

SYSTEM OPERATIONAL REQUEST: #2006-1

The following State, Federal, and Tribal Salmon Managers have participated in the preparation and support this SOR: U.S. Fish & Wildlife Service, Idaho Department of Fish and Game, Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, NOAA Fisheries, and the Columbia River Inter-Tribal Fish Commission.

TO:	Brigadier General Gregg F. Martin	COE-NWD
	James D. Barton	COE-Water Management
	Cathy Hlebechuk	COE-RCC
	Witt Anderson	COE-P
	Col. Thomas E. O'Donovan	COE-Portland District
	LTC Randy L. Glaeser	COE-Walla Walla District
	J. William McDonald	USBR-Boise Regional Director
	Stephen J. Wright	BPA-Administrator
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Russell B. Kiefer

FROM: Russ Kiefer, Chairperson, Salmon Managers

DATE: February 16, 2006

SUBJECT: Spill at Bonneville Dam for the March Spring Creek Hatchery Release

SPECIFICATIONS:

The Salmon Managers listed above are requesting the following fishery operations at the Bonneville Project following the March 2 Spring Creek Hatchery tule Chinook release:

1. No operation of unscreened units at Bonneville Powerhouse II and follow the turbine operating priority in the Fish Passage Plan;
2. Operate Powerhouse II as first priority. Fully load PH II before operating PH I;
3. Operate turbine units within 1% of peak efficiency;
4. Operate juvenile and adult facilities according to criteria;
5. Beginning March 3, operate the Bonneville Project to maintain a minimum 14.5 foot tailwater elevation. This elevation is sufficient to allow 50,000 cfs of spill while maintaining a maximum level of 105 % TDG (factored for depth compensation) the expected highest elevation (11.5 foot tailwater) chum salmon redds at the Ives Island complex and on the Oregon shore below Multnomah Falls.
6. Beginning March 3, monitor sub-samples at the Hamilton Island Juvenile Monitoring Facility (JMF) facility. When sub-sampling at the JMF indicates large numbers of sub-yearling Chinook have reached Bonneville Dam, contact COE Reservoir Control Center to begin spill and B2CC operation;
7. Operate for five days at 50,000 cfs spill and B2CC operation, or to an estimated 95% fish passage index (defined as the estimated percent of fish from the release group that have

passed the project), which ever comes first. Adjust the spillgates to the best bulk pattern available. If the B2 corner collector is not operational on March 2nd, operate by spilling at Bonneville for five days, starting at 50,000cfs spill level and if the TDG levels are low ramp up the spill in 5,000cfs increments toward the goal of 75,000 cfs for this period.

8. At no time is spill to exceed 120% total dissolved gas measured at the downstream Warrendale gauge, or 115% at the Camas/Washougal gauge, as allowed under the dissolved gas waivers from the states of Oregon and Washington;
9. We request that the Action Agencies use the flexibility in the system to accomplish this SOR without jeopardizing the April 10th rule curve elevations called for by the Biological Opinion;

JUSTIFICATION:

We are entering a water runoff season with a slightly higher than normal (103%) runoff forecast (RFC February final). With this in mind, this SOR is requesting spill, flow, and duration at levels that will provide for protection of the March release group.

Spring Creek Hatchery is scheduled to release about 7.5 million tule fall Chinook by mid-day March 2, 2006. This represents one-half of the total production for brood year 2005. The overall importance of this stock to ocean and Columbia River commercial, sport and tribal fisheries has been previously documented and recently reported in the requests for a total dissolved gas waivers submitted to the Oregon Department of Environmental Quality and Washington Department of Ecology. Survival rates and abundance appear to be declining significantly from the recent highs produced by broodyears 1998-2001 which produced adult returns that ranged between 147,000 and 195,000 for the period of 2001-2004. The 2005 adult return to the Columbia River was about 93,000, and jack returns in 2005 were the lowest since 1997. The most recent preseason forecast for 2006 fall Chinook returns to the Columbia River estimates 50,000 adult tules, indicating another reduction in adult returns. These reduced survival rates and abundance levels are likely highly influenced by changing ocean productivity levels but are also affected by inriver passage conditions. The low jack return in 2005 is the first indicator of overall survival conditions for the 2003 brood that experienced the 2004 B2CC operation. If overall survival rates and abundance levels continue to decline, the Spring Creek stock could once again become a constraining stock for fishery management purposes to help achieve brood stock needs rather than achieving its purpose to provide abundant hatchery fish that fisheries are targeted on.

Spill is necessary to achieve the best fish passage conditions. When conducted with the proper spill gate openings and pattern, spill at Bonneville is the safest route available for downstream migrating juvenile salmonids. Few adult migrants will be present during the time period associated with this spill, therefore adult passage delay and/or fall back problems are not anticipated.

In order to protect the most sensitive developmental stages of juvenile fall Chinook and chum salmon that are incubating downstream from Bonneville Dam in the Ives/Pierce Islands area and along the Oregon shore across from the Ives/Pierce areas, the total dissolved gas supersaturation levels over the redds should not exceed 105%, when factored for depth compensation. At the same time, the fishery agencies and tribes wish to provide adequate spill protection for the

Spring Creek Hatchery release. To ensure the protection of incubating juvenile fall Chinook and chum salmon, while providing some protection for the Spring Creek Hatchery release, spill should be provided at approximately 50,000 cfs. Spill up to 120% TDG would require a depth compensation of 5 feet over the chum redds. We estimate that a spill of 50,000 cfs and a projected flow of 170,000 – 180,000 cfs, a minimum tailwater elevation of 14.5 feet will produce a total dissolved gas supersaturation level at, or below, 110%. This would mean that the TDG (with depth compensation) for the expected highest elevation (11.5 tailwater) chum redd on the Oregon shore below Bonneville Dam would be below 105% at the Ives Island complex and at Multnomah Falls site. The flow from PH II is preferred because it provides a buffer between the more highly saturated spillway flow and the Ives/Pierce Islands area on the Washington shore, where most of the chum redds are located. If downstream TDG monitors at Warrendale and Camas/Washougal indicate TDG levels above 120% or 115%, respectively, spill is to be reduced immediately to remain within state water quality guidelines.

Prior to the 2001 drought up to ten days of spill had been provided for the Spring Creek March release. The number of days/hours and/or amount of water, for spill has been significantly restricted since 2001 (Table 1).

Table 1. Historic data during the spill period for the March Spring Creek release.

Year	Start Day	End Day	Average Q (Kcfs)	Reported Avg. Spill (Kcfs)	Corrected Avg. Spill (Kcfs)#	Spill Hours	Spill Days	Spill Hours/Day	Total KAF
1989	03/11/89	03/16/89	200.9	47.5	22.4	133	5.5	24	245.7
1990	03/16/90	03/22/90	185.1	52.0	27.1	143	6.0	24	320.5
1991	03/22/91	03/28/91	217.9	74.0	51.4	152	6.3	24	646.2
1992	03/06/92	03/13/92	183.0	89.3	69.4	169	7.0	24	969.1
1993	03/19/93	03/26/93	214.0	87.0	66.6	169	7.0	24	930.6
1994	03/18/94	03/25/95	157.0	81.1	59.7	169	7.0	24	833.3
1995	03/17/95	03/25/97	201.8	77.2	55.1	184	7.7	24	838.2
1996	03/14/96	03/22/96	332.3	135.8	129.1	184	7.7	24	1,963.0
1997	03/13/97	03/20/97	284.7	113.8	99.9	156	6.5	24	1,287.6
1998	03/13/98	03/23/98	188.1	53.4	28.6	234	9.8	24	553.3
1999	03/18/99	03/25/99	253.6	150.9	150.1	168	7.0	24	2,084.7
2000	03/09/00	03/16/00	206.9	111.0	96.3	168	7.0	24	1,336.7
2001	03/10/01	03/13/01	119.0	47.3	22.1	36	3.0	12	131.8
2002	03/12/02	03/15/02	170.9	74.4	51.9	69	2.9	24	295.9
2003	03/10/03	03/12/03	160.4	51.9	27.0	36	1.5	24	80.4
2004*	03/02/04	03/06/04	166.1	50.0	25.0	96	4.0	24	198.3
2005**	03/03/05	03/05/05	143.5	0.0	0.0	0	0.0	0	0.0
1989 - 2005 Average			199.1	76.3	57.7	133.3	5.6	21.9	646.3
1989 - 2000 Average			218.8	89.4	71.3	169.1	7.0	24.0	996.4
2001 - 2005 Average			152.0	44.7	25.2	47.4	2.3	16.8	113.7
# spill rate is adjusted for spill gate error									
* A special comparison test was agreed to: 4 days of 50 kcfs spill only vs. 4 days of B2CC only (5 kcfs) to test FPE. The 4 days of B2CC operation is not included here.									
** B2cc only (5 kcfs)									

In an e-mail from Greg Delwiche (BPA) on February 26, 2004 to Witt Anderson (COE) and Bill Shake (USFWS), an agreement was reached in support of a two-treatment evaluation in which the effectiveness of spill, as compared to operation of the new B2 corner collector (B2CC), was to be evaluated for two release groups of tule smolts from Spring Creek National Fish Hatchery in March 2004.

The parties agreed to "... a commitment (sic) to no spill for March Spring Creek releases in 2005 and 2006 (unless we see significant (sic) problems with the new B2 corner collector, in which case we will revisit 2005 and 2006 operations for the March hatchery release)." The Service "commitment" to no spill in 2005 and 2006 was predicated on the fact that the B2CC would be available and functional for the March release in 2005 and 2006 and that its efficiency at moving fish over the dam would be similar to the spillway operations.

The hydroacoustic evaluation of fish passage in March 2004 (Table 2, Ploskey et al. 2005) provided indications that the B2CC operation may not be comparable to past spill operations in fish passage efficiency (FPE) and FPE goals established for the region are not being achieved. Fish passage efficiency is defined as the proportion of fish passing the dam via routes other than turbine passage. An 85 % FPE goal was established at Bonneville Dam in the 1984 amendments to the Columbia Basin Fish and Wildlife Program by the Northwest Power Planning Council (NWPPC 1984), now called the Northwest Power and Conservation Council (NPCC). This goal was established before the first salmonids in the Columbia Basin were listed under the ESA in 1992. The 1995 FCRPS BiOp (NMFS 1995) established a spill program to pass 80% of downstream migrants through non-turbine routes, or an FPE of 80%. The first ESA listing of a salmonid in the Columbia Basin was in 1992.

The 2004 evaluation indicated that the FPE for Spring Creek fish during the operational periods for "spill only" (50,000 cfs, actual spill 24,000cfs) and "B2CC only" were 54% and 45%, respectively, both below the goal of 85% FPE and a difference of 9% between operational tests. The spill passage efficiency (SPE), defined as the proportion of the total test population passed by the specific operational mode, for the "spill only" operation was 23%, and the SPE for the "B2CC only" operation was 17%. It was revealed after the 2004 operation that a spill gate calibration error (that had existed for years) resulted in false readings for the amount of spill. The corrected spill level was actually about 24,000 cfs.

Table 2. Passage at Bonneville Dam using March 2004 hydroacoustic data (Ploskey et al. 2005)

Treatment	FPE	SPE	Percent of Fish Passage by Project Route				Project Sluice [^]	
			Project Sluice [^]	Bypass	Turbine	Total	B1 Sluice	B2CC
							Passage Efficiency	Passage Efficiency
24 K Spill	54%	23%	5%	26%	46%	100%	5%	0%
B2CC*, No Spill	45%	0%	18%	27%	55%	100%	2%	16%
No B2CC, No Spill	32%	0%	5%	27%	68%	100%	5%	0%

* B2CC flow is about 5,000 cfs

In February 2005 in light of a very poor water year prediction, the Service only requested a B2CC operation of six days or a 95% fish passage index (FPI), whichever came first. Fish passage index is defined as the proportion of the population of interest (Spring Creek March release in this case) passing the project during the timeframe of special operations. Although it was recognized by the Service that March spill would likely provide better fish passage efficiency than the B2CC operation alone, the poor water year, expected TDG levels generated by spill, and lack of adequate tail water elevations to provide adequate depth compensation over listed chum redds, in combination, prompted the Service to forego an operational spill request. Continuing concerns for a dwindling water supply forecast and low flow conditions prompted the Action Agencies to only agree to a four day "B2CC only" operation for the March release from Spring Creek. In fact, the B2CC operation was terminated after only two days because of the unanticipated level of TDG generated by the B2CC, and the low tailwater over the listed chum salmon redds. There was not enough water made available to provide adequate depth compensation for the TDG levels above 105% at the chum redds. The tule smolt passage index for the two day B2CC operation was about 62% versus the 95% objective. No estimates of FPE or SPE were measured for the 2005 operations, as was done in 2004.

2006 Conditions

- Elevation of chum redds:

The 2005 chum spawning season (Nov-Dec) was managed at the 11.5 foot tailwater elevation below Bonneville Dam, therefore the chum redds are presumed to be no higher than this project tailwater elevation.

- Expected March 2006 flows:

The Corps' long term water supply forecasts are not exact, but the indications are that the flows at Bonneville Dam may be at least 170,000 – 180,000 cfs. Presently, there is a 16-18 foot tailwater elevation below Bonneville Dam. Recently measured depths of the chum redds at Ives Island and Multnomah Falls sites indicate there should be more than sufficient depth of water over the chum redds for TDG compensation in early March.

The currently programmed release date for Spring Creek NFH is March 2, 2006. Marking and fish health examinations for the March release group should be completed by February 23, and therefore the Service could take advantage of fortuitous weather events that would improve fish passage at Bonneville Dam (e.g., uncontrolled spill) by adjusting the release date a few days earlier, if the opportunity arose. However, according to the Corps, the bypass screens will not be in place at Bonneville Dam until March 2. Having the bypass screens in place prior to the Spring Creek release is critical to maximizing FPEs and avoiding high passage mortality rates. On the other hand, delaying the release beyond March 2nd becomes problematic in terms of potentially exceeding rearing density protocols at Spring Creek NFH and conflicting with continuing marking schedules.

If the conditions below Bonneville Dam occur as currently forecast there should be adequate total flow and tailwater depth compensation for TDG at the chum redds. The need for using water from Grand Coulee for the March release is highly unlikely. However, the Action Agencies should plan now to provide any necessary projected flow for depth compensation

during the March 1 -10 time frame by using some of the projected water available at Grand Coulee for power generation between now and April 10.

The recommended operation will best approach the FPE goal of 85% at Bonneville Dam, as established in 1984 by the NPCC, or the minimum 80% FPE goal established by NMFS in 1995 for ESA listed salmonids.

If this SOR cannot be implemented as requested, please provide a written response to the Fish Passage Advisory Committee documenting the rationale for the actions taken.

References

NMFS (National Marine Fisheries Service). 1995. Biological opinion - reinitiation of consultation on 1994-1998 operation of the Federal Columbia River Power System and juvenile transportation program in 1995 and future years. NMFS, Hydro Program, Portland, Oregon.

NWPPC (Northwest Power Planning Council). 1984. Columbia River basin fish and wildlife program. NWPPC, Portland, Oregon.

Ploskey et al. 2005. *Hydroacoustic Evaluation of Fish Passage through Bonneville Dam in 2004*. PNNL-15249, Pacific Northwest National Laboratory, Richland, Washington.