OFFICIAL COORDINATION REQUEST FOR
NON-ROUTINE OPERATIONS AND MAINTENANCE

COORDINATION TITLE- 24JDA01 – SFL 2-Fish Turbine Operation and Floating Orifice Gate Removals
COORDINATION DATE- 1/31/24
PROJECT- John Day Dam
RESPONSE DATE- 2/15/2024

Description of the problem - The John Day South (JD-S) fishway has an auxiliary water supply powered by three turbines which feeds water to the entrance area of the JD-S fish ladder. Each turbine design is complex and consists of a turbine, gear box, and the pump itself.

During the 2023 winter maintenance season, metal shavings were found in south fish turbine (SFT) #3 that required major gearbox repairs (as of 1/30/24 repairs are still underway, and repairs are anticipated to be completed by 1 March 2024). Additionally, on 1 March 2023, excessive vibrations, due to worn guide bearings, were noticed at SFT #2 (SFT #1 has a similar issue). To preserve the life of SFT #1&2, personnel opted to run them at reduced RPMs (55 RPMs instead of the usual 68 RPMs) in 2023.

Currently, SFT #1&2 are in the planning phase of major overhauls, therefore acquiring significant funding at this time which is underway.

Two JD-S SFT's, running at max RPMs (68-RPMs), are required to meet FPP criteria, with one remaining as a back-up. The FPP provides operational guidance for AWS turbine failures. With SFTs #1&2 running at reduced RPMs, SFT #3 (when repairs are completed) will operate at max RPMs, and either SFT #1 or #2 will operate at reduced RPMs (while the other acts as a backup).

The FPP states "if one turbine fails, increase the output of the two remaining turbines to meet adult fishway criteria" (3.2.4.1.a.). Since SFT #3 will already be running at max RPMs and the other SFT can only be run at reduced RPMs, this will not be possible. Therefore, personnel are requesting to operate JD-S in a modified 1-turbine operation (3.2.4.1.b). All entrance weirs will be open at 8' (instead of closing NE-1), and the floating submerged orifice gates (FOGs) will be closed. This should allow for adequate attraction flow to the JD-S while also leaving one SFT available for backup.

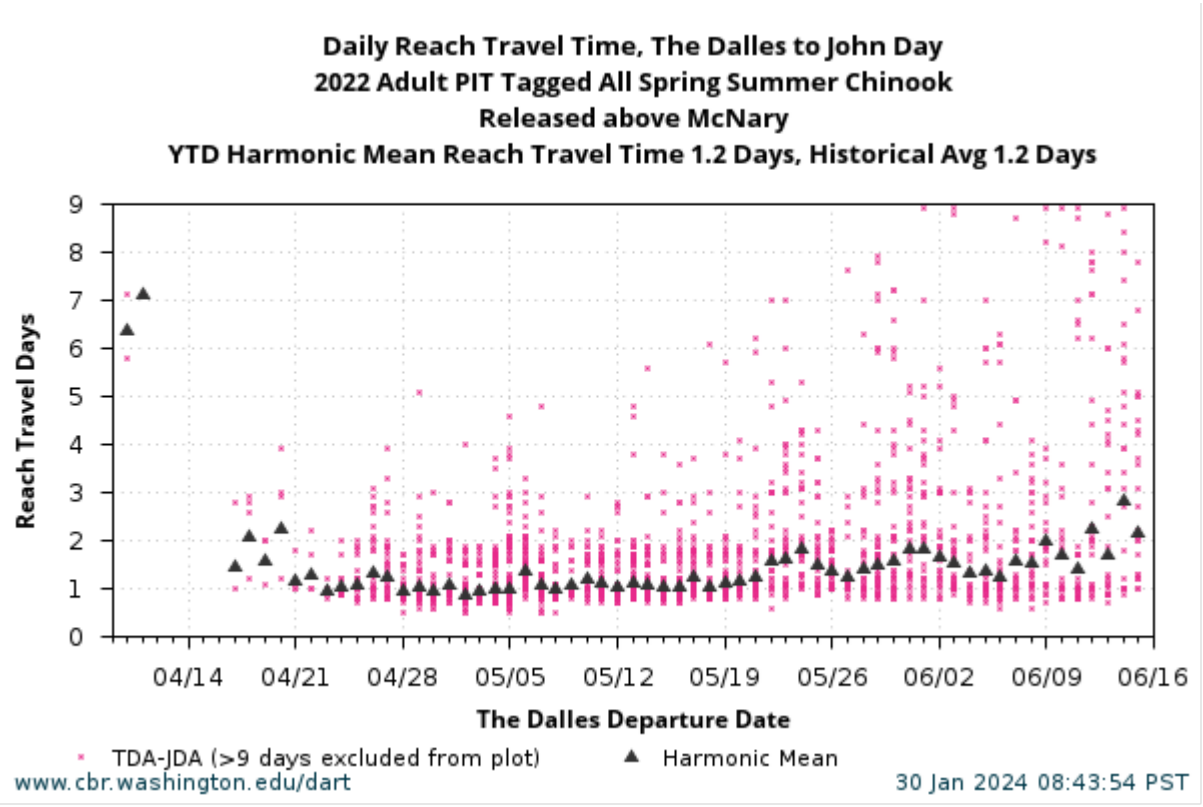
Type of outage required – FOGs will be removed for 2024 similar to the 2023 adult passage season. The additional water savings will aid in decreasing the output of SFT 1 or 2 and will help by decreasing any degradation to the unit's pump assemblies, which are in poor shape and at risk of total failure.

Impact on facility operation – There will be minimal impacts to facility operation. However, removing the FOGs will allow the remaining JD-S entrances to run in criteria while also freeing up one of the turbines as a backup.

Dates of impacts/repairs – 1 March 2024 – 11 November 2024

Length of time for repairs – Unknown, as stated earlier SFT #1 & #2 are in the planning phase of a major overhaul with no set repair dates.

Analysis of potential impacts to fish-
None- Mean travel time for Spring migrants was similar between 2022 and 2023.


Daily Reach Travel Time, The Dalles to John Day
2022 Adult PIT Tagged All Spring Summer Chinook
Released above McNary
YTD Harmonic Mean Reach Travel Time 1.2 Days, Historical Avg 1.2 Days
Reach Travel Days
0
1
2
3
4
5
6
7
8
9
04/14
04/21
04/28
05/05
05/12
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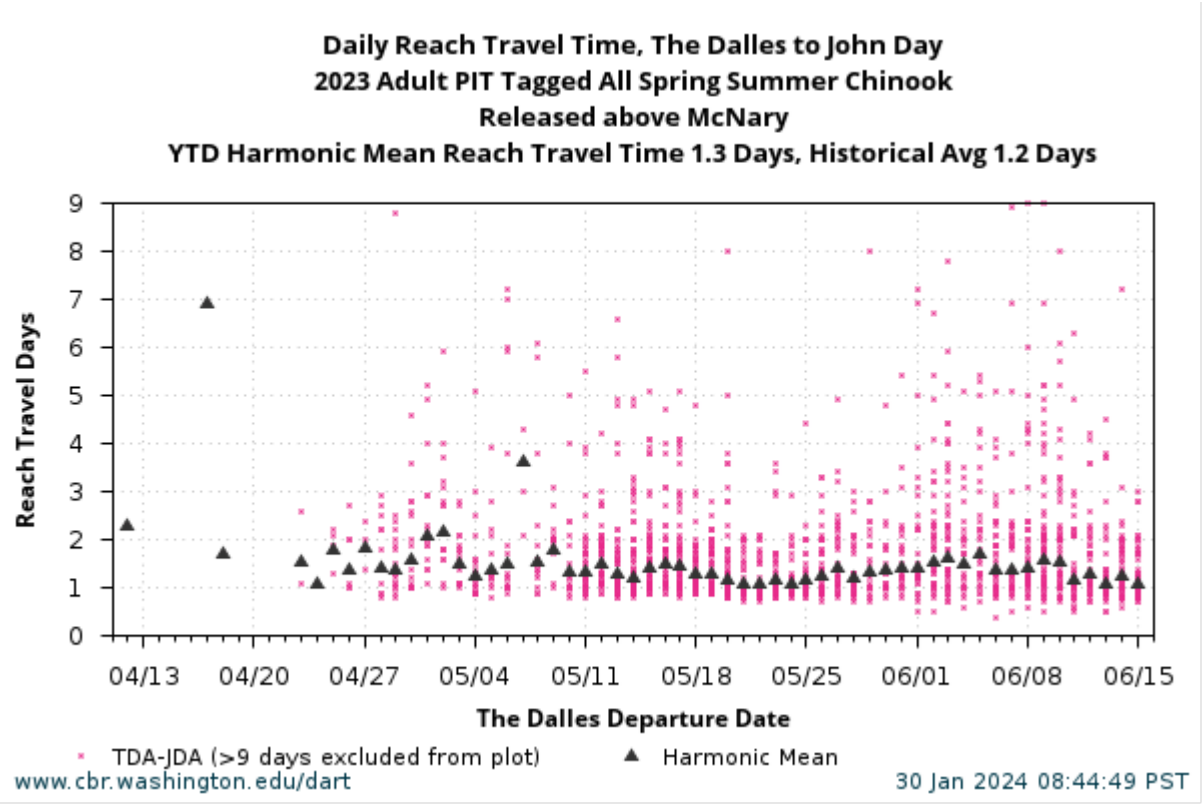
06/09
06/16
The Dalles Departure Date
TDA-JDA (>9 days excluded from plot)
Harmonic Mean
www.cbr.washington.edu/dart
30 Jan 2024 08:43:54 PST


Daily Reach Travel Time, The Dalles to John Day
2023 Adult PIT Tagged All Spring Summer Chinook
Released above McNary
YTD Harmonic Mean Reach Travel Time 1.3 Days, Historical Avg 1.2 Days
Reach Travel Days
0
1
2
3
4
5
6
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04/13
04/20
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05/11
05/18
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The Dalles Departure Date
TDA-JDA (>9 days excluded from plot)
Harmonic Mean
www.cbr.washington.edu/dart
30 Jan 2024 08:44:49 PST

Summary statement – expected impacts on:

Downstream migrants: There is no expected impact to downstream migrants.

Upstream migrants (including Bull Trout): The entrance weirs and their entrances will be kept in FPP ranges.

Lamprey: The entrance weirs and their entrances will be kept in FPP ranges.

The condition of South fish turbine pumps 1 & 2 gives the project no flexibility in maintaining entrance criteria at the ladder entrances if the floating orifices are redeployed.

Comments from agencies

FPOM February meeting minutes:

1.1.1. 24JDA01 MOC SFL 2-Fish Pump Operation and Floating Orifice Gate Removals -Similar to last year's request. The project can't run fish pumps more than 55 RPMs otherwise cavitation occurs regular operations is up to 68 RPMs. Proposing to modify FPP guideline. The project proposes to pull floating orifice gates and run pumps 1 and 2 at 55rpms. Lorz asked for an estimate on how long they would run this operation. He's concerned about this becoming the new normal. Lotspeich said there is a PDT to rehab pumps 1 and 2. Morrill asked for completion timeframe. Lotspeich said he was unsure, but it was several years out. Hesse asked what the threshold is for RPM before detectable impact on fish passage. Lotspeich said there is a lot of variables. Lotspeich is not aware of minimal RPMs. Conder asked if everything else was to be operated in criteria. Lotspeich said yes. Conder asked what proportion of fish typically use floating orifice gates. **ACTION:** Lotspeich will get the floating orifice gate usage information to FPOM. Conder is concerned with this operation at higher levels of spill, although that is unlikely this year.

From: Tom Lorz <lort@critfc.org>
Sent: Monday, February 19, 2024 5:07 PM
To: Madson, Patricia L CIV USARMY CENWP (USA) <Patricia.L.Madson@usace.army.mil>; Trevor Conder <trevor.conder@noaa.gov>
Subject: [Non-DoD Source] Re: FPOM Official Coordination: 24JDA01 MOC SFL 2-Fish Pump Operation and Floating Orifice Gate Removals

I think at least for me, if I can carve some time out to look at some past data on the FOG data that would be helpful. Also If we can get a rough timeline, is this a 1 or 2 year op or is this like 10 years. I mostly need to look at FOG passage during the late spring summer time to see if more FOG equal fast passage when fish have less time to be slow in their migration. Sockeye are a big unknown and not sure if we have very good data on them with regard to FOG's. Any help would be appreciated.

tom

To: Tom Lorz <lort@critfc.org>; Trevor Conder <trevor.conder@noaa.gov>
Subject: RE: FPOM Official Coordination: 24JDA01 MOC SFL 2-Fish Pump Operation and Floating Orifice Gate Removals

Attached is the MOC with the JDA Orifice Gate Report amended to it. This op will be requested for the duration of the SFL pumps #1 & 2 rehab, at which point operations will return to normal.

Cheers,

Patricia

Update: JDA Orifice Gate Letter Report / 21 October 04

Evaluation of Submerged Orifice Gate Usage by Adult Chinook Salmon and Steelhead at John Day Dam During 2003

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Enclose is information regarding the performance of submerged orifice gates at John Day Dam in 2003. Submerged orifice gates located along the downstream face of the powerhouse were open at John Day Dam during the 2003 migration season. Submerged orifice gates located along the face of the powerhouse (10 gates) and main entrances (3 gates) located at either end the powerhouse and adjacent to the spillway were equipped with a series of underwater antennas to monitor fish movement into and out of the collection channel (Figure 1). Dates and times of receiver outages at submerged orifice gates and main entrances are reported in Figure 2.

We evaluated the total number of known fishway approaches, entrances, and exits for adult Chinook salmon and steelhead at John Day Dam. Unknown approaches, entrances, and exits resulting from a missed antenna or receiver outages were excluded from the summary as where entrances and exits following a fallback event to account for bias that could result from non-naive fish.

Approaches, entrances and exits at John Day Dam were observed for 755 radio-tagged adult Chinook salmon and 415 radio-tagged adult steelhead during 2003. The location where fish approached the dam was distributed between main entrances and floating orifice gates (Figure 3). Of the 93,095 approaches at John Day Dam, 24.3% occurred at main entrances. Although Chinook salmon and steelhead frequently approached floating orifice gates the number of entries was disproportionately lower compared to main entrances (Table 1). The number of approaches per entry (total approaches / total entries) ranged between 3.4 and 6.9 for the main entrances and between 20.4 and 68.8 for floating orifice gates (Table 1). This indicates that fish were attracted to the vicinity of the

powerhouse, but that they either were not attracted to enter orifice gates or had difficulty locating orifice gate opening even though they were in close enough proximity to be detected on the underwater telemetry antennas.

We observed adult salmon and steelhead made greatest use of the main entrances south shore entrance (LJD1 telemetry antenna), north powerhouse entrance (BJD1), and north shore entrance (AJD1) to reach the fishway collection channel (Figure 3). But there was also relatively high use of orifice gates closest to the main entrances. Of the 8,738 entries made by adult Chinook salmon and steelhead, 74.4% occurred at main entrances (Table 1). Of the 7,056 exits, 83.4% occurred at main entrances. Approximately half of the total entries (52.1%) and exits (49.1%) were observed at south-shore entrance. The lowest number of entries at a main entrance occurred at north-powerhouse entrance (8.0% of total entries) which performed similar to southern most (8.1% of total entries) and northern most (6.4% of total entries) floating orifice gates. We observed a

disproportionate number of exits relative to entries at the north-powerhouse main entrance (over twice as many exits to entries) and orifice gate LJD5 (over three times more entries to exits). Trends among the location of entrances, exits and approaches where similar between Chinook salmon and steelhead (Figure 4).

As there was no experimental design implemented to address the effects of orifice gate closures on dam passage. Studies conducted at other dams in previous years constitutes the basis for our recommendations. Radio-tagged adult spring and summer Chinook salmon were monitored to assess passage times at Priest Rapids Dam in 1996 during two treatments: half the powerhouse orifice gates open and all orifice gates closed. Travel times from first record in the tailrace to first approach at the dam, to first entry into the fishway, first entry to the junction pool, and to pass the dam were not significantly different with respect to orifice gate closure (Bjornn et al. 1997). Repeating the study at Priest Rapids and Wanapum dams during 1997, we found that times for Chinook and sockeye salmon to enter the dams could be longer (.5 to 5.0 hr) when orifice gates were closed but total times to the projects did not seem significantly affected (Peery et al. 1998). Additional evaluations were conducted at Bonneville, The Dalles, Lower Monumental, and Little Goose dams to determine the effects of closing orifice or sluice gates on passage rates and routes. A randomized block design was implemented at Bonneville Dam in 2000 and 2001. Although passage times where longer during the closed treatment, there was little significant difference between treatments (Daigle et al. draft report). At The Dalles, Lower Monumental, and Little Goose Dam dams, orifice gates were closed in 2000 and 2001 and passage times were compared to those of 1997 and 1998 when gates were open. Chinook salmon and steelhead took less time to approach and enter dams in 2000 and 2001 when orifice gates were closed (Daigle et al. draft report). Times for first entering the dam to exiting the top of the fishway were similar all years for both species (Daigle et al. draft report). The pattern of use of orifice gates at John Day Dam in 2003 was similar to that observed at McNary Dam in previous years, with high numbers of approaches but relatively few entries at these openings. We did see use of the orifice gates adjacent to the main powerhouse fishway entrances, indicting that fish attracted to the vicinity of the main entrances are able to locate those orifice gates better than floating orifice gates not adjacent to larger openings and, presumably, their attractive flow. Based on these results we suggest that closure of floating orifice gates should not negatively affect adult salmon or steelhead passage at John Day Dam, although maintaining the northern and southern most floating orifice gates (those adjacent to NPE and SSE) main provide benefits to fish passage.

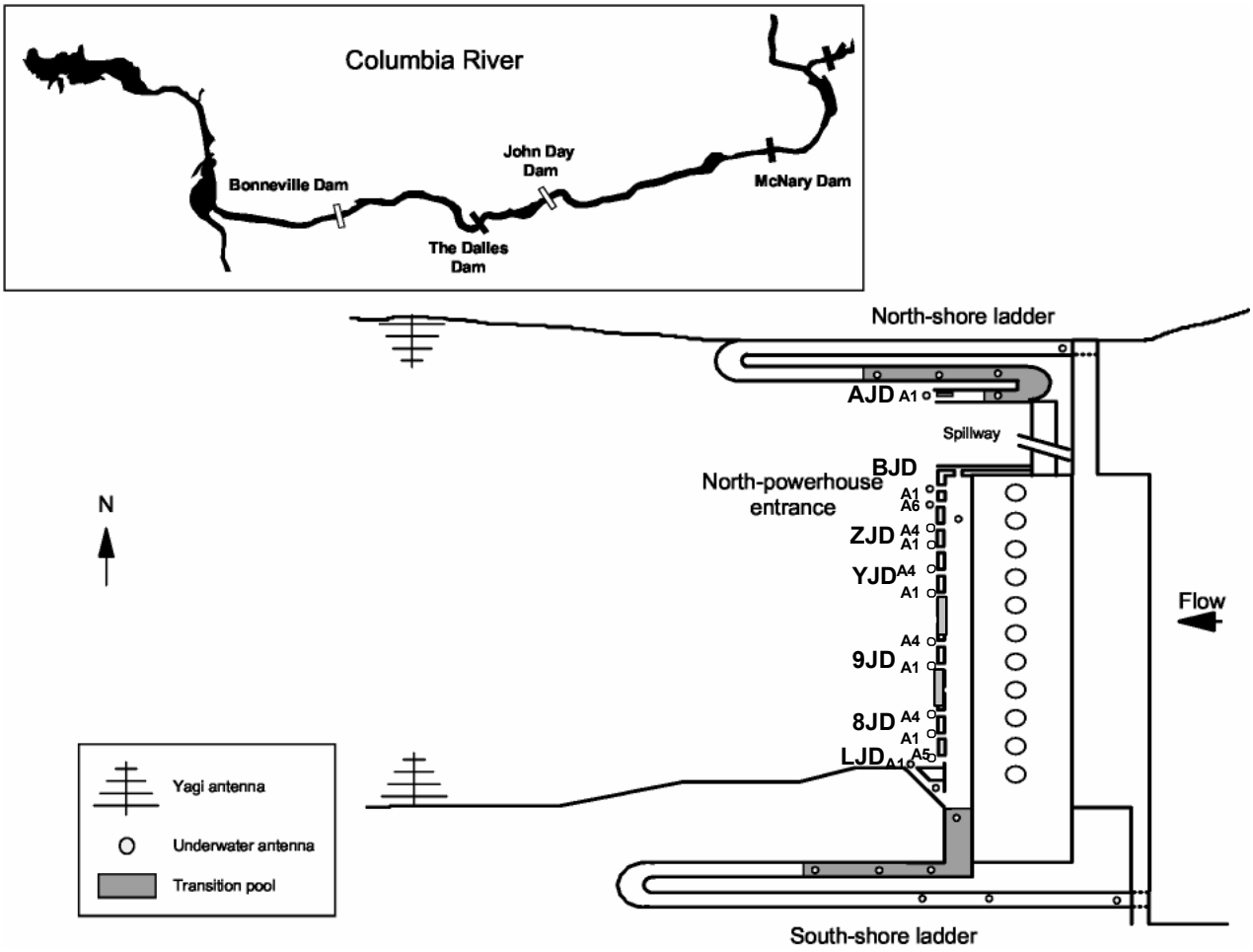


Figure 1. Placement of aerial and underwater antenna for radio receivers at John Day Dam during 2003.

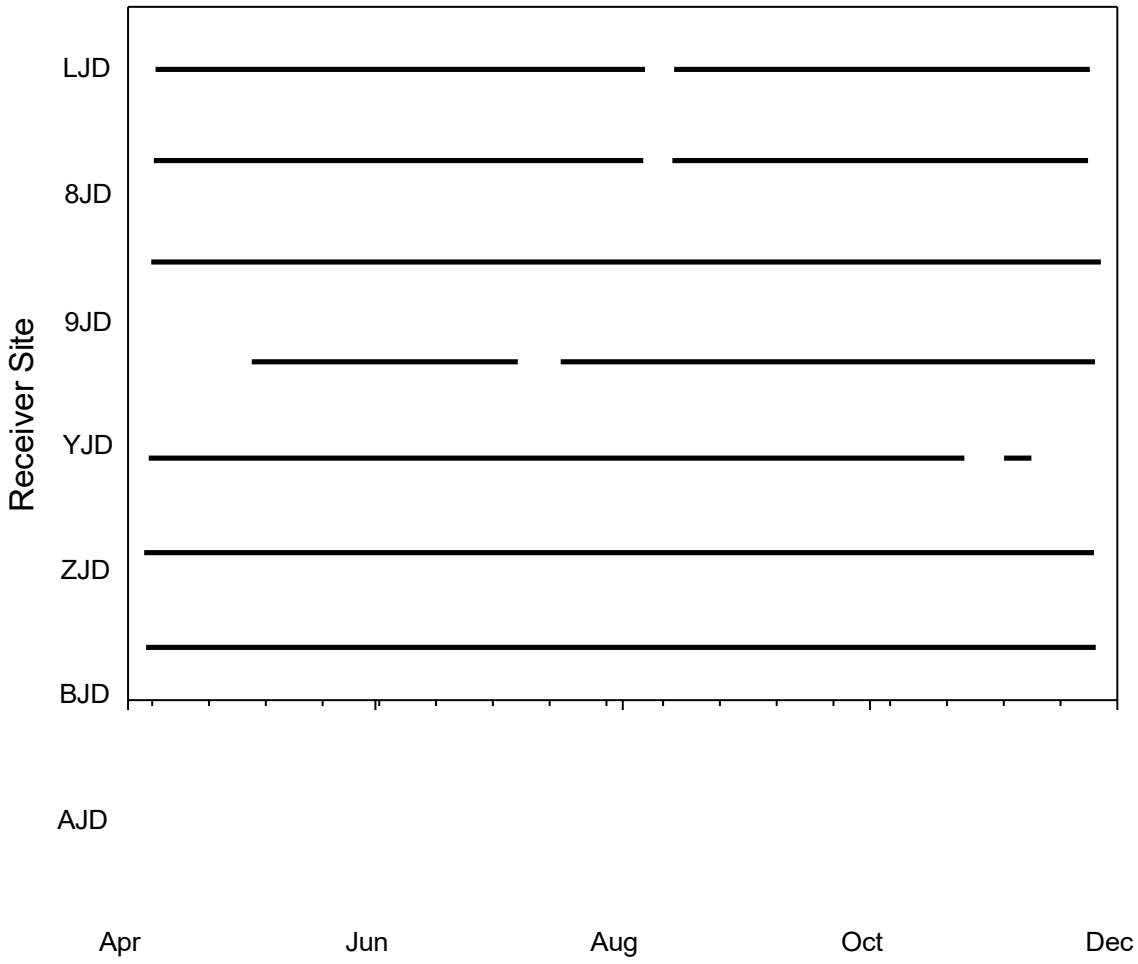


Figure 2. Time of operation of fixed-site radio receivers at John Day Dam, 2003. Breaks in time lines represent periods of time when receivers where not operational.

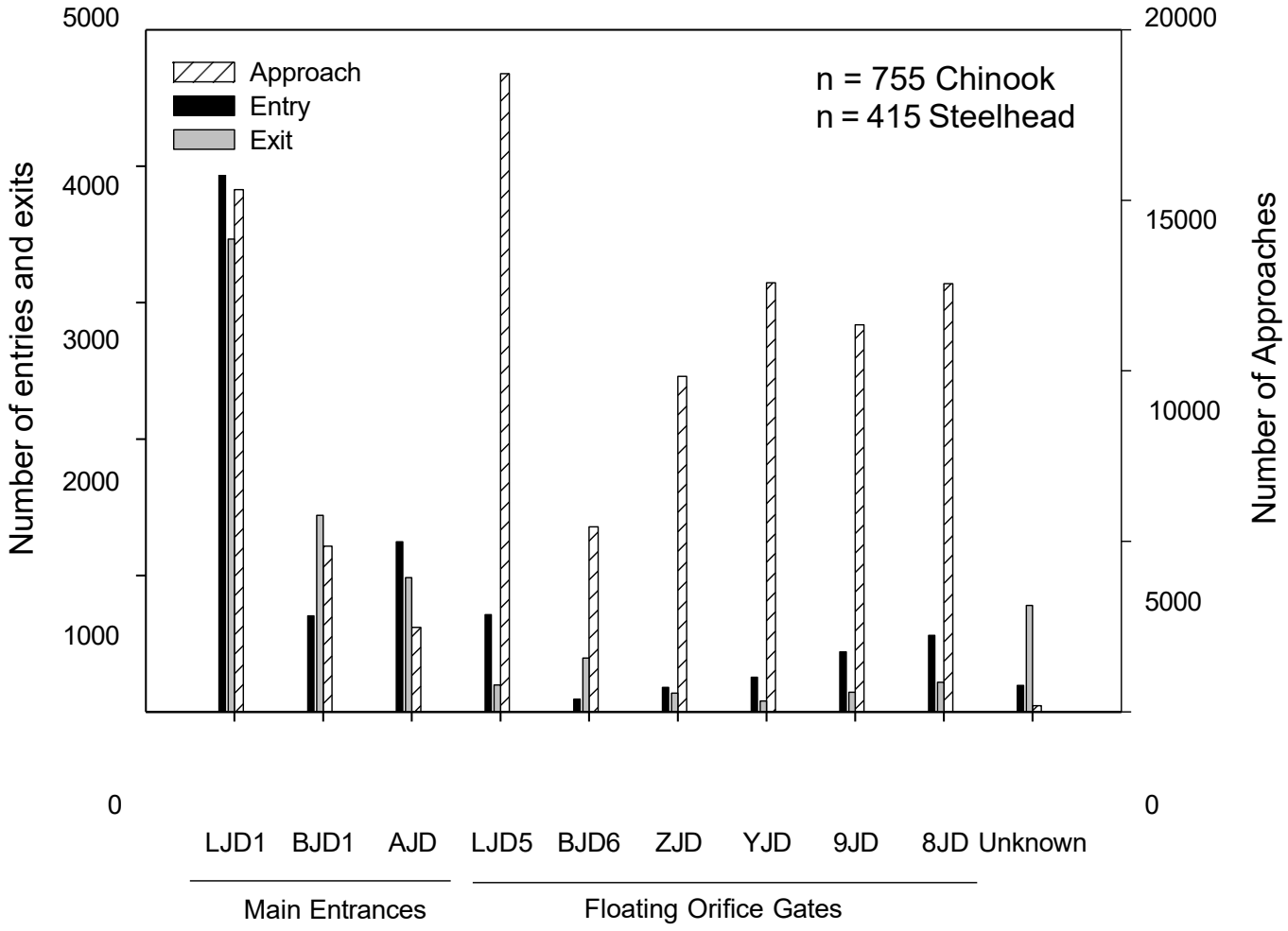
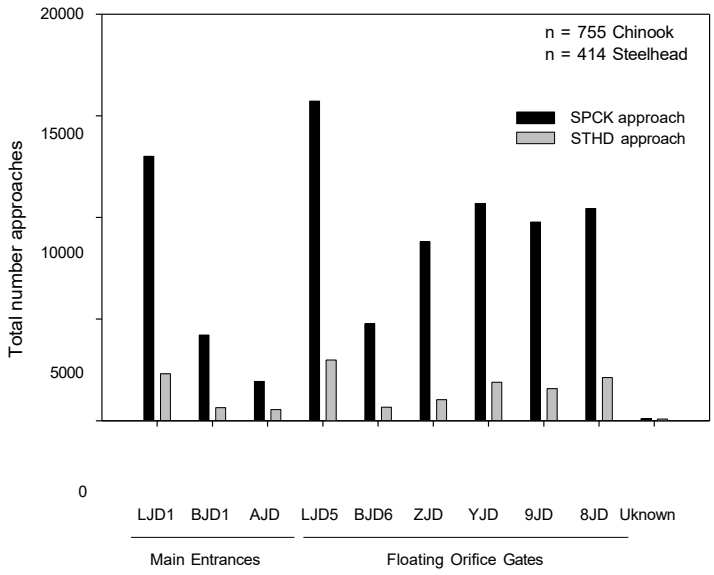
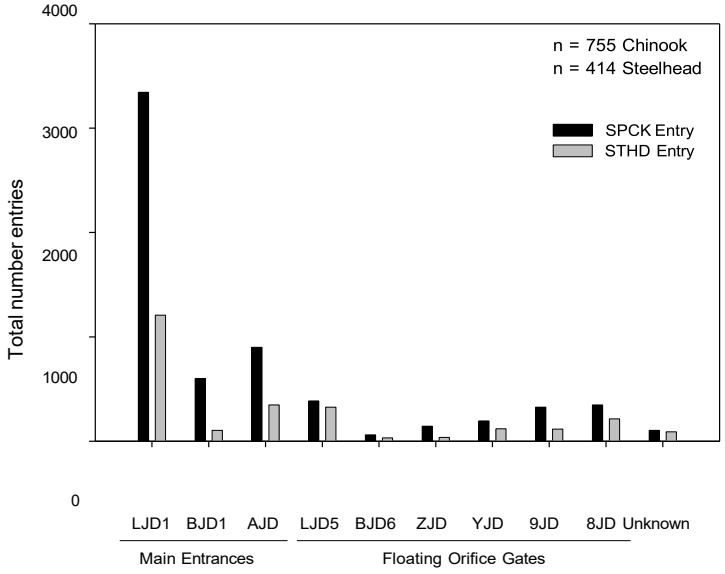


Figure 3. Distribution of total entries, exits, and approaches for radio-tagged Chinook salmon and steelhead at John Day Dam during 2003 (all floating orifice gates open).


n = 755 Chinook
n = 414 Steelhead
SPCK approach
STHD approach
Total number approaches
20000
15000
10000
5000
0
LJD1 BJD1 AJD LJD5 BJD6 ZJD YJD 9JD 8JD Uknown
Main Entrances
Floating Orifice Gates


n = 755 Chinook
n = 414 Steelhead
SPCK Entry
STHD Entry
Total number entries
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2000
1000
0
LJD1 BJD1 AJD LJD5 BJD6 ZJD YJD 9JD 8JD Unknown
Main Entrances
Floating Orifice Gates

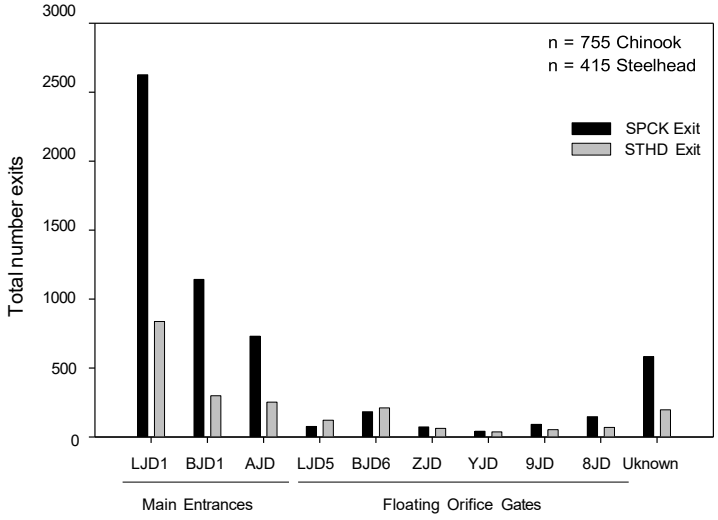
n = 755 Chinook
n = 415 Steelhead
SPCK Exit
STHD Exit
Total number exits
3000
2500
2000
1500
1000
500
0
LJD1 BJD1 AJD LJD5 BJD6 ZJD YJD 9JD 8JD Uknown
Main Entrances
Floating Orifice Gates

Figure 4. Distribution of total approaches (top), entries (middle), and exits (bottom) for radio tagged Chinook salmon (black) and steelhead (gray) at John Day Dam in 2003.

Table 1. Number of entrances, exits, and approaches at each fishway entrance by Chinook salmon and steelhead at John Day Dam in 2003 (numbers in parenthesis represent the percentage of the total).

Receiver Site	*Antenna #*	*Total Entries*	*Total Exits*	*Total Approach*	*Net Entries*	*Approaches per Entry*
LJD[a]	1	4551 (52.1%)	3465 (49.1%)	15312 (16.4%)	1086	3.4
BJD[a]	1	703 (8.0%)	1441 (20.4%)	4854 (5.2%)	-738	6.9
AJD[a]	1	1246 (14.3%)	984 (13.9%)	2476 (2.7%)	262	2.0
LJD[b]	5	712 (8.1%)	197 (2.8%)	18711 (20.1%)	515	26.3
BJD[b]	6	92 (1.1%)	394 (5.7%)	5425 (5.8%)	302	59.0
ZJD[b]	1	85 (1.0%)	71 (1.0%)	5846 (6.3%)	14	68.8
ZJD[b]	4	95 (1.1%)	65 (0.9%)	3997 (4.3%)	30	42.1
YJD[b]	1	137 (1.6%)	46 (0.7%)	6748 (7.2%)	91	49.3
YJD[b]	4	116 (1.3%)	33 (0.5%)	5830 (6.3%)	83	50.3
9JD[b]	1	227 (2.6%)	97 (1.4%)	6818 (7.3%)	130	30.0
9JD[b]	4	213 (2.4%)	47 (0.7%)	4528 (4.9%)	166	21.3
8JD[b]	1	264 (3.0%)	162 (2.3%)	5391 (5.8%)	102	20.4
8JD[b]	4	297 (3.4%)	54 (0.8%)	7159 (7.7%)	243	24.1
Total		**8738**	**7056**	**93095**	**2286**	

[a] main entrances (shaded)

[b] floating orifice gates

References

Bjornn, T.C., M.A. Jepson, C.A. Peery, and K.R. Tolotti. 1997. Evaluation of adult chinook salmon passage at Priest Rapids Dam with orifice gates open and closed – 1996. Idaho Cooperative Fish and Wildlife Research Unit, University of Idaho, Moscow, Technical Report 97-1.

Daigle, W.R., T.C. Bjornn, C.A. Peery, K.R. Tolotti, R.R. Ringe, M. A. Jepson, and M. Moser. Draft report. Evaluation of adult chinook salmon and steelhead passage at Columbia and Snake River dams with orifice or sluice gates open and closed. Idaho Cooperative Fish and Wildlife Research Unit, University of Idaho, Moscow. Report for project MPE-P-95-1.

Peery, C. A., T. C. Bjornn, and K.R. Tolotti. 1998. Evaluation of adult Chinook salmon and sockeye salmon passage at Priest Rapids and Wanapum dams – 1997. Idaho Cooperative Fish and Wildlife Research Unit, University of Idaho, Moscow, Technical Report 98-5.

Final coordination results –

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

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