Testing Effects of Two Spill Treatments on Route Specific Survival of Subyearling Chinook Salmon

Metric	All Summer 6/13-7/18	SE	n	24 h 95 kcfs 7/2-7/18	SE	n	85 kcfs D 120 kcfs N 7/2-7/18	SE	n
Spillway Virtual Release (VR) + 81 km of tailwater (to C	0.9304	0.00616	1787	0.9241	0.01209	498	0.8774	0.01687	381
Spillway End Bay VR + 81 km of tailwater (to CR153)	0.9222	0.00955	835	0.9233	0.01682	263	0.8772	0.02417	186
Spillway Middle Bay VR + 81 km of tailwater (to CR153	0.9376	0.00797	952	0.9251	0.01740	235	0.8776	0.02355	195
B2 VR + 81 km of tailwater	0.9539	0.00730	892						
B2CC VR + 81 km of tailwater	0.9704	0.01009	311	0.9630	0.01932	102	0.9353	0.02576	92
B2 JBS VR + 81 km of tailwater	0.9759	0.01543	144	0.9248	0.05242	36	0.9667	0.03277	36
B2 Turbine VR + 81 km of tailwater	0.9363	0.01172	437	0.9172	0.02134	168	0.9340	0.02412	106
B1 VR + 81 km of tailwater	0.9608	0.00748	764						
B1 Sluiceway VR + 81 km of tailwater	0.9424	0.01730	196	0.8775	0.05871	32	0.8686	0.06486	29
B1 Turbine VR + 81 km of tailwater	0.9671	0.00807	568	0.9038	0.04088	52	0.9233	0.03153	75

Based on all upstream releases to maximize power

Rank Routes by Survival Pooling All Upstream Releases

Metric	All Summer 6/13-7/18	SE	n
B2 JBS VR + 81 km of tailwater	0.9759	0.01543	144
B2CC VR + 81 km of tailwater	0.9704	0.01009	311
B1 Turbine VR + 81 km of tailwater	0.9671	0.00807	568
B1 VR + 81 km of tailwater	0.9608	0.00748	764
B2 VR + 81 km of tailwater	0.9539	0.00730	892
B1 Sluiceway VR + 81 km of tailwater	0.9424	0.01730	196
Spillway Middle Bay VR + 81 km of tailwater (to CR153	0.9376	0.00797	952
B2 Turbine VR + 81 km of tailwater	0.9363	0.01172	437
Spillway Virtual Release (VR) + 81 km of tailwater (to C	0.9304	0.00616	1787
Spillway End Bay VR + 81 km of tailwater (to CR153)	0.9222	0.00955	835

Best

Worst

Based on all upstream releases to maximize power

Estimates of Survival and Passage Metrics for Steelhead in Spring 2010

Metric	All Spring[1]	SE	n[2]
Survival - Dam Passage + 81 km of tailwater (CR234 to CR	0.9567	0.00818	3883
Survival - Forebay entrance to primary array (CR236 to CR]	0.9564	0.00826	3883
Median Forebay Residence Time (CR236 to CR234)	1.6933	0.11004	3427
Median 100 m Forebay Residence Time (100 m to CR234)	1.4233	0.56047	440
Median Egress Time (dam to end of tailrace; CR234 to CR2	0.4156	0.14105	3293
Median Project Passage Time (CR236 to CR233)	2.4208	0.18014	3295
FPE || Dam	0.7987	0.00684	3432
Spill Passage Efficiency || Dam	0.3974	0.00835	3432
Spill + B2CC Passage Efficiency || Dam	0.6976	0.00784	3432
B1 Sluiceway Passage Efficiency || B1	0.4082	0.03511	196
B2CC Passage Efficiency || B2	0.5502	0.01150	1872
B2 JBS Passage Efficiency || B2	0.1426	0.00808	1872
B2 FGE (B2 Screen Efficiency) || (B2 turbine + B2 JBS)	0.3171	0.01604	842
B2 FPE || B2	0.6928	0.01066	1872
B1 Sluiceway Passage Efficiency || Dam	0.0233	0.00258	3432
B2CC Passage Efficiency || Dam	0.3001	0.00782	3432
B2 JBS Passage Efficiency || Dam	0.0778	0.00457	3432

1 Days before 7/2 had higher discharge than after 7/2
2 Based on TDA Tailrace and Hood River Releases Only
3 Based on all upstream releases to maximize power

Estimates of Survival and Passage Metrics for Day and Night Periods in Spring 2010

Metric	Spring Day	SE	n	Spring Night	SE	n
Survival - Dam Passage + 81 km of tailwater (CR234 to CR	0.9574	0.00938	1518	0.9601	0.00911	1915
Survival - Spillway Passage + 81 km of tailwater (CR234 to	0.9287	0.01563	428	0.9610	0.01026	936
Median Forebay Residence Time (CR236 to CR234)	2.3339	0.17113	1511	1.2047	0.14324	1916
Median 100 m Forebay Residence Time (100 m to CR234)	1.9822	0.94278	187	0.8131	0.68081	253
Median Egress Time (dam to end of tailrace; CR234 to CR2	0.3722	0.26754	1461	0.4486	0.13701	1832
Median Project Passage Time (CR236 to CR233)	3.0000	0.31971	1455	1.9193	0.20115	1832
FPE || Dam	0.8571	0.00898	1518	0.7524	0.00987	1914
Spill Passage Efficiency || Dam	0.2820	0.01155	1518	0.4890	0.01143	1914
Spill + B2CC Passage Efficiency || Dam	0.7530	0.01107	1518	0.6536	0.01088	1914
B1 Sluiceway Passage Efficiency || B1	0.6111	0.05745	72	0.2903	0.04076	124
B2CC Passage Efficiency || B2	0.7024	0.01433	1018	0.3689	0.01651	854
B2 JBS Passage Efficiency || B2	0.1120	0.00988	1018	0.1792	0.01312	854
B2 FGE (B2 Screen Efficiency) || (B2 turbine + B2 JBS)	0.3762	0.02783	303	0.2839	0.01942	539
B2 FPE || B2	0.8143	0.01219	1018	0.5480	0.01703	854
B1 Sluiceway Passage Efficiency || Dam	0.0290	0.00431	1518	0.0188	0.00311	1914
B2CC Passage Efficiency || Dam	0.4710	0.01281	1518	0.1646	0.00848	1914
B2 JBS Passage Efficiency || Dam	0.0751	0.00676	1518	0.0799	0.00620	1914

Based on all upstream releases to maximize power

Route Specific Survival Rates Ranked from Best to Worst

Metric	All Spring	SE	n	Survivals with different letters in the same column differ	
B2 JBS Virtual Release + 81 km of tailwater	0.9884	0.01317	267		C
B2CC Virtual Release + 81 km of tailwater	0.9882	0.00914	1030	A	
B1 Sluiceway Virtual Release + 81 km of tailwater	0.9740	0.02703	80		
Spillway Mid Bay Virtual Release + 81 km of tailwater	0.9541	0.01163	719		
Spillway Virtual Release + 81 km of tailwater	0.9509	0.00964	1364		
Spillway End Bay Virtual Release + 81 km of tailwater	0.9473	0.01233	644		
B2 Turbine Virtual Release + 81 km of tailwater	0.9228	0.01436	574	B	D
B1 Turbine Virtual Release + 81 km of tailwater	0.9095	0.02937	116	B	

Estimates of Survival and Passage Metrics for Yearling Chinook Salmon Smolts in Spring 2010

Metric	All Spring[1] 5/13-7/1	SE	n
Survival - Dam Passage + 81 km of tailwater (CR234 tc	0.9637	0.00776	3875
Survival - Forebay entrance to primary array (CR236 to	0.9631	0.00764	3875
Median Forebay Residence Time (CR236 to CR234)	0.7378	0.04694	3407
Median 100 m Forebay Residence Time (100 m to CR2	0.1739	0.26627	424
Median Egress Time (dam to end of tailrace; CR234 to	0.4558	0.14398	3268
Median Project Passage Time (CR236 to CR233)	1.2931	0.15173	3281
FPE || Dam	0.8048	0.00679	3406
Spill Passage Efficiency || Dam	0.5188	0.00856	3406
Spill + B2CC Passage Efficiency || Dam	0.7052	0.00781	3406
B1 Sluiceway Passage Efficiency || B1	0.3299	0.03376	194
B2CC Passage Efficiency || B2	0.4395	0.01306	1445
B2 JBS Passage Efficiency || B2	0.1903	0.01033	1445
B2 FGE (B2 Screen Efficiency) || (B2 turbine + B2 JBS	0.3395	0.01664	810
B2 FPE || B2	0.6298	0.01270	1445
B1 Sluiceway Passage Efficiency || Dam	0.0188	0.00233	3406
B2CC Passage Efficiency || Dam	0.1864	0.00667	3406
B2 JBS Passage Efficiency || Dam	0.0807	0.00467	3406

[1] Based on all upstream releases, which did not differ significantly

Estimates of Survival and Passage Metrics During Day and Night Periods for Yearling Chinook Salmon Smolts in Sprir

Metric[1]	Spring Day	SE	n	Spring Night	SE	n	Day & Night Different?
Survival - Dam Passage + 81 km of tailwater (CR234 tc	0.9658	0.00836	2197	0.9679	0.00907	1209	No
Survival - Spillway Passage + 81 km of tailwater (CR2:	0.9443	0.01021	1161	0.9508	0.01196	605	No
Median Forebay Residence Time (CR236 to CR234)	0.7364	0.05794	2197	0.7388	0.08004	1210	No
Median 100 m Forebay Residence Time (100 m to CR2	0.2650	0.36615	249	0.0811	0.38100	175	No
Median Egress Time (dam to end of tailrace; CR234 to	0.4444	0.18521	2101	0.4831	0.22677	1167	No
Median Project Passage Time (CR236 to CR233)	1.2790	0.19554	2098	1.3222	0.24171	1167	No
FPE || Dam	0.8440	0.00774	2198	0.7334	0.01272	1208	Yes
Spill Passage Efficiency || Dam	0.5282	0.01065	2198	0.5017	0.01439	1208	No
Spill + B2CC Passage Efficiency || Dam	0.7425	0.00933	2198	0.6374	0.01383	1208	Yes
B1 Sluiceway Passage Efficiency || B1	0.2917	0.04149	120	0.3919	0.05675	74	No
B2CC Passage Efficiency || B2	0.5136	0.01651	917	0.3106	0.02014	528	Yes
B2 JBS Passage Efficiency || B2	0.2050	0.01333	917	0.1648	0.01615	528	No
B2 FGE (B2 Screen Efficiency) || (B2 turbine + B2 JBS	0.4215	0.02338	446	0.2390	0.02235	364	Yes
B2 FPE || B2	0.7187	0.01485	917	0.4754	0.02173	528	Yes
B1 Sluiceway Passage Efficiency || Dam	0.0159	0.00267	2198	0.0240	0.00440	1208	No
B2CC Passage Efficiency || Dam	0.2143	0.00875	2198	0.1358	0.00986	1208	Yes
B2 JBS Passage Efficiency || Dam	0.0855	0.00597	2198	0.0720	0.00744	1208	No

[1] Based on all upstream releases, which did not differ significantly

Route Specific Survival Rates Ranked from Best to Worst

Metric	All Spring	SE	n	Survivals with different letters in the same column differ
B2CC Virtual Release + 81 km of tailwater	1.0034	0.00861	634	A
B1 Turbine Virtual Release + 81 km of tailwater	0.9988	0.01633	129	A
B2 JBS Virtual Release + 81 km of tailwater	0.9923	0.01222	275	A
B1 Sluiceway Virtual Release + 81 km of tailwater	0.9913	0.02502	64	
B2 Turbine Virtual Release + 81 km of tailwater	0.9688	0.01149	533	
Spillway Mid Bay Virtual Release + 81 km of tailwater	0.9524	0.01047	949	B
Spillway Virtual Release + 81 km of tailwater	0.9465	0.00911	1766	B
Spillway End Bay Virtual Release + 81 km of tailwater	0.9396	0.01127	817	B

Schwartz, Dennis E NWP

From: Hamilton-Laura@npr70.nwd-wc.usace.army.mil
Sent: Wednesday, June 08, 2011 2:01 PM
Subject: CBT Msg: TDG Production Estimates sent on 06/08/2011 at 14:01

Sent to: CO
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
BON R 060811 1400 CO

ATTENTION: COLUMBIA BASIN PROJECTS AND BPA

SUBJECT: REVISED TDG PRODUCTION ESTIMATES (MCN & BON)

1. THIS TELETYPE UPDATES TDG PRODUCTION ESTIMATES BASED ON OBSERVED TDG PRODUCTION AND PROVIDES SPILL CAPS FOR FISH PASSAGE SPILL, AND LACK OF LOAD SPILL CONDITIONS.

2. ALSO REFERENCE TTY BON R 060111 1401 WHICH REVISED THE SPILL PRIORITY LIST AND PROVIDES THE PROJECT ORDER FOR LACK OF LOAD SPILL CONDITIONS.

3. CURRENT SPILL CAPS FOR THE VARIOUS TDG LEVELS ARE SHOWN BELOW. THESE ARE UPDATED BASED ON REAL-TIME DATA.

	LACK OF LOAD SPILL CAPS								FISH PASSAGE SPILL CAPs	
PROJECT	TDG% 110	TDG% 115	TDG% 120	TDG% 122	TDG% 125	TDG% 127	TDG% 130	TDG% 135	120%	(SEE NOTE 6)
LMN	18	23	49	55	80	120	180	250	28	
LGS	18	23	52	56	75	116	165	177	40	* Changes
MCN	40	80	190	235	280	305	342	375*	190	
IHR	18	45	79	93	110	124	145	240	79	
LWG	20	30	50	61	73	86	98	200	41	
TDA	45	60	146	220	250	294	360	400	135	
JDA	15	60	144	177	190	206	235	300	135	
BON	65	75	107	120	215	234	250	294*	100	
DWR	GC									(SEE NOTE 4)
CHJ	20	45	150	160	170	180	189	189		
GCL(a)	0	5	19	21	25	32	42	57		
GCL(b)	0	15	18	21	75	93	120	130		

4. THE DWR SPILL LISTED ONLY FOR THE 110% TDG TYPICALLY PRODUCED BY SPILLING 37% FOR MODELING PURPOSES, AND VARIES WITH ENVIRONMENTAL FACTORS BETWEEN 35%-38%.

5. WHEN GRAND COULEE FOREBAY ELEVATION IS LESS THAN 1266 FT USE GCL(a) SPILL CAPS ASSOCIATED WITH OUTLET TUBES. WHEN GRAND COULEE FOREBAY ELEVATION IS GREATER THAN 1265.5 FT, USE GCL(b) SPILL CAPS ASSOCIATED WITH DRUMGATES.

6. THE FISH PASSAGE SPILL CAP COLUMN REPRESENTS THE LIMITING SPILL CAP FOR VOLUNTARY SPILL ACCORDING TO THE CURRENT FISH

TOTAL DISSOLVED GAS REPORT FOR CAMAS/WASHOUGAL
starting at 0705 8 jun 2011

						BONNEVILLE			
DATE	TIME	WA TM DEG F	BARO PRES	TD GAS PRES	GAS %	SPILL QS	TOT QR	DEPTH OF GAGE(FT)	COMPENSATION DEPTH(FT) **
0608	0800	56.0	765.0	950.0	124.2	292.7	502.6	07.9	8.0
0608	0900	56.0	765.0	950.0	124.2	292.7	502.7	07.0	8.0
0608	1000	56.0	765.0	952.0	124.4	292.9	500.6	08.0	8.1
0608	1100	56.0	765.0	952.0	124.4	292.9	501.6	07.7	8.1
0608	1200	56.0	765.0	954.0	124.7	293.1	500.3	07.4	8.2
0608	1300	56.0	765.0	955.0	124.8	293.2	501.2	08.7	8.3
0608	1400	56.0	765.0	956.0	125.0	293.2	500.9	08.6	8.3
0608	1500	56.0	765.0	957.0	125.1	293.4	500.2	07.9	8.3
0608	1600	55.9	765.0	956.0	125.0	293.2	500.5	09.0	8.3
0608	1700	56.0	765.0	958.0	125.2	293.4	501.4	08.9	8.4
0608	1800	56.0	766.0	960.0	125.3	293.6	501.3	10.7	8.4
0608	1900	56.0	765.0	959.0	125.4	293.7	501.5	09.8	8.4
0608	2000	56.0	765.0	959.0	125.4	293.4	499.2	08.4	8.4
0608	2100	56.0	765.0	960.0	125.5	293.4	499.3	10.4	8.5
0608	2200	56.0	766.0	960.0	125.3	293.9	498.1	10.2	8.4
0608	2300	56.0	766.0	960.0	125.3	294.0	499.4	09.5	8.4
0609	000	56.0	766.0	960.0	125.3	294.3	497.2	10.0	8.4
0609	0100	56.0	766.0	961.0	125.5	294.7	496.8	12.5	8.5
0609	0200	56.0	766.0	961.0	125.5	294.8	498.1	10.3	8.5
0609	0300	56.0	766.0	961.0	125.5	295.0	497.3	10.5	8.5
0609	0400	56.0	766.0	962.0	125.6	298.4	502.9	12.1	8.5
0609	0500	55.9	766.0	961.0	125.5	297.8	504.5	10.2	8.5
0609	0600	55.9	766.0	961.0	125.5	296.0	501.4	10.0	8.5
++++	++++	++++	+++++	+++++	+++++	+++++	+++++	++++	0.0

** Calculation of compensation depth @ 120% TDG
[Baro. Pres. (765) - TDG Pres. (918)]/23 = 6.7 ft.

1 NPD RESERVOIR CONTROL CENTER — PROJECT- BON BONNEVILLE DAM & LAKE
HOURLY OPERATION DATA REPORT — THURSDAY JUNE 9, 2011

	GROSS GEN MW	STA USE MW	------ OUTFLOW ------ -- IN KCFS -- TOTAL	POWER	SPILL	EL AT POWERHOUSE IN FEET + MSL FOREBAY	TAILWATR	AVG HEAD FT	SUPR CAP MW	UNIT STATUS ON RMT	ON LINE	AVL	PROJECT FOREBAY ELEV	STEVENSON GAGE ELEV	PROJECT TAILWATER ELEV	HOUR
1		3	496.80	189.70	294.70	72.90	33.10	39.80					72.70	77.60	32.30	1
2		3	498.10	190.90	294.80	72.90	33.00	39.90					72.80	77.60	32.20	2
3		3	497.30	189.90	295.00	72.80	33.00	39.80					72.80	77.60	32.10	3
4		3	502.90	192.10	298.40	72.70	33.20	39.50					72.60	77.60	32.30	4
5		3	504.50	194.30	297.80	72.70	33.30	39.40					72.50	77.60	32.40	5
6		3	501.40	193.00	296.00	72.80	33.10	39.70					72.60	77.60	32.20	6
7																7
8																8
9																9
10																10
11																11
12																12
13																13
14																14
15																15
16																16
17																17
18																18
19																19
20																20
21																21
22																22
23																23
24																24
TOT 24		18														
AVG		3	500.17	191.65	296.12	72.80	33.12	39.68					72.67	77.60	32.25	
MAX			504.50	194.30	298.40	72.90	33.30	39.90					72.80	77.60	32.40	
MIN			496.80	189.70	294.70	72.70	33.00	39.40					72.50	77.60	32.10	

1 NPD RESERVOIR CONTROL CENTER — PROJECT- BON BONNEVILLE DAM & LAKE
HOURLY OPERATION DATA REPORT — THURSDAY JUNE 9, 2011

	---- BONNEVILLE PH 1 GROSS GEN MW	POWER FLOW KCFS	UNIT STATUS ON RMT	ON LINE	AVL	---- PH 1 FOREBAY EL FT	---- PROJECT FOREBAY EL FT	BONNEVILLE PH 2 GROSS GEN MW	POWER FLOW KCFS	UNIT STATUS ON RMT	ON LINE	---- AVL	----PROJECT--- SPWY GATES IN USE	MISC FLOW KCFS	HOUR
1		71.80				72.9	72.7		117.90				18	12.4	1
2		72.80				72.9	72.8		118.10				18	12.4	2
3		72.10				72.8	72.8		117.80				18	12.4	3
4		74.20				72.7	72.6		117.90				18	12.4	4
5		76.00				72.7	72.5		118.30				18	12.4	5
6		73.40				72.8	72.6		119.60				18	12.4	6
7															7
8															8
9															9
10															10
11															11
12															12

Schwartz, Dennis E NWP

From: David_Wills@fws.gov
Sent: Wednesday, June 08, 2011 4:53 PM
To: Schwartz, Dennis E NWP
Cc: Aaron Jackson; Hausmann, Ben J NWP; Klatte, Bernard A NWP; Hevlin, Bill; Van-der-leeuw, Bjorn NWP; brose@yakama.com; caudill@uidaho.edu; charles.morrill@dfw.wa.gov; Walker, Christopher NWP; Chris_Peery@fws.gov; Feil, Dan H NWD; Statler, Dave; Clugston, David A NWD; Dave Benner; Fryer, Derek S NWW; Baus, Douglas M NWD; ed.meyer@noaa.gov; elmerc@nezperce.org; Fryer, Jeff; Fredricks, Gary; Lear, Gayle N NWD; Medina, George J NWP; Kovalchuk, Greg; Moody, Gregory P NWW; heib_critf.org; Kiel, James D NWP; Jason Sweet; Jerry McCann; Rerecich, Jonathan G NWP; Renholds, Jon F NWW; Skidmore,John T - KEWR-4; Kathryn Kostow; Swenson, Larry; Ebner, Laurie L NWP; Lorz, Tom; Ahmann, Martin L NWW; Shutters, Marvin K NWW; Eppard, Matthew B NWP; Brian McIlraith; Langeslay, Mike J NWP; Zyndol, Miroslaw A NWP; Richards, Natalie A NWP; Zorich, Nathan A NWP; Ocker, Paul A NWD; Roger Dick Jr.; Martinson, Rick; Kruger, Rick; Davidson, Robert A ERDC-CHL-MS; Stansell, Robert J NWP; Johnson, Robert L NWW; Cordie, Robert P NWP; Wittinger, Rodney J NWP; Kiefer,Russell; Tackley, Sean C NWP; Nelson, Shawn L NWW; Shane Scott; Stephenson, Ann; Barton, Steven B NWD; Richards, Steven P (DFW); Haeseker, Steve; BPA Scott Bettin; Mackey, Tammy M NWP; Hurd, Terry W NWP; Dykstra, Timothy A NWW; trevor.conder@noaa.gov; Tucker Jones; Whiteaker, John
Subject: Re: FPOM: Official Coordination (BON PH1 Operational Range)
Attachments: 110608 BON PH1 TURB OPS RANGE WAIVER_2011-2012.docx

Dennis,
I will not be able to attend the FPOM meeting tomorrow, so I am forwarding on my comments now.

Until a revised and comprehensive White Paper is submitted and thoroughly reviewed and discussed by the regional managers the Service will not support the implementation of the proposed Bonneville Powerhouse 1 turbine operations above the 1% range of peak efficiency, as requested in the coordination request. The coordination request is lacking in any comprehensive discussion of the impacts to the passage of juvenile fish being diverted to the turbines from the ice and trash sluice way and spill routes. The impact to juvenile fish passage and survival at the higher operation point of best geometry is speculative. Current smolt monitoring for GBT is not indicating that a problem exists for juvenile salmonids migrating in-river with the current elevated levels of TDG.

David Wills
U.S. Fish & Wildlife Service
Columbia River Fisheries Program Office
1211 SE Cardinal Court, Suite 100
Vancouver, Washington 98683-9684
phone: (360) 604-2500
fax: (360) 604-2505
e-mail: david_wills@fws.gov
http://www.fws.gov/columbiariver

"Schwartz, Dennis
E NWP"
<Dennis.E.Schwart

To