

OFFICIAL COORDINATION REQUEST FOR NON-ROUTINE OPERATIONS AND MAINTENANCE

COORDINATION TITLE- 18BON02 Nighttime Lamprey Operations at Bradford Island Fishway Entrances

COORDINATION DATE- 26 February 2018

PROJECT- Bonneville Dam

RESPONSE DATE- 8 March 2018

Description of the problem

Fishway entrances have been designed to optimized salmonid attraction and passage, which requires fairly high velocities. However, Pacific Lamprey also use these fishway entrances and the high entrance velocities can result in many lamprey turning around or expending large amounts of energy to enter fishways.

Pacific Lamprey entrance efficiency and passage times have been shown to benefit from reduced velocities at entrance gates (Johnson et al, 2012). Lamprey currently benefit from “nighttime lamprey operations” at PH2 entrances but not at the fishway entrances at the spillway or PH1. More recently, Project and Field Unit Biologists have, on separate occasions, observed and photographed lamprey attempting to enter at B-Branch and repeatedly thwarted by the high current velocity.

Due to the potential benefits of reduced nighttime flows, the University of Idaho has developed a block study design using radio tagged adult Pacific lamprey to evaluate the potential benefit, which could lead to a permanent operational change at the Bradford Island B-branch and powerhouse one entrances. The proposal for this evaluation was distributed through SRWG and referenced as LMP-P-17-1.

The University of Idaho proposes to monitor lamprey passage at Bradford Island Fishway entrances during a randomized block experiment where nighttime entrance velocity is held at the standard daytime velocity (control, ~8 ft/s; ‘Off’ in Table 2) or at reduced velocity (~4 ft/s, ‘ON’). The key monitoring metrics will include entrance rate, exit rate, net entrance rate each night, and overall dam passage rate under the two treatments. Analysis of variance will be used to test for treatment effects if adequate sample size is available, as in Johnson et al. (2012). Alternatively, time-to-event analyses will be used to estimate the relative passage rates while controlling for environmental variation through time (including treatment condition because individual fish cannot be restricted to single treatment conditions; see Caudill et al. (2007) for an example.

Reference

Johnson et al, 2012. “Movement of Radio-Tagged Adult Pacific Lampreys during a Large-Scale Fishway Velocity Experiment”. Available online at:
<http://www.tandfonline.com/doi/abs/10.1080/00028487.2012.683468>

Caudill, C.C., W.D. Daigle, M.L. Keefer, M. Jepson, B.L. Burke, T.C. Bjornn, and C.A. Peery. 2007. Slow dam passage in Columbia River salmonids associated with unsuccessful migration: delayed negative effects of passage obstacles or condition-dependent mortality? *Canadian Journal of Fisheries and Aquatic Sciences* 64:979-995.

Impact on facility operation

Fishway entrance differentials at Cascade Island, B-Branch, and PH1 will be reduced to 0.5' by reprogramming of existing PLC Fish Valve control systems. This is a temporary change to section 2.42.12.c Lamprey Operations June 1 – August 31 of the Bonneville Fish Passage Plan. The current proposed block treatment is outlined in table 1.

Table 1. Example treatment schedule for a randomized block experiment manipulating entrance velocities at Bradford Island Fishway entrances. Treatment and control nights would be assigned within each 2-day block. An experimental period from the beginning of June through the end of September would provide approximately 61 treatment blocks.

Date	Treatment	Date	Treatment
1-June	ON 1continuing.....continuing.....
2-June	OFF	23-Sept	OFF
3-June	ON 2	24-Sept	ON 58
4-June	OFF	25-Sept	OFF
5-June	ON 3	26-Sept	ON 59
6-June	OFF	27-Sept	ON 60
7-June	ON 4	28-Sept	OFF
8-June	OFF	29-Sept	ON 61
.....continuing.....continuing.....	30-Sept	OFF

Dates of impacts: 1 June up to 30 September 2018

Analysis of potential impacts to fish

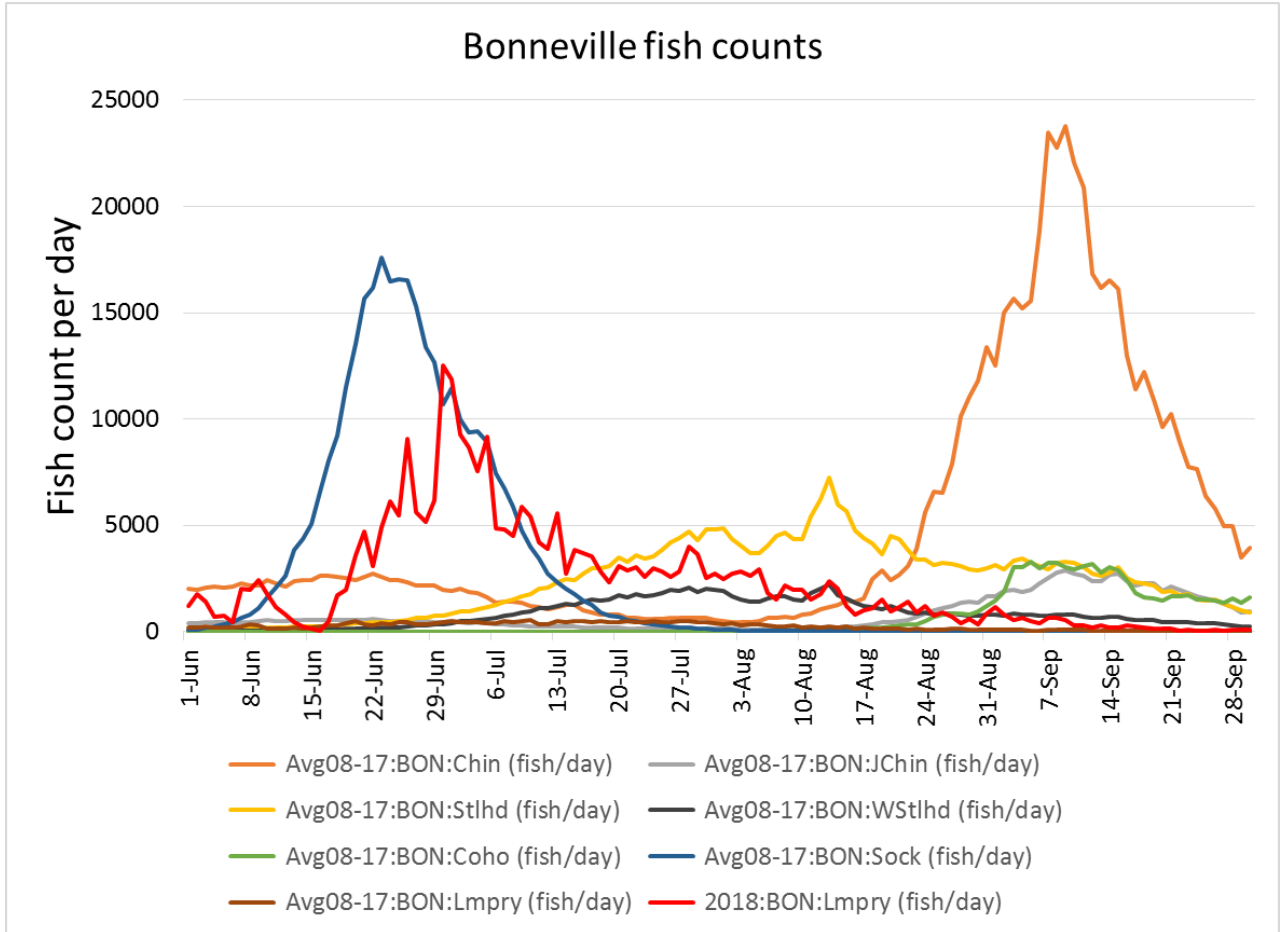


Figure 1. 10 year average (2008 to 2017) Bonneville dam counts from Columbia River DART. 2017 lamprey counts are reported by the USACE fish field unit and include day and night window counts, and corrected lamprey passage system counts.

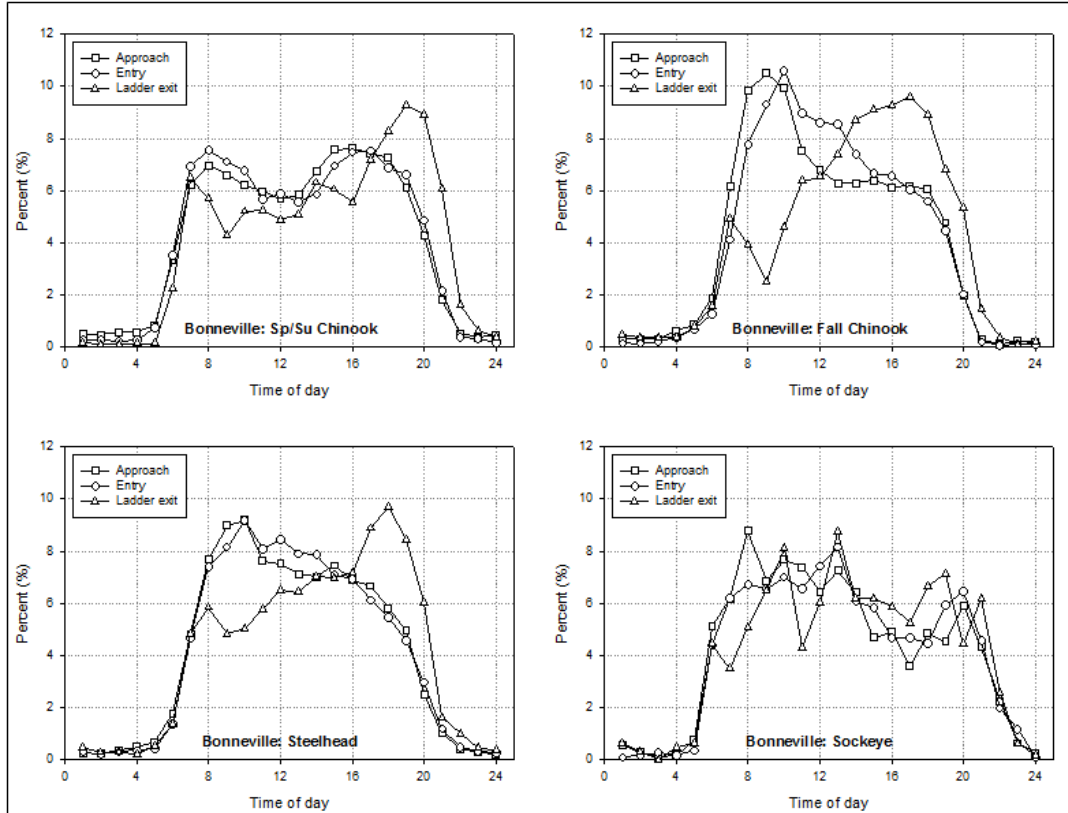


Figure BON-6. Diel Distribution of Adult Salmonids at Bonneville Dam Fishway Entrances and Exits (Keefer & Caudill 2008).
Figure 2. Borrowed from the 2018 draft Fish Passage Plan.

Downstream migrants

There are no expected impacts to steelhead kelts, juvenile salmonids, or juvenile lamprey as a result of reduced nighttime flows.

Upstream migrants (including Bull Trout)

In June adult Sockeye and August through September adult Chinook Salmon are present in significant numbers. However, very few Sockeye and Chinook Salmon are approaching the Bonneville Dam fishway entrances between 2200 and 0400 and therefore impacts should be minimal as a result of the reduced nighttime flows (Figure 2).

Facilities around the region being designed for bull trout are using lower head than salmon ladders (0.75' instead of 1.5'). Therefore bull trout passage under reduced nighttime flows, through this type of ladder, should be an improvement for bull trout.

Lamprey

Based on prior work completed by the University of Idaho, referenced above, there may be beneficial impacts to adult lamprey passage as a result of reduced nighttime flows. However the purpose of this evaluation is to evaluate the potential for no benefit or negative impacts to adult lamprey attempting to pass through these entrances.

Prior coordination comments on the WITHDRAWN FPP change request form 17BON003-Nighttime lamprey operations.

COMMENTS: (listed oldest to newest)

8/11/16 FPOM: Fredricks and Lorz agreed this would be good for lamprey. Fredricks concerned it could potentially slow adult salmon passage and increase risk of sea lion predation. Conder wondered how much of an issue the entrances really are for lamprey. Fredricks wants to look at PIT-tag sockeye passage data—one side vs the other—and see if there is a difference between daytime vs nighttime passage. Mackey reminded there is a report from the early 2000s with this info. Fredricks and Conder want to look into this more. PENDING more time for review.

9/8/16 FPOM: Since this is the same operation as the one that already occurs at PH2, Fredricks and Lorz are fine with this change. Conder would like to look at sockeye data to see if there might be a delay impact due to this operation. If there is an impact, then should we be doing it at all? Since the impact is uncertain, Conder thinks that keeping it only at PH2 spreads the risk, just in case. PENDING more time for review.

10/6/16 email to FPOM:

From: Tackley, Sean C NWP

Subject: RE: 17BON033 FPP change form (nighttime lamprey operations at B1)

All,

My apologies for not seeing the 17BON003 FPP change form (nighttime lamprey operations) earlier. Jen Graham brought it to my attention at this week's quarterly Corps-Tribal Lamprey Workgroup meeting in Walla Walla. The proposal is to go to reduced nighttime flows at BON Bradford Island in an effort to improve entrance conditions for lamprey. My understanding from the FPOM notes is that Gary and others may have concerns regarding sockeye attraction.

From a lamprey standpoint...this is a laudable goal and worth continuing to revisit, but I'd caution against it without a robust RT evaluation (as was done at B2). Caudill or Keefer can probably speak to the particulars better than me, but while reduced nighttime flows at B2 provided an apparent overall net benefit in entrance efficiency, there were some apparent tradeoffs in attraction (see attached final report). [*Hyperlink in footnote¹*]

In the wake of moving to this permanent operation at B2, the Corps-Tribal Lamprey Workgroup discussed the possibility of expanding the operation and testing beyond BON and MCN. After considering the potential tradeoffs between attraction and entrance efficiency and with the knowledge that each fishway is different, we decided to shelve any plans to do costly RT studies at B1, TDA, JDA, etc, favoring higher priority actions. This is definitely NOT to say that we shouldn't in the future or that

¹ Johnson et al, 2010. "Effects of Lowered Fishway Water Velocity on Fishway Entrance Success by Adult Pacific Lamprey at Bonneville Dam, 2007-2009". Available online at: http://www.webpages.uidaho.edu/uiferl/pdf%20reports/Johnson_etal_Lamprey_Velocity_Test_07_09_Draft_Final.pdf

objectives couldn't be added to the upcoming post-construction lamprey RT study at BON (2018, 2019).

The sockeye concerns are also worth consideration. My memory may be hazy, but don't think this was a major part of the discussion when operations were changed at B2. I'm sure we didn't run concurrent sockeye RT studies in the years we evaluated B2.

I'd like to thank BON Fisheries for putting this idea forward and for getting the discussion going. The initiative is much appreciated.

10/6/16 email to FPOM:

From: Caudill, Christopher (caudill@uidaho.edu)

Subject: Re: 17BON033 FPP change form (nighttime lamprey operations at B1)

Hello all, I've attached the publication that resulted from the report Sean sent—it may be a bit more digestible. [*Hyperlink in footnote²*] The punchline was that lowered velocities improved entrance efficiency, but that improved movement into the lower ladder from the entrance was inconsistent, i.e., the bottleneck moved from the entrance to the transition pool/lower ladder. We should have some data on day vs. night sockeye entrance times from 2013-2014 that could speak to the issue, though I don't recall if operations included lowered nighttime velocities in those years.

10/13/16 FPOM: Swank supports removing the bottleneck at the entrance; then other bottlenecks can be addressed later. Conder reviewed diel sockeye passage and is comfortable with this operation since sockeye aren't passing from 2300-0400. Lorz thinks starting at 2200 would be fine. FPOM was generally supportive of this operation but wants more discussion with Tackley, Caudill at FFDRWG next week. PENDING discussion at FFDRWG 10/20/16.

11/10/16 FPOM: This issue was discussed at FFDRWG. NOAA is ok with impacts to sockeye and Chinook, but Tackley has concerns for lamprey. Studies show half flow was good, but no flow was bad. Tackley will coordinate with CRITFC (McIlraith). PENDING further coordination/discussion – will be revisited at December FPOM.

12/7/16 email to FPOM:

From: Tackley, Sean C CIV USARMY CENWP (US)

Subject: Re: 17BON033 FPP change form (nighttime lamprey operations at B1)

Hi all,

First, I'd like to thank Bonneville Fisheries for preparing change form 17BON033 and for continuing to look for ways to improve lamprey passage at Bonneville Dam. Your efforts are much appreciated!

² Johnson et al, 2012. "Movement of Radio-Tagged Adult Pacific Lampreys during a Large-Scale Fishway Velocity Experiment". Available online at:
<http://www.tandfonline.com/doi/abs/10.1080/00028487.2012.683468>

Ricardo noticed that a decision on this change form had been deferred, pending discussion between me and Brian McIlraith. With FPOM coming tomorrow, he asked if I could close the loop on the topic.

Brian McIlraith, Ricardo and I discussed this today and agreed that it is risky to implement the proposed operation without a study. As many of you know, evaluation of reduced nighttime entrance flows was a particular action item in the Columbia Basin Fish Accords. U of I completed studies at Bonneville WA Shore Ladder (B2) in 2007-2009 and at McNary South Ladder in 2009-2010. There was a minor net benefit at Bonneville and a neutral effect at McNary. We collectively decided to go ahead and implement the nighttime operations of reduced AWS flows at Bonneville WA Shore and lowered entrance weirs (lower velocities) at McNary.

As we discussed with our tribal partners several years ago and as noted in the 2014 revision to the Corps' 10 Year Plan, generalizing (mixed) results from the WA Shore/B2 study to other fishway systems is not recommended, given the potential negative impacts on lamprey attraction and the inherent differences between each fishway system.

We are currently planning a 2018-2019 lamprey RT study to evaluate performance of the new LPS(s). It is worth considering whether we could/should add an evaluation of reduced nighttime flows at B1 to the scope of this study. Good topic of discussion for SRWG, BON Fisheries, U of I, and the Corps-Tribal Lamprey Workgroup. More to come!

I request that change form 17BON033 be withdrawn by the Corps at this time and that we instead have an SRWG discussion about adding this to the 2018-19 lamprey telemetry study.

Best Regards,
Sean

*The FPP change form was withdrawn from consideration until this proposed evaluation was completed to determine if reduced nighttime flows at Braford Island was determined to be beneficial to adult Pacific lamprey.

Comments from agencies

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

From: Erick VanDyke [mailto:Erick.S.VanDyke@state.or.us]

Sent: Monday, February 26, 2018 11:49 AM

To: Kovalchuk, Erin H CIV USARMY CENWP (US)
<Erin.H.Kovalchuk@usace.army.mil>;

Subject: [Non-DoD Source] RE: FPOM: Official Coordination 18BON02 MOC
Lamprey Reduced Nighttime Flows

An early review of this proposal has me expressing concern that it will impact 2018 spring operations that cannot be supported. June 15 is the end of the spring operation and should be considering June 16 for the

start of this kind of operation in 2018. I may have additional thoughts after a more thorough review of the MOC.

Erick S. Van Dyke
Oregon Dept of Fish & Wildlife
Fish Passage/Mitigation Technical Analyst
17330 SE Evelyn Street
Clackamas, OR 97015
971-673-6068 Office

Final coordination results – From the March FPOM meeting minutes: FPOM concurred with this action pending the time change to 2200-0400.

After Action update – This action went as coordinated.

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

Ricardo Walker
Ricardo.walker@usace.army.mil; (503) 808-4709

Erin Kovalchuk
NWP Operations Division Fishery Section
Columbia River Coordination Biologist
Erin.H.Kovalchuk@usace.army.mil