Columbia River Inter-Tribal Fish Commission

RIVER|OPERATIONS|PLAN|2003

PUTTING FISH BACK IN THE RIVERS

Columbia River Inter-Tribal Fish Commission
2003 River Operations Plan

March 18, 2003

Overview

The Columbia River Inter-Tribal Fish Commission (CRITFC) presents the 2003 River Operations Plan (Plan) for the Federal Columbia River Power System (FCRPS), the Hells Canyon Complex and mid-Columbia FERC-licensed hydro-projects including Rock Island, Rocky Reach, Wanapum and Priest Rapids. The Plan contains recommendations for water management and dam operations, including flows, reservoir elevations, spill, and fish facility operations. It also contains recommendations for water acquisition. Each of the recommended actions will contribute singularly and cumulatively to increase mainstem salmon protection and survival. Current direct mortality and indirect mortality for Snake River yearling chinook is estimated between 25% - 73% and 37% - 68% respectively (Budy et al. 2002). If implemented, the recommended actions in this Plan will likely reduce these significant mortality rates.

In 2003, the Columbia Basin has experienced low precipitation levels and unusually warm weather and correspondingly low snowpack levels. The basin faces the second serious drought situation in three years. Near historical levels of adult salmon escapement in 2002 indicate that many juvenile salmon will be outmigrating this spring and summer. For example, an estimated 40 million juvenile bright fall chinook will emerge from the Hanford Reach this spring (Hoffarth 2003 pers. comm.), which is about 40% above average production. With respect to Okanogan Sockeye, the last transboundary stock, a large adult escapement in 2001 is projected to produce some 2.2 million smolts that will migrate seaward this spring; this compares to about 200,000 smolts that will migrate in seaward in 2004 due to low 2002 adult escapements (Hyatt 2003 pers. comm.) Thus, it is critical that substantial anadromous fish productivity in 2003 be protected through the hydro-system through appropriate river operations.

The USDA-Natural Resources Conservation Service and the National Weather Service project a 75 million acre feet (MaF) January-July runoff for the Columbia at The Dalles or 70% of normal for 2003. CRITFC staff, through independent analyses, project about a 68 MaF runoff forecast. [1] This forecast compares to a 107 MaF runoff average runoff over the historical period of record and a 58.5 MaF runoff in 2001.

In 2001, low runoff and financial and power emergencies declared by BPA eliminated fish flow augmentation and reduced fish spills to a fraction of those required under the NMFS

[1] CRITFC analysis of trends of historical water supply forecasts produced a series of correction curves (Martin 2002) and indicates that the final forecast for the Columbia at The Dalles for the year is likely to be near 68.3 MaF.

(NOAA Fisheries) 2000 Biological Opinion for the Federal Columbia Power System (FCRPS). Salmon and steelhead losses were significant. For example, the Fish Passage Center noted that only 4% of Snake River juvenile steelhead survived passage from Lower Granite to Bonneville Dam, and some 27% of Snake River juvenile chinook survived to Bonneville. Juvenile run timing was affected with the runs beginning later and with shorter passage durations. Travel times in 2001 were some of the slowest observed in the historic records. Many migrants did not arrive to downstream dams. Power peaking in the Hanford Reach exacerbated the effects of the low flow year.

Unfortunately, BPA is currently immersed in a serious financial crisis that could, as in 2001, cause a declaration of a power or financial emergency that could again significantly reduce fish flows and spill. Unusually warm winter temperatures may reduce a normative peaking mainstem flow for fish migrations due to the unavailability of snowpack at lower elevations. While the federal operators appear to be more conservative regarding liberal flood control management, preemptive drafting of upper basin storage has already occurred.

The foundation of the CRITFC 2003 River Operations Plan (Plan) is a peaking normative, hydrograph which offers juvenile salmon migrations a more natural flow regime to 1) reduce time of entry into saltwater, 2) create an enhanced mainstem and Columbia River near-ocean plume to enhance critical habitat, and 3) minimize predation losses (Williams et al.1996; Bunn and Arthington 2002). Plan operations use limited available storage and flood control rule curve modifications to create a peaking hydrograph in late May to accommodate an earlier than normal juvenile salmon emigration due to warmer than normal mainstem water temperatures.

Plan operations were modeled against probable federal river operations. The Northwest Power Planning Council's GENESYS Hydro-regulation model (Version 2.6.1) was used for these analyses. The model simulates recommended monthly flow and reservoir elevations at various index points in the Basin. The Plan uses altered flood control rule curves (Martin 2003) and additional "pockets of water" from upper basin storage to create a natural flow regime for virtually all major river index points. Using the GENESYS model with the historical water years 1929-1978, the system-wide flood risk for the CRITFC plan is about the same as federal operations.

The CRITFC Plan operations assure beneficial flows for anadromous fish, while seeking to maintain higher reservoir levels for resident fish and tribal cultural resource protection. The spill season in the Plan is extended and enhanced over that required in the NMFS 2000 Biological Opinion for the FCRPS in the spring and summer to many federal dams. The Plan's spring and summer spill recommendations extend spill timing and amounts for Rocky Reach and Rock Island dams, but maintain Priest Rapids and Wanapum spill levels as provided under the 2000 Memorandum of Agreement. The Plan also contains specific recommendations and guidelines for power peaking, adult and kelt passage, water temperature criteria to meet Clean Water Act standards, water management during the tribal treaty fisheries, fish facility operations and mainstem research. Also offered in the Plan is a list of key fish facility mitigation projects, which, if implemented, could result in significant improvements in fish passage survival. The Plan also offers a water management paradigm that avoids the weaknesses of week-to-week

trade offs common to the Technical Management Team, Implementation Team, and Regional Executive Committee forums.

The difference in CRITFC's altered flood control operation and the Corps' standard flood control operation varies from 6.6 MaF (as modeled in GENESYS, Table 2) to 2.2 MaF (as compared with the Corp's in-season calculations), spread amongst Arrow, Libby, Hungry Horse, Grand Coulee, Brownlee, and Dworshak dams. Because of a pre-emptive flood control draft at Libby in December, the reservoir is struggling to meet the Corps' Upper Rule Curve. The CRITFC plan would have left 13 more feet in Libby and carried throughout the water year. The water saved from altered flood control operations should be applied to spring salmon migrants. Further, the shut down of the WNP-2 nuclear plant in early March resulted in the operators using storage in Dworshak and Lake Roosevelt to meet power needs. The loss of this storage may impact spring flows and the ability to meet the April 10 refill requirement called for by the NMFS 2000 Biological Opinion for the FCRPS.

Given another drought situation in 2003 with extraordinary numbers of juvenile salmon migrating seaward through the hydrosystem, it is critical that measures in the 2003 CRITFC River Operations Plan be fully implemented. CRITFC urges the federal Government, Idaho Power Company, and the Mid-Columbia Public Utility Districts to seriously consider implementing the recommendations in this Plan.

Key Plan Recommendations

Decision Making

- The Technical Management Team (TMT) and Implementation Teams are useful for some regional information sharing but they do not suffice for river operations decision-making and are not government-to-government forums. The CRITFC tribes formally withdrew from TMT and other NMFS forums in 1997, due to the lack of formal government-to-government consultation mandated in various federal agency policies and the 1997 Secretarial Order to the Departments of Interior and Commerce. Further, the TMT is prevented from candid discussions of operational alternatives due to the presence of various power marketing entities.[2] To avoid these serious problems, the federal operators and NMFS should use CBFWA as a technical forum to discuss river operations where all 13 Columbia Basin tribes can have meaningful input. Disputed issues should be raised to an executive committee table. Similarly, spill and flow decisions in the Mid-Columbia should be determined in the Mid-Columbia Coordinating Committees established by individual settlement agreements for Wells and Rock Island Projects and under the Mid-Columbia Proceedings established under existing licenses for Rocky Reach, and Priest-Wanapum Projects.

Emergency Declarations

- The definition of "emergency" and related procedures must be recast for 2003 to exclude any BPA financial problems. The definition of "emergency" must be based on unforeseen circumstances. Any power sales revenues accruing to BPA and attributable to an emergency operation must be set aside for salmon mitigation, where such amounts will be in addition to and not in lieu of previously planned BPA expenditure levels.

Energy and Water Conservation

- Water and land acquisition programs begun in 2001 should be continued.

- BPA should renew the 1995-2001 contract with Idaho Power Company to allow flexibility in flow augmentation through power exchanges.

[2] TMT meetings are typically attended by several power-marketing representatives from private companies or corporations. These representatives are present to learn of real-time federal operators river operation plans, in order to maximize power-marketing arrangements. As a result, federal operators are hesitant to disclose vital information and making decisions for fishery management to the tribes, state and federal fishery managers in this forum. TMT was not burdened with this situation in the early years of its implementation, but now it is a serious obstacle to regional information sharing, and has greatly diminished and compromised any effectiveness of TMT.

Runoff Forecast

- The Plan assumes that 64 % of normal precipitation pattern will continue into spring, while the Northwest River Forecast Center continues to predict "near normal" precipitation.[3] Based upon the historical flow record that shows a declining runoff pattern in below average years, CRITFC anticipates that a continuing pattern of below normal precipitation is likely. A comparison using the University of Washington's Climate Impact Group's (CIG) Experimental One-Year forecast (Hamlet and Lettenmaier 2002), using their VIC Hydro Model, points to a similar conclusion, if their forecast flows are adjusted downward to closely match the unregulated October-December flows for the Columbia at The Dalles (Table 1).

- Water supply forecast correction curves suggest a low water year. Runoff in the CRITFC 2003 River Operations Plan is projected to be 68 MaF for the Columbia at The Dalles.

Table 1. UW-Climate Impact Group forecast for the Columbia at The Dalles for WY 2003.

Initial Cond. WY1962	UW-CIG (KaF)	The Dalles (unregulated) (KaF)	59% UW Unregulated Flow
Oct	6550	3304	3865
Nov	6705	3372	3956
Dec	5949	3536	3510
Jan	5174		3053
Feb	4817		2842
Mar	6693		3949
Apr	12033		7099
May	24517		14465
Jun	31731		18721
Jul	20566		12134
TOTAL: (MaF) (Jan. - July)	**105.5**		**62**
Regression:	**109.5**		**65**

[3] The Northwest River Forecast Center continues to predict close to 100% of average future precipitation, but CRITFC estimates that these projections are very liberal. Flows at all basin index points in the Plan (Attachment 1) were based on runoff at about 64% of normal precipitation and snow-pack.

Flow and Reservoir Management

- Available storage and runoff should be shaped to meet natural peaking, normative hydrographs at Priest Rapids, Lower Granite, The Dalles and other index points (Attachment 1). Detailed weekly operations, using the NWRFC's NWSRFS-STP model, are offered in Attachment 2. The object is to provide flushing flows during the main portions of the juvenile and adult migrations and to leave as much storage as possible for resident fish and tribal cultural resource protection. Given the impact of *El Nino* on the regional snow-packs, it is very likely that the freshet will peak in mid May this year.

- As recommended in the NMFS 1995-1998 Biological Opinion for the FCRPS, in water years when the January-July forecast is less than 95 MaF at The Dalles, 500 KaF of flood control should be shifted from Arrow to Mica (Attachments 1 and 2).

- In general, reservoirs are left at the end of the salmon migration season at or above elevations specified by the NMFS 2000 FCRPS Biological Opinion.

- Dworshak. Refill of Dworshak Reservoir by the end of June is a high priority (Attachments 1 and 2). The majority of flow should be dedicated to summer migrants and temperature control to attempt to meet Clean Water Act standards in the Lower Snake River. Consistent with the Nez Perce Tribe-State of Idaho Plan, Dworshak should fill to msl 1600 by June 30 for juvenile and adult summer migrants and temperature control. A draft to msl 1590 feet in late July may be needed to alleviate temperature problems in the lower Snake. Dworshak should draft to msl 1520 feet by September 30.

- Lower Granite Reservoir should be drawn down to msl 723 feet during June 20 - October 31 to decrease juvenile and adult travel time and to make increase the effectiveness of temperature control from Dworshak.

- Hells Canyon Complex. The 110 KaF described in the 1998 FERC Biological Assessment for the Hells Canyon Complex should augment Snake River spring flows in May. For summer flows in June and July, Brownlee should contribute an additional 237 KaF described in the 1998 Biological Assessment and should pass through all upper Snake storage in June-August in addition to the 237 KaF from Brownlee. Idaho Power Company is requested to follow plan recommendations and should continue negotiations with BPA concerning establishment of a power and water exchange contract (Attachment 4). NMFS should release a biological opinion for the Hells Canyon Complex that includes Plan recommendations, with or without power/water exchange contract.

- Upper Snake storage. An additional 450 KaF should be added to the 427 KaF required in the NMFS 2000 FCRPS Biological Opinion for a total of 877 KaF flow augmentation from the upper Snake from Bureau of Reclamation and Corps of Engineers upper Snake reservoirs. This water should be passed through the Hells Canyon Complex in a timely manner to augment June, July, and August flows.

- Lake Roosevelt. Reservoir flood control drafts should be restricted to msl 1270 or 1275 feet by early June, which allows runoff refill for spring flows, Hanford Reach juvenile out-migration protection and summer flows (Attachments 1 and 2). Lake Roosevelt is drafted to msl 1280 feet by late July, held through August, and fills to msl 1283 feet by late September for resident fish and cultural resources.

- Banks Lake. Storage of 260 KaF (10 foot draft at Banks Lake) should remain in Lake Roosevelt instead of being pumped into Banks Lake to provide additional flow augmentation for salmon in August and September.

- Canadian storage. Storage should be released in early spring in order to leave some storage in Lake Roosevelt for salmon migrants and energy needs (Attachments 1 and 2). Consistent with the NMFS 1995-1998 FCRPS Biological Opinion for a 68 MaF runoff year, 500 KaF of flood control should be reallocated from Arrow to Mica. An extra 500 KaF from Canadian Non-Treaty storage over the 1 MaF called for by the NMFS Biological Opinions should be allocated for downstream flows.

- The CRITFC 2003 Plan recommends that modified VAR-Q operations be implemented at Libby and Hungry Horse without compensating drafts of Lake Roosevelt (Attachments 1 and 2). This action would hold storage in upper basin reservoirs for anadromous fish migrations and reduce impacts to resident fish. These operations are consistent with historical runoff volumes for below-normal water years.

- Libby. Storage should be managed for sturgeon flows (a three-week operation is offered), downstream salmon migrations and resident fish needs by implementing modified VAR-Q operations (Attachment 1) and fills within one-foot of full by late July (Attachment 2). Libby should be drafted to avoid drafting Dworshak, which has substantial temperature control capacity in the lower Snake.

- Hungry Horse. Storage should be managed for salmon flows and resident fish needs by implementing modified VAR-Q operations. CRITFC operations leave the reservoir 2 feet higher across WY 2003 (Attachment 1) and fills by June 30th (Attachment 2). Minimum flows of 2.5 kcfs maintained through September would benefit Columbia Falls flows.

- Power peaking/load following. Should be restricted to: 1) avoid stranding of juvenile salmon in the Hanford Reach, 2) allow fish ladders and other fish passage facilities to operate within established criteria and protocols and 3) and to allow proper conduct of tribal treaty fisheries.

- Meeting Clean Water Act standards for dissolved gas and temperature is a high priority. Juvenile salmon should be left in river to take advantage of cool water releases and to avoid high temperatures in screen and transportation systems.

Hanford Reach Flows

- Power peaking should be restricted to avoid stranding of Hanford Reach juvenile chinook, especially during the key fry susceptibility period (March 15 - June 10). Fluctuations during this period should not exceed specified criterion during each 24-hour period in the CRITFC 2003 Hanford Stranding Operations Recommendations. (Attachment 3). Grant PUD should fund and should cooperate with tribal and fishery agency 2003 Reach monitoring and evaluation efforts.

Spill

- Spill has been demonstrated to be the most effective and safest means of juvenile project passage (Fishery Managers 1994; NPPC 1999). Spill also best protects the beneficial use under the Clean Water Act by providing salmon access to lower temperatures found at depth in the reservoirs instead of higher temperatures found in dam bypass and transportation systems. Spill also provides safer downstream passage for steelhead kelts and adults that fallback over dams than powerhouse routes. Starting dates are March 20 and go until June 20 (Snake) or June 30 (Columbia). End dates include August 31 (Snake) and September 15 (Columbia).

- CRITFC recommends provision for summer spill at Lower Granite, Little Goose, Lower Monumental and McNary dams above the requirements of the NMFS 2000 FCRPS Biological Opinion.

- CRITFC recommends provision for daytime spill at John Day, McNary and the Lower Snake River dams. When implemented, daytime spill at most dams has been demonstrated to be as successful or more so than nighttime spill.

- The Corps of Engineers should complete their timely application for a total dissolved gas waiver to the appropriate water quality agencies to allow for both spring spill at the eight federal dams and summer spill at all dams.

Dam Facility Operations and Research

- Fish facilities should be operated according to CRITFC and other salmon managers' recommendations for the Corps of Engineers' 2003 Fish Passage Plan (Attachment 5). Inspection of facilities should be increased to three inspections per day. Salmon Corps participation in monitoring dam passage facilities should be established by CRITFC and Corps of Engineers collaborative efforts.

- Fish facilities should have full components of spare parts and backup systems, consistent with CRITFC and other fishery agencies recommendations to the Corps' 2003 Fish Passage Plan.

- Monitoring systems for water quality should be installed by the federal operators throughout the dams and reservoirs with real-time tracking of data.

- Mainstem research that involves fish handing and tagging and modifications to fish protection measures should be extremely limited, should not compromise fishery operations and should meet consensus tribal and fishery agency approval.

Fish Facility Mitigation Projects

- A list of mitigation projects has been compiled for dam fish passage facilities (Attachment 6). Funding of these projects would individually and collectively increase juvenile and adult passage success and survival.

2003 FCRPS Flow Operations

The 2003 River Operations Plan recommends that the federal operators reshape available runoff and reservoir storage to create a natural peaking (i.e., normative) flow regime. The Plan specifically dedicates available runoff and storage to shaping the limited amount of water to best meet the migration and habitat requirements for anadromous fish. Low runoff in 2003 will cause the Plan's peaking hydrograph to be less than under a normal water year; target flows under the NMFS 2000 Biological Opinion seasonal flow targets will not be met.

That salmon flow is positively related to increases in survival and productivity has been established in various forums worldwide including a 1994 independent scientific review under the NPPC, biological opinions and recent analyses by the fishery agencies and tribes (Agencies and Tribes 2003). In their 1995-1998 FCRPS Biological Opinion, NMFS provided minimum flow recommendations for listed salmon and established seasonal, flat, "target flow" regimes, which were considered the minimum flows necessary to prevent jeopardy to listed salmon populations. The NMFS 2000 FCRPS Biological Opinion continues the concept of "target flows" for salmon, where specific seasonal average flows are to be met at Lower Granite, Priest Rapids and McNary Dam. During the creation of the target flow concept, it was realized by NMFS and the federal operators that the seasonal targets would not be met during the lowest series of water years, such as the case in 2003. Similarly, in 2001, none of these targets were met, and in many higher runoff years since the 1995-1998 Biological Opinion, these targets often have been missed.

The 2000 Biological Opinion differs from the 1995-1998 Biological Opinion in that the federal operators have more discretion to avoid implementing measures that will insure that flow targets are met. For example, the 1995-1998 Biological Opinion required the Corps to shift flood control storage further down the system and modify flood control rule curves to allow reservoirs to store more of the spring runoff for fish summer flows. In the 1995-1998 Biological Opinion, the Bureau of Reclamation was to provide an additional 1 million acre-feet (MaF) of water from the upper Snake for salmon flows. Again, this operation has yet to be realized.

The Plan's hydrograph has monthly flow objectives that would have peak flows well below flood stages in Portland and other basin locations [4] (Figures 1, 2, and 3). Alternative flood control curves were modeled within GENESYS (Martin 2003) and those results feed into the attached spreadsheet. The URC values are listed in Table 2. Water Years 1929-31, 1937, 1941, 1944, and 1973 were chosen in the modeling because their volumes average out to CRITFC's projected 68 MaF forecast for WY 2003. The flow values shown in Figures 1, 2, and 3 use the inflows from the NWRFC's new NWSRFS-STP hydro model (daily and weekly time steps) and

[4] Flood stage is defined by the Corps as 550 kcfs measured at The Dalles Dam. Bank-full stage is defined by the Corps as 450 kcfs measured at The Dalles. The peak flow in CRITFC's 2003 River Operations Plan with altered flood control rule curves is about 360 kcfs at The Dalles, or 90 kcfs below bank-full. In the 2002 Biological Assessment for the Lower Columbia Channel Deepening, the Corps states that flood control was managed to keep peak flows at The Dalles at 550 kcfs in 1970 and prior years. In recent years, the Corps has managed to keep peak flows at The Dalles at about 360 kcfs, without Congressional authorization.

the elevations modeled in GENESYS (monthly time steps) guided the shaping of the seasonal flows.

In the Plan, the receding limb of the hydrograph that provides summer fish flows would be augmented by adding drafts of upper basin storage beyond what is required in the NMFS 2000 Biological Opinion. Drafts include an additional 500 KaF from Non-Treaty Storage, an additional 450 KaF of upper Snake storage, and 237 KaF of Hells Canyon Complex storage. The resultant summer flows would create better migration conditions by reducing salmon travel time and mainstem temperatures.

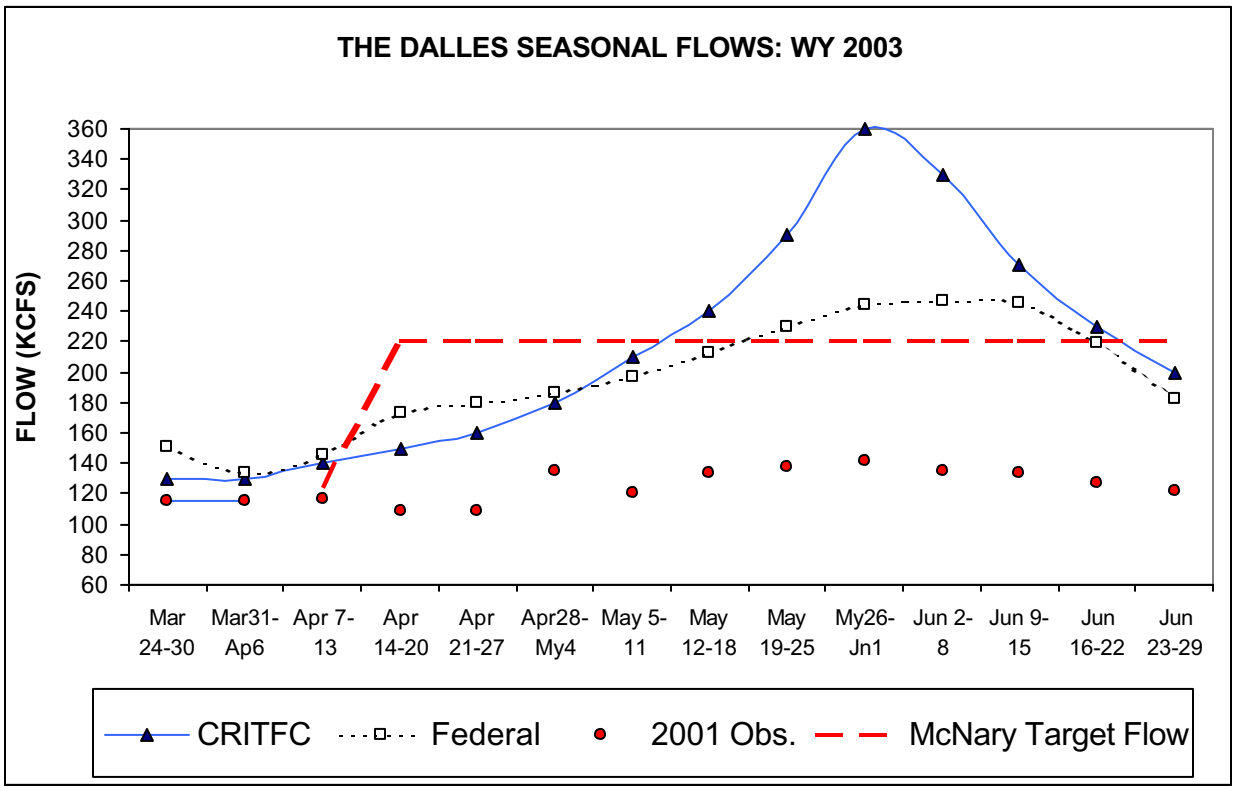

Figure 1. 2003 CRITFC River Operations Plan hydrograph for the Columbia at The Dalles during spring compared to 2000 Biological Opinion flow targets, 2001 observed river flows, and likely 2003 river flows under federal operations.

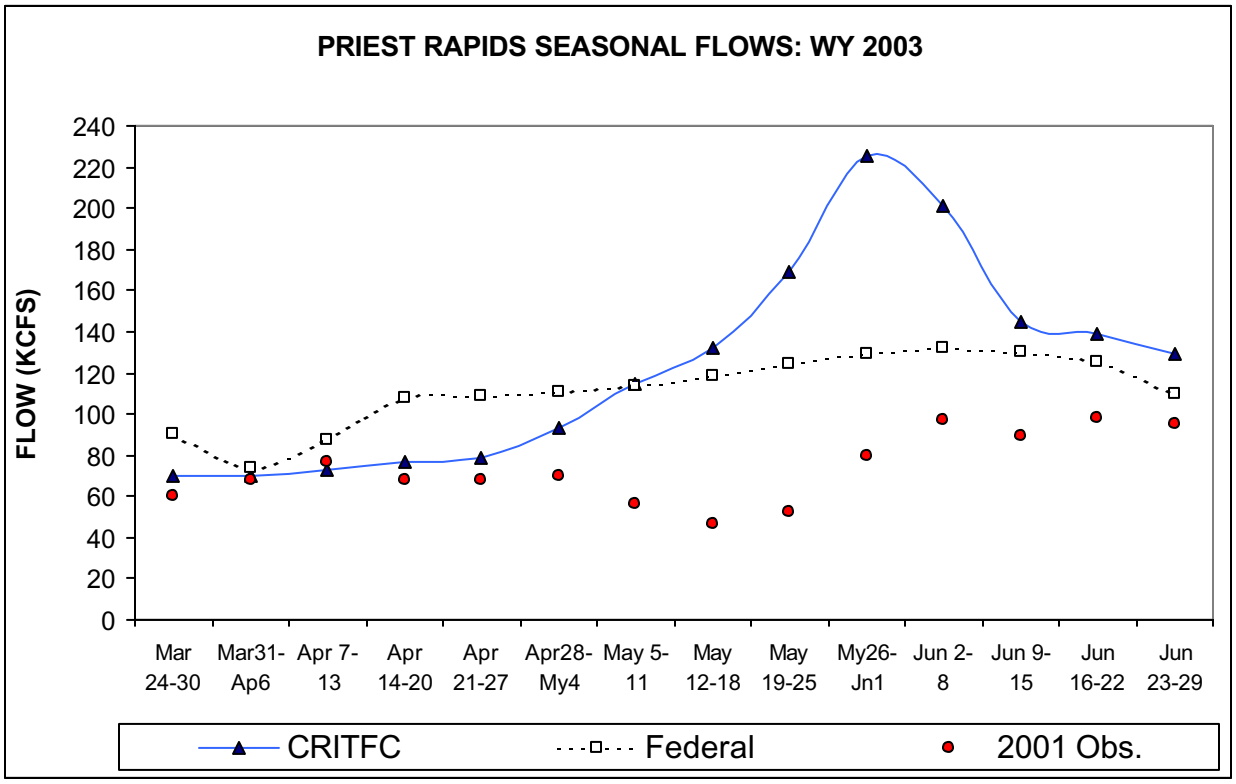

Figure 2. 2003 CRITFC River Operations Plan hydrograph for the Columbia at Priest Rapids compared to 2001 observed river flows and likely 2003 river flows under federal operations.

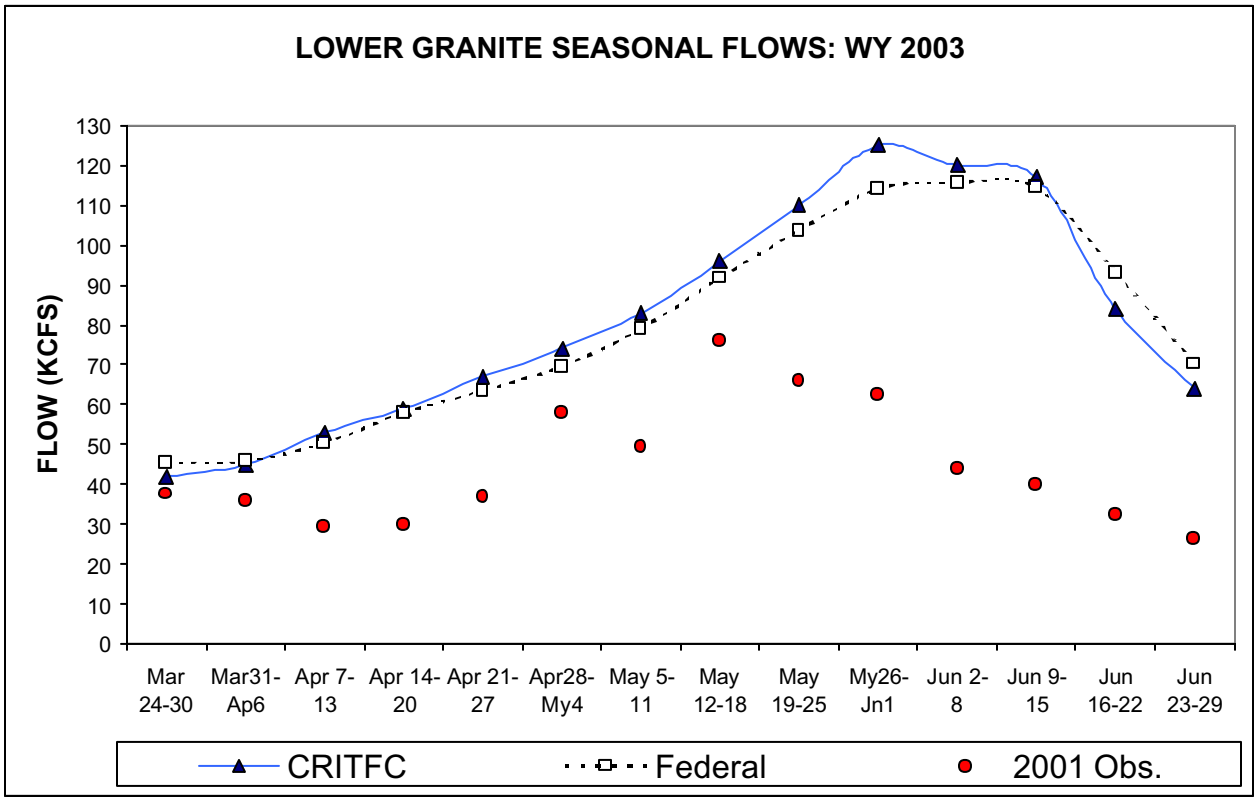

Figure 3. 2003 CRITFC River Operations Plan hydrograph for the Snake at Lower Granite compared to 2001 observed river flows and likely 2003 river flows under federal operations.

SYSTEM FLOOD CONTROL: UPPER RULE CURVE (URC), as modeled in GENESYS

WATER YEAR 2003 (average of WY 1929-31, 1937, 1941, 1944, and 1973)

GRAND TOTAL: KaF: **6628**

January 31st, KaF:	***CRITFC***	(elev.)	Federal Plan	(elev.)	Difference (KaF)	Sum Total
Arrow, BC	5553.4	1431.8	5355.1	1430.1	198.3	
Libby	3496.1	2424.6	3496.1	2424.6	0.0	
Hungry Horse	2741.2	3546.0	2741.2	3546.0	0.0	
Grand Coulee	5184.8	1290.0	5185.0	1290.0	-0.2	
Brownlee	975.2	2077.0	975.2	2077.0	0.0	
Dworshak	1420.0	1565.2	1221.7	1551.7	198.3	**396**
February 28th, KaF:	***CRITFC***	(elev.)	Federal Plan	(elev.)	Difference (KaF)	Sum Total
Arrow, BC	5747.5	1433.4	5152.6	1428.5	595.0	
Libby	3920.6	2435.0	3920.6	2435.0	0.0	
Hungry Horse	2737.5	3545.9	2737.5	3545.9	0.0	
Grand Coulee	5145.5	1289.5	5050.2	1288.3	95.2	
Brownlee	975.2	2077.0	975.2	2077.0	0.0	
Dworshak	1855.6	1591.3	1373.6	1562.1	481.9	**1172**
March 31st, KaF:	***CRITFC***	(elev.)	Federal Plan	(elev.)	Difference (KaF)	Sum Total
Arrow, BC	6257.3	1437.4	4922.1	1426.5	1335.2	
Libby	4295.0	2443.7	4295.0	2443.7	0.0	
Hungry Horse	2779.1	3547.7	2779.1	3547.7	0.0	
Grand Coulee	5184.8	1290.0	4561.3	1282.0	623.6	
Brownlee	975.2	2077.0	975.2	2077.0	0.0	
Dworshak	2015.0	1600.0	1733.0	1584.4	282.0	**2241**
April 15th, KaF:	***CRITFC***	(elev.)	Federal Plan	(elev.)	Difference (KaF)	Sum Total
Arrow, BC	6021.7	1435.6	5625.0	1432.4	396.7	
Libby	4546.3	2449.5	4546.3	2449.5	0.0	
Hungry Horse	2806.2	3548.9	2806.2	3548.9	0.0	
Grand Coulee	5184.8	1290.0	4593.6	1282.5	591.2	
Brownlee	975.2	2077.0	975.2	2077.0	0.0	
Dworshak	2005.0	1599.5	1855.0	1591.3	150.0	**1138**
April 30th, KaF:	***CRITFC***	(elev.)	Federal Plan	(elev.)	Difference (KaF)	Sum Total
Arrow, BC	5842.6	1434.2	5644.3	1432.5	198.3	
Libby	4693.3	2452.7	4693.3	2452.7	0.0	
Hungry Horse	2851.9	3550.8	2851.9	3550.8	0.0	
Grand Coulee	5184.8	1290.0	4647.2	1283.1	537.7	
Brownlee	975.2	2077.0	975.2	2077.0	0.0	
Dworshak	2012.1	1599.8	1877.6	1592.5	134.5	**870**
May 31st, KaF:	***CRITFC***	(elev.)	Federal Plan	(elev.)	Difference (KaF)	Sum Total
Arrow, BC	6417.5	1438.7	6020.9	1435.6	396.7	
Libby	4694.5	2452.7	4694.5	2452.7	0.0	
Hungry Horse	2974.2	3556.0	2974.2	3556.0	0.0	
Grand Coulee	5184.8	1290.0	4792.4	1285.0	392.5	
Brownlee	975.2	2077.0	975.2	2077.0	0.0	
Dworshak	2010.5	1600.0	1989.7	1598.6	20.8	**810**

Table 2. Flood control Upper Rule Curves, as modeled in the NPPC GENESYS Hydro model.

2003 Spill Program for the Columbia Basin

The 2003 River Operations Plan recommends a program to increase spill at key projects in order to significantly increase overall passage success and survival for the 2003 juvenile and adult migrants. Runoff for the Snake River is projected to be even lower than 70% of normal projected for the lower Columbia. Federal Operators are planning their operations around this value, even though the forecast is very likely to decline over winter.

Principal features of this spill program include:

- Provision for summer spill at Snake River and McNary dams. The current NMFS 2000 FCRPS Biological Opinion does not require summer spill, despite the lack of scientific evidence that indicates transporting summer migrants would be advantageous compared to spilling migrants over dams. CRITFC has advocated for a summer spill program and transport study (with summer spill) in the Lower Snake River for at least the last five years. This controversy was expressed in the fall fishery negotiations in *U.S. v. Oregon* in the last several years. CRITFC will continue to oppose any Snake River or McNary transport study that does include a reasonable spill and flow component.

- Provision for daytime spill at John Day, McNary and Lower Snake River dams. When implemented, daytime spill has been demonstrated to be as successful or more so than nighttime spill at most dams. Early migrations of abundant 2003 fall chinook migrants from the Hanford Reach will achieve better protection from daytime spill at McNary and John Day than under no spill conditions.

- Extension of spill season. The Plan also recommends that the spill season be extended in duration over that offered in the NMFS 2000 FCRPS Biological Opinion. Because mainstem river temperatures have been much warmer than in past years, it is very likely that juvenile migrations will start earlier than in the past and kelts will be migrating and need downstream protection. Early spill will better protect spring chinook kelts emigrating seaward. Recent radio-telemetry studies indicate that about half of steelhead spawners return to sea and that spill increases kelt survival (English et al. 2001; English et al. 2003; Evans et al. 2001; Evans 2002).[5] Spill should begin at mainstem dams around March 20, depending on the status of the migrations. Depending on monitoring assessments, spill should be extended to September 15 at lower Columbia Dams to assist millions of late migrating juvenile salmon and to reduce powerhouse injuries to adult steelhead and fall chinook that fall back at dams.

- Real- time spill ramping impacting fish passage goals. During the 2002 spill season, spill levels were ramped up and down depending on the TDG readings from monitoring sites

[5] Telemetry data from these studies indicate that in 2001 with no spill and screen system turbine passage, only 3.8% of radio-tagged kelts survived from Lower Granite Dam to the Bonneville Dam tailrace. These studies indicate that that if spill and sluiceway passage is provided, 86-93% of kelts will use these routes, which insure substantially higher survival rates through the dams.

below dams. Atmospheric conditions, combined with temperature greatly influence the accuracy of TDG monitoring sites. Depending on exceedences of TDG levels that would violate gas waivers from the state water quality agencies, spill levels were reduced to levels well below the TDG waiver levels, and this condition was left for several hours. Thus, spill volumes required in the NMFS 2000 FCRPS Biological Opinion were not provided. It appears to CRITFC that Corps' actions to hold spill at levels below the gas waivers for hours after reducing spill is negatively impacting regional passage goals. For example, total dissolved gas levels at Bonneville's tailwater location are quite variable and these levels can impact spill operations at Bonneville, The Dalles and, to a lesser degree, John Day. It is our understanding that the Corps has set up a protocol to deal with ramping down spill when the monitoring sites are above the standard, however, a protocol for the real-time expedited ramping up of spill when the monitoring sites are under the gas waiver and the spill level is lower than intended in the NMFS 2000 FCRPS Biological Opinion has not been completed. The Corps should install the capacity to resolve this issue at all Corps dams by implementing project operational measures in the 2003 Fish Passage Plan and ensure that all dam operators closely follow the measures.

Priorities:

Bonneville (BON). Spill is very effective and efficient at Bonneville. Past survival studies indicate that the for juvenile migrants, spill resulted in a relative survival to the estuary of 98% compared to screen bypass and turbine passage survival of 80% and 82% respectively. Recent installation of spillway deflectors decreased total dissolved gas levels to allow increased spill levels. CRITFC recommends daytime spill in blocks of 75 kcfs and up to the gas waiver limits (about 150 kcfs) to examine fallback issues and nighttime spill of 150 kcfs. At least three days of spill should be allocated at these levels to protect release of the Spring Creek Hatchery fall chinook migration during Mid-March.

McNary (MCN). McNary is the only Lower Columbia dam that is not scheduled to have voluntary spill 24 hours a day in either spring or summer. The Plan's recommended hydrograph will create some involuntary spill at McNary as the powerhouse is hydraulically limited for flows up to about 140 kcfs. McNary passes a substantial number of Columbia Basin salmon from the Mid-Columbia, Snake River and Hanford Reach. The existing screened bypass system has structural and hydraulic problems; PIT-Tag studies indicate that juveniles that experience multiple screen bypass passage have lower smolt-to-adult returns than juveniles that pass thorough spill and turbines (Bouwes et al. 2002; Budy et al. 2002). Of about 200,000 juvenile spring chinook marked and released in 1995 from the bypass system, no adults returned. Transportation results to date have been equivocal. Thus, to spread-the-risk [6] and encourage better tailrace egress conditions to avoid predators and delay, the Plan recommends that the Corps provide daytime spill at a level commensurate with the current nighttime Biological Opinion spill operation. Further, the Plan recommends that the Corps consider removing half of

[6] Under the CRITFC Plan, "Spread the risk" entails an operation where approximately half of the migrants are passed through the dam via surface bypass and/or spill and the other half are passed through turbine screened systems and transported in trucks or barges.

the turbine intake screens especially during the summer months when river temperatures often exceed the water quality standard.

The Dalles (TDA). Due to concerns with juvenile turbine passage (survivals in the low 80% range; 2000 FCRPS Opinion, Appendix D), it is prudent to increase non-turbine passage routes, which include the sluiceway and spillway. Spill is the only passage route that can immediately increase juvenile passage survival. The 1995-1998 FCRPS biological opinion required spill at 64% of daily average flow. Based upon questionable survival studies, NMFS decreased spill to 40% of daily average flow. This subjects more juveniles to turbine passage. The CRITFC Plan recommends an increase in spill from the 2000 FCRPS Opinion level from 40% to 50% of daily average flow. North loading of the spillway with these flows would avoid placing juvenile salmon toward shallow island predation zones where they were placed with the 64% spill. The 2003 research and fish passage at TDA is best served by maintaining a constant spill level during the migration season.

John Day (JDA). Critical uncertainties remain regarding spill operations at John Day. Research in 2001 (Beeman, Counnihan et al. USGS, 2001) indicated that radio-tagged juveniles using the screened bypass outfall had a direct survival of 88-92%, while juveniles passing through spill survived in the 98-100% range. CRITFC proposes the best operation would be 30% of daily average flow during the day with 45 – 50% daily average flow at night. Night spill is very effective at passing fish. However the large volume of spill required to generate the high fish passage efficiency appears to create poor conditions at the screened bypass outfall, which in 2002, may have led to lower survival. (Beeman and Counnihan 2002) Because indirect mortality rates and lowered smolt-to-adult survival rates occur for smolts that pass through screened bypass systems and bypass systems select against juvenile lamprey and certain salmons stocks, we recommend maximizing spill at John Day and examining fish passage without turbine intake screens through comparative survival studies as a high priority. In the future, to increase passage we recommend investigations of removable spillway weirs or similar surface spill options at JDA to increase fish passage efficiency. Current estimates for turbine passage in 2002 were extremely low with large confident intervals. Therefore, it is be prudent to reduce the exposure of juveniles to the powerhouse and potential turbine passage.

Lower Monumental (LMN). With the repairs to the stilling basin complete, CRITFC strongly recommends the implementation of 24-hour spill for spring migrants and summer migrants. Transportation at Lower Monumental for spring migrants has shown to return fewer adults than Lower Granite, indicating that some serious problem in the screened bypass system or transportation system may be selecting against migrants. Summer migrant transportation has not been examined yet, but results from summer migrant transportation at McNary are not encouraging. We recommend spread the risk for migrants at this project and comparative survival studies that require removal of turbine intake screens.

Little Goose (LGS). Currently, under the 2000 FCRPS Biological Opinion, the Corps does not provide daytime or summer spill. CRITFC strongly recommends the implementation of 24-hour spill for spring migrants and summer migrants. Smolt-to-adult survivals for juveniles that pass through screened bypass systems indicate fewer adults lower rates that for juveniles that pass through non-screened bypass routes. Spring transportation at Little Goose has been equivocal

(Bouwes et al. 2002), thus, CRITFC recommends a spread the risk approach for juvenile migrants with about half passed in spill and the other half transported. Summer migrant transportation has not been examined yet, but results from summer migrant transportation at McNary are not encouraging. We recommend spread the risk for summer migrants at this project and comparative survival studies that require removal of turbine intake screens.

Lower Granite (LWG). For 2003, the Corps has left the removable spillway weir (RSW) installed in an attempt to increase fish passage effectiveness. CRITFC believes that the weir, with some auxiliary spill, should be tested in 2003 against spill at levels that approach total dissolved gas cap limits to determine if there is a difference in project fish passage efficiency (FPE). Auxiliary spill should be set at 22 kcfs to insure that juveniles are provided the best possible tailrace egress conditions, and that they are attracted to the RSW zone of influence in the forebay. RSW/spill tests should only compare two conditions to insure that there are adequate test blocks to insure results have statistical precision and robustness. It is vital to test the performance of the RSW at Lower Granite for summer migrants.

Ice Harbor (IHR). For 2003, CRITFC recommends a comprehensive study to evaluate passage as a whole at Ice Harbor. Several survival studies have been done at IHR in recent years with a large variety in survival estimates for both spring and summer. (Eppard et al. 2002) It appears that high spill volumes in low tail water and low flow conditions do not provide good passage for juveniles. Whether this problem is due to mechanical/hydraulic conditions at the spillway, predation below the spill, or some combination of these factors is unclear. CRITFC recommends conducting a study that compared a nighttime spill level less than the 100-kcfs/TDG cap to the existing spill level. Further refinement and study of the current spill patterns should also be examined to insure the best egress conditions possible.

Refer to Table 3 for the details of project spill operations. All proposed operations conform to existing total dissolved gas constraints.

Rock Island. This project still is under the authority of the Rock Island Settlement Agreement and established spill conservation account, despite incomplete Habitat Conservation Plan development. Chelan PUD should coordinate project spill with fishery managers through the Mid-Columbia Coordinating Committee. Spill should begin and end at the direction of the Committee, and should be provided at a minimum rate of 31 kcfs consistent with the 2000 spill program.

Rocky Reach. This project is still under the authority of the Mid-Columbia FERC proceedings, despite incomplete Habitat Conservation Plan Development. Chelan PUD should coordinate project spill with fishery managers at the direction of the Committee. Spill should begin and end at the direction of the Committee, and should be provided at a minimum rate of 20% of daily average flows.

Wanapum. Spill should be provided as specified by the 2000 Spill Memorandum of Agreement (MOA) between Grant PUD and the Joint Fishery Parties. The Agreement specifies that Grant will spill 43% of daily average flow in the spring and 49% of daily average flow in the summer to pass 95% of the juvenile migrants and meet an 80% FPE and 95% survival standard estimate.

The beginning and end of spring spill is determined by the Mid-Columbia Coordinating Committee and the beginning of summer spill is June 15 or when fish are present, whichever occurs first and ends between August 15 and August 30 based upon in-season monitoring.

Priest Rapids. Spill should be provided as specified by the 2000 Spill Memorandum of Agreement (MOA) between Grant PUD and the Joint Fishery Parties. The Agreement specifies that Grant will spill 61% of daily average flow in the spring and 39% of daily average flow in the summer to pass 95% of the juvenile migrants and meet an 80% FPE and 95% survival standard estimate. The beginning and end of spring spill is determined by the Mid-Columbia Coordinating Committee and the beginning of summer spill is June 15 or when fish are present, whichever occurs first and ends between August 15 and August 30 based upon in-season monitoring. Spill at Priest should be increased by an equal amount of spill foregone at Wanapum if total dissolved gas restrictions limit Wanapum spill from achieving MOA required percentages.

Table 3. 2003 River Operations Plan Spill Program

Project	BiOp Spill Spring	CRITFC Plan	BiOp Summer Spill	CRITFC Plan
BON				
Day	75 kcfs	75kcfs vs.120-150 kcfs	75 kcfs	75 vs. 120-150 kcfs
Night	120-150 kcfs (Cap)	120-150 kcfs (Cap)	120-150 kcfs (Cap)	120-150 kcfs (Cap)
TDA				
Day	40% of flow	50% of flow	40% of flow	50% of flow
Night	40% of flow	50% of flow	40% of flow	50% of flow
JDA				
Day	0	30%	0	30% vs. 60%
Night	60% flow or max 180	45%	60% of flow	60%
MCN				
Day	0	50%	0	50%
Night	50% of flow	50%	0	50%
IHR				
Day	45 kcfs	45 kcfs	0	45 kcfs
Night	100 kcfs	65 kcfs vs. 100 kcfs	0	65 kcfs vs. 100 kcfs
LMN				
Day	40 kcfs (Gas Cap)	40 kcfs	0	30 kcfs
Night	40 kcfs (Gas Cap)	40 kcfs	0	40 kcfs
LGS				
Day	0	45 kcfs	0	30 kcfs
Night	45 kcfs (Gas Cap)	45 kcfs	0	45 kcfs
LGR				
Day	0	22 kcfs vs. 60 kcfs	0	22 kcfs vs. 60 kcfs
Night	60 kcfs (Gas Cap)	60 kcfs (Gas Cap)	0	60 kcfs (Gas Cap)

Attachments 1-6

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Attachment 3

2003 Hanford Protection Operations to Reduce Juvenile Hanford Reach Fall Chinook Stranding and Mortality

Power peaking causing flow fluctuations from federal and FERC licensed dams in the mid-Columbia River can be extreme (Figure 4), with shoreline water levels varying up to 13 feet over a 24 hour period. When this occurs during the early emergence and migration of Hanford fall chinook from redds, hundreds of thousands of fry are stranded in pools or other entrapments left by the receding river. Fry are susceptible to avian or fish predation, thermal shock, stress and desiccation. Most of the significant stranding occurs with shoreline fluctuations of 1-3 feet Wagner et al. 2000). Fluctuations at flows of 120 kcfs and under are especially problematic because they dewater significant shoreline areas and cause greater risks of stranding (Table 4). Due to 2003 drought conditions, flows are likely to be in this range, thus, CRITFC recommends no more that plus or minus 10 kcfs changes in mainstem flows in the Reach over a 24 hour period measured from noon to noon the prior day.

Biological and hydrological monitoring of the stranding has occurred since 1998 with funding provided by BPA and Grant PUD. The tribes and fishery agencies initially recommended that ever increasing or stable flows be provided in the Reach, consistent with the recommendations of the NPPC's Independent Scientific Advisory Board (Williams et al. 1998). In the CRITFC tribes' *Spirit of the Salmon* restoration plan, fluctuation of no more than 10 % of the previous day's average flow in the Reach was recommended. However, the federal and mid-Columbia FERC power operators claimed that this operation could not be accomplished because of power needs. Instead they offered regimes that targeted flow fluctuations to plus or minus 20-40 kcfs over the previous 24-hour flows. Tribes and fishery agencies were left with no recourse and could but monitor the dead and stranded salmon over the next three years.

In 1999-2001, the federal and mid-Columbia FERC power operators implemented an operational regime aimed at limiting flow fluctuations to reduce stranding. In 1999, the operators attempted to keep flow fluctuations within a plus or minus 20 kcfs range. In other words, the river flow levels from Priest Rapids dam could fluctuation up to 40 kcfs in a 24-hour period. The estimated fry "at risk" of mortality [7] from these levels for 17 miles of the Reach (about one third of the Reach) in 1999 was about 382,000 and about 255,000 in 2000. The confidence intervals around these estimates were wide because more sampling effort is needed. The overall annual fry production for the Reach has been estimated by WDFW as 16-27 million salmon. [8] The operators believed that these losses were acceptable as a cost of doing business for regional power production. To date, no mitigation or compensation for these losses has been offered by the operators.

[7] "At risk" are fry that have been stranded and are not likely to get passage back to the river in time to avoid predation, thermal shock or other mortality.

[8] The reader should note the difficulties and uncertainties in deriving these estimates in footnote four and text below.

In 2001, the operators wanted greater power peaking flexibility, thus, they proposed a flow fluctuation of 40-80 kcfs in a 24-hour period. Given the extreme low flow conditions, with the second worst runoff conditions in the 70-year record, CRITFC objected to this flow band and proposed no more than a 10 kcfs fluctuation in a 24 hour period. The fishery agencies and operators agreed to proceed with up to a 40-80 kcfs band. The result was more than a four-fold increase for "at risk" fry or an estimate of about 1.6 million fry.

Based upon 1) review of the four years susceptibility data, 2) additional information supplied by the USFWS on dewatered areas below Priest Rapids Dam and, 3) taking into account likely 2003 Hanford Reach flow regimes from 50-200 kcfs, we recommend the specific operations provided below. These are offered to reduce stranding impacts on Hanford Bright fall chinook, ESA-listed steehead and Pacific Lamprey. In order to achieve the recommended flow bands, the federal operators should limit power peaking from Grand Coulee and release additional water on weekends to assure the FERC-licensed operators can keep the flows within the CRITFC recommended 10-20 kcfs maximum flow fluctuations. During the period of high fry stranding susceptibility, if necessary, the federal operators should rely on other generation sources than Grand Coulee to meet power contract obligations to reduce flow fluctuations. In turn, the Mid-Columbia FERC operators, in particular Grant PUD, will have to fill reservoirs on Fridays to assure that appropriate Reach flows would be maintained over weekends when reduced power demand and/or flood control operations limit upriver flows from federal dams.

Monitoring of stranding impacts and overall loss estimates for the middle section of the reach will be implemented by Grant PUD and WDFW using similar methods and effort as in 2002. For 2003, CRITFC, WDFW, and the Yakama Nation will expand sampling efforts to the entire Reach based upon a stratified sampling design that focuses on entrapments. The USGS plans on studying behavioral aspects of stranding in conjunction with these efforts.

The following are CRITFC's recommendations for 2003 operational constraints for flow releases below Priest Rapids Dam to reduce mortality of emerging and rearing juvenile fall chinook in the Hanford Reach. In 2002, a large escapement of adult chinook will create an estimated 40 million fry into the Reach. Due to much warmer temperatures that normal these fry have already begun to emerge from the redds. To protect this significant productivity, it is critical that the following criteria be implemented by the federal and Mid-Columbia PUD operators.

2003 Hanford Juvenile Fall Chinook Flow Recommendations

Starting Program Operating Constraints

Seining of the six established index sites will be conducted three days per week (Monday, Wednesday, and Friday) beginning one week prior to the estimated start of emergence. Once a daily total of 50 sub-yearling fall chinook salmon fry are captured, a daily flow fluctuation constraint of 40 kcfs would be imposed. This constraint will continue until a daily total of 100 fry are captured from the index sites at which time the following proposed flow constraints will be implemented. After the 100 chinook criteria have been met, index sampling would be decreased to once weekly (Wednesday).

When PRD daily discharge is between 36 and 80 kcfs.

When average daily discharge at Priest Rapids is between 36 and 80 kcfs, the mid-Columbia projects will limit flow fluctuations to no more than 10 kcfs in a 24-hour period.

- Flow bands between 36 and 80 kcfs dewater the most area with the least amount of fluctuation and have the most potential for catastrophic fish kills.
- River configuration - long shelves, and shallow water entrapments, substrates that heat up or drain quickly.

When PRD daily discharge is between 80 and 110 kcfs.

When average daily discharge at Priest Rapids is between 80 and 110 kcfs, the mid-Columbia projects [9] will limit flow fluctuations to no more than 10 kcfs in a 24-hour period.

- Flow bands between 80 and 110 kcfs hold optimal rearing habitat. Data suggests these areas hold large entrapments and some stranding sites including backwater sloughs with good rearing habitat.
- These flow bands are located at the upper most reaches of the lower river shelves. Evaluation years 1999 and 2000, showed the highest susceptibility areas between 80 and 120 kcfs.

When PRD daily discharge is between 110 and 140 kcfs.

When daily average discharge is between 110 and 140 kcfs, the mid-Columbia projects[1] will limit fluctuations to no more than 20 kcfs in a 24-hour period.

- Data suggests that flow bands between 120 and 190 kcfs offer reduced susceptibility but not in the reach directly below Priest Rapids Dam.

[9] The mid-Columbia projects refer to Grand Coulee, Chief Joseph, Wells, Rocky Reach, Rock Island, Wanapum and Priest Rapids that are operated under mid-Columbia hourly coordination agreements.

- River configuration - steep banks, area of exposed shoreline drop significantly between 110 and 140 kcfs.

When PRD daily discharge is between 140-170 kcfs

When daily average discharge is between 140 and 170 kcfs, the mid-Columbia projects[1] will limit fluctuations to no more than 20 kcfs in a 24 hour period.

- Data suggests that flow bands between 120 and 190 kcfs offer reduced susceptibility in the SHOALS reach, but not in the reach just below Priest Rapids Dam.

When PRD daily discharge is 170 kcfs and above

When daily average discharge is 170 and above, the mid-Columbia projects[1] will limit fluctuations to no more than 20 kcfs in a 24-hour period. A minimum hourly flow of 150 kcfs will be maintained.

- Constraints will protect the backwater areas of the sloughs (Hanford Slough and White Bluffs Slough) from dewatering.

Ending Program Operating Constraints

CRITFC and WDFW recommend that flow constraints be terminated after the accumulation of 1400 temperature units (TU) past calculated end of spawning under the Vernita Bar Settlement Agreement.

- Evaluations from 1999, 2000, and 2001 show that susceptibility drops significantly after 1200 TU's and after 1400 TU it is assumed that susceptibility has reduced to allow for termination of constraints. The last fish found stranded and entrapped in 1999 and 2000 fell relatively close to 1400 TU's. The 2001 evaluation showed fish becoming entrapped and stranded past this deadline but at decreased rates.

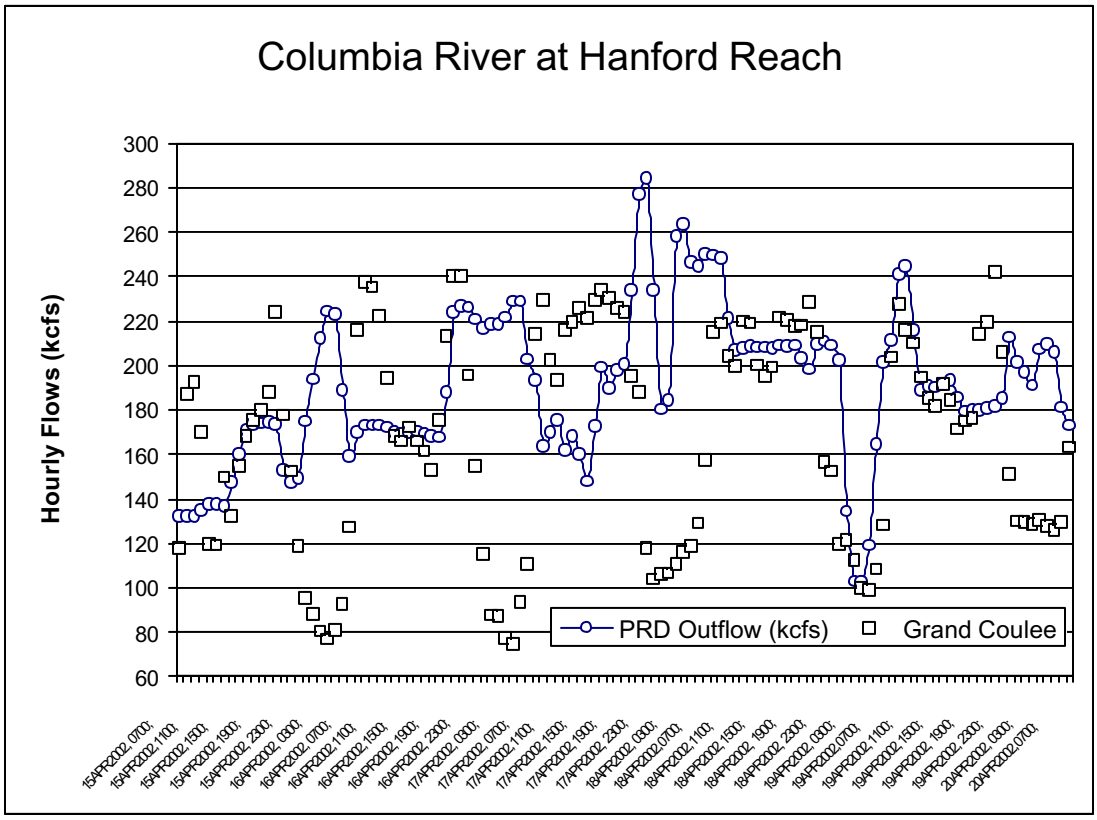

Figure 4. Hourly flows in the Hanford Reach during the 2002 out-migration.

Table 4. Flow bands and number of stranded and entrapped juvenile fall chinook salmon found on the Hanford Reach of the Columbia River in 2002 (From WDFW 2003).

Flow Band (kcfs)	Total Shoreline Within Study Area (hectares)	Number of Flow Fluctuations During Season	Shoreline Exposed During Season (hectares)	Number of Plots Sampled	Area Sampled (hectares)	Number of Plots with Chinook	Number of Chinook Found at Risk	Number of Chinook Found at Risk per Hectare
50-80	1,234.64	2.98	3,683.97	28	7.03	12	98	13.93
80-120	1,203.43	4.90	5,895.14	36	8.84	6	65	7.36
120-160	701.12	18.54	12,997.51	51	15.42	7	15	0.97
160-200	767.48	20.00	15,347.91	44	10.16	3	8	0.79
200-240	691.96	9.82	6,797.96	27	7.21	0	0	0.00
240-280	569.80	8.83	5,031.03	8	2.18	1	2	0.92
Total	5,168.43	65.07	336,320.91	194	50.84	29	188	3.70

Attachment 4

BPA-Idaho Power Company Water and Power Exchange

From the late 1980's until April 2001, BPA and Idaho Power Company (IPC) were engaged in annual exchange contracts for water and power. Typically, IPC would store water in the Hells Canyon Complex (Complex) in early spring and BPA would provide a power exchange to IPC. This storage would be released later in spring for salmon. The power generated from this release was sent back to BPA.

In the late summer, IPC would release storage and generate power, which would be sent to BPA. BPA would replace this power in September, which allowed IPC to store water to meet project elevations and assure that enough water was on hand for Hells Canyon fall chinook spawning.

In 1995, after release of the 1995-1998 FCRPS Biological Opinion, firm water exchange volumes and timing were established in contracts to meet Opinion RPAs. A five-year contract was finalized for power and water exchanges in 1996. In early May, IPC would release 110 KaF, and send power to BPA. BPA would send the power back to IPC the latter half of May and

refill the Complex. In summer, IPC would 1) release 237 KaF from the Complex and 2) shape and pass 427 KaF of Bureau of Reclamation water through the Complex. The power generated from these releases was sent to Bonneville. Bonneville would send exchange power for the 237 KaF to IPC in September and send exchange power for the 427 KaF back to IPC the following winter.

Because power markets are more lucrative in summer months, BPA claimed that IPC gained a substantial financial advantage in the contract arrangement. BPA negotiated with NMFS to have the power exchange contract omitted from the 2000 Biological Opinion and the five-year contract expired on April 1, 2001. During 2001 and 2002 negotiations with the federal operators, the CRITFC tribes, Oregon and Idaho all pressed BPA to renew the exchange contracts with IPC. BPA claimed that they were at a financial disadvantage, thus, were unwilling to renew the contract, despite long negotiations with IPC that involved the Idaho Governor's office.

Without the contract in place, it appears difficult but not impossible for IPC to: 1) assure that the 427 KaF or additional upper Snake water will be shaped and passed through the Complex, 2) assure that the 110 KaF and 237 KaF will be provided in a timely manner for fish. This would assure that salmon obtain the water critical to their migrations, habitat and survival.

IPC recently released a draft license application for relicensing of the Complex, and is still engaged in ESA consultation for the Complex. In CRITFC comments on the draft license application, CRITFC analyses utilizing the GENESYS hydrologic model[10] indicate that, in nearly all water years on record, a discrete 450 kaf [11] could be delivered downstream from Brownlee storage primarily in July for anadromous fish to meet the Opinion's Lower Granite target flows and the recommendations in the tribal recovery plan, *Wy-Kan-Ush-Mi Wa-Kish-Wit* (Nez Perce et al. 1995). These analyses show that in nearly all years, inflows into the Complex leave enough water to provide a minimum of 9.5 kcfs for fall chinook spawning flows in late September through early November, with spawning flows up to 13 kcfs possible in higher flow years. In addition, delivery of Complex water in July to the lower Snake would allow more judicious use of Dworshak Reservoir storage for temperature control. Idaho Power should conduct analyses that examine the potential for supplying 450 KaF, primarily in July, for flow augmentation in all water years while assuring that at least 9.5 kcfs is available for fall chinook spawning and rearing flows below the Complex.

Renewal of the BPA-IPC water exchange contract is important to facilitate vital flows downstream of the Complex for listed Snake River chinook and steelhead and endangered Snake River sockeye. Nonetheless, IPC has an obligation as a competent licensee to provide equitable treatment for salmon by providing the above storage volumes for flow augmentation.

[10] The GENESYS model was developed by the Northwest Power Planning Council as a basinwide hydrologic model. It incorporates water routing thorough the Federal Columbia River Power System using a data set of 50 years of historical runoff (WY 1929-1978).

[11] The 450 KaF should be contributed directly from Brownlee Reservoir. Bureau of Reclamation water from the upper Snake could be passed through in addition to the 450 KaF from Brownlee.

Attachment 5

Fish Facility Operations Recommendations

CRITFC has submitted the following comments and recommendations to the Corps' draft 2003 Annual Fish Passage Plan. We reference these comments that identify important changes to federal dam fish passage facilities and suggest research to better protect anadromous fish.

January 30, 2003

Brigadier General David Fastabend
Division Engineer
Northwest Division, Corps of Engineers
P.O. Box 2870
Portland, OR 97208-2870

RE: **Comments on Corps' 2003 Fish Passage Plan for FCRPS Dams**

Dear General Fastabend:

Thank you for providing us with a review copy of the Corps' draft 2003 Fish Passage Plan (FPP). Unfortunately the draft was delayed this year which has a caused a delay in review and providing final comments. We have reviewed the document and provide the following comments and recommendations. We request that the Corps provide us with a written, detailed response to our recommendations and comments by April 1 to facilitate discussions between the Corps and regional fishery managers in the Fish Passage Operations and Maintenance Subcommittee (FPOM) before the onset of the 2003 anadromous fish migrations. In the event the Corps cannot implement certain CRITFC recommendations, we ask that the Corps provide their justification for not implementing these recommendations in writing.

General Comments

The Corps should create a post-season assessment report of 2003 FPP actions with a check- list. Projects and criteria that were successfully implemented should be specified as well as those projects that were not implemented. This review would provide accountability and a focal point for end of year FPOM discussions and a preliminary framing of issues for the 2004 FPP.

Funding provided in the 2003 operations and maintenance budget for specific projects should be presented as an appendix in the 2003 FPP. A list of funded and unfunded projects is vital for the region to gain a sense of which projects have funding and where funding gaps exist that are preventing completion of important operations and maintenance projects.

Evans and Beaty (2001) and Evans (2002) noted that steelhead kelts prefer to use surface bypass routes such as sluiceways. This same research concluded that kelts that passed via spillways or sluiceways seem to have better long-term survival. Wagner and Hilson (1993) noted that a significant number of adult steelhead that fall back through turbine intake screen systems at McNary Dam suffered a high percentage of visible bruises. Thus, CRITFC recommends that all dam sluiceways be in use 24 hrs a day to insure accessibility for kelt passage and that spill be implemented at dams before April 10 if kelts are present, and after August 31 if adult fall chinook and steelhead are present.

In 2001, it became evident to CRITFC that the Corps' dam biologists were short- staffed and had a difficult time maintaining a schedule which requires 3 daily inspections of all fish passage facilities. In 2001, the Corps and CRITFC combined efforts to give Salmon Corps members access to Lower Columbia dams. Salmon Corps members assisted Corps of Engineers biologists in fish facility inspections and other routine tasks. This resulted in better inspection capacity of fish passage facilities. We will continue to work with the Corps through the tribal partnership program to secure Salmon Corps dam monitoring programs for 2003 and outyears. We believe that this program should be mentioned in the FPP.

The checklist for adult/juvenile fishway inspections at each project should be included in the 2003 FPP, possibly in an appendix and/or should be reviewed by FPOM before the fish migration season starts.

Special low flow operations should be outlined in the 2003 FPP to take advantage of any lessons learned from low flows in 2001to insure that the facilities are operated to create the best possible passage conditions.

In 2003 there will be a spring chinook fishery in April for 1 week. There will also be a fall fishery, which generally occurs from the third week in August through the third week in September. The fall fishery usually occurs Tuesday through Saturdays, or as set by the Columbia River Compact. Pools fluctuations in Zone 6 (Bonneville to McNary Dam) during the tribal treaty fishery should be limited to a 1-2 feet draft from full pool at each project to facilitate tribal fisheries as a key component of tribal members exercising their treaty rights to fish. While the in-season pool elevations are set by Reservoir Control Center, the pool targets should be outlined in the special operations section of the 2003 FPP.

Under the Corps' Anadromous Fish Evaluation Program, there have been several proposals to install additional temperature monitors in reservoir and in dam juvenile and adult passage facilities. The Corps should maintain the Snake River tri-level thermograph system and the McNary Dam temperature monitoring system. The Corps should install additional temperature monitoring equipment in the south fishway at John Day, McNary and Bonneville fishways, at Snake River dam fishways and anywhere else FPOM deems appropriate. This data

is critical to establish mainstem TMDLs and to comply with the Clean Water Act. Temperature data should be made available or posted on the Internet for real-time management decisions for the salmon managers. The fishways should be operated to reduce temperatures and to meet fishery agency and tribal criteria.

Specific Dam Comments

Bonneville Dam

- The daytime spill cap should be changed from 75 kcfs to the total dissolved gas level, which will likely be approved under the state water quality agency temporary waivers for fish spill. The adult passage research from 2000 and 2002 and past years showed little to no correlation between increases of adult fall back and increased spill volumes. The 2003 FPDEP research plan calls for daytime spill in excess of 75 kcfs. Further, with a change from Powerhouse I priority to Powerhouse II the number of adults using the Bradford Island Facility will be greatly reduced. The Bradford Island Ladder accounts for roughly 90% of the adult fallbacks. Preliminary modeling indicates about a 10% percent improvement of survival for juveniles with a Powerhouse II operation and increase in daytime spill. This operational scenario should be verified using the NMFS' SIMPASS model.

- Currently the Bonneville spill pattern is under review for adult migration concerns. If approved by FPOM, the new spill pattern should be incorporated into the 2003 FPP.

2.2.1. Spill level changes. Any Corps decision regarding spill level changes should be made after regional discussion and consultation with the tribes, unless the spill changes are necessary to maintain the dissolved gas waiver in response to an emergency situation. A new system for reducing spill to meet TDG limits has been outlined by the Water Quality Team but to date a system for increasing spill levels to get them back to BiOp levels when TDG levels and spill levels are lower than targets has not been completed to date. We need to insure that BiOp spill levels are maintained whenever possible under the TDG limits.

BON- 11 Table 5 unit priorities needs to discussed. This table does not reflect current thinking on the unit operations. There has been discussion about not operating B1 MGR units at low end of peak due to fish passage concerns. These items should be discussed and addressed so a recommendation can be made by FPOM.

BON- 18 Need to add language about removal of STS and running of MGRs unit priority as well as leaving some screen installed for fallbacks.

BON-20, 2.4.2.2.b. In past comments to FPPs, we stated our concerns with the actions in this section on fish unit drawdown. The FPOM task group guidelines need to be developed and included in the 2003 FPP before an emergency situation develops. The Corps should ensure that the trash rack at Powerhouse II is compatible with the rake to maximize the effectiveness of debris removal when the system is raked.

BON- 26 2.4.2.5.b-3 Has the new methodology for removing adults, ie, kelts from the separator proven to be adequate or will structural changes be required?

BON- 35 d-1 The floating gates should be open at Powerhouse II

BON-37, 3.2.2.4. and 3.3.2.4. The in-season visual inspection for diffuser malfunctions is not an adequate method for determining problems. A better method of in-season inspection is needed and should be developed by the FPOM members before the start of the passage season. What is the status of this issue?

BON- 44 c Second Powerhouse during time of turbine failure we need to insure that the FPP operations make the most sense when compared with adult tracking information. Certain entrances may get used less and would be the first ones closed.

BON-50, 5.5.1.5. We recommend that the Corps provide some guidelines for kelt identification for approval by FPOM. Kelt identification guides in Evans and Beaty (2001) are recommended.

The Dalles Dam

To our knowledge there is no turbine unit priority at The Dalles Dam. However, after 2002 research, it appears that we need to reconsider turbine unit priority and determine what the turbine priority should be to best protect anadromous fish. Turbine priority should be developed in consensus with the fishery managers.

TDA-8-2.4.1.2. a. – Has the crane used to rake Units F1 through MU5 been repaired? If so it should be included in the FPP. If not, a new criteria needs to be added specifying trash raking or some other means of debris monitoring for Units F1 through MU5.

TDA –9 2.4.1.2.e – There is a need to review the sluice gate opening criteria. Research is being proposed to study what locations make the most sense.

TDA-21, 4.5. As stated above, the Corps should operate all turbines within the 1% peak efficiency band during the fish passage season. Specific to The Dalles, the Corps should have an emergency operational plan for turbine units if they are to be operated outside this criteria. FPOM should review and approve this plan before implementation by the Corps.

John Day Dam

The current spill pattern needs to be updated and field-verified due to the bathymetry changes in the 1:80 model at the Waterways Experiment Station (WES). Regional review of the spill patterns is underway.

2.4.1.3.e. 8 The updated language to the FPP seems appropriate, however the number of adults removed from the sluiceway should be reported to FPOM or in the daily reports. This section should specify where the temperature is obtained as a prelude to determine if dewatering of the box should occur. The 2003 FPP should specify routine box dewaterings at appropriate times (at

least once a month) to assure that adult delay and possible injury are reduced to an absolute minimum. FPOM needs to discuss the option of dewatering in the mornings before temperatures exceed the 70 deg F standard.

Holding of substantial numbers of adult steelhead and chinook in the box for long periods of time is not biologically acceptable. For 2003 we strongly recommend that the Corps begin design investigations for structural remedies to this problem. One possibility could be a crowder that could be used to carefully guide adults out of the dewatering section of the bypass, into the 30 cfs flume, and past the monitoring station.

JDA-7..2.2 Spill Management. The FPP should contain additional language to clearly specify appropriate spillway one operations during the adult fish migration period. We recommend continued use of spillbay one to provide additional attraction flow for adults. This is especially important for fall chinook and steelhead. We recommend that spillway one be operated from March 20 until spring juvenile spill begins and September 1 through November 30. All operations should be coordinated through FPOM.

JDA-22,23..b. North Ladder. The FPP should specify the current capability of the pump system. If more that three pumps can be operated, it should be described in the FPP. Final operations should be approved by FPOM.

JDA-22, 3.3.2.1.a.3 and 4. Radio-telemetry research at Corps' and Mid-Columbia dams indicates that it is advantageous to close the floating orifices before closing or raising the main entrance weirs. This should be specified in the FPP.

Walla Walla District Projects

General Recommendations

CRITFC recommends that half of the turbine intake screens be removed from each dam to create a "spread the risk" scenario. Vertical barrier screens (VBS) inspection schedules should be explicit for each dam. Video inspections might be used where screens cannot be pulled easily to deck level to clean. The FPP should specify that screens with the most use and/or end units generally attract more debris. These screens are the most likely ones to accumulate debris on their VBSs, thus, they should be prioritized for inspection and cleaning.

McNary Dam

CRITFC opposes the speed-no-load turbine operation which are suggested in the FPP to help the fish barges leave the dock. These operations will negatively impact turbine-passed fish and violate peak efficiency turbine criteria. The extent and frequency of these operations should be discussed by FPOM and appropriate changes should be made to the FPP.

There is no section discussing temperature requirements for handling of juveniles. CRITFC has maintained that juvenile salmon should not be handled when temperatures reach and/or exceed

68 degrees F. The Final FPP should have criteria established that conforms to the both water quality standards and the biological needs of the salmon.

The Corps should add language to include reference of PIT-Tag detection systems installed in the McNary fish ladders and the Oregon shore fish count station, as well as the juvenile bypass facility.

MCN-7..c5. Referring to the section, "…[P]lastic covers on orifice chutes maintained…orifice flow is visible." In general, orifice flows are visible but during facility inspections, we are unable to discern whether an orifice is plugged with debris. This is because the flow from the orifice is not a clear jet but is distorted as it discharges through the chute and into the bypass channel. Other means should be used to check for oriface blockages, such as gatewell hydraulics. Back-flushing orifices should be accomplished at routine times.

MCN-26 and 27: Referring to the spill schedule - NMFS is expecting that the general McNary model at WES will be used to develop a revised spill schedule for spring 2003, which concurrently considers adults and juvenile passage and gas abatement criteria. A WES trip is scheduled to verify the new spill pattern.

Ice Harbor

What operations and maintenance, if any, have been discussed to reduce the oil leak in the turbine units?. These should be included in the FPP. Is it possible to use a less biologically benign oil in the unit until repairs have been made, such as a vegetable oil product?

Lower Monumental

LMN-6, 2.1. With the completion of the still basin work and the end bay deflector a new spill pattern will needs to added to the plan. This pattern needs to be verified with the general model.

Lower Granite Dam

LWG-17, 3.1.2.3: Text should be revised per comment discussion last year (similar to section 2.3.1.2.c): "do not close orifices in operating turbine units with ESBSs in place for longer than 5 hours. If possible, keep to less than three hours".

LWG-22 through 29: Include revised tables as they are available.

Appendix A, Special Operations

Overall several critical projects are missing from this section (i.e. Lower Granite spill with the removable spillway weir, ect.). This section needs to be completed and/or updated to allow comprehensive review and comments in the next two weeks.

Appendix B - Juvenile Fish Transportation Plan

CRITFC does not support the current full juvenile transport plan and recommends in-river migration with spill for juveniles. The Corps continues to maximize transportation, especially in trucks, that does not hold up to independent scientific scrutiny. The FPP should reference the findings of the ISAB (98-2) *Response to the Questions of the Implementation Team Regarding Transportation,* with respect to juvenile transportation. There is no temperature, stress, injury or mortality criteria in the FPP for juveniles that must pass through screen and transportation facilities at the Lower Snake dams. This is a key deficiency in the FPP. Fish should not be handled, kept in screen bypass, or transportation facilities when temperatures meet or exceed 68 degrees F. However, the FPP simply states that more care must be taken in handling salmon when these temperatures are or and exceeded in transportation facilities, which is in violation of water quality standards in the Clean Water Act. We applaud the decrease of use of trucks and anticipate discussions with the Corps and FPOM to continue to reach resolution on this topic.

B-4, 4.a.(2). NMFS suggested the following change. *"PIT-tagged fish will be sorted by code, to determine which fish are part of the transport study group and which are to be returned to the river. All non PIT-tagged fish will be returned to the river*." It was our understanding that fish transportation would occur at McNary every other day so all of the bypassed fish would not have to go through sampling loop. Currently, McNary has the capability to identify PIT-Tagged fish as they travel through bypass pipe and do not have to enter the sampling loop to be detected.

Appendix C – Bonneville Power Administration's System Load Shaping Guidelines to Enable Operating Turbines at Best Efficiency

All turbines should be operated within their 1% efficiency range during the entire juvenile and adult salmon migrations. Deviations from the 1% efficiency should only occur under emergency conditions and not for power peaking/load following and non-emergency power production. These deviations and justifications should be recorded and reported to the fishery managers at the end of each migration season and should be included in the post-season report. A system to record and post operations outside of 1% should be created for review during the passage season.

Appendix G - Fish Sampling Protocols

It is CRITFC's understanding that a review of the current practices at the adult fish collection and monitoring facility is underway. Appendix G should be completed/updated in the next few weeks to allow FPOM the opportunity to provide a comprehensive review and comments specific to the facility.

The number of picketed leads lowered for adult guidance into adult fish collection facilities needs to be reviewed, especially if there are large numbers of migrating adults in the ladders. Operations should err on the side of caution. One option might be to start with a minimum number of picket leads (i.e. two). If sample numbers cannot be obtained during the sampling period then additional picketed leads should be utilized. FPOM should coordinate this operation and establish a criterion to determine when more picket leads should be lowered. These issues

should be incorporated into the FPP. What is the status of this criteria and how well did it work in 2002. For 2003 we may need to consider powerhouse operations to move fish from Powerhouse II to Powerhouse I.

The current FPP changes to adult handling procedures in elevated river temperatures are an improvement over past practices, but the FPP still specifies adult trapping and handling at 70 degrees F and above. The susceptibility of adults to bacteriophage diseases such as *furunculosis* and *columnaris* increases greatly at 68 degrees F (Bouck et al. 1975 in McCullough 1999). These diseases are readily transferred in water and from animal to animal. Egg viability is also compromised at these temperatures (McCullough 1999). CRITFC prefers that adults not be handled when temperatures in traps or fishways reach 68 degrees F. We recommend that at the least special operation should go into affect at 68 deg. F not wait until 70. Furthermore no sampling above 72 degree F should be allowed at all. And sampling from 70 – 72 should not occur unless special situations require it and has approval by FPOM and the section 10 permit.

In 2001, NMFS limited adult handling in the Priest Rapids Dam trap to 69 degrees F in a ESA Section 10 incidental take permit. There should be a consistent temperature criterion for handling adults throughout the river, not exceeding 69 degrees F and preferably not exceeding 68 degrees F., the current water quality standard.

CRITFC is uncertain if high temperatures and handling stress can be mitigated by holding anesthetized adults in lower temperatures and then releasing them into higher temperatures in the ladders. We are concerned with the possibility of inducing a thermal shock with no way of determining the effects. Further, CRITFC has concerns with the temperature differentials between several tanks to which adults may be subjected. It remains a critical uncertainty as to whether or not the Corps' proposed 3 degree F change is appropriate for adult health. We continue to recommend that a literature review of this practice be completed to see if there is scientific information to support this procedure. Until this review is completed, we cannot support the proposed action.

We need to address the problems of salvage related to lamprey in the adult ladders. With a loss of about 1200 adult lamprey at John Day, new guidelines or some better procedures must be implemented. Lamprey are significant culture resource for the CRITFC's member tribes and they are greatly concerned over the loss of hundreds of adult lamprey at John Day during the November, 2002 dewatering. Criteria to insure that lamprey are not again lost must be developed in coordination with the tribes and other fishery managers and included in the FPP.

Conclusion

The 2001 fish passage season occurred during extremely low flow conditions caused by federal operator power operations and low runoff. Fish passage facility operations during such conditions caused increased direct and delayed mortality. Given the present drought conditions, 2003 has the potential to cause similar or even greater losses since many more juvenile salmon than in 2001 are projected to migrate through the Corps dams and reservoirs. We must insure that any facility operations and maintenance issues that arose due to the low flows are addressed before the 2003 migration season begins.

CRITFC appreciates the opportunity to comment on the Corps' draft 2003 Fish Passage Plan. We have made many recommendations that we anticipate the Corps can incorporate into the final 2003 FPP. We stress that time is of the essence to resolve many of these passage issues before the onset of the 2003 migration season. We look forward to working closely with the Corps staff in developing the final 2003 FPP. Should you have technical questions regarding these comments please contact Tom Lorz, Fisheries Engineer or Bob Heinith, Hydro Program Coordinator at (503) 238-0667.

Sincerely,

Don Sampson
Executive Director

Cc: Commissioners
Tribal program managers
Steven Wright, BPA
J. William McDonald, Reclamation
Robert Lohn, NOAA Fisheries
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Witt Anderson, Corps NWD
Lynda Walker, Corps NWD
FPOM

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Attachment 6

2003 Fish Facility Mitigation Projects

1) Bonneville Dam. Automated Chain gates at Bonneville Powerhouse I sluiceway. This would allow for improved operation and better compliance with sluiceway criteria. The sluiceway has been shown to be a passage route for both juveniles and kelts; insuring that the sluiceway stays in criteria assures better access and utilization of this passage route.

2) Bonneville Powerhouse Two. Adult fishway trash rake system. Currently the rack and the rakes are not properly meshed, thus trash raking does not work well. The fishway units have to shut down to allow debris to float off. This problem has been ongoing for several years. In the past, during the adult passage season, debris build-up in the diffusers led to a failure of the system, and the ladder was forced to operate with only the emergency auxiliary water-supply system for nearly a month and fishway criteria was not met. Purchase of a proper rake system that meshes well with the rack will help to reduce the debris problem and should halt the operation of having to turn off the fish units at night to remove the debris. This on/off operation can lead to premature failure of the units and can possibly affect night passage of adults.

3) John Day Dam- North shore fishway pump The fishway pump is currently unable to provide entrance criteria for both north shore adult entrances due to a potential constriction in the hydraulic conduit. Funds could be used to determine a remedy for this situation.

4) John Day Dam- Full Flow PIT-Tag detection on the juvenile transport flume. Currently, adults that fallback over the dam can spend extended periods of time in the juvenile system since there is no way to move them from the channel. Several hundred adults are removed each time the system is dewatered. This dewatering is stressful to adults and has led to mortality. A full flow PIT-Tag detection system would allow for operation of the juvenile facility so that adults would not hold in the dewatering section of the transport flume. Further, juvenile stress would be reduced since the dewatering structure would not need to be operated.

5) McNary Dam juvenile screen system outfall. Concern has been raised about increased avian predation in conjunction with the outfall. Methods for reducing predation should be designed, implemented and evaluated for effectiveness.

6) Bonneville Dam. Bradford Island adult ladder repair and modernization. Currently the Bradford Island ladder is the oldest in the Columbia River Basin and renovation and repairs are underway. Increased funding would assure that the work would be expedited. This ladder system passes a significant portion of all of the Basin's returning adults, thus, expedient repairs are critical.