the problem - Erosion holes have been observed in the previously repaired area of the B-Branch riprap. These holes were not observed during the May spillway inspection. Due to the water movement in the eroded areas, there are concerns that the undercutting may extend further beneath the ladder structure. Please see the photos of the erosion areas below.



An investigation as to the cause of the erosion has just begun but there is too much energy being dissipated at the erosion locations. The attached diagram is from the Bonneville Deflector DM (2001). The diagram shows that the flow conditions off of the 7 foot deflector are unsteady (turbulent) for the conditions that have existed much of the past month (17 foot tailwater and about 6600 cfs through Bay 18). Tailwater is expected to drop as we move into July and August; the lower tailwater should help with the unsteady flow. Any change in discharge through Bay 18 also causes an increase in turbulence (energy dissipation). Using a constant spill operation eliminates the additional turbulence associated with gate changes.

The Corps has significant concerns regarding the magnitude of the erosion that has occurred near the Bradford Island B-Branch fish ladder. The current summer spill operation identified in the 2016 Fish Operations Plan (FOP) alternates every two days between spill treatments (85 kcfs day/121 kcfs night and 95 kcfs 24 hours per day), which is likely exacerbating the erosion due to the increased frequency in changing hydraulic conditions associated with the alternating spill treatments operation.

In order to minimize the current rate of erosion, the Corps plans to modify the current summer spill operation (alternate every two days between 85 kcfs day/121 kcfs night and 95 kcfs 24 hours per day) to a constant 95 kcfs 24 hours per day effective 8 July through 31 August. Changing to a constant spill operation of 95 kcfs 24 hours per day is needed for the following reasons:
1) The expected effect of switching to a constant spill level will be the stabilization of hydraulic conditions that will likely minimize the rate of erosion and;
2) Stable hydraulic conditions are required for the Corps to evaluate and monitor the situation.



Type of outage required - No outage. From July 8 through August 31, implement a constant spill operation of 95 Kcfs 24 hours/day, rather than alternating every two days with the 85 Kcfs day/121 Kcfs night treatment.

The 2016 FOP summer spill operation alternates between 2-day blocks of each spill treatment, for a total of 19 blocks (38 days) per treatment over the season. This modification would result in changing 14 blocks (28 days) from 85 kcfs day/121k night to 95 kcfs 24 hrs/day between July 8 and August 31.

Impact on facility operation – The FOP summer spill schedule will be revised as defined above. FPP spill patterns will be followed at all times.

The 95 kcfs spill operation may result in slightly more or less spill over the 24-hour period versus the 85/121 treatment, depending on the number of hours defined for day/night (per the 2016 Fish Passage Plan, Table BON-5). During the 85/121 treatment, hourly average spill over the 24-hr period is approximately 94.75 kcfs July 1–31 (night=2200-0430), 95.88 kcfs August 1–15 (night=2145-0500), and 97.75 kcfs August 16–31 (night=2030-0500). However, August spill is frequently limited by low flows and minimum generation requirements when river flow is less than approximately 137-140 kcfs and the remaining flow for spill is below the FOP target. The current STP forecast indicates BON flow will be below 137 kcfs August 1–31.

Therefore, going to a constant 95 kcfs spill operation July 8–August 31 will result in slightly more spill than the 85/121 treatment on an average hourly basis in July, and likely no difference in August when spill will be limited by low flows and minimum generation requirements, regardless of spill treatment.

Dates of impacts/repairs – Beginning 8 July and continuing through the end of spill season (31 August)

Length of time for impacts – The original spill schedule would have had 28 days for the 85/121 treatment. Those 28 days will change to the 95 kcfs constant treatment. .

Expected impacts on fish passage –
Upstream migrants (including Bull Trout) – no expected impacts.

Downstream migrants – limited impacts expected since an accepted summer spill operation of 95 kcfs, 24 hours/day will be continued through the juvenile fish spill season.

Comments from agencies
ODFW - -----Original Message-----
From: Erick VanDyke [mailto:erick.s.vandyke@state.or.us]
Sent: Tuesday, June 28, 2016 12:41 PM
To: Mackey, Tammy M NWP <Tammy.M.Mackey@usace.army.mil>
Subject: [EXTERNAL] RE: FPOM: Official Coordination - 16BON49 Summer spill change

Hi Tammy,
Is this request indicating your current analysis has determined the cause of the erosion holes? Or, is it also possible the cause of the holes were related to some other factor and flow was related to the moving of material in the area of the holes? I've not seen an analysis that has specified the cause, so I am a little sensitive to other factors that might be related to the observation of the eroded areas. Some potential questions that could help to inform the upcoming meeting might include:
* What were the specifics of the original repair and what specs or longevity was predicted?
* What factors may have played a role in erosion and some documentation of the conditions when the area was visible and conditions when the area was obscured from view (hope get to understanding why not present until after the inspection in May)?
* What would be the expected difference if you were to provide a steady flow at a spill level greater than 95 kcfs?
* What impact will this have on the study design rationale (i.e., 2-day blocks, treatments) used in the SOR?

All that said, this alternative may be a prudent operation in the wake of the erosion while addressing the uncertainty of maintaining the integrity of the adult fish ladder—which should go without saying, is a high priority. Thanks and hear you July 5 at 2 PM. Erick

5 July 2016 FPOM conference call to discuss 16BON47 and 16BON49: Attendees included: BON Project (Chase, Guajardo, Roth, and Royer), BPA (Bettin), CRITFC (Lorz), NOAA (Fredricks and Meyer), NWD RCC (Baus and Wright), NWP (Ebner and Mackey), ODFW (van Dyke), WDFW (Morrill). There were no representatives from USFWS or IDFG.

Fredricks expressed concerns about impacting the sub-yearlings, especially with the numbers so high right now.

Ebner explained there are growing concerns because the holes appear to be getting larger. She explained that the survey will provide a baseline for monitoring erosion as well as provide information for planning a repair. Lorz wanted to know how the holes were growing and what indicators are being used to monitor erosion.

FPOM asked if the survey could be delayed a few days to allow the sub-yearlings to move through. Guajardo explained T11 will be OOS for annual maintenance beginning the week of 11 July through the end of the month. This outage takes out four units at PH2. It makes it difficult to shut off spill when half of PH2 is also OOS. More discussion occurred around the T11 outage but moving the outage was eventually dropped.

Ebner explained the shot-crete cap is blocking the view of what is happening closer to the ladder. For the August inspection, she really wants eyes on what is going on under the cap. Chase noted that the shot-crete is chunking off and that is how he noticed the erosion is progressing. He also said the Project had painted areas on the shot-crete and riprap but the paint has either washed off or the painted areas have eroded.

FPOM discussed moving to a constant spill pattern – 95kcfs day/night. Those on the phone reached consensus regarding changing to a 95k spill. FPOM also discussed potentially modifying patterns to reduce the energy out of Bay 18. Ebner would like Bay 18 at 1.5' She recommended meeting at BON to adjust spill patterns and observe the changes in flow patterns and energy dissipation. Fredricks agreed and has looked at patterns that reduce the flow through the three southernmost bays since they have the 7' deflectors instead of the 14' deflectors. He also stressed looking at modifying the spill pattern before going to a no-spill option. **FPOM will wait to see the survey results before pursuing further spill volume/pattern changes.**

FPOM reluctantly agreed with the survey on 7 July. Fredricks stressed that the consensus was for the July survey only. August will need to be coordinated after the results from July are known. He said there would be impacts to the juveniles but that those impacts will be minimal.

-----Original Message-----
From: Erick VanDyke [mailto:erick.s.vandyke@state.or.us]
Sent: Wednesday, July 06, 2016 11:33 AM
To: Mackey, Tammy M NWP <Tammy.M.Mackey@usace.army.mil>; Ebner, Laurie L NWP <Laurie.L.Ebner@usace.army.mil>
Cc: Gary Fredricks - NOAA Federal <gary.fredricks@noaa.gov>; Lorz, Tom <lort@critfc.org>; Trevor Conder - NOAA Federal (Trevor.Conder@noaa.gov) <Trevor.Conder@noaa.gov>; Charles Morrill (charles.morrill@dfw.wa.gov) (charles.morrill@dfw.wa.gov) <charles.morrill@dfw.wa.gov>; Dave Benner <dbenner@fpc.org>; david_swank@fws.gov
Subject: [EXTERNAL] RE: FPOM: Official Coordination - 16BON47 and 16BON49 B-branch erosion and summer spill change

Thanks for the update. When I review 16BON49 summer spill change form, I don't see that anyone addressed the four questions I posed (provided below). Is there a chance that this information can be provided? I would appreciate some information on these topics to better inform what we might expect moving forward. Hope all goes well Thursday July 7 12:00 to 16:00, and look forward to hearing more Friday.

* What were the specifics of the original repair and what specs or longevity was predicted?

* What factors may have played a role in erosion [with] some documentation of the conditions when the area was visible and conditions when the area was obscured from view (hope get to understanding why not present until after the inspection in May)?

* What would be the expected difference if you were to provide a steady flow at a spill level greater than 95 kcfs?

* What impact will this have on the study design rationale (i.e., 2-day blocks, treatments) used in the SOR?
Erick

-----Original Message-----
From: Ebner, Laurie L NWP
Sent: Wednesday, July 06, 2016 1:23 PM
To: Erick VanDyke <erick.s.vandyke@state.or.us>; Mackey, Tammy M NWP <Tammy.M.Mackey@usace.army.mil>
Cc: Gary Fredricks - NOAA Federal <gary.fredricks@noaa.gov>; Lorz, Tom <lort@critfc.org>; Trevor Conder - NOAA Federal (Trevor.Conder@noaa.gov) <Trevor.Conder@noaa.gov>; Charles Morrill (charles.morrill@dfw.wa.gov) (charles.morrill@dfw.wa.gov) <charles.morrill@dfw.wa.gov>; Dave Benner <dbenner@fpc.org>; david_swank@fws.gov; Rerecich, Jonathan G NWP <Jonathan.G.Rerecich@usace.army.mil>; Hanson, Matthew D NWP <Matthew.D.Hanson@usace.army.mil>; Chase, Matthew T NWP <Matthew.T.Chase@usace.army.mil>
Subject: RE: FPOM: Official Coordination - 16BON47 and 16BON49 B-branch erosion and summer spill change

Eric,

I will attempt to answer your questions. These are my opinions and the full design team hasn't had a chance to weigh in. Thus I anticipate some tweaking to what I am writing but it is in the right ball park.

With regards to the repair our expectation is it would have lasted longer than it did. Shot Crete isn't the most exact science but I don't think that is the problem. I think the underlying material vacated under the shot crete. The repair was completed about the time we started the contract to remove rocks in the stilling basin. As part of the stilling basin work we did a lot of hydro-surveys. In one of the surveys we saw some interesting rock features at depth below the repair area. From the hydro-survey we see what appears to be a steep rock chute. I believe this next repair would need to fill in the rock chute.

The erosion was identified either on Sunday or Monday June 12th or 13th. TW had average around 17 feet for a couple of weeks - see attached. With a 14 foot deflector and a 17 foot tailwater the flow is unsteady - what the water looks like when a person is swimming with the dolphin kick. My guess is the action dislodged material under the shot crete and is slipped down the rock chute.

It is possible that the erosion occurred earlier but wasn't visible due to tailwater being higher or the shot crete cap took longer to deteriorate. Don't believe we will ever know.

In my opinion good egress requires a minimum of 95 cfs - spilled through a very specific spill pattern developed in the physical model. If we keep total spill to 104 Kcfs or less the gate opening in bays 16, 17 and 18 are 3 feet (higher spill it gets higher). My concern is the 3 foot gate opening may be providing too much energy at the shore line. My hope is we can limp through the spill season with the 95 Kcfs spill pattern without having to adjust the spill pattern. My first adjustment if necessary would be to reduce the flow in bay 18 (would meet at Bonneville and observe the changes). I would hope to go to 18 inches and keep 16 and 17 where they are. Bay 18 is confined by walls so we can handle some delta.

Be aware Engineering is recommending to reduce spill on the south side and not use all 18 bays because we do not want to comprise the stability of Bradford Island B Branch Fish Ladder.

Survey results from tomorrow will provide additional data.

With regards to your last question Tammy provided the following insight. There is no study. The blocks are due to the rollover of the FOP.

Laurie Ebner
CENWP-EC-HD
503-808-4880

6 July 2016 TMT meeting – TMT updated on the status of this MOC.

Final results - Summer spill change will occur as coordinated.

Please email or call with questions or concerns.
Thank you,
Tammy Mackey
NWP Operations Division Fishery Section
503-961-5733
Tammy.m.mackey@usace.army.mil