Columbia River Inter-Tribal Fish Commission

2005 River Operations Plan

Table of Contents

Columbia River Inter-Tribal Fish Commission
2005 River Operations Plan

March 24, 2005

Overview

The Columbia River Inter-Tribal Fish Commission (CRITFC) presents the 2005 River Operations Plan (ROP) 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 ROP is a detailed extension of the mainstem recommendations from the CRITFC tribes' Columbia River Anadromous Fish Restoration Plan, *Wy-Kan-Ush-Mi Wa-Kish-Wit* (Spirit of the Salmon; Nez Perce et al. 1995). The ROP outlines dam and reservoir operations consistent with the aggressive, non-breach alternative offered by the federal government in the 2000 FCRPS Biological Opinion.

The ROP contains recommendations for water management and dam operations, including flows, reservoir elevations, spill, and fish facility operations. [1] Further, the ROP contains recommendations for water acquisition. Each of the recommended actions will contribute singularly and cumulatively to increase mainstem anadromous fish protection and survival. This is important because another poor runoff year is occurring in 2005. Current runoff rates in the Snake River are equivalent to those in 2001 (Table 1) while upper Columbia runoff forecast rates are similar to 1992 at 93-99% of normal, and are still dropping (Table 1). Given the severe water conditions, this Plan attempts to "spread the pain" of water shortages equitably among the various river demands.

The Northwest River Forecast Center-National Weather Service estimates a 2005 March mid-month water supply forecast (January through July) of 67.7 MaF (63% of normal) at The Dalles, which compares to a 2001 final water runoff of 58.2 MaF at The Dalles (Table 1). The March final forecast has dropped 12 MaF from the February final forecast (Table 1). The worst water year on record was 1977 with a runoff of 53.8 MaF (50% of normal).

[1] The ROP also expands upon CRITFC's December 17, 2004 recommendations on the federal 2005 Water Management Plan (Attachment 4).

Table 1. 2001-2005 Water Supply Comparisons for Index Points in the Columbia Basin (from FPC)

Location	*February* Final		March Final		Actual 2001
	% Average MaF (1971-2000)	Actual Runoff Volume (KaF)	Probable Runoff Volume (% of Average)	Actual Runoff Volume (KaF)	
The Dalles (Jan-July)	77	82400	66	70700	58200 (54%)
Grand Coulee (Jan-July)	91	57200	79	54700	37400 (59%)
Libby Res. Inflow, MT (Jan-July)	90	5650	77	4860	3341 (53%)
Hungry Horse Res. Inflow, MT (Jan-July)	75	1660	67	1480	1300 (59%)
Lower Granite Res. Inflow (Apr- July)	59	12700	46	9960	10300 (48%)
Brownlee Res. Inflow (Apr-July)	41	2590	28	1740	1970* (31%)
Dworshak Res. Inflow (Apr-July)	66	1750	56	1470	1470 (56%)

*The value shown is the June 2001 final forecast.

The goals of the ROP are to provide, as much as possible with existing water supplies:

- A normative (i.e., natural peaking) hydrograph, achieved by reasonable flood control modifications and use of additional upstream storage.

- A reduction of water particle and fish travel time by implementing partial draw downs and increasing flows.

- Normative dam passage conditions through optimizing spill and surface bypass.

Singularly and cumulatively, these actions will result to increase juvenile and adult salmon and lamprey survival by: 1) reducing the time of juvenile salmon entry into saltwater, 2) creating enhanced water quality conditions in the mainstem and estuary and Columbia River near-ocean plume to enhance critical habitat, and, 3) minimizing predation and residualization losses (ISG 1996; Bunn and Arthington 2002). In crafting ROP flow regimes, judicious use of available storage and altered flood control modifications creates a peaking hydrograph in early June at the Columbia at The Dalles to assure flow and increase critical mainstem habitat for anadromous fish.

In addition, implementation of ROP measures is important to protect the progeny of some recent high adult escapement years. Near historical levels of adult salmon escapement in 2003 and 2004 indicate that many juvenile salmon will be out-migrating this spring and summer through the mainstem Snake and Columbia River hydro-system of 13 dams and reservoirs where fish can still pass. For example, 2004 adult escapement estimates for Hanford Reach bright fall chinook indicate that 15-45 million fry are emigrating from the Reach spawning areas this spring (Hoffarth 2005). Thus, it is critical that substantial anadromous fish productivity with respect to recruits from the 2003 and 2004 brood years be protected through the hydro-system by the implementation of the appropriate river operations contained in this ROP.

Flow augmentation, spill, and selected drawdown to reduce water particle travel time are major components of the ROP, consistent with the normative river paradigm (ISG 1996). These combined operations will increase fish survival and speed migrations to salt water. A key objective of the ROP is to decrease water particle travel time in the lower Snake and Columbia Rivers by 10% over what is proposed by the federal government.

The ROP objectives are as follows:

- Reduce power peaking impacts on fish (i.e. Hanford Reach)
- Enhance adult and kelt passage
- Enhance water temperature criteria to meet Clean Water Act standards
- Enhance river conditions for the tribal treaty fisheries
- Enhance fish facility operations
- Direct mainstem research to resolve critical uncertainties.

The spring and summer spill season in the ROP is extended and enhanced over that required in the 2000 FCRPS Biological Opinion and the 2005 Federal Water Management Plan. Also offered in the ROP is a list of key fish facility mitigation projects, which, if implemented, could result in significant improvements in fish passage survival. The ROP 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.

Tribal treaty fishing occurs in all of Zone 6 from McNary to Bonneville dams. The ROP includes water management regulations to promote the treaty fishery during the limited fishing periods. Given the expected adult run forecasts for 2005, based on Pacific Salmon Commission and Columbia River forecasts, treaty fisheries are likely to occur in 2005 from April through October. Scaffold fisheries will occur most of the period with ceremonial, subsistence and some commercial net fisheries occurring during limited days. Pool elevation restrictions and steady flows should be provided during tribal fisheries for all of Zone 6, not just Bonneville Pool.

Federal operations, including spill curtailment and the droughts in 2001 and 2003, where federal target flows were not met, caused significant fish losses. In-river survival rates for juvenile salmon ranged from 1.5-16% in 2001 and are compared with 2000 FCRPS Biological Opinion survival standards (NOAA 2004; FPC 2002; Table 2). Despite good ocean conditions and hatchery returns, ESU interim recovery standards are far from being met and in many cases adult returns from recent brood have been declining (Reclamation 2005; Oosterhout 2005). For example, in NOAA Fisheries last published report on the status of Upper Columbia River Steelhead before it issued the 2004 FCRPS Biological Opinion, NOAA found that the level of survival improvement still required to achieve recovery targets was "high" and that "…the natural survival rate would have to increase nearly seven-fold to meet the indicator criteria under all assumptions and for all spawning aggregations" (Toole 2003 in Oosterhout 2005). Given the critical status of ESUs with respect to recovery it is critical that measures in the 2005 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.

Table 2. 2001 Estimated Juvenile Salmon In-River Survival Rates vs. 2000 FCRPS Biological Opinion Performance Standards

Snake River Spring Chinook	2001 - 16%	2000 BiOp 49.6 %
Snake River Steelhead	2001- 4%	2000 BiOp 51.6%
Snake River Fall Chinook	2001 - 1.5%	2000 BiOp 14.3%

Key Plan Recommendations

Decision Making

- The Technical Management Team (TMT) and Implementation Teams are useful for regional information sharing but they do not suffice for river operations decision-making and are not government-to-government forums.[2] Further, the TMT is prevented from candid discussions of operational alternatives due to the presence of power marketing agents.[3]

- To avoid these serious problems, the federal operators and NMFS should use the Columbia Basin Fish and Wildlife Authority 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 comprised of policy representatives from the tribes and states and federal entities.

Emergency Declarations and Energy

- The definition of "emergency" and related procedures must be recast for 2005 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.

- Currently, the Pacific Northwest as a region is roughly 1,500 MW (megawatts) power surplus under critical (low) water conditions. This compares to 2001, when the Pacific Northwest region had a 4,000 MW deficit.

- The difference in system-generation (Table 3) between the ROP and Federal operations varies from -1557 (spring) to -933 MW (summer).

- Water and energy supply conditions in California are much better in 2005 than they were in 2001. Sierra-Nevada Mountain snow-packs range from 100% to 150% of normal.

- In mid-February 2005 the Northwest Power and Conservation Council projected:

  "No danger of blackouts (due to low flows)"

---

[2] CRITFC's member tribes formally withdrew from TMT and other NMFS' ESA forums in 1997, due to the lack of formal government-to-government consultation mandated in various federal agency policies including the 1997 Secretarial Order to the Departments of Interior and Commerce.

[3] Many power-marketing representatives from private or public corporations attend TMT meetings. 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 make 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 the effectiveness of TMT.

"No danger of extreme prices spikes (due to low flows)"

- The NWPCC also projected that the water supply picture:

    - Will likely cause some increase in electricity prices
    - Will likely reduce BPA's spring and summer revenues (from spot market sales)
    - Should not affect end-of-summer reservoir elevations
    - Not likely to meet Biological Opinion target flows

Water Conservation

- Water and land acquisition programs begun in 2001 by BPA and Reclamation should be continued. BPA and Reclamation should seek additional water from irrigators.

- The states should refrain from allowing additional water withdrawals during the 2005 fish migrations. For example, the State of Washington should not, as in 2001, honor additional irrigation withdrawals from the mainstem Columbia and Snake because of the 2005 drought situation. The National Research Council's 2004 Report, *Managing the Columbia River: Instream flow, water withdrawals and salmon survival"*, states that when river flows become critically low or when water temperatures become excessively high, "…pronounced changes in salmon migratory behavior and lower survival rates are expected."

Flow Augmentation

- Upper Snake Storage. The full 427 KaF from the upper Snake should be delivered in July and early August, consistent with the 2000 Biological Opinion. An additional 60 KaF should be made available from natural flow rights. [4] Figures 3 and 4 indicate that the upper Snake has adequate storage to provide these flows.

- Brownlee Storage. Approximately 237 KaF will be provided during July and the first part of August for Snake River summer migrants.

- Upper Columbia Storage. Approximately 1 MaF will be provided over 2000 FCRPS Biological Opinion volumes (500 KaF from Canada; 250 KaF from Banks Lake; 200 KaF from Libby, and 50 KaF from Hungry Horse).

Modified Flood Control

- Given drought conditions, the Corps of Engineers and the Bureau of Reclamation should modify flood control operations this year. Further, the ongoing draw down of Lake Roosevelt 45 feet from full for drum gate repairs creates additional flood control space.

[4] Consistent with the term sheet from the SRBA, the Upper Snake may acquire or rent on a permanent basis 60,000 acre feet of consumptive natural flow water rights diverted and consumed below Milner and above Swan Falls from the mainstem of the Snake River.

The ROP uses altered flood control rule curves, earlier reservoir refill and delay of refill at Lake Roosevelt to increase spring and summer flows by 4.5% in the Lower Columbia at major river index points (Martin 2004).[5] Because of low runoff forecasts and the fact that upper basin storage reservoirs are already well below flood control rule curves, there is little to no flood risk in implementing the CRITFC Plan this year. [6]

Drawdown

- In order to increase water particle travel and correspondingly decrease juvenile fish migration time in an extreme low water year, a drawdown of Lower Granite pool ten feet to msl 723 feet from June 20 - August 31 is recommended.

Spill

- 24 hour spill is recommended at all Corps dams during spring and summer.

- The ROP spill planning dates are March 20 - September 15 (Snake) and March 20-September 30 (Columbia). Actual spill periods will be determined by fish passage. The extended spill period accommodates early spring juvenile migrants and kelts. The federal 2005 Water Management Plan proposes spring spill planning dates of April 3 - June 20 (Snake) and April 10 - June 30 (Columbia).

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

- CRITFC recommends a 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 and summer spill at the eight federal dams and five Mid-Columbia dams.

---

[5] ROP operations were modeled against probable future federal river operations for 2005. The federal operations are based upon the historical 50-year flow record and the 2000 FCRPS Biological Opinion. The Northwest Power and Conservation Council's GENESYS Hydro-regulation model (Version 2.7.1) was used to simulate recommended monthly flow and reservoir elevations at index points across the region.

[6] The NWRFC's peak flow procedure for March 2005 suggests a spring peak daily flow of 243 kcfs for the Columbia at The Dalles this year. Hence, for the 243 kcfs flow level, the peak flow frequency analysis, using WY 1929-1978 data, suggests that the flow exceedence probability for the Columbia at The Dalles is 98% for the CRITFC plan, 98% for Federal operations, and 98% for historical observed data. When they become available later this spring, the Northwest River Forecast Center's NWSRFS-STP hydro model results, in daily time steps, will be used to update and fine-tune the ROP for spring and summer operations. Water supply forecast correction curves (Martin 2002) suggest a low water year with runoff at the Dalles at about 64 MaF. Hence, CRITFC expects the water supply forecast to decline a little more.

Dam Facility Operations and Research

- Fish facilities should be operated according to CRITFC and other salmon managers' recommendations for the Corps of Engineers' 2005 Fish Passage Plan.[7] Inspection of facilities should be increased to a minimum of three inspections per day. Turbine operations should be maintained within the 1% peak efficiency band during the fish migration season.

- Fish facilities should have full components of spare parts and backup systems, consistent with CRITFC and other fishery agencies recommendations to the Corps' 2005 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 (Appendix 2). Funding of these projects would individually and collectively increase juvenile and adult passage success and survival.
-

Juvenile Transportation

- "Spread the risk" operations are recommended for Snake River spring and summer migrants, where no more than 50% of the migration is transported. All fish diverted into screen bypass systems should be transported unless temperatures in holding facilities become too warm (i.e. exceed water quality standards).[8] Bouwes (2004) found that cessation of juvenile fall chinook transportation and providing a spring-like spill program in the summer produced large increases in adult returns over current federal transport operations.

[7] Formal CRITFC comments on the 2005 Corps' passage plan were submitted on January 14, 2005.
[8] Some fish will be bypassed back to the river as part of ongoing research projects.

2005 FCRPS Flow Operations

Despite the fact that target flows called for in the 2000 FCRPS Biological Opinion will not be met in 2005, the CRITFC ROP recommends that the federal operators reshape available runoff and reservoir storage to create a natural peaking (i.e., normative) flow regime.[9] This is considerably different than the double-peaked hydrograph that the federal operators are projecting to implement, similar to federal hydrograph management in 2001 (*see* Figure 1).

The ROP's flow scenario would best meet the migration and habitat requirements for anadromous fish. Available storage and runoff should be shaped to meet natural peaking, normative hydrographs at Priest Rapids, Lower Granite, The Dalles and other index points (Table 3 and Attachment 1). 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

Salmon and flow are positively related to increases in survival and productivity. This fact has been established in various forums worldwide including a 1994 independent scientific review under the Northwest Power and Conservation Council, Federal biological opinions, and recent analyses by the fishery agencies and tribes (Agencies and Tribes 2001; Marmorek et al. 2004; Connor et al. 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 2000 and 2004 FCRPS Biological Opinions continue the concept of "target flows" for salmon, where specific seasonal average flows are to be met at Lower Granite, Priest Rapids and McNary Dam. In reality, the target flows have not been. During the creation of the target flow concept, NMFS and the federal operators realized that the seasonal targets would not be met during the lowest series of water years, such as 2003 and 2001, and in other years. The 2005 March mid-month forecast ranks as the 5th lowest year of the last 76 years.

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

[9] The April 30th storage volume difference in ROP's altered flood control operation and the federal Water Management Plan's standard flood control operation is 1072 KaF, distributed between Mica, Arrow, Libby, Grand Coulee, Brownlee, and Dworshak projects.[9] The ROP applies this storage to both spring and summer salmon migrants through the creation of the natural river operation. If they proceed as planned, federal flood control drafts will likely result in a loss of storage that may impact spring flows and the ability to meet the April 10th refill requirement called for by the 2000 FCRPS Biological Opinion. For example, federal flood control operations already conducted a pre-season draft of more than 1 MaF at Libby by December 31st. Since the draft occurred before the first official water supply forecast in January, Libby is now struggling to reach its Upper Rule Curve. Also, drafts for power, in the disguise of flood control operations, puts all FCRPS projects at risk for meeting early spring elevation targets. As of March 23rd, 2005, Arrow was 36 feet below its April 30th flood control rule curve target elevation (a troubling observation of FCRPS operations, given the relatively favorable water supply forecast for the Upper Columbia), as was Libby (-30 feet), Hungry Horse (-10.5 feet), Dworshak (-26.3 feet), and Brownlee (-3.5). The loss of this storage may also reduce the ability to 1) meet the April 10th refill requirement and, 2) meet McNary spring target flows called for by the FCRPS 2000 Biological Opinion.

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 one million acre-feet (MaF) of water from the upper Snake for salmon flows. Again, this operation has yet to be realized.

The ROP's hydrograph generates peak flows that are well below flood stages in Portland and other locations [10] (Figures 1 and 2) and is better able to meet flow objectives (Table 3). Alternative flood control curves were modeled with GENESYS (Martin 2004). CRITFC's Prescribed Rule Curves values are listed in Table 4. Seven water years (1929-31, 1937, 1941, 1973, and 1977) are used in the modeling as their volumes average out to near the official 67.7 MaF forecast. Those years reflect a neutral-to-cold PDO and neutral-to-slight El Nino trend.

In the ROP, 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 2000 FCRPS Biological Opinion. Drafts include an additional 500 KaF from Non-Treaty Storage from BC Hydro projects, 250 KaF from Banks Lake, 250 KaF from Montana, and 237 KaF of Hells Canyon Complex storage. Additional storage from the Upper Snake (Figures 3 and 4) is available to help meeting minimum velocity equivalents through the Lower Snake and Lower Columbia rivers. The resultant summer flows would create better migration conditions by reducing both salmon travel time and mainstem river temperatures.

Specific Project Flow and Reservoir Management

- **Dworshak**. Refill of Dworshak Reservoir by the end of June is a high priority (Appendix 3). 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 mean sea level (msl) 1600 feet by June 30 for juvenile and adult summer migrants and temperature control. A draft to msl 1580 feet by July 31 may be needed to alleviate temperature problems in the lower Snake River that usually occur during summer. Dworshak should draft to msl 1520 feet by September 15. Neither CRITFC nor the Nez Perce Tribe supports any drafts down to 1500 feet. Such a draft would compromise refill for the next water year and expose tribal cultural resources to unlawful theft and vandalism.

- **Lower Granite Reservoir** should be drawn down to msl 723 feet from June 20 – August 31 to decrease juvenile and adult travel time and to increase the effectiveness of selective withdrawal of cool water from Dworshak for Lower Snake River temperature control. Juvenile bypass screens will be removed with the drawdown and only one unit operates

[10] The Corps defines flood stage as 550 kcfs and bank-full as 450 kcfs, as gauged at The Dalles Dam. The peak monthly flow in CRITFC's 2005 Plan with altered flood control rule curves is 210 kcfs at The Dalles, or 240 kcfs below bank-full. The Corps' QADJ procedure suggests a monthly June peak of 149 kcfs is likely in 2005 with federal operations. 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. The Corps has managed peak flows at The Dalles to ~360 kcfs in recent years, without Congressional authorization.

for station service. The rest of the river is spilled. Lower Granite should be gradually refilled by October 31 with most of the refill occurring in October.

- **Little Goose, Lower Monumental, and Ice Harbor** pools should be maintained at minimum operating pool during the fish passage season as required by the FCRPS Biological Opinion.

- **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 July and the first part of August, Brownlee should contribute an additional 237 KaF described in the 2004 Interim Settlement Agreement for the re-licensing of the Project. As also described in the Agreement, Idaho Power Company should pass through upper Snake water through the Hells Canyon Complex in July and August for salmon migrations in the Snake River.

- **Lake Roosevelt**. The ongoing drum gate work will drain the reservoir to msl 1255 feet for six weeks ending in mid-May. In order to limit impacts to spring flows at the peak of the spring salmon migration, reservoir refill should be limited to msl 1280 feet by June 30th (see: Appendix 3). Lake Roosevelt is drafted to msl 1270 feet by August 31 for summer flows. The reservoir should then be filled to msl 1275 feet by September 30 and 1283 feet by October 31. It is important that power peaking flows from Grand Coulee be limited during the Hanford Reach juvenile fall chinook susceptibility period for 3-6 week from mid-March to mid-May as determined by field monitoring. Thus, Grand Coulee should remain on Mid-Columbia Hourly Coordination for this period.

- **Banks Lake**. Storage of 260 KaF (a 10 foot draft at Banks Lake) should remain in Lake Roosevelt during July and first-half of August instead of being pumped into Banks Lake. This extra 5-foot draft over that called for by the 2004 FCRPS Biological Opinion will provide additional flow augmentation for salmon.

- **Canadian storage**. Storage should be released to fill out the natural runoff in mid- April through June to provide flows for spring migrants when inflows are passed through Lake Roosevelt and to refill Roosevelt after the drumgate work is concluded in mid-May. (Attachment 1). An extra 500 KaF from Canadian Non-Treaty storage over the 1 MaF called for by the FCRPS Biological Opinions should be allocated for summer Columbia River flows.

- **Montana VAR-Q Operations.** The CRITFC 2005 Plan recommends that modified VAR-Q operations be implemented at Libby and Hungry Horse without compensating drafts of Lake Roosevelt (Appendix 3). This action would hold storage in upper basin reservoirs for later anadromous fish migrations and reduce impacts to resident fish.

- **Libby**. Storage should be managed for sturgeon flows in late June and early July, downstream salmon migrations and resident fish needs by implementing modified VAR-Q operations. Libby fills within one-foot of full by late July (Appendix 3). Libby should be drafted to avoid drafting Dworshak, which has substantial temperature control

capacity in the lower Snake. CRITFC recommended operations leave the reservoir 5.9 feet from full by June 30, or 4.6 feet lower than FCRPS operations, but creates a smoother down-river summer flow regime. An extra 200 KaF (or 4% of April-September water supply forecast) should be drafted by August 31 to augment with lower Columbia flow augmentation.

- **Hungry Horse**. Storage should be managed for salmon flows and resident fish needs by implementing modified VAR-Q operations. CRITFC recommended operations leave the reservoir at full by June 30, or the same as the proposed federal FCRPS operations (Appendix 3). An extra 50 KaF (or 4% of April-September water supply forecast) should be drafted by August 31 to help with lower Columbia flow augmentation.

- **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) allow proper conduct of tribal treaty fisheries. Power peaking impacts are greater in low flow years than in average flow years.

- **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 and fish kills 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 – May 15). Fluctuations during this period should not exceed specified criterion during each 24-hour period in the CRITFC 2005 Hanford Stranding Operations Recommendations (Appendix 1). To accomplish these fluctuation reductions, all seven Mid-Columbia Projects should stay on Mid-Columbia Hourly Coordination during all of the early migration and susceptibility period. Grant PUD should fund evaluation efforts in the Hanford Reach and should cooperate with tribal and fishery agency 2005 Hanford Reach monitoring and evaluation efforts.

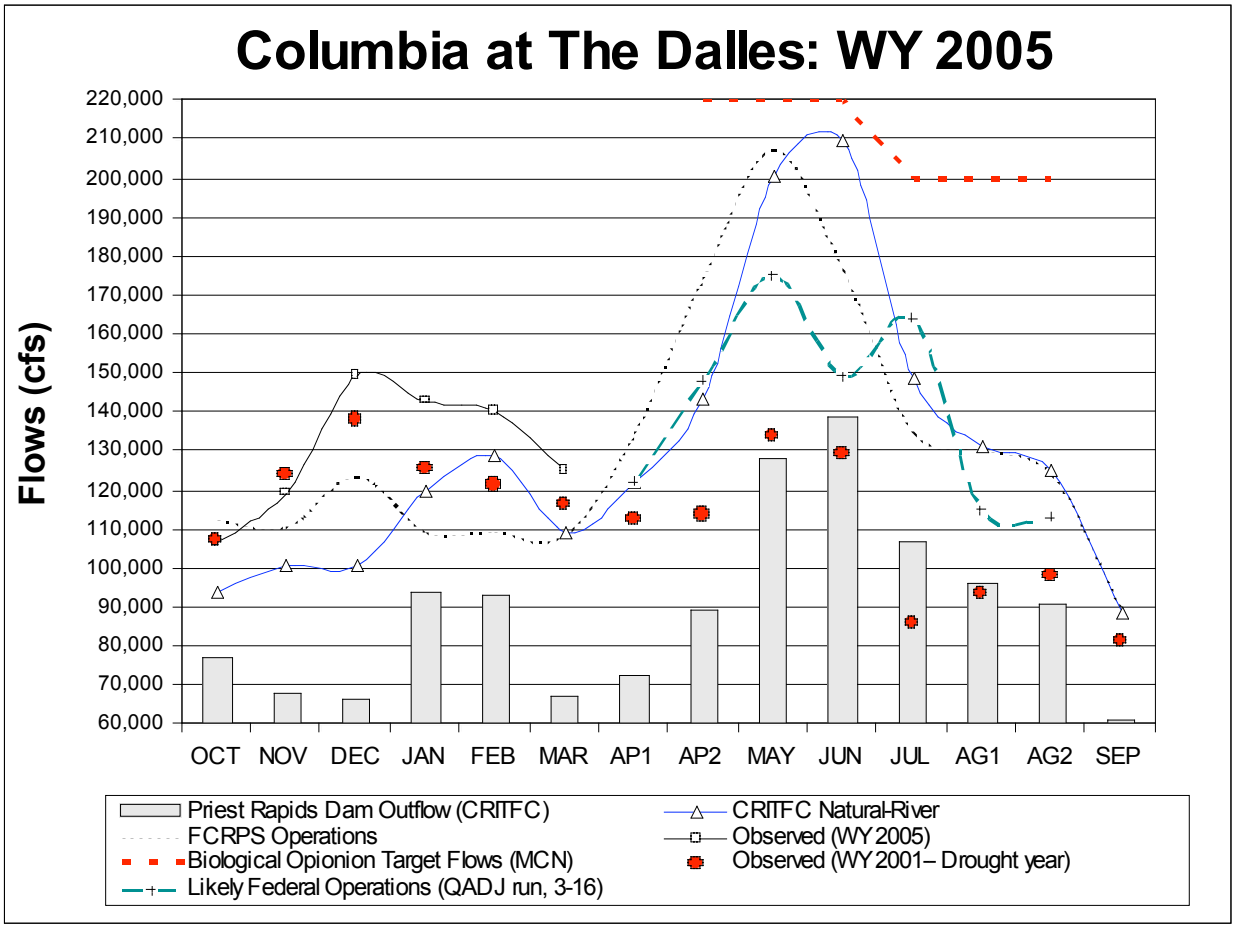


Figure 1. The 2005 CRITFC River Operations Plan hydrograph for the Columbia at The Dalles and Columbia at Priest Rapids as compared to FCRPS operations, as modeled in GENESYS. The "likely" Federal operation (dashed green line), as given by the Corps' QADJ procedure, is also shown. The 2000 Biological Opinion flat flow targets and observed river flows for WY 2005 (to date) and WY 2001 are plotted for reference.

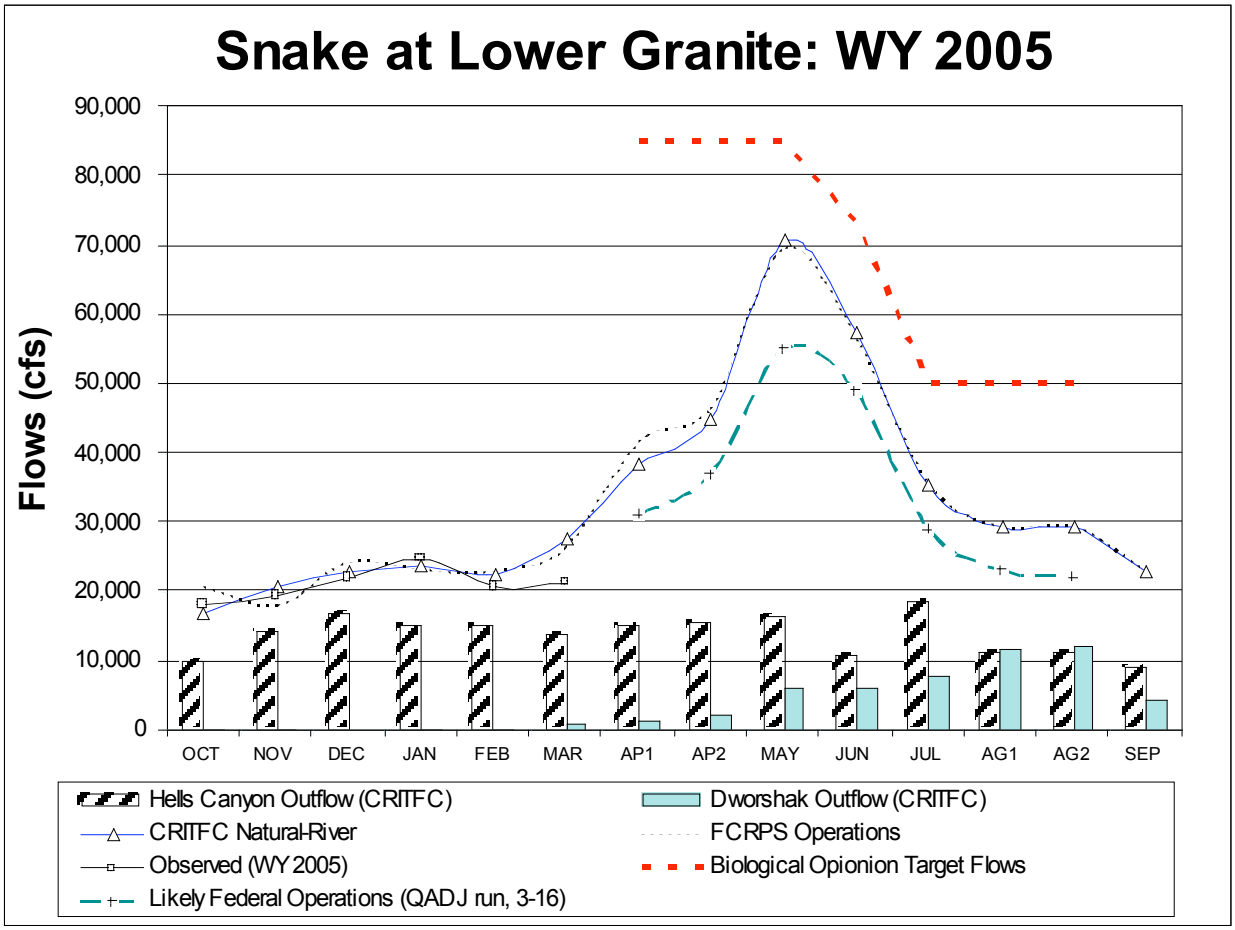


Figure 2. The 2005 CRITFC River Operations Plan hydrograph for the Snake River at Lower Granite as compared to FCRPS operations, as modeled in GENESYS. The historical years used for GENESYS modeling likely overestimate 2005 flows. The "likely" Federal operation (dashed green line), as given by the Corps' QADJ procedure, is also shown. The 2000 Biological Opinion flow targets and observed WY 2005 river flow are plotted for reference.

Bureau of Reclamation, Pacific Northwest Region
Major Storage Reservoirs in the Upper Snake River Basins

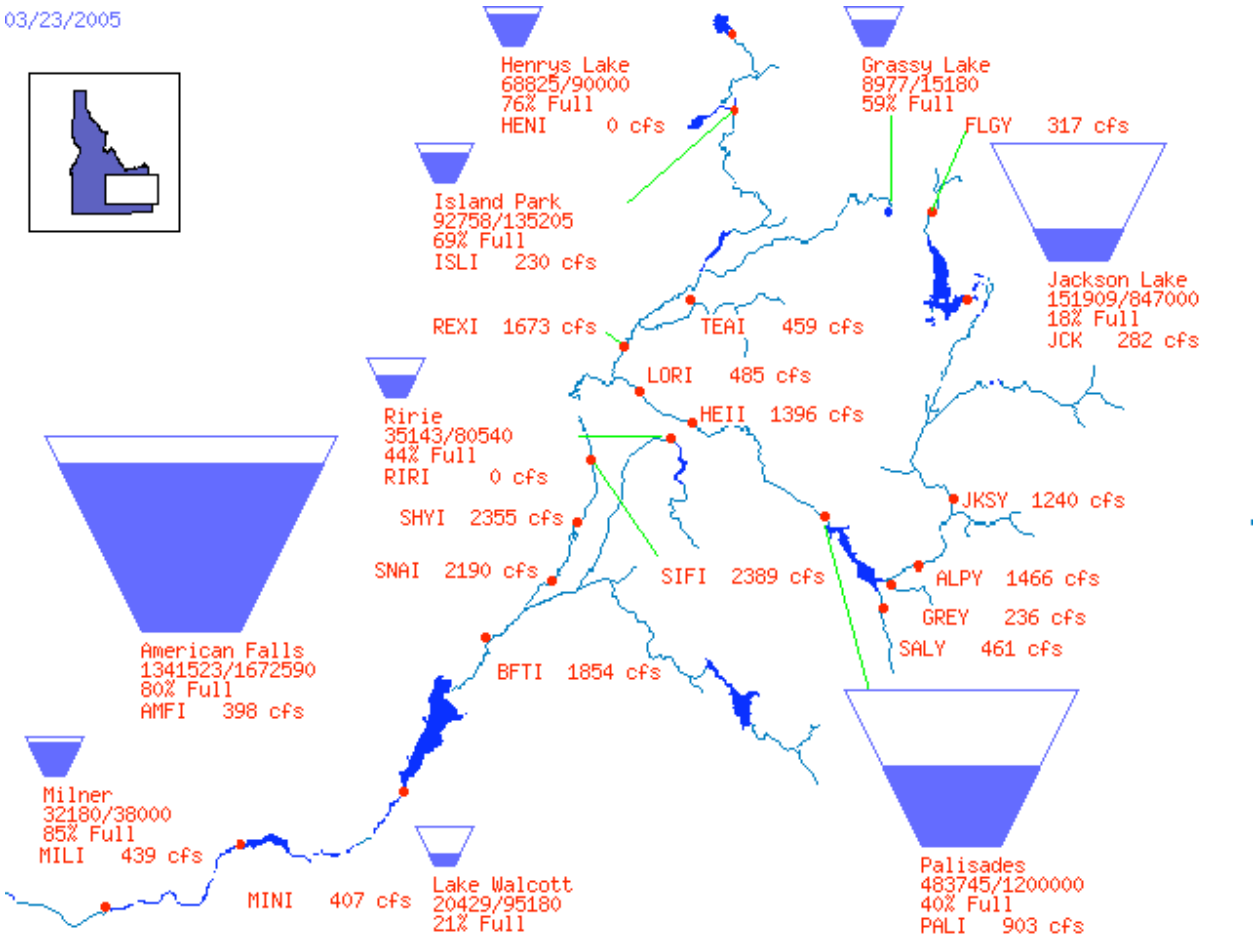


Figure 3. March 23, 2005 storage in the Bureau of Reclamation's Upper Snake Projects.

Bureau of Reclamation, Pacific Northwest Region
Major Storage Reservoirs in the Boise & Payette River Basins

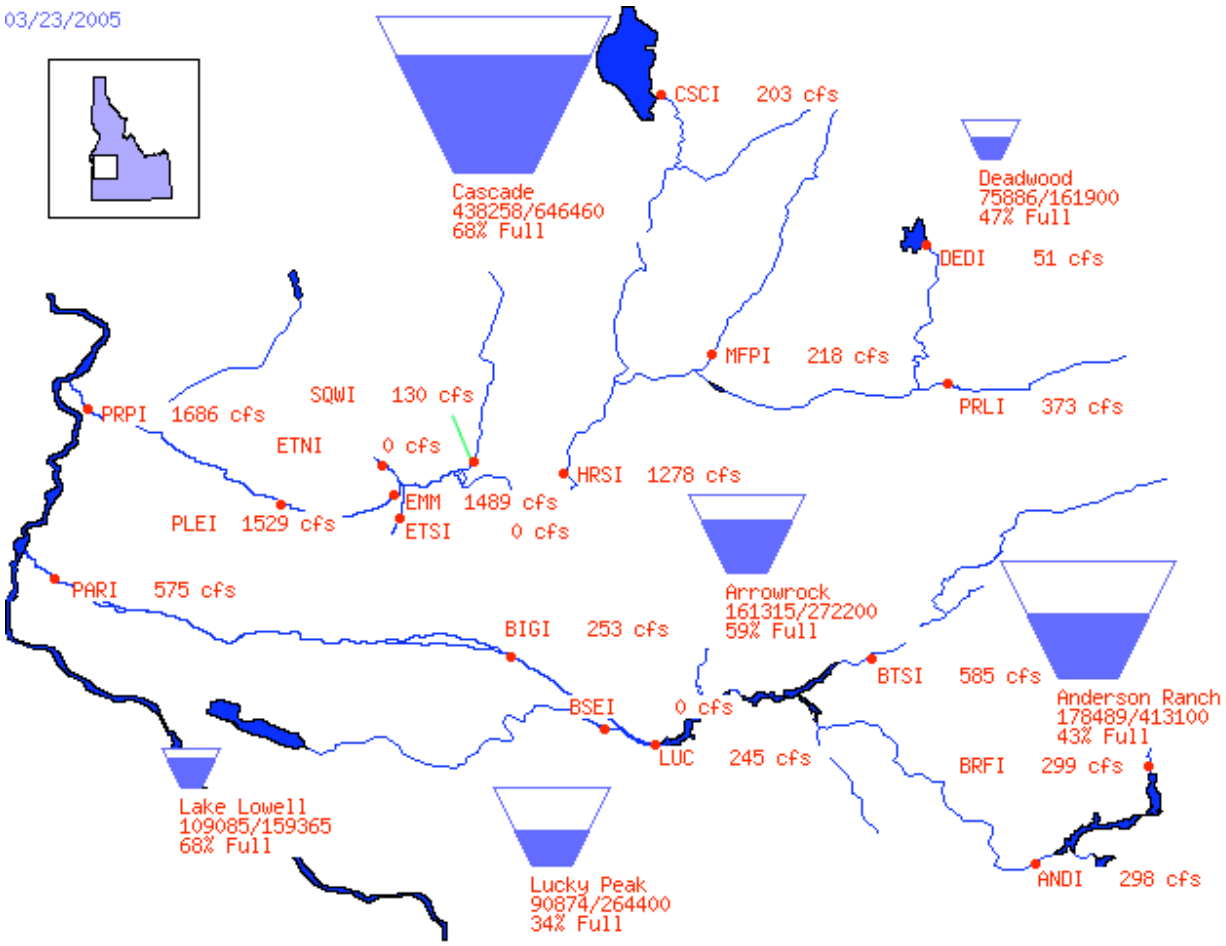


Figure 4. March 23, 2005 storage in the Bureau of Reclamation's Boise and Payette Projects.

WATER YEAR 2005 (average of 7 years: WY 1929-31, 1937, 1941, 1973, and 1977)

Spring (April 10 - June 30, Columbia):	CRITFC	Federal	Difference
Seasonal Flow (McNary), cfs	181,835	176,522	5,313
Seasonal Flow (Lower Granite), cfs	57,384	57,304	80
System Generation, MWa	11,682	13,239	-1,557

Summer (July 1 - August 31):	CRITFC	Federal	Difference
Seasonal Flow (McNary), cfs	133,348	126,291	7,057
Seasonal Flow (Lower Granite), cfs	35,828	35,734	94
System Generation, MWa	9,525	10,458	-933

August 31st pool elevations, feet:	CRITFC	Federal	Difference
Mica, BC	2453.3	2458.2	-5.0
Arrow, BC	1411.2	1411.2	0.0
Libby	2434.2	2439.0	-4.8
Hungry Horse	3537.7	3540.0	-2.3
Grand Coulee	1270.1	1278.0	-7.9
Brownlee	2059.0	2059.0	0.0
Dworshak	1535.1	1535.1	0.0

Snake Flow Augmentation (KaF):	427	427	0
Brownlee Flow Augmentation (KaF):	237	237	0
BC Non-Treaty Storage (KaF):	500	0	500
Banks Lake (KaF):	250	125	125
Montana (LIB 200 KaF, HGH 50 KaF):	250	0	250

SPILL OPERATIONS

Spring Spill (cfs)		CRITFC Plan			Federal Plan		Difference
(April 3 - June 20):	Bypass	Forced	Total Spill	Bypass	Forced	Total Spill	
Lower Snake (avg.)	36,780	0	36,780	0	0	0	36,780
(April 10 - June 30):							
Lower Columbia (avg.)	71,817	14,219	86,036	45,252	12,764	58,015	28,021

Summer Spill (cfs)		CRITFC Plan			Federal Plan		Difference
(June 21 - August 31):	Bypass	Forced	Total Spill	Bypass	Forced	Total Spill	
Lower Snake (avg.)	20,224	0	20,224	0	0	0	20,224
(July 1 - August 31):							
Lower Columbia (avg.)	71,652	463	72,115	46,307	59	46,365	25,749

Table 3. Summary of GENESYS modeled flow, elevation, and spill for the CRITFC River Operations Plan vs. expected Federal (Biological Opinion) Operations. Seven water years approximating 2005 runoff conditions were selected from the historical record to forecast flows.

SYSTEM FLOOD CONTROL (GENESYS model)

WATER YEAR 2005 (average of 7 water years, WY 1929-31, 1937, 1941, 1973, and 1977)

	Spring Operations				
CRITFC	PRC--Prescribed Rule Curve				
Elev. (msl ft)	Mica, BC	Arrow, BC	Grand Coulee	Brownlee	Dworshak
April 15th	2398.6	1407.9	1254.1	2077.0	1570.3
April 30th	2398.9	1405.0	1255.0	2077.0	1581.9
May 31st	2408.9	1400.0	1263.0	2069.0	1599.9
June 30th	2428.2	1398.4	1280.0	2077.0	1600.0
Federal	Flood Control Elevations				
Elev. (msl ft)	Mica, BC	Arrow, BC	Grand Coulee	Brownlee	Dworshak
April 15th	2395.5	1408.5	1253.8	2077.0	1565.1
April 30th	2393.1	1400.6	1255.0	2077.0	1575.1
May 31st	2403.6	1391.6	1263.0	2069.0	1597.7
June 30th	2428.2	1397.2	1290.0	2077.0	1600.0

	Summer Operations				
CRITFC	PRC--Prescribed Rule Curve				
Elev. (msl ft)	Mica, BC	Arrow, BC	Grand Coulee	Brownlee	Dworshak
July 31st	2451.8	1419.6	1270.1	2059.0	1580.0
August 15th	2456.5	1419.8	1270.1	2059.0	1560.0
August 31st	2457.1	1417.7	1270.1	2059.0	1535.1
September 30th	2455.3	1418.0	1275.0	2059.0	1520.0
Federal	Biological Opinion Elevations				
Elev. (msl ft)	Mica, BC	Arrow, BC	Grand Coulee	Brownlee	Dworshak
July 31st	2453.4	1419.6	1285.0	2059.0	1580.0
August 15th	2460.2	1419.8	1280.0	2059.0	1560.0
August 31st	2461.8	1417.7	1278.0	2059.0	1535.1
September 30th	2460.3	1418.0	1282.7	2059.0	1520.0

Table 4. Recommended Modified Flood Control Rule Curves, as modeled in GENESYS.

2005 Spill Program for the Columbia Basin

Under the terms of the 2000 Biological Opinion, with the low 2005 projected flows, no spring or summer spill is required at three of the four Snake River dams. In contrast the 2005 River Operations Plan recommends a program to provide 24-hour spill at all Corps dams in spring and summer in order to significantly increase overall passage success and survival for the 2005 juvenile and adult migrants. This includes protection of Pacific lamprey. Lamprey passage through screen bypass systems has been problematic, with significant numbers of lamprey being observed to be impinged on screen bars (Morsund et al. 2002). Spill has been demonstrated to be the most effective and safest means of juvenile project passage (Fishery Managers 1994; FPAC 2003; Whitney et al. 1998; 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.

Principal features of this spill program include:

- Provision for spring and summer spill at Snake River and McNary dams. The current 2000 and 2004 FCRPS Biological Opinions do not require summer spill, despite the lack of scientific evidence that indicates transporting summer migrants would be advantageous compared to spilling migrants over dams.[11] 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.

- Extension of spill season. The Plan also recommends that the spill season be extended in duration over that offered in the 2000 FCRPS Biological Opinion. Because mainstem river temperatures have been 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).[12] Spill should begin at mainstem dams about 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

[11] Recent analysis entitled: *Review of the Bonneville Power Administration's analysis of the biological impacts of alternative summer spill operations* (Bouwes 2005), indicates that ceasing transportation and employment of a spring season spill regime in the summer could result in increasing adult returns from 44,000-139,000 salmon.

[12] 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.

migrating juvenile salmon and to reduce powerhouse injuries to adult steelhead and fall chinook that fall back at dams. Recent analysis by the Fish Passage Center indicates that a significant number of ESA- listed fish, including Clearwater fall chinook and unlisted fish, migrate through the hydro-system in September (FPC 2003).

- Real- time spill ramping impacting fish passage goals. During the 2002-4 spill seasons, spill levels were ramped up and down depending on the TDG readings from monitoring sites below dams. Atmospheric conditions, combined with temperature greatly influence the accuracy of TDG monitoring sites. Depending on 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 continued for several hours. Thus, spill volumes required in the 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 established a protocol to address ramping down spill when the monitoring sites are above the standard, however, a protocol for the real-time expedited ramping up spill when the monitoring sites are under the gas waiver and the spill level is lower than intended in the 2000 FCRPS Biological Opinion has not been completed. The Corps should install the capacity to resolve this issue at all FCRPS dams by implementing project operational measures in the 2005 Fish Passage Plan and ensure that all dam operators closely follow the measures.

Priorities:

Refer to Table 5 for the details of project spill operations. All proposed operations conform to existing total dissolved gas constraints.

Bonneville (BON). Spill is very effective and efficient at Bonneville. Past survival studies indicate that 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 to the 120 kcfs until an additional fallback and potential delay of adults can be evaluated to determine if daytime spill to the cap is warranted. Fallback information for 2000 and 2002 showed little difference between fallback within 24 hours of exiting the adult ladder under low (75 kcfs) and gas cap spill. A 2002 balloon tag study showed higher survival and lower mortality under the higher spill rates at Bonneville (Normadeu, 2002 the final draft is still under review). Nighttime spill would set at ~150 kcfs or Gas Cap. 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.

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. In 2002 project survival decreased significantly. This subjects more juveniles to turbine passage. The ROP 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 is provision of 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 may in part, create poor conditions at the screened bypass outfall, which in 2002, may have led to lower survival. (Beeman and Counnihan 2002) Furthermore project operations of the turbine units were shown to be different than that outlined in the Corps Fish Passage Plan (FPP). Hydraulic studies indicated a marked improvement in tailrace conditions at the outfall when turbine priority was followed as outlined in the FPP. 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.

McNary (MCN). McNary is the only Lower Columbia dam that is not scheduled by the 2000 BiOp to have voluntary spill 24 hours a day in either spring or summer. The ROP's recommended hydrograph will create some involuntary spill at McNary as the powerhouse is hydraulically limited to flows up to about 140 kcfs. However, there is regional discussion of eliminating the 1% turbine operating range at this project which would further reduce any amount of involuntary spill. 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. Juvenile survival rates for spill range from 94-97%; screen system passage survival ranges from 85-90%; and turbine survival ranges from 67-74% (Perry et al. 2004). Based upon this data, additional spill is needed at this project to

increase salmon survival. Thus, to spread-the-risk [13] and encourage better tailrace egress conditions to avoid predators and delay, the ROP recommends that the Corps provide daytime spill at a level commensurate with the current nighttime Biological Opinion spill operation and provision for 24 hour summer spill.

Ice Harbor (IHR). For 2005, CRITFC recommends a comprehensive study to evaluate RSW 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 and 2003) It appears that high spill volumes in low tail water and low flow conditions do not provide optimal passage for juveniles. Whether this problem is due to mechanical/hydraulic conditions at the spillway, poor egress from the tailrace, which increases predation, 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.

Lower Monumental (LMN). Under the 2000 FCRPS Biological Opinion, the Corps will not provide spring or summer spill. 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. Further, NMFS has suggested an operational change in the spill program at Lower Monumental. The 2000 FCRPS Biological Opinion indicated a 24-hour spill to gas cap operation. The proposed federal 2005 spill operation is one based on spill rates of approximately 50% of the instantaneous flow in order to reduce tailrace eddies. Whether or not this change would be beneficial for salmon has not been reviewed and CRITFC recommends a carefully structured evaluation before spill is modified. Survival and passage data from other projects, such as Priest Rapids, indicate that salmon migration timing and survival has not been reduced from large eddy conditions in tailraces. For summer, we recommend spread-the-risk for summer migrants at this project through comparative survival studies. We recommend spill of all flow except one turbine unit needed for station service for adult passage and other needs.

Little Goose (LGS). Under the 2000 FCRPS Biological Opinion, the Corps will not provide spring 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

[13] 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.

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 and spill of all flow except one turbine unit needed for station service for adult passage and other needs.

Lower Granite (LWG). Under the 2000 FCRPS Biological Opinion, the Corps will not provide spring or summer spill, except for possible RSW tests. For 2005, 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 spring 2005 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. For summer, CRITFC recommends a 10 foot drawdown of Lower Granite pool, remove turbine screens to avoid gatewell trapping of juvenile salmon and spill all flow except one turbine unit needed for station service for adult passage and other needs.

Wanapum. Spill should be provided as specified by the 2000 Spill Memorandum of Agreement (MOA) between Grant PUD and the Joint Fishery Parties, as modified by mutually agreeable research. 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 as modified by mutual agreement for research. 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 5. 2005 River Operations Plan Spill Program

Project	Biological Opinion Spring Spill	CRITFC Spring Spill	Biological Opinion Summer Spill	CRITFC Summer Spill
BON				
Day	75 kcfs	120 kcfs	75 kcfs	120 kcfs
Night	120-150 kcfs (Cap)	120-150 kcfs (TDG Cap)	120-150 kcfs (TDG Cap)	120-150 kcfs (TDG Cap)
TDA				
Day	40% of flow	50% of flow	40% of flow	45% of flow
Night	40% of flow	50% of flow	40% of flow	45% of flow
JDA				
Day	0	30% of flow	30% of flow	45% of flow
Night	60% flow or max 180	45% vs. 60% (BiOp)	30% of flow	45% of flow
MCN				
Day	0	50% of flow	0	50% of flow
Night	TDG Cap	TDG Cap	0	50% of flow
IHR				
Day	45 kcfs	45 kcfs	20 kcfs	River flow other than one unit station service
Night	100 kcfs	~50% flow vs. 100 kcfs	20 kcfs	River flow other than one unit station service
LMN				
Day	0	40 kcfs (TDG Cap) vs. ~50% of flow	0	River flow other than one unit station service
Night	0	40 kcfs (TDG Cap) vs. ~50% of flow	0	River flow other than one unit station service
LGS				
Day	0	45 kcfs (TDG Cap)	0	River flow other than one unit station service
Night	0	45 kcfs (TDG Cap)	0	River flow other than one unit station service
LWG				
Day	0	22 kcfs vs. 60 kcfs	0	River flow other than one unit station service
Night	0	22 kcfs vs. 60 kcfs	0	River flow other than one unit station service

References

Agencies and Tribes (CRITFC, USFWS, WDFW, IDFG, Nez Perce). 2001. April 20, 2001 letter in Response to April 5, 2001 Northwest Power Planning and Conservation Council Recommendations on 2001 Federal Columbia River Power System Operations and Fish Survival. Portland, Oregon.

Beeman, J., and T. Counihan. 2001. Survival estimates of migrant juvenile salmonids in the Columbia River from John Day Dam Through Bonneville using Radio-Telemetry, 2001. USGS Western Fisheries Research Center, Columbia River Research Laboratory. Cook WA.

Beeman, J. and T. Counihan et al. 2001. Summary of Juvenile Salmonid FPE, Survival and tailrace egress based on radio telemetry at John Day Dam in Spring 2002. AFEP Presentation. USGS Western Fisheries Research Center, Columbia River Research Laboratory. Cook WA.

Bouwes, N. 2004. Review of the Bonneville Power Administration's analysis of the biological impacts of alternative summer spill operations. Report to the Columbia Basin Fish and Wildlife Authority. Portland, Oregon.

Bouwes, N., C. Petrosky, H. Schaller, P. Wilson, E. Weber, S. Scott and R. Boyce. 2002. Comparative survival study (CSS) of PIT Tagged Spring/Summer Chinook. Status Report for Migration Years 1997-2000. Mark/Recapture Activities. Contract #8712702 to Bonneville Power Administration. By Columbia Basin Fishery Agencies and Tribes. Fish Passage Center. Portland, Oregon.

Budy, P., G.P. Thiede, N. Bouwes, C.E. Petrosky and H. Schaller. 2002. Evidence linking delayed mortality of Snake River salmon to their earlier hydrosystem experience. North American Journal of Fisheries Management. 22:35-51.

Bunn, S.E. and A.H. Arthington. 2002. Basic Principles and Ecological Consequences of Altered Flow Regimes for Aquatic Biodiversity. Environmental Management, v. 30 (4), pp. 492-507.

Connor, W.P., R. Kirk Steinhorst and H.L. Burge. 2003. Migration behavior and seaward movement of wild subyearling fall chinook salmon in the Snake River. North American Journal of Fisheries Management 23:414-430.

Dawley, D.M., R.D. Ledgerwood, L.G. Gilbreath and P.J. Bentley. 1996. Relative survival of subyearling chinook that have passed Bonneville Dam via the spillway, first or second powerhouse bypass system or turbines or tailrace. Draft Report. Indirect survival studies. Adult recoveries of indirect survival studies. Direct measure survival studies. NMFS. Seattle, WA.

Deriso, R B., D. Marmorek and I. Parnell. 2001. Retrospective patterns of differential mortality and common year-effects experienced by spring and summer chinook salmon (*Oncorhynchus tshawytscha*) of the Columbia River. Can. J. Fish. Aquat. Sci. 58:2919-2430.

Deriso, R.B., D.R.Marmorek and I.J. Parnell. 1996. Retrospective Analysis of Passage Mortality of Spring Chinook of the Columbia River. Chapter 56 *in* Marmorek et al. 1996. Plan for Analyzing and Testing Hypotheses (PATH): Final report on retrospective analyses for fiscal year 1996. Compiled and edited by ESSA Technologies, Ltd. Vancouver, B.C.

English, K.K., C. Sliwinski, B. Nass, and J.R. Stevenson. 2003. Assessment of adult steelhead migration through the Mid-Columbia River using radio-telemetry techniques, 2001-2002. Draft report to Mid-Columbia Public Utility Districts. LGL Limited. Sidney, B.C.

Eppard, B. 2002. Ice Harbor Dam Spillway Survival Migrational Characteristics of Juvenile Chinook Salmon Trough McNary Dam (AFEP Presentation). Fish Ecology Division Northwest Fisheries Science Center National Marine Fisheries Service. Seattle WA.

Evans, A. 2002. Steelhead (*Oncorhynchus mykiss*) kelt outmigration from Lower Granite Dam to Bonneville Dam: abundance, downstream conversion rates, routes of passage and travel times. Contract No. DACW68-01-0016 to Corps of Engineers. Columbia River Inter-Tribal Fish Commission. Portland, Oregon.

Evans, A., and R. Beaty. 2001. Identification and enumeration of Steelhead (*Oncorhynchus mykiss*) kelts in the juvenile collection systems of Lower Granite and Little Goose dams, 2000. Contract No. DACW68-00R--0016 to Corps of Engineers. Columbia River Inter-Tribal Fish Commission. Portland, Oregon.

FPC (Fish Passage Center). 2002. Annual Report of the Fish Passage Center- 2001. Portland, Oregon.

Fishery Managers (Columbia River Inter-Tribal Fish Commission, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife). 1994. Scientific Rationale for Implementing a Spring and Summer spill program to increase juvenile salmonid survival in the Snake and Columbia Rivers. CRITFC. Portland, Oregon.

Gilbreath, L.G., E.M. Dawley, R.D. Ledgerwood, P.J. Bentley and S.J. Grabowski. 1993. Relative survival of subyearling chinook salmon that have passed Bonneville Dam via the spillway or second powerhouse turbines or bypass system: Adult recoveries

through 1991. Coastal Zone and Estuarine Services Division. NMFS. Seattle, Washington.

Heede, B.H. and J.N. Rinne. 1990. Hydrodynamic and fluvial morphologic processes: implications for fisheries management and research. North American Journal of Fisheries Management. 10:249-268.

Hamlet, A. F. and D. P. Lettenmaier. 2004. One-year Lead Time Experimental Streamflow Forecasts for the Columbia River at The Dalles. Climate Impacts Group, University of Washington, Seattle, Washington. (http://www.ce.washington.edu/~hamleaf/DallesForecast.html)

Hoffarth, P. 2005. Historical estimates of fall chinook fry emergence into the Hanford Reach. Unpublished data. Washington Department of Fisheries. Kennewick, WA.

Hoffarth, P. District Fisheries Biologist. Washington Department of Fish and Wildlife. Kennewick, WA. February 20, 2003. Personal communication.

Hyatt, K. Fishery Scientist, Department of Fisheries and Oceans, Canada. February 13, 2003. Personal communication.

ISAB (Independent Scientific Advisory Board) 1998. Recommendations for stable flows in the Hanford Reach during the time when juvenile fall chinook are present each spring. August 3, 1998 Memorandum from the Independent Scientific Advisory Board to J. Etchart, Chair. Northwest Power and Conservation Council. Portland, Oregon.

ISG (Independent Science Group). 1996. *Return to the River.* Restoration of Salmonid Fish in the Columbia River ecosystem. Northwest Power and Conservation Council. Portland, Oregon. (http://www.nwcouncil.org/library/return/2000-12.htm)

Martin, K. 2002. Water Supply Forecast Correction Curves. Presentation to the Oregon Chapter of the American Meteorological Society. Portland, Oregon. (http://www.critfc.org/tech/03-forecast_report.html)

Martin, K. 2004. Altered Flood Control, Climate Change, and Rebuilding Pacific Northwest Salmon Stocks. Presented at CRITFC's Regional Flood Control Workshop. Columbia River Inter-Tribal Fish Commission, Portland, Oregon. (http://www.critfc.org/text/nat_riv.html)

Nez Perce, Yakama, Umatilla and Warm Springs Tribes. 1995. *Wy-Kan-Ush-Mi Wa-Kish-Wit: Spirit of the Salmon.* The Anadromous Fish Recovery Plan of the Tribes. Vol. I. CRITFC, Portland, Oregon.

NPCC (Northwest Power and Conservation Council). 1999. Report and recommendations of the NPCC upon Review of the Corps of Engineers' Columbia River Fish Mitigation Program. Report 99-5. Portland, Oregon.

Oosterhout, G. 2005. Third Declaration. Civ. No. CV 01-00640-RE. District Court of Oregon.

Perry, R.W. and six co-authors. 2004. Survival and migration behavior of juvenile salmonids at McNary Dam, 2004. *In:* Army Corps of Engineers 2004 Anadromous Fish Evaluation Program. November 15-18, 2004. Portland, Oregon.

Reclamation (US Bureau of Reclamation). 2005. Draft Biological Assessment for Bureau of Reclamation Operations and Maintenance in the Snake River Basin above Brownlee Reservoir. Boise, Idaho.

Wilson, P.H. 2003. Using population projection matrices to evaluate recovery strategies for Snake River spring and summer chinook salmon. Conservation Biology 17:782-794.

Yuen, H. and R.Sharma. 2004 (in review). Using simulation techniques to estimate management parameters on Snake River steelhead: declines in productivity make rebuilding difficult. U.S. Fish and Wildlife Service and Columbia River Inter-Tribal Fish Commission. Vancouver Washington and Portland, Oregon.

Appendix 1

2005 Hanford Protection Operations to Reduce Juvenile Hanford Reach Fall Chinook Entrapment/Stranding and Mortality

Power peaking causing flow fluctuations from federal and FERC licensed dams in the mid-Columbia River can be extreme (Figure 1), 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 1). 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 previous 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 NPCC's Independent Scientific Advisory Board (ISAB 1998). In the CRITFC tribes' *Wy-Kan-Ush-Mi Wa-Kish-Wit* (Spirit of the Salmon) restoration plan, fluctuation of no more than 10 % of the previous day's average flow in the Reach is 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 [14] 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.[15] 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.

[14] "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.

[15] 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 five years susceptibility data (Figure 2), 2) additional information supplied by the USFWS on dewatered areas below Priest Rapids Dam, 4) final results from the ADFG/CRITFC evaluation of entrapment during the 2003 Hanford fall Chinook emigration, and, 3) taking into account likely 2005 Hanford Reach flow regimes from 50-170 kcfs, we recommend the specific operations provided below. These are offered to reduce stranding impacts on Hanford Bright fall chinook, ESA-listed steelhead and Pacific Lamprey. In order to achieve the recommended flow bands: 1) 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, 2) all seven mid-Columbia hydro-project should stay on Mid-Columbia Hourly Coordination during all of the fall chinook susceptibility period (roughly the third week of March to third week in May to early June). 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 may be implemented by Grant PUD and WDFW using similar methods and effort as in 2003. The USGS may continue studying behavioral aspects of stranding in conjunction with these efforts.

The following are CRITFC's recommendations for 2005 operational constraints for flow releases below Priest Rapids Dam to reduce mortality of emerging and rearing juvenile fall chinook in the Hanford Reach. In 2004, an unusually large escapement of adult chinook has created an estimated 15-45 million fry into the Reach (Hoffarth 2005). It is critical that the following criteria be implemented by the federal and Mid-Columbia PUD operators to protect this significant productivity.

2005 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 [16] 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 floodplain terraces. 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.

[16] The seven 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 1999-2003 show that in general stranding and entrapment 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 2 below indicates that the range of juvenile chinook susceptibility based upon abundance and fork length is about 8 weeks.

.

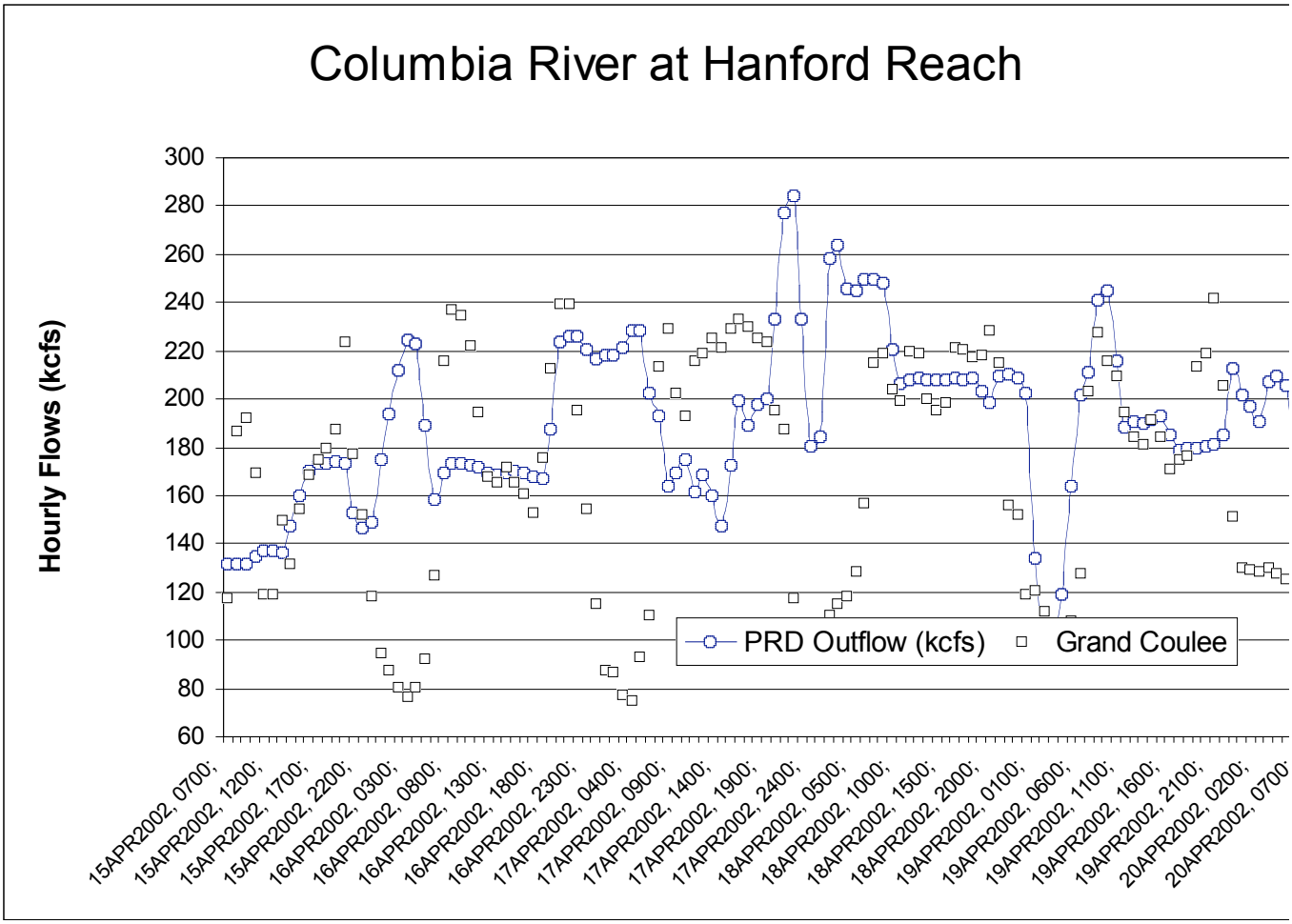


Figure 1. Hourly flows in the Hanford Reach during the 2002 juvenile fall chinook out-migration.

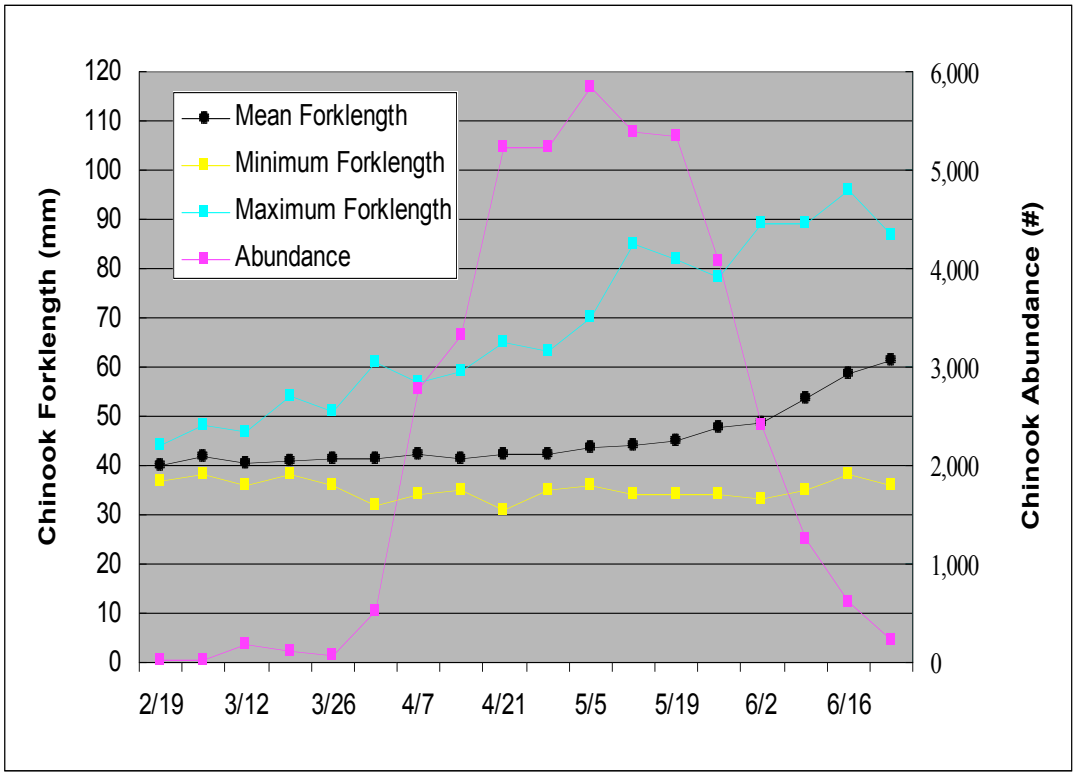


Figure 2. Juvenile fall chinook abundance and size in nearshore areas of the Hanford Reach, February 19 – June 23, 2003

Table 1. 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

Appendix 2

2005 Fish Facility Mitigation Projects

The following are outstanding issues regarding specific improvements needed at dam fish passage facilities, consistent with CRITFC's comments on the Corps' 2005 Annual Fish Passage Plan.

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. The system was installed in 2003. Monitoring and evaluation of the new system should be conducted before fish passage season on April 10 and at timely intervals throughout the entire spring and summer passage season. This work should be coordinated closely with the tribes and agencies through the District's operations and maintenance subgroup.

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 the entire Basin's returning adults, thus, expedient repairs are critical.

7) Adult lamprey passage. Currently the Corps is spending about 0.2 % of the Columbia River Juvenile Fish Program on lamprey passage. Lamprey are an extremely important resource for tribes and have been petitioned for ESA listing. Passage studies indicate that only about 50% of tagged adult lamprey successfully pass Bonneville Dam and few if any reached McNary Dam. The Corps should fund a comprehensive lamprey passage program at all Corps' dams, consistent with regional lamprey restoration efforts.

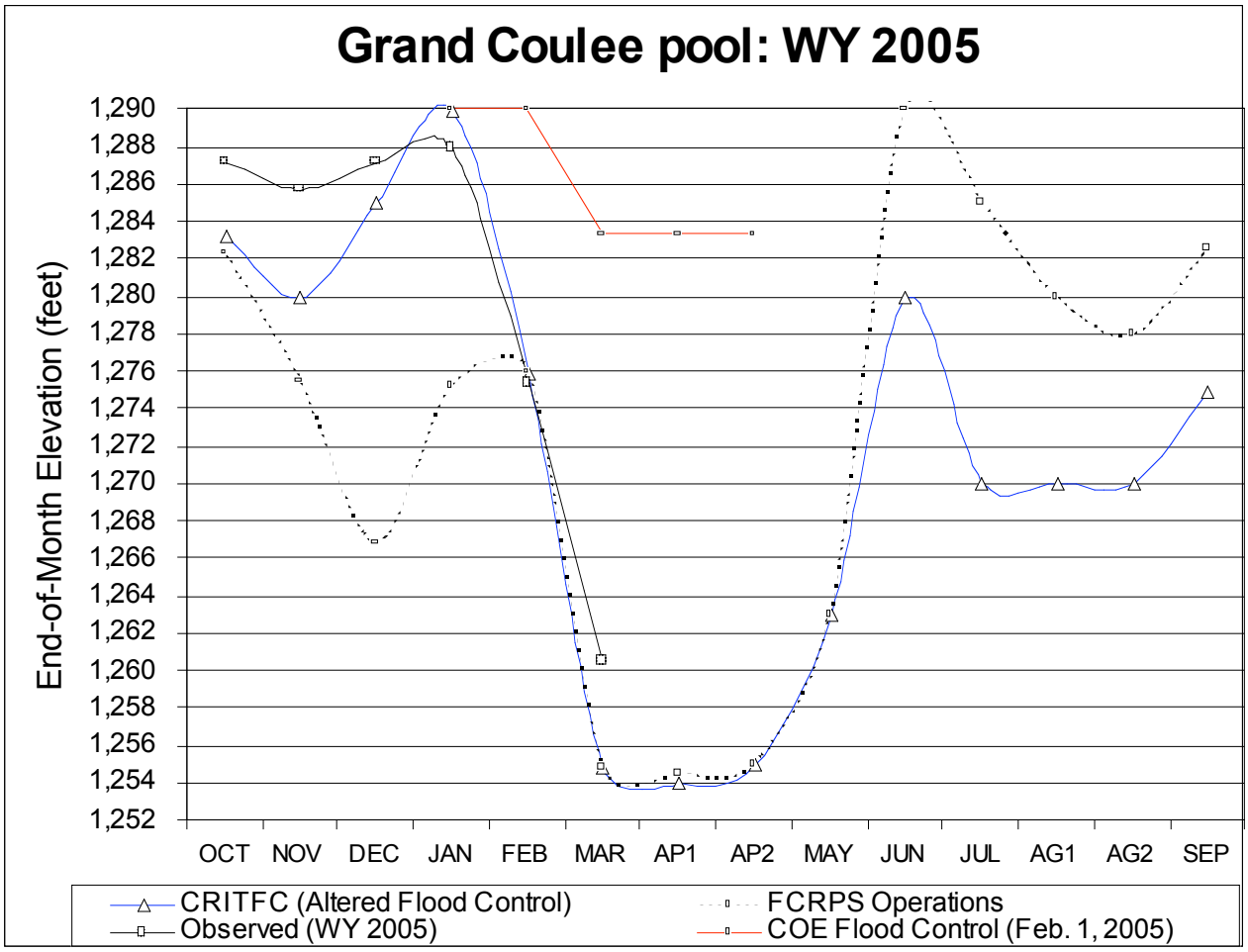
8) McNary Dam Fishway Pumps. Currently only two pumps for the McNary auxillary water at the fishway work, and one of these pumps is in poor condition. The Corps should bring a spare pump on line and plan to repair on line pumps as soon as possible.

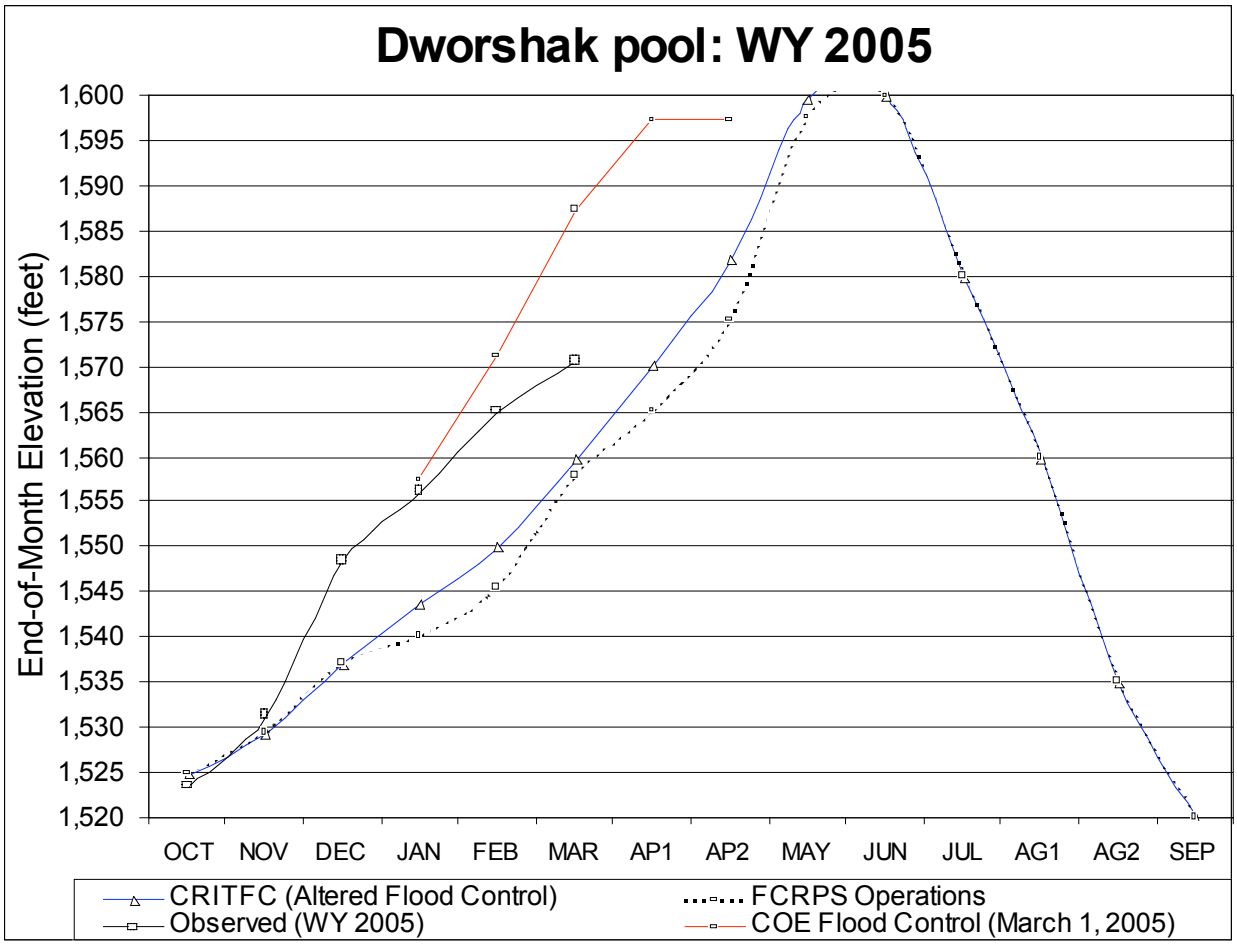
9) The Dalles spill gates. Currently several spillway tainter gate cables are broken and need repair, or the gates cannot be opened for fish spill patterns. The Corps should replace these cables immediately.

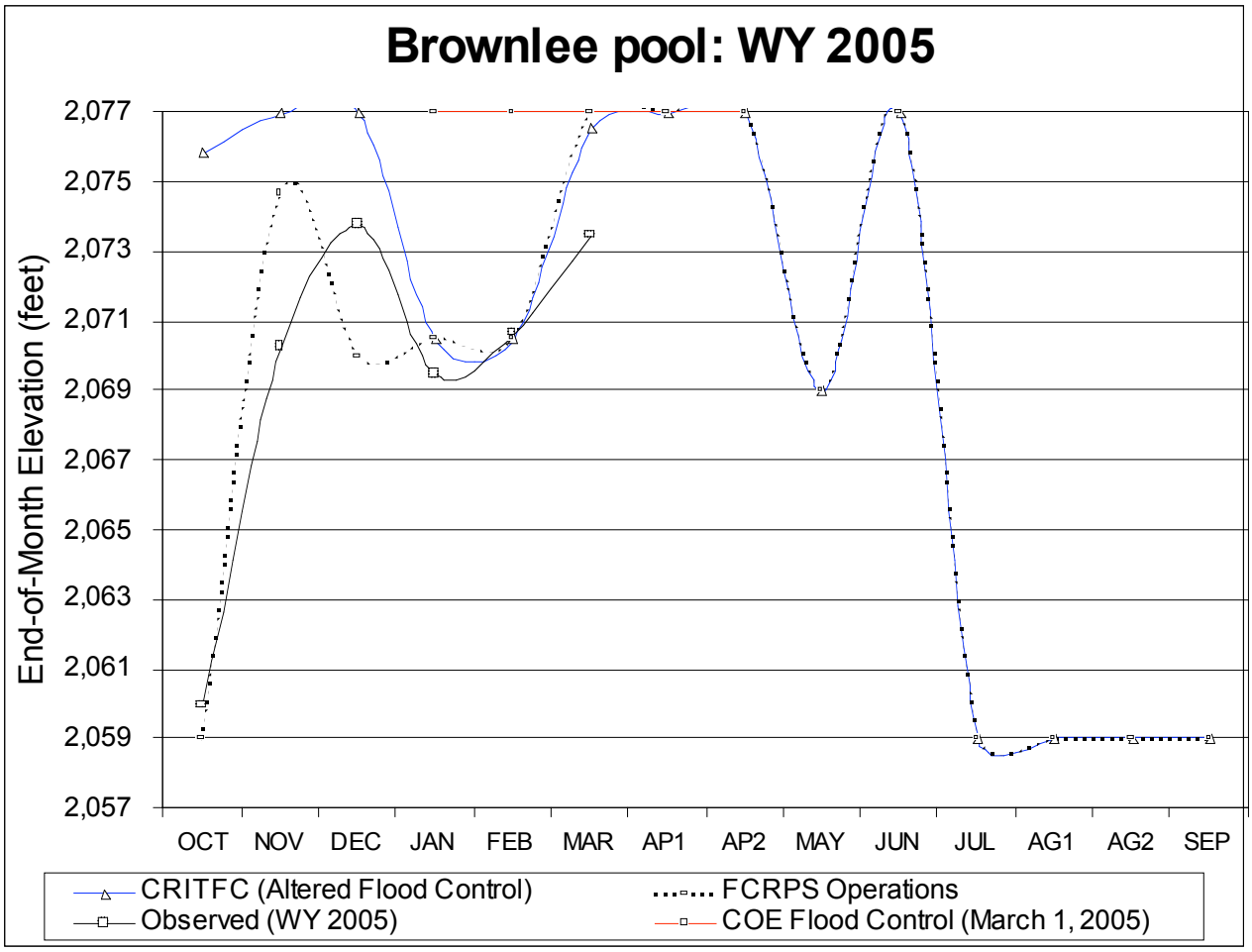
10) Lower Granite Dam gantry crane. The existing crane is damaged and needs immediate repair or replacement. Without the crane, damaged or defective screens for the bypass system cannot be removed and repaired.

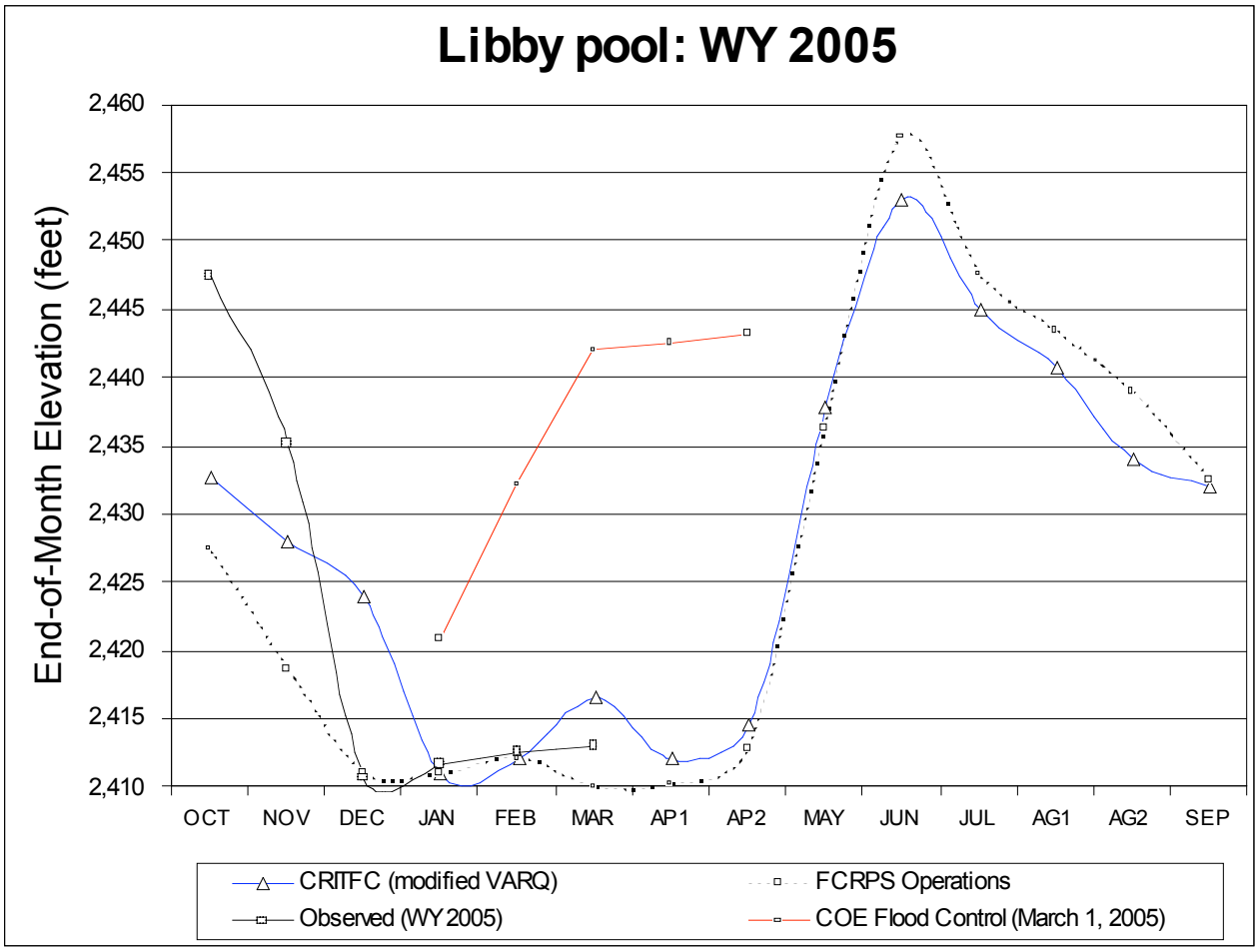
11) Bonneville Dam. Full flow pit-tag detector. The full flow detector should be installed as quickly as possible to allow identification of tagged fish through larger passage system areas.

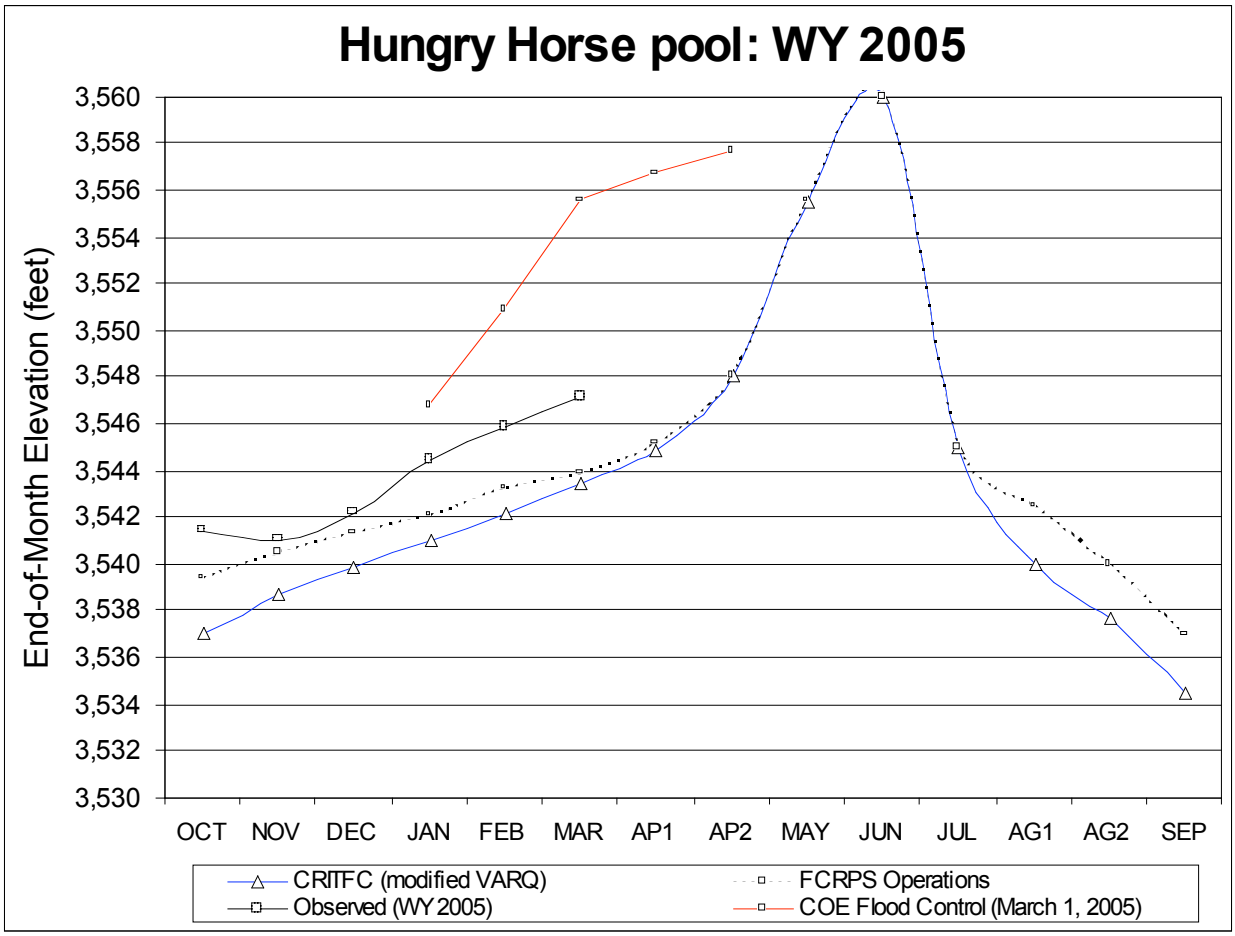
Appendix 3—GENESYS modeled pool elevations

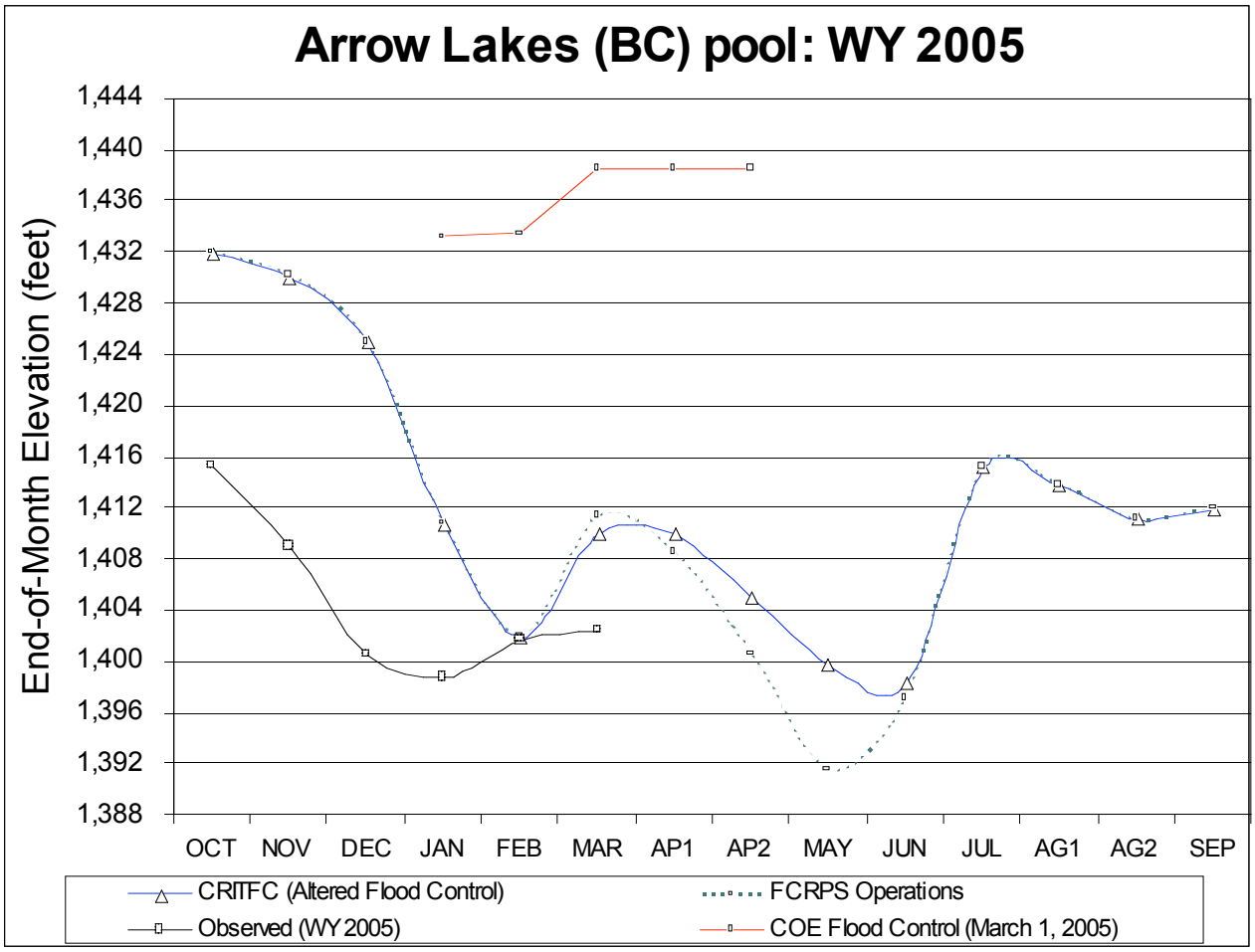


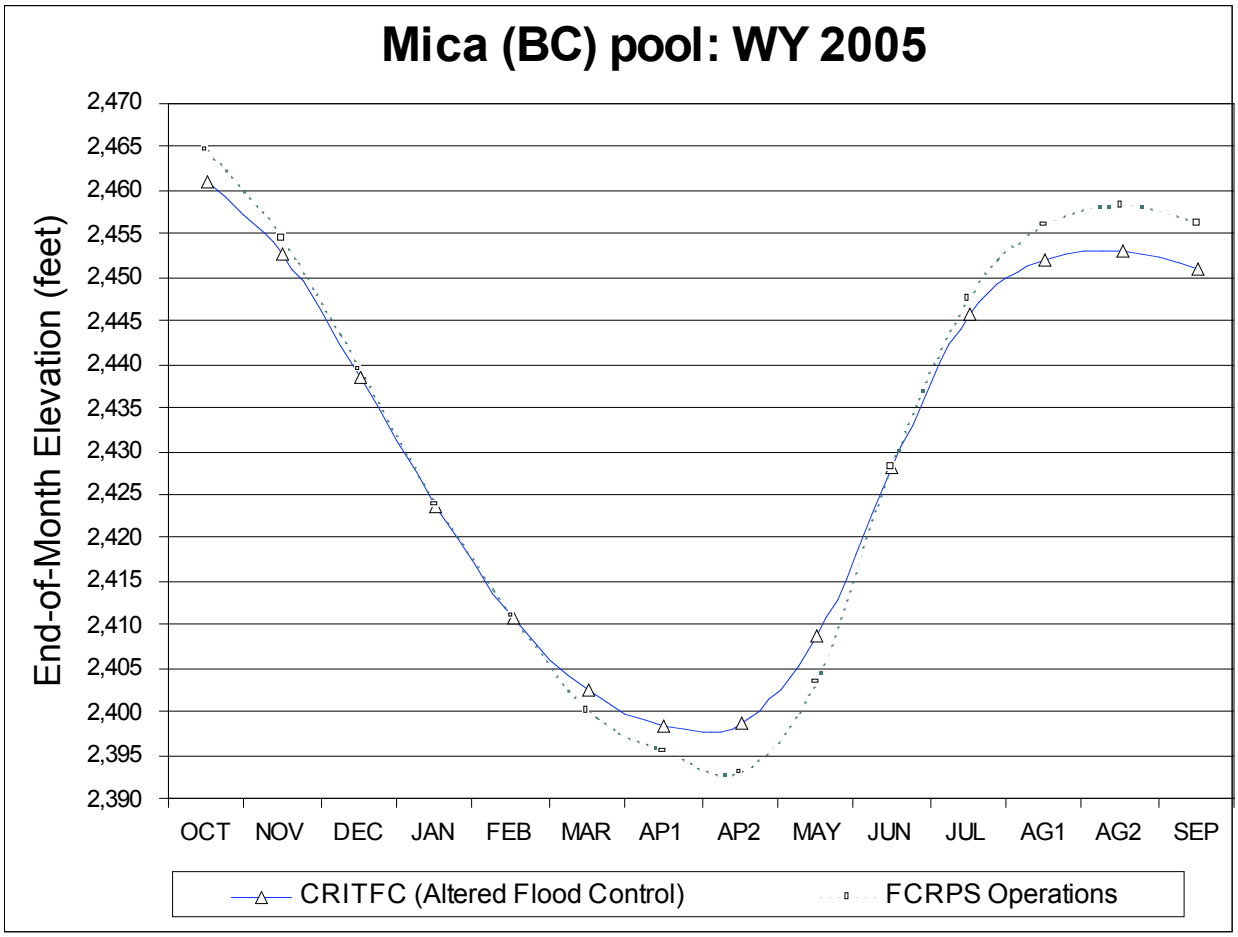

Dworshak pool: WY 2005
End-of-Month Elevation (feet)
1,600
1,595
1,590
1,585
1,580
1,575
1,570
1,565
1,560
1,555
1,550
1,545
1,540
1,535
1,530
1,525
1,520
OCT
NOV
DEC
JAN
FEB
MAR
AP1
AP2
MAY
JUN
JUL
AG1
AG2
SEP
CRITFC (Altered Flood Control)
Observed (WY 2005)
FCRPS Operations
COE Flood Control (March 1, 2005)


Brownlee pool: WY 2005
End-of-Month Elevation (feet)
2,077
2,075
2,073
2,071
2,069
2,067
2,065
2,063
2,061
2,059
2,057
OCT
NOV
DEC
JAN
FEB
MAR
AP1
AP2
MAY
JUN
JUL
AG1
AG2
SEP
CRITFC (Altered Flood Control)
FCRPS Operations
Observed (WY 2005)
COE Flood Control (March 1, 2005)


Libby pool: WY 2005
End-of-Month Elevation (feet)
2,460
2,455
2,450
2,445
2,440
2,435
2,430
2,425
2,420
2,415
2,410
OCT
NOV
DEC
JAN
FEB
MAR
AP1
AP2
MAY
JUN
JUL
AG1
AG2
SEP
CRITFC (modified VARQ)
FCRPS Operations
Observed (WY 2005)
COE Flood Control (March 1, 2005)


Hungry Horse pool: WY 2005
End-of-Month Elevation (feet)
3,560
3,558
3,556
3,554
3,552
3,550
3,548
3,546
3,544
3,542
3,540
3,538
3,536
3,534
3,532
3,530
OCT
NOV
DEC
JAN
FEB
MAR
AP1
AP2
MAY
JUN
JUL
AG1
AG2
SEP
CRITFC (modified VARQ)
FCRPS Operations
Observed (WY 2005)
COE Flood Control (March 1, 2005)


Arrow Lakes (BC) pool: WY 2005
End-of-Month Elevation (feet)
1,444
1,440
1,436
1,432
1,428
1,424
1,420
1,416
1,412
1,408
1,404
1,400
1,396
1,392
1,388
OCT
NOV
DEC
JAN
FEB
MAR
AP1
AP2
MAY
JUN
JUL
AG1
AG2
SEP
CRITFC (Altered Flood Control)
FCRPS Operations
Observed (WY 2005)
COE Flood Control (March 1, 2005)


Mica (BC) pool: WY 2005
End-of-Month Elevation (feet)
2,470
2,465
2,460
2,455
2,450
2,445
2,440
2,435
2,430
2,425
2,420
2,415
2,410
2,405
2,400
2,395
2,390
OCT
NOV
DEC
JAN
FEB
MAR
AP1
AP2
MAY
JUN
JUL
AG1
AG2
SEP
CRITFC (Altered Flood Control)
FCRPS Operations

Attachment 1

COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION
729 N.E. Oregon, Suite 200, Portland, Oregon 97232 Telephone (503) 238-0667
Fax (503) 235-4228
www.critfc.org

December 17, 2004

Witt Anderson
North Pacific Division
Corps of Engineers
P.O. Box 2870
Portland, Oregon 97208

Jim Ruff
NOAA Fisheries
525 NE Oregon Street
Portland, Oregon 97232

SUBJECT: **Comments on Draft 2005 FCRPS Water Management Plan for the Federal Columbia River Power System**

Dear Mr. Anderson and Mr. Ruff:

On behalf of its member tribes, the Columbia River Inter-Tribal Fish Commission (CRITFC) appreciates the opportunity to comment on the November 4, 2004 draft 2005 Water Management Plan (DWMP) for the Federal Columbia River Power System (FCRPS). The actions in the plan have a significant bearing on the restoration of listed and unlisted salmon, Pacific lamprey that are a candidate for ESA listing, listed and unlisted sturgeon and other tribal trust resources. We incorporate by reference the December 15, 2004 State, Federal and Tribal Agencies Joint Technical Staff memo commenting on the DWMP (Attachment 1).

We believe that significant information that is necessary to develop the final 2005 WMP has yet to be available or materialize. It is premature at this time to be considering many foundation WMP issues. However, we realize that water management actions, particularly flood control operations (i.e. Libby) and below Bonneville chum and Vernita Bar flow operations, begin to be implemented in November and December.

In the future we suggest that that a first draft of the plan be released on September 1 with a 30 day comment period to address early water management actions. Subsequently, when critical information on flow forecasts and research study results are available, a final draft should be released for a 30 day comment period on January 15. This information includes but is not limited to:

- The first official water supply forecast is not released until mid-January 2005. Water supply forecasts are integral to the final water management plan. The plan should contain specific, state-of-the-art methodologies to provide reasonable water supply predictions before the mid-January forecast. We offer several of these methodologies in specific DWMP comments below.

- Research results for many hydro-system and fishery studies that will highly influence draft plan measures are not currently available.

- Other issues such as new transmission capability that are still under development.

General Comments

- In 2004, neither summer nor spring target flow objectives were met for the Columbia and Snake Rivers, similar to most past years since the issuance of the FCRPS Biological Opinion in 1995. Meeting target flows is the overall priority of the WMP. Flow runoff in 2004 was a little less than normal, but if operational actions suggested by CRITFC were implemented by the Action Agencies, we believe the target flows could have been met.

- The DWMP should be based upon a "normative river system" paradigm necessary for anadromous fish recovery, expressed and described in the NPCC's landmark salmon recover document, *Return to the River* (Williams et al. 1996) and the CRITFC tribes salmon recovery plan, *Wy-Kan-Ush-Mi Wa-Kish-Wit* (Nez Perce et al. 1995). Chief elements of the normative river system include a spring peaking hydrograph with an extended summer reclining limb, minimum flow fluctuations and spill over dams during fish migrations. The "target flows" in the DWMP at key river index sites are flat, seasonal flow that are often missed. Further, the daily cycle of peaking flows allowed in the DWMP significantly and negatively impacts salmon life histories and critical habitat in the mainstem river (ISAB 2001-3; ISAB 1998).

- The DWMP should be supported by the state-of-the-art science with respect to the biological and ecological needs of anadromous fish. The stated objectives of the plan should include important components of the 1999 NWPPC review of the Corps of Engineers' capital construction plan:

- ***protect biodiversity*** -- passage solutions must be designed to benefit the range of species, stocks and life-history types in the river, which may require multiple passage solutions at a project, and

- ***favor passage solutions that best fit natural behavior patterns and river processes*** -- the best passage solutions are those that take into account and work with the behavior and ecology of the species and life-history types using the river system, that mimic the natural situations and processes that emigrating salmonids encountered in their evolutionary history.

Flat target flows, 24 hour flow fluctuations and passing fish through screen systems and turbines and transporting fish are not supported by the relevant science of anadromous fish ecological needs expressed in *Return to the River*, or other important studies (see: Vannote et al. 1980, Heede and Rinne 1990; Power et al. 1996; Hynes 1970; Lichatowich and Mobrand 1995 and ISAB 2003).

- The DWMP fails to integrate the operation of the Canadian Projects which are part of the Columbia River Treaty that significantly impact Columbia River flows and water quality. Yet, annual and five year plans through the Columbia River Treaty and the Pacific Northwest Coordinating Agreement are implemented that impact water quantity and quality through flood control, resident fish, recreational use, irrigation and power generation. The 1995 Action Agencies' System Operations Review EIS adopted the 1995-1998 FCRPS BiOp as the preferred alternative, which included examination of the Canadian storage projects in the environmental baseline. The final WMP should have provisions that allow consideration of obtaining additional water through flood control modifications and power swaps with Canadian entities. In taking this approach, the DWMP disregards over 17 million acre feet of Canadian storage to provide better flows and mainstem habitat for the listed and unlisted anadromous fish stocks.

- The DWMP fails to describe the impacts of flow management on the estuary and near ocean plume. The accumulation of evidence from studies indicate that increasing flows lead to biological productivity of fish stocks by increasing estuary habitat and organic and inorganic inputs into the near ocean plume (Simenstad et al. 1982; Sherwood et al. 1990; NOAA 2004). Pulses of high flows creating a semblance of a normative hydrograph, such as that provided in high flow years, is linked to higher adult anadromous fish returns.

- Available evidence with respect to extant juvenile in-river survival rates indicates that the FCRPS operations in the DWMP, which are nearly identical to past water management plans, will not achieve rates necessary to recover listed ESUs. For example in the July 1, 2004 Findings Report on Actions Agencies' 2004/2004-2008 Implementation Plan, NOAA Fisheries stated that in-river survival for Snake River juvenile fall chinook was 10.2% on average from 1995-1999, and only averaged 8.7% from 2000-2003. Further, in that report NOAA Fisheries stated that the 2010 in-river survival performance standard has not yet been met, and is not expected to be met for six more years. The 2000 FCRPS BiOp set a performance standard of 14.3% in-river survival for 2010. It is evident that more aggressive water management actions, such as provided in these comments and CRITFC's *River Operations Plans* (CRITFC 2004) are necessary if juvenile in-river performance standards are to be met.

- The conduct and process of the Technical Management Team does not allow the free exchange of information between the fishery managers and the FCRPS operators. This is because power marketing representatives are allowed to observe and "listen in" on discussions regarding river operations that influence power marketing and sales, which may place federal operators at an economic disadvantage. This "openness" leads the federal operators to restrict fishery manager access to important river operation

information, such as forecasted daily reservoir outflows and reservoir elevations. Thus, the tribes and other fishery managers cannot access critical information to plan operations to best benefit fish populations before and during the fish migration season.[17] To address this problem, we recommend that the federal operators convene a routine pre-season and in-season forum that excludes the marketing representatives, but allows the free exchange of hydrological and other information to the tribes and other fisheries managers. We suggest that the final water management plan (WMP) include a reference to this forum.

- As we have stated in the past, CRITFC strongly recommends that the Corps' Annual Fish Passage Plan be appended to the final WMP. The FPP has specifics on spill operations, transportation, research and fish facility operations that are intricately tied to the WMP. Both of these documents are called for by the 2000 Biological Opinion. It does not make sense that the FPP and WMP are kept in separate forums and never formally integrated.

- Although the CRITFC tribes officially withdrew from the NMFS' Adaptive Management Forum in 1997,[18] the federal operators and federal fishery agencies still have a trust responsibility to formally consult with the CRITFC tribes before implementing actions, such as in the WMP, that will impact their trust and treaty resources. The current forum assigns the federal executives full authority to make critical operational decisions without the tribes at the table and without tribal consultation. For example, and as stated in the DWMP, the federal executives and the USFWS decided to eliminate spill protection at Bonneville Dam for the annual Spring Creek Hatchery release of fall chinook in March without even contacting the tribes. CRITFC can assist the federal agencies in arranging river operations consultations. The final WMP should contain a specific section indicating how the federal agencies intend to coordinate and consult with the tribes regarding all actions that will affect their treaty trust resources as required by the 1998 Secretarial Order for the Departments of Commerce and Interior, BPA's obligations to tribes, and the Corps' Nationwide Policy for Native American Tribes.

- The final WMP should include reference to and the details of the Detailed Operating Plan and annual PNCA planning hydro-regulations and non-power fishery constraints data submittals as the overarching plan to operate the FCRPS. The Corps and Reclamation's respective data submittals create the foundation for real-time decision making for river operations. Thus, while real-time river operations may be "tweaked" by the TMT, the actual plan to operate the river has already been established the February before the water year begins by the PNCA parties.

---

[17] This information includes forecasted elevation at storage reservoirs and outflow information. Without this information, fishery managers cannot make well-informed decisions about flow management for fishery needs.

[18] In a letter dated May 16, 1997 from Ted Strong, CRITFC Executive Director to Will Stelle, NMFS Regional Director, CRITFC informed the federal government that it would, "… no longer participate in the NMFS adaptive management process, except as necessary to obtain information on system operations and configuration that cannot otherwise be obtained." In reaching this conclusion, CRITFC stated, "It is absolutely inappropriate for the policies of the United States, with respect to fulfillment of our treaties, to be determined by technical committees of biologists and engineers." CRITFC recommended that, "NMFS and the other federal agencies work with the Commission's member tribes to establish meaningful government-to-government relationship between the federal agencies and the tribes." And, "Consultations must be structured to reach agreement between NMFS and the tribes on policy issues before technical issues are referred to technical committees".

- The DWMP lacks emphasis on water quality. Other than a section on dissolved gas and reference to Dworshak cool water releases, the plan is essentially silent on water quality actions to establish preferred temperatures and turbidity for the survival and productivity of anadromous fish. For example, water temperatures at the McNary juvenile bypass facility violate standards for an extended period of time every summer. There is no mention of point source pollution from the FCRPS (i.e., leaks from turbine and other equipment on dams) and there are no plans or contingencies outlined to address oil spills and other emergencies related to river operations.

- There are no specific operations required to reduce load following or power peaking operations in the plan. Such operations can cause desiccation of salmon redds, stranding of juvenile anadromous and resident fish and cause delay of juvenile and adult salmon. The final plan should acknowledge the impacts of power peaking on fish and offer management actions to reduce these impacts, such as limited peaking to some small percentage of the predicted base flow for the month. Such actions as experimental measures were offered by the ISAB in Report 2003-1, *Review of flow augmentation: Update and Clarification.* The ISAB further highlighted the federal agencies' lack of addressing this issue in their recent report, *ISAB Findings from the Reservoir Operations/Flow survival symposium* (ISAB 2004-2).

Specific Comments

Section 1.2: Preparation of Plans

The DWMP does not refer to the tribes' *Spirit of the Salmon* (Nez Perce et al. 1995) anadromous fish restoration plan that has specific measures for river operations for all anadromous fish. As in the 2000 FCRPS Biological Opinion, the federal agencies should include reference to the tribes' plan, consistent with the federal agencies' obligations to consult and provide trust responsibility to the tribes.

As stated above, river operations implemented in past water management plans have not provided SR Fall Chinook juvenile in-river survival rates necessary to meet BiOp standards. The operations proposed in the DWMP are nearly identical to those in recent water management plans. For UCR Spring Chinook the FCRPS BiOp states that despite the strong adult returns, both recent and 5-year and long-term productivity trends remain below replacement. The SR Steelhead ESU is also not replacing itself despite the recent abundance of adult returns. With respect to the URC Steelhead ESU: 1) the Biological Review Team is concerned about the lack of data regarding productivity for this ESU, 2) the low replacement rate for this ESU (0.25-0.30) has not appreciably increased and, 3) the mean proportion of natural spawners declined 10% from 1992-1996 to 1997-2001. Yet, the DWMP does not offer any additional protective measures over that of past water management plans (i.e. more normative conditions with more flow and spill) that could specifically reduce hydro impacts to this stock to avoid extinction.

Section 1.3: BiOp Strategies

This section lacks any reference to a basin-wide, ecosystem approach to increase productivity of listed and unlisted anadromous and resident fish (see *Return to the River*; Williams et al. 1996). Simply measuring reach survival of migrating juvenile fish from one point of the river downstream to another point as a performance standard is an important metric but it is not adequate to evaluate anadromous fish productivity. For example, delayed mortality from hydro-system passage does not occur until after the fish leave the last dam and enter saltwater (Budy et al. 2002). Further, there is no mention of increasing adult survival through the hydro-system and increasing spawning success, two metrics essential to increasing anadromous fish productivity (Lichatowich and Cramer 1979). This section should be expanded beyond mere reach survival-performance standards.

Pacific lamprey should be specifically identified in this section.

Section 1.3.1.Hydro Strategies and Sub-strategies

Actions to meet water quality standards are needed for this section. Among other things, actions should include investigation of selected water releases from Lake Roosevelt, keeping fish out of dam bypass and transportation systems under elevated temperature conditions that exceed standards, avoiding trapping adult fish under elevated temperature conditions that exceed standards, and monitoring of disease at dams under elevated temperature conditions. As stated previously in these comments, the foundation of the final WMP should be establishment of a natural peaking (i.e., normative) hydro operation (CRITFC 2004; Martin 2004) that provides for the environmental and passage conditions that support anadromous fish productivity to recovery goals (Williams et al. 1996).

While operations for Kootenai sturgeon are specified, there are no specified operations for other Columbia and Snake River sturgeon. Peaking flows and spills in dam tailraces have been shown by ODFW and USGS to promote sturgeon recruitment.

Section 1.4: Non-Biological Opinion Actions

Tribal fishing is a very high priority action and operations to promote tribal fishing consistent with treaties should be listed for all of Zone 6 that includes John Day and The Dalles pools—not just Bonneville. Other actions that significantly affect fish survival are lower priority and include filling the McNary pool for power boat races on the July 4th weekend and raising pools from MOP for navigation.

Section 2.1: Hydro-System Priorities

The action agencies should meet with the fishery managers in a formal meeting before establishing priorities in the plan. We recommend that:

- The spring refill operation of reservoirs to their upper rule curve by approximately April 10 should be priority one. This will ensure that spring flows can be shaped to a normative hydrograph and that target flows can be met.

- Refill of reservoirs by June 15 should be priority two. Earlier refill will ensure summer flow augmentation will be met.

- Reduction of flow fluctuations during spawning, rearing and migration should be the next priority.

- Operation of storage reservoirs to meet criteria for bull trout and sturgeon as the next priority.

Meeting these priorities should take precedence over meeting power generation needs. If flood control is operated with flexibility and a reasonable minimum spawning flow for chum is established and maintained through reduction of lower river power peaking, it is not necessary to consider reducing Hanford Reach flows established to protect thousands of fall chinook redds. The 2000 FCRPS Biological Opinion, through adoption of the 1995 FCFPS Biological Opinion, established scientific evidence why the flow targets must be met as the minimum to avoid jeopardy to listed stocks. Meeting flow targets must be given a higher priority than meeting minimum elevations in reservoirs at the end of August and not the other way around as stated by the DWMP.

Adaptive management is not, as described in the DWMP, "…. The concept that the operation of the system should be adjusted based on acquired knowledge about current conditions in the system…", but is instead involves active management actions (McAllister and Peterman 1992) that will increase the ability to discriminate between alternative states of nature (Hilborn 1987). This requires that exploratory, probing actions be employed that provide information about the true state of nature. An example of this probing could be that no fish are transported in an average flow year. The final WMP should reflect this difference in the use of the terminology. We concur with the ISAB (2003) that, "… decisions to implement actions that have any potential for adversely affecting an ESU will be required to satisfy a burden of proof that no harm is likely to be done as a result of the action."

We disagree with the statement that, "…[t]he use of water for any one fish species or project purpose will most likely affect the amount of water available for other fish species or project purposes." This is not correct. For example, storage added to natural runoff will provide good migration conditions for a particular year class for all anadromous fish stocks that are present. On the other hand, filling of reservoirs for recreational purposes, such as boat races, will increase water particle travel time through those reservoirs and delay fish migrations. The final WMP should correct this broad, incorrect statement.

Because chum spawning requirements affect storage and refill for all anadromous fish the following year, a precautionary approach should be used when setting chum flows in November and December. Preseason forecasts, groundwater storage and the previous year's runoff and meteorological conditions should be carefully considered when setting minimum chum flow

spawning regimes. For example, the Climate Impacts Group has projected a 92 MaF January-July runoff at The Dalles for 2005, while CRITFC independently projects a 94 MaF runoff for the same period. Use of this information and the status of deficient groundwater supplies from the below normal runoff in 2004 supports limiting minimum chum spawning flows below Bonneville Dam to 120-125 kcfs. Power peaking from load following tends to complicate chum spawning and the maintenance of flows to protect chum redds. CRITFC strongly encourages the Corps and the other federal operators to consider reducing load following at Bonneville Dam to reduce these impacts.

The 2000 FCRPS Biological Opinion requires flow and spill measures to increase the survival of listed anadromous fish in order to avoid jeopardy and to meet tribal trust obligations, since these fish must pass many dams and reservoirs. The action agencies must consult, not coordinate, with the fishery managers including the tribes on all aspects of river operations that affect this very high priority. The final WMP should reflect these commitments and responsibilities.

Section 2.2.1: Conflicts: Flood Control Drafts vs. Project Refill

In order to meet the 2000 Biological Opinion river operations requirements and other requirements, flood control rule curves should be modified. In 2004, water was prematurely released from Lake Roosevelt for flood control. A reduction in water runoff after the release resulted in the reduction of the probability of spring flows not being met and summer flow augmentation being reduced. Early release of Lake Roosevelt storage in March for flood control can also increase the potential for stranding and entrapment of Hanford Reach fall chinook. Premature release of storage for flood control is a serious problem that is not addressed in the DWMP.

There is additional flood control space located in Canadian reservoirs that is available for purchase that could be utilized as part of this modification.[19] The DWMP fails to include relaxing flood control management in Arrow, Mica, Grand Coulee, Libby, Dworshak, and Brownlee. Further, several advanced hydro-modeling tools that incorporate future climate information are available to be used to modify flood control or improve existing flood control, especially when conducting long-range water planning. [20] These include: probabilistic streamflow and climate forecasts, multivariate ENSO (El Nino Southern Oscillation) index, ENSO Risk Model, and sea-surface temperature departure analysis. As mentioned above, the Climate Impacts Group now produces a one-year lead ensemble forecast for the Columbia at The Dalles that should be considered. Even NOAA's NWRFC is now experimenting with long-range ESP-based flow forecasts for The Dalles that could be considered. A comprehensive package of the above tools is needed to better manage all Columbia Basin reservoirs. These methods are recommended in the 2000 FCRPS Biological Opinion and should be included in the final plan.

[19] This space of 500 KaF, is noted in the 1995 FCRPS Biological Opinion.

[20] RPA Number 35 in the 2000 FCRPS Biological Opinion specifies use of these new technologies that, "….[w]ould enhance system response and afford greater precision in system flood control operations". To our knowledge, the federal operators are not using available technologies that could make available more water available for fish flows.

Section 2.2.2: Spring Flows vs. Project Refill

CRITFC continues to advocate for a natural peaking flow or normative hydrograph concept. Since 2001, we have offered the federal operating agencies detailed *River Operations Plans* that meets the dual objectives of a peaking hydrograph and meeting reservoir refill levels. We have yet to receive any written comments on these plans. Again, we ask the federal operators to review our *River Operations Plans*, provide written comments and consider using them as a paradigm to meet flow objectives and reservoir elevations.

Section 2.2.3: Chum Tailwater Elevations vs. Spring Flows

We responded to this issue in our above comments.

Section 2.2.4: Sturgeon Pulse vs. Summer Flows

The DWMP fails to adequately describe how the proposed sturgeon operation comports with VAR-Q operation at Libby that is likely to occur in WY 2005. The final WMP should carefully explain this issue.

Section 2.2.5: Fish Operations vs. Other Project Uses

If non-power constraints are identified in detail and specified in the 2004 PNCA planning, there should only be minimal in-season conflicts between fish and power operations. Spill levels and flows should be clearly specified from the PNCA non-power constraint in the 2005 final WMP. Irrigation demands and recreational elevations can and should be modeled prior to the water management season to determine if conflicts will exist. In any case, they should have a lower priority than meeting fish flows under the Endangered Species Act. If pre-season runoff forecasting tools are utilized and an increased level of precision and detail is applied to planning to avoid conflicts before the fish passage season begins, in-season conflicts should be minimal and all parties involved with water management actions will know beforehand what to expect. The tribes have not been consulted on the conflicts between other project uses and fish operations. The federal agencies have a trust responsibility to provide consultations with the tribes before actions are implemented.

Section 2.2.6: Conflicts and Priorities

As mentioned above, CRITFC's member tribes withdrew from the NMFS' Adaptive Management Forum several years ago. The regional federal executives have a trust responsibility to meet with our member tribes' government officials before and during the fish passage season with respect to FCRPS operations.

Section 2.3: Emergencies

Short-term FCRPS emergencies that impact fish flows, spill and dam operations over a few hours or days should be avoided. If they do occur, tribal technical and policy representatives should be immediately notified and consulted and appropriate in-kind mitigation should be

implemented as soon as possible. In no case should fish operations be interrupted due to financial reasons such as poor financial planning.

Section 2.4 Research

Consistent with the paradigm of active adaptive management (McAllister and Peterman 1992; Hilborn 1987), operations that are considerably different from the status quo in the DWMP should be implemented and evaluated using state-of-the-art scientific designs (McAllister and Peterman 1992; Marmoreck et al. 2004) developed cooperatively with the fishery managers.

Section 4.1.1: Reservoir Passage

The Corps operated the four Lower Snake reservoirs to MOP+1.5 in 2004, as it did in 2003, contrary to the Biological Opinion. CRITFC expects that Lower Snake reservoirs will be operated within one foot of MOP in 2005.

Section 4.2.1.1: John Day Pool Level

The Corps needs to restrict the John Day pool to one-foot fluctuations when SORs are submitted for treaty fishing. During the Autumn 2004 fishing season, many tribal fishers complained that the pool was too low (262.5 to 263 foot range) in late August and early September 2004. This fact was mentioned at TMT on October 27th, 2004.

Section 5.1: Flow Objectives

The 1995 FCRPS Biological Opinion stated that the minimum flows were set as bare thresholds to avoid jeopardizing the listed salmon ESUs. If the minimum flows are not met, then the listed species are placed in jeopardy. Thus, every effort must be made to meet the minimum flows through modification of flood control and purchase of flood control space and purchase of power produced off of the river. This effort includes meeting the minimum flows during weekends. To migrating salmon that need flows for critical life history functions, a weekend is the same as a weekday. The FCRPS must be adjusted to meet the needs of salmon, instead of salmon trying to exist in the face of federal operators running the FCRPS to achieve financial gains.

As noted elsewhere in these comments, in CRITFC's *River Operations Plan*, we have developed a natural peaking hydrograph that meets seasonal target flow objectives and reservoir refill objectives more often than Federal operations. A natural peaking flow regime also provides the physical habitat parameters—sediment transport, nutrient cycling, enhancement of mainstem and estuarine riparian corridors and water quality elements—that are critical to salmon life histories (Williams et al. 1996). Using this paradigm, combined with trended-and corrected (Martin 2002) Water Supply Forecasts during the fish passage season, the Federal Operators can deliver more water in a timely manner to better coincide with the salmon's life cycle and better protect listed and unlisted salmon and other anadromous fish. We recommend that these paradigms be tested for the FCRPS in WY 2005.

Section 5.2 All Storage Projects

Available research indicates a direct flow-survival relationship for juvenile steelhead, which are spring migrants (NMFS 1998). For example, Mullan et al. (1992 in NMFS 1998) ran a regression of smolt-to-adult returns of Wells hatchery steelhead against spring flows which indicated that flows over 140 kcfs resulted in smolt-to-adult returns that were three times higher than for lower flows. Berggren and Filardo (1993) also showed a strong relationship with steelhead migrations and increased flows. Under low flows in 2001, only 4% of Snake River steelhead were estimated to survive, the survival rate in 2002, a near normal runoff year, was about 26%. All efforts, described above, must be made to achieve spring flows and reservoir refill. All of these elements should be included in the final WMP.

For Grand Coulee, we understand the need to lower the pool to msl 1255 feet for maintenance work. This elevation is 11.4 feet less than CRITFC's URC for April 30th. CRITFC is concerned about the possibility of missing refill and lower seasonal flows in the Hanford Reach. We request that the maintenance work be done as early in the season as possible so as to minimize the impact on refill and Hanford Reach spring flows.

The Hells Canyon Complex operation coordinated with federal operations is not detailed in this section. In the final WMP, the Hells Canyon Complex operations for fish should be specified. Included in these specifications should be 1) arrangements between the Corps and Idaho Power should be made so that a flood control shift of up to 110 KaF can be realized from Brownlee to augment spring flows in the lower Snake River if desired by the fishery managers. The Bureau of Reclamation should assure that that 427 KaF of upper Snake flow augmentation will be delivered in a timely manner for 2005 fish migrations. Water from the upper Snake reservoirs and the Hells Canyon Complex should augment natural flows. Water from Brownlee should be released in July to save limited Dworshak cool water for later temperature control.

Section 5.8.3: Dworshak Summer Operations

Dworshak should be prioritized for temperature control, not flow augmentation. Summer drafts should be limited to 1535 feet by August 31st unless additional water is needed for temperature control. Dworshak should be targeted for refill to msl 1600 feet by June 1 or earlier and be targeted for msl 1520 feet by mid-to-late September. Lower Snake pools should not refill while Dworshak flow augmentation continues during September. A monitoring program should be put in place to evaluate effectiveness of Dworshak operations. The Corps should provide the Nez Perce Tribe with financial resources to protect cultural sites and resources during reservoir draw downs. All of these elements should be included in the final WMP.

Section 6.0 Hydrosystem Substrategy 2.3: Spill operations for project passage

The final WMP should describe the 120% total gas pressure as conservative, because, among other things, salmon can and do achieve depth compensation in the river from elevated levels of dissolved gas. This comports with the relevant regional research (Backman et al. 2002, Backman and Evans 2002), a risk assessment by the regions' fishery managers (Columbia Basin Agencies and Tribes 1995) and the water quality appendix to the 2000 FCRPS Biological

Opinion. All of these indicate that total dissolved gas levels cause little harm up to 125% TGP. Thus, spill management should not be overly concerned about some excursions above 120% TGP.

Recent data obtained from turbine survival and transportation studies at McNary Dam indicate that turbine and bypass system mortality of summer migrants is very high (15-26 %; Perry et al. 2004) and that transportation from McNary and the Snake River dams, with respect to smolt-to-adult returns is at best the same as in-river passage and may be worse (NOAA 2004; CRITFC 2004). Implementing a spread-the-risk spill passage operation [21] for McNary and the lower Snake dams for summer migrants should be included in the final WMP. Further, it is critical to evaluate the removable spillway weir at Lower Granite for summer migrant passage to determine if this technology is a viable complement to conventional spill.

Further, substantial numbers of juvenile salmon migrate in September (FPC 2003 unpublished data; Connor et al *in press*) and recent evidence indicates that "reservoir type" SR Fall chinook migrate throughout the late fall, winter and early spring (Connor et al. *in press*). Given these facts, serious consideration should be given to extending salmon flows and spill through September.

Recent data for spill at Bonneville Dam indicates that adult fallback is not substantially affected by daytime spill. The final WMP should examine a 24-hour spill program at Bonneville without a daytime spill cap.

Bonneville spill for Spring Creek National Hatchery fall chinook is not mentioned in this section. The final WMP should include a 3-7 day spill program in March to protect this stock of international importance.

Section 7.1.3: Libby Storage Reservation Diagram

The December 31st preemptive draft at Libby to msl 2411 feet should not be implemented in this year to leave additional water in storage for WY 2005. Right now, the Corps is starting their pre-season draft. We ask that the Corps to draft to no lower than msl 2424 feet by December 31st.

Section 7.7: Dworshak Draft to 1500 feet

CRITFC does not support any draft below msl 1520 feet. Drafts below this level may reduce refill probabilities the following year and cultural resources are particularly exposed at drawn down elevations and are vulnerable to vandalism and theft.

Section 7.8: Other Reclamation Water Management Actions

The final WMP should incorporate, in detail, what specific actions will be taken in 2005 to reduce illegal water spreading. The Columbia Basin Institute, in its 1994 report on the

[21] This action would entail summer spill at McNary and the lower Snake dams as necessary to pass 50% of summer migrants over the spillways or a combination of removable spillway weirs and spillways. .

Columbia Basin Irrigation Project, identified 800 to 1000 KaF, out of the 2800 KaF being diverted by the Bureau of Reclamation, that is illegally spread by some irrigation districts. The upper Snake contribution from Reclamation reservoirs should be specified in the final WMP as a minimum of 427 KaF.

Section 12.4.1: Kokanee—Grand Coulee

The upper Columbia Tribes have indicated to us that Lake Roosevelt needs to be at msl 1283 feet by the end of September to allow kokanee spawning access to tributaries. Filling to elevation 1285 feet by October 1 is not necessary for kokanee spawning and such refill could reduce lower Columbia flows in September that would negatively impact CRITFC' member tribes treaty fisheries in September and October.

12.5 Hanford Reach Protection Flows

Flow fluctuations from Grand Coulee and Chief Joseph dams can overwhelm efforts of the mid-Columbia public utility districts to re-regulate and stabilize flows into the Hanford Reach. Stable flows in the Hanford Reach are vital to protect millions of emerging and migrating fall chinook from stranding and entrapment and to protect redds and spawning activity specified under the Vernita Bar Agreement. The federal operators should work with the PUDs to limit flow fluctuations during the juvenile susceptibility period from late March until early June and in October and November for adult spawners. The federal agencies should remain on Mid-Columbia Hourly Coordination during these times of fish life history susceptibility to flow fluctuations. These issues should be specific and detailed in the final WMP.

Section 12.9.1: Tribal Fishing

As previously mentioned in these comments, CRITFC's member tribes' treaty fisheries occur in all of Zone 6 (Bonneville to McNary dams). Pool elevation restrictions and steady flows should be provided during tribal fisheries for all of Zone 6, not just Bonneville Pool. The federal operators have a trust and treaty responsibility to provide this operation. The final WMP should specify these requirements.

Section 12.9.2 Spring Creek Hatchery Releases

The 2004 evaluation of the corner collector at Bonneville Powerhouse II during the Spring Creek release indicated that the Bonneville Project fish passage efficiency was reduced from 60% to 51% from a 50 kcfs spill operation to a no spill and corner collector operation (Ploskey et al. 2004). As survival rates through the turbines are considerably less than through the bypass system and corner collector, there is a distinct survival disadvantage for the Spring Creek migration when no spill is implemented.

Further, it has been determined through WES hydraulic studies that a minimum of 50 kcfs spill should be provided for good tailrace egress conditions to occur below the corner collector. Implementation of active adaptive management requires modifying project operations based upon monitoring and evaluation when the goal is to increase passage protection for juvenile

salmon. The 2005 final WMP should require 24 hour spill at the dissolved gas cap level during the majority of the Spring Creek out migration through the dam, which historically occurs over 3-5 days.

While, as stated in the DWMP, the Corps and other federal agencies entered into a 2004 agreement on Bonneville operations during the 2005-2006 Spring Creek release that does not require any spill, the best available scientific information now at hand indicates that not providing spill at the project to pass 7-8 million Spring Creek fish will significantly reduce their direct survival and probably, based upon route specific studies at Bonneville and other dams, reduce adult returns (Gilbreath 1993; Dawley 1996; Marmorek et al. 2004; Budy et al. 2002). Further, the Corps never consulted with the tribes regarding this agreement and impacts to their trust resources from Spring Creek Hatchery. Apparently, the Corps has failed to consider the implication of reducing survival of these fish on international fisheries under the U.S.-Canada Pacific Salmon Treaty. Fish released from this hatchery are in themselves mitigation for the construction of Bonneville and other lower Columbia River dams. Thus, the Corps is eliminating mitigation fish without mitigating for these fish that were established as mitigation for the original harm to natural stocks of lower Columbia fall chinook. This is not acceptable.

Conclusion

CRITFC appreciates the opportunity to review and comment on the 2005 DWMP. We request a staff to staff meeting with your agencies and other federal agencies as appropriate to discuss these comments and recommendations for consideration in the final WMP. Should you have questions about these comments, please contact Bob Heinith at (503) 238-0667.

Sincerely,

/s/
Olney Patt, Jr.
Executive Director

Attachment 1

CC: Commissioners, tribal staffs, tribal attorneys, CBFWA Fish Managers, Regional Executives, C. Henriksen, Corps RCC

References

Backman, T.W.H., A.F. Evans, M.S. Robertson and M.A. Hawbecker. 2002. Gas bubble trauma incidence in juvenile salmonids in the lower Columbia and Snake Rivers. North American Journal of Fisheries Management. 22:965-972.

Backman, T.W.H. and A.F. Evans. 2002. Gas bubble trauma incidence in adult salmonids in the Columbia River Basin. North American Journal of Fisheries Management. 22:579-584.

Berggren, T.J. and M. Filardo. 1993. An analysis of variables influencing the migration of juvenile salmonids in the Columbia River Basin. North American Journal of Fisheries Management 13:48-63.

Budy, P., G.P. Thiede, N.Bouwes, C.Petrosky and H. Schaller. 2002. Evidence linking delayed mortality of Snake River Salmon to their earlier hydrosystem experience. North American Journal of Fisheries Management. 22:35-51.

CRITFC (Columbia River Inter-Tribal Fish Commission). 2004. *2004 River Operations Plan.* Portland, Oregon.

CRITFC. 2004. Comments on the Federal Agencies Summer Spill Proposals. April and June 2004. Portland, Oregon.

Columbia Basin Agencies and Tribes. 1995. Spill Risk Assessment. Columbia Basin Fish and Wildlife Authority. Portland, Oregon.

Cushman, R.M. 1985. Review of ecological effects of rapidly varying flows downstream from hydroelectric facilities. North American Journal of Fisheries Management. 5:330-339.

Dawley, E.M., R.D. Ledgerwood, L.G. Gilbreath and P.J. Bentley. 1996. Relative survival of subyearling chinook salmon that have passed Bonneville Dam via the Spillway, First or Second Powerhouse Bypass System or Turbine and Tailrace. Draft Report. Adult recoveries and indirect survival studies and direct measures survival studies. Report to Corps of Engineers. By Coastal Zone and Estuarine Services Division. NMFS. Seattle.

FPC (Fish Passage Center). 2003. Unpublished data on juvenile salmon migration timing in the Columbia River. Portland, Oregon.

Gilbreath, L.G., E.M. Dawley, R.D. Ledgerwood, P.J. Bentley and S.J. Grabowski. 1993. Relative survival of subyearling chinook salmon that have passed Bonneville Dam via the spillway or second powerhouse turbines or bypass system: Adult recoveries through 1991. Coastal Zone and Estuarine Services Division. NMFS. Seattle, Washington.

Heede, B.H. and J.N. Rinne. 1990. Hydrodynamic and fluvial morphologic processes: implications for fisheries management and research. North American Journal of Fisheries Management. 10:249-268.

Hilborn, R. 1987. Living with uncertainty in resource management. North American Journal of Fisheries Management. 7:1-5.

Hynes, H.B. 1970. The ecology of flowing waters in relationship to management. Journal of the Water Pollution Control Federation 42:418-424.

ISAB (Independent Scientific Advisory Board). 2004. ISAB Findings from the reservoir operations/flow survival symposium. November 9-10, 2004. Sponsored by the Northwest Power and Conservation Council and NOAA Fisheries. ISAB 2004-2. Portland Oregon.

ISAB. (2003). Review of flow augmentation: update and clarification. Report 2003-1 to the Northwest Power and Conservation Council, National Marine Fisheries Service and Columbia River Basin Indian Tribes. Portland, Oregon.

ISG. (Independent Science Group). 1996. *Return to the River.* Restoration of salmonid fish in the Columbia River ecosystem. Northwest Power and Conservation Council. Portland, Oregon.

Lichatowich, J.A. and L.E. Mobrand. 1995. Analysis of chinook salmon in the Columbia River from an ecosystem perspective. Contract No. DE-AM79-92BP25105 to the Bonneville Power Administration. Submitted by Mobrand Biometrics, Inc. Vashon Island, Washington.

Lichatowich, J. and S. Cramer. 1979. Parameter selection and sample sizes in studies of anadromous salmonids. Information Report Series, Fisheries. Number 80-1. Contract DACW-57-C-0027 to the Corps of Engineers. Oregon Department of Fish and Wildlife. Portland, Oregon.

Marmorek, D.R., M. Porter, I.J. Parnell and C. Peters, eds. 2004. Comparative survival study workshop, February 11 – 13, 2004; Bonneville Hot Springs Resort. ESSA Tech. Ltd.., Vancouver B.C.

Martin, K. 2004. Altered Flood Control, Climate Change, and Rebuilding Pacific Northwest Salmon Stocks. Presented at CRITFC's Regional Flood Control Workshop. Columbia River Inter-Tribal Fish Commission, Portland, Oregon. (http://www.critfc.org/text/nat_riv.html)

Martin, K. 2002. Water Supply Forecast Correction Curves. Lecture, Oregon Chapter, American Meteorological Society. Portland, Oregon. (http://www.critfc.org/tech/03-forecast_report.html)

McAllister, M.K. and R.M. Peterman. 1992. Experimental design in the management of fisheries: a review. North American Journal of Fisheries Management. 12:1-18.

Mundie, J.H. 1991. Overview of effects of Pacific coast river regulation on salmonids and the opportunity for mitigation. American Fisheries Society symposium. 10:1-11.

Nez Perce, Umatilla, Warm Springs and Yakama Tribes. 1995. *Wy-Kan-Ush-Mi Wa-Kish-Wit. Spirit of the Salmon.* The Columbia River Anadromous Fish Restoration Plan. Columbia River Inter-Tribal Fish Commission. Portland, Oregon.

NMFS. 1998. Supplemental Biological Opinion on Operation of the Federal Columbia River Power System including the Smolt Monitoring Program and the Juvenile Fish Transportation Program, during 1998 and future years. Seattle, Washington.

NOAA 2004. Passage of adult and juvenile salmon through Federal Columbia River Power System dams. Technical memorandum. Northwest Fisheries Science Center. National Marine Fisheries Service. Seattle, Washington.

Peery R.W. and six co-authors. 2004. Survival and migration behavior of juvenile salmonids at McNary Dam, 2004. Abstract presented at November 2004 Corps of Engineers Annual Anadromous Fish Evaluation Program Research Review. Portland, Oregon.

Ploskey, G. and six co-authors. 2004. Hydroacoustic evaluation of salmonid fish passage at Bonneville Dam. Abstract presented at November 2004 Corps of Engineers Annual Anadromous Fish Evaluation Program Research Review. Portland, Oregon.

Power, M.E., W.E. Dietrich and J.C.Finlay. 1996. Dams and downstream aquatic biodiversity: potential food web consequences of hydrologic and geomorphic change. Environmental Mangement. Vol 20. No. 6 pp. 887-895.

Sherwood, C.R., D.A. Jay, R.B. Harvey, P. Hamilton and C.A. Simenstad. 1990. Historical changes in the Columbia river estuary. Progr. Oceanogr. 25:299-352.

Simenstad, C.A., K.L. Fresh and E.O. Salo. 1982. The role of Puget Sound and Washington coastal estuaries in the life history of Pacific salmon: an unappreciated function. *In*: V.S. Kennedy (editor) Estuarine Comparisons. Academic Press, Toronto.

Tyus, H.M. 1990. Effects of altered stream flows on fishery resources. Fisheries. Vol: 15. No. 3. 18-20.

Vannote, R.L., G.W. Minshall and K.W. Cummins (and others). 1980. The river continuum concept. Canadian Journal of Fisheries and Aquatic Sciences. 37:130-137

Whitney, R.R., L.D. Calvin, M.W. Erho and C.C. Coutant. 1997. Downstream passage for salmon at hydroelectric projects in the Columbia River Basin: development, installation and evaluation. Northwest Power Planning Council. Portland, Oregon.