Irrigation Districts — ID

COMMENT ID 01

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January 29, 2003

Mr. J. William McDonald, Regional Director
US Bureau of Reclamation
1150 North Curtis Road, Suite 100
Boise, ID 83706

RE: Banks Lake Drawdown DEIS

Dear Mr. McDonald:

01

At the January 27, 2003 regular semi-annual meeting of the Columbia Basin Project Reserved Works Committee, the Directors unanimously adopted a motion requesting Reclamation to extend the written comment period for the Banks Lake Drawdown Draft Environmental Impact Statement an additional 60 days. Presently, the deadline for written comments is March 10, 2003. A 60-day extension would result in a revised deadline of about May 9, 2003.

Since the enactment of the 2000 FCRPS Biological Opinion the CBP Districts have consistently urged Reclamation to make every effort to meet the deadlines set forth in that biop for those action items relevant to the Columbia Basin Project. This request is, in the opinion of the Districts, a justifiable exception to that general position.

The original target date for public release of the referenced DEIS was mid-summer of 2002. That date was slipped by Reclamation several times last year and actual public release was not until January 6, 2003. That delayed release date has caught the Districts at a difficult time period for management workload requirements. The deadline extension is requested to better enable the Districts to prepare and submit comprehensive and meaningful comments about this important CBP operational decision.

As we've told you and other Reclamation officials, the Districts are retaining a team of scientists and consulting engineers to assist the managers in the preparation of comments about the DEIS. Consultant selection for that work was carried out last summer consistent with Reclamation's earlier schedules for release of the DEIS. However, final contractual arrangements could not be completed with the consultants until the DESI was available which wasn't until January 6th. Unfortunately, during the time lapse from consultant selection to January 6th some of the selected consultants became unavailable for this work and the Districts are scrambling to rearrange the consulting team. As a result that work can't start until sometime in February. The DEIS is a complex, voluminous and technical document. The Districts feel that credible scientific and engineering peer review by experts other than those employed by Reclamation is in the best interests of the CBP.

Mr. J. William McDonald
January 29, 2003
Page 2

At the present time the managers are engaged in several other extended issues of a regulatory and/or environmental nature. These other activities are also important to the CBP and have a similar timeline to the present DEIS schedule. This further complicates our ability to deal with the DEIS between now and March 10th. Those activities include: 02

- Grant County PUD's Priest Rapids/Wanapum FERC relicensing and the related proposal to enhance Lower Crab Creek for fish and wildlife purposes. The District managers will be involved in this activity through at least February.

- Updating the Washington Department of Ecology NPDES permit for the application of aquatic herbicides for 2003. This requirement is the result of the Talent case decision and the immediate deadline for this year's work is February.

- WDOE rule making for revisions to the State's water quality standards. This activity culminating several years of proposals by the State has a March 7 deadline and it is important that the Districts stay involved.

- WDOE rule making for revisions to the Referendum 38 program. This activity also has an early March deadline.

- The NWPPC draft mainstem amendment process is scheduled to reach a conclusion in mid-March. The Districts' involvement in this is probably about completed but significant time was spent on this activity through January further complicating our ability to start a review of the DEIS.

- WDOE's Director has requested the District's to become involved in Governor Locke's Columbia River Regional Initiative. One of the study processes for that activity kicks off next week.

The Districts realize we are not alone in having a full plate at this time. However, the long awaited release of the DEIS has caught us at a particularly difficult time and we request your favorable consideration of a 60 day extension.

Sincerely,

Richard L. Erickson
Secretary
CBP Reserved Works Committee

cc: Bill Gray
Eric Glover
QCBID
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GCPHA
Tom Pitts

COMMENT ID 02

EAST COLUMBIA BASIN IRRIGATION DISTRICT

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April 10, 2003

Mr. Jim Blanchard, Special Projects Officer
U.S. Bureau of Reclamation
P.O. Box 815
Ephrata, WA 98823

RE: Banks Lake Drawdown, Draft Environmental Impact Statement, January 2003

Enclosure (1) "Review of Draft Environmental Impact Statement On The Proposed Banks Lake Drawdown" by Tetra Tech FW, Inc. (formerly Foster Wheeler Environmental Corporation), April 2003

Enclosure (2) March 28, 2000 Bureau of Reclamation letter by Deputy Area Manager William D. Gray re: 2000 – 2004 Diversion Rate, Columbia Basin Project

Enclosure (3) July 15, 1983 Bureau of Reclamation memorandum by Grand Coulee Project Manager R.E. Ethridge re: Proposed Operating Plan for Banks Lake and Grand Coulee Pumping/Generating Plant

Dear Mr. Blanchard:

Thank you for the opportunity to review the referenced DEIS.

The East District is opposed to both the 5 ft. drawdown, the supposed No Action Alternative, as it has been implemented to date and even more opposed to the 10 ft. drawdown, the Action Alternative. The basis for this opposition can be expressed for the following general reasons, with supporting data to follow:

- Selection of the alternatives appears to be arbitrary, or at least inadequately explained, in the DEIS.
- The No-Action Alternative is, in fact, an action alternative.
- Benefits to ESA listed anadromous fish (and also non-listed anadromous fish) are not demonstrated in the DEIS, even though this is the purpose of the proposed action(s).
- The geographic scope of the resource impact assessments of the DEIS are not consistent.
- The cumulative hydrologic effects of the proposed action(s) do not show the relative contribution of Banks Lake.
- The impacts to resident fish in Banks Lake of the proposed action(s) are underestimated.

Mr. Jim Blanchard
April 10, 2003
Page 2

- The impacts to the FCRPS hydropower capacity at Grand Coulee Dam, particularly peaking power ability related to the GCD Pump/Generator Plant are either not addressed or underestimated.
- The impacts of the proposed action(s) will diminish established economic and social benefits of the Columbia Basin Project with no assurance of off-Project ESA/environmental benefits.
- The proposed action(s) will introduce a further element of risk to the late season Columbia Basin Project irrigation water supply, albeit small, with no assurance of off-Project ESA/environmental benefits.

Enclosures (1), (2) and (3) are submitted as documentation in support of the above stated positions of the East District. In particular, Enclosure (1) is submitted to Reclamation in its entirety as a portion of the East District's comments to the referenced DEIS. That report, "Review of Draft Environmental Impact Statement On The Proposed Banks Lake Drawdown", April 2003, was prepared for the East, Quincy and South Columbia Basin Irrigation Districts and the Grand Coulee Project Hydroelectric Authority by Tetra Tech FW, Inc. Until recently that consulting firm was known as Foster Wheeler Environmental Corporation. Primary authors of that report are Mr. Thomas Martin, P.E. and Mr. John A. Knutzen, Aquatic Scientist. Your attention is directed to Attachment A of that report, "Lower Columbia River Modeled Salmonid Survival and Water Velocities Under Proposed Banks Lake August Drawdown Scenarios" by Chris Van Holmes and Dr. James Anderson, March 17, 2003. Dr. Anderson and Mr. Van Holmes are with Columbia Basin Research and are well experienced and widely accepted in mainstem modeling. This East District comment letter will only quote or reference portions of the Tetra Tech – Foster Wheeler report but reading the report and its attachments, in their entirety, is necessary to fully comprehend the deficiencies of the DEIS. 01

Enclosures (2) and (3) are Reclamation documents, portions of which will be referred to regarding hydropower peaking ability losses associated with the proposed action(s).

- **Selection of the alternative appears to be arbitrary, or at least inadequately explained, in the DEIS.** 02

While the DEIS discusses several scenarios related to the timing of accomplishing 5 ft. and 10 ft. drawdowns as well as similar timing scenarios for refill following the drawdown(s), it does not discuss or evaluate how the drawdown levels of 5 ft. and 10 ft. were selected. Were these quantified based on desired flow augmentation or fish survival outcomes at McNary Dam or below? That appears unlikely considering that the most aggressive drawdown scenario presented in the DEIS is estimated to increase flows at McNary by 7923 cfs (10 ft., early draft) doesn't sufficiently exceed the DEIS's flow uncertainty factor of 5000 cfs.

Were these drawdown levels quantified based on acceptable risk to late season CBP irrigation water supplies? Were these quantified based on acceptable impacts to FCRPS hydropower at Grand Coulee Dam, i.e. peaking ability and/or to District hydropower at Dry Falls Dam? Or, are the 5 ft. and 10 ft. drawdown levels the result of negotiation or bartering between the federal parties during the Section 7 consultation?

Mr. Jim Blanchard
April 10, 2003
Page 3

It doesn't appear likely that these drawdown levels were quantified based on minimizing the adverse impact(s) to Banks Lake itself and the immediate surrounding area. If that were the case, drawdown actions of less than 5 ft. and less than 10 ft. would have been selected. The discussions in Chapters 3 and 4 of the DEIS give ample support that lesser drawdown levels would have significantly lesser impacts to resident fish, recreation and Banks Lake area economies and communities. 02

If Reclamation proceeds to a final EIS and a record of decision, much more consideration and justification is needed regarding the selection of the appropriate drawdown levels for consideration.

- **The No-Action Alternative is, in fact, an action alternative.** 03

The FCRPS Biological Opinion RPA 23 and the No Action Alternative of the DEIS propose an August drawdown of Banks Lake by 5 feet to elevation 1565. This is, in fact, a federal action. Refer to Figure 2 of Appendix C of the DEIS, Hydrologic Report, and Enclosure (1) (page ES-2, pages 2, 3 and 42) which demonstrate that up to 2000 Banks Lake elevations in August exceeded 1565 about 95% of the time and exceeded 1568.5 about 80% of the time. The DEIS does describe the hydropower load following operation typically employed at the GCD P/G Plant. Enclosure (2) provides a detailed description of the load following operation. However, that operation rarely drops the reservoir to 1565 with elevations over the past 20 or so years usually being at 1568 or higher (See Figure 4, DEIS Appendix C). Also refer to page 3 of Enclosure (3) and page 42 of Enclosure (1) which discuss the need for Banks Lake to be above 1567.5 and 1568.5 (respectively) to enable operation of the P/G units at GCD.

It should also be noted that the hydropower load following operation typical of the past 20 years creates a weekly reservoir level cycle of about 2 ft. The proposed No Action Alternative results in a monthly reservoir cycle of 5 ft. (possibly a 6 or 7 week cycle when refill time is added on). Section 5 of Enclosure (1) which discusses resident fish issues indicates that the longer duration of this cycle will likely be significant for resident fish and their food chain. The East District does not challenge Reclamation's authority to operate Banks Lake at 1565. However, Reclamation and NOAA Fisheries are in error by implementing RPA 23 without some level of environmental analysis since historical operations have been well above that level and the drawdown cycle has been of shorter duration. If Reclamation proceeds to a final EIS and a record of decision this deficiency needs to be overcome either by further justification that 5 ft. is not a federal action or by adding a true no action scenario.

- **Benefits to ESA listed anadromous fish (and also non-listed anadromous fish) are not demonstrated in the DEEIS, even though this is the purpose of the proposed action(s).** 04

Reclamation has consistently stated throughout this study process that questions about the benefits of increased flows at McNary Dam for juvenile salmon survival are beyond the scope of the Bureau's duties and the only meaningful measure is Columbia River hydrology at McNary. The DEIS estimates that the 10 ft. drawdown will make it more likely to meet that 195 kcfs or 200 kcfs flow target only about 1 more year out of every 50 years. Even if all were to accept the relationship that this will improve salmon survival on that infrequent schedule,

Mr. Jim Blanchard
April 10, 2003
Page 4

does it justify the adverse economic and social impacts to Banks Lake communities in 50 years out of 50 years? 04

Enclosure (1) evaluates both the hydrology and hydraulics at McNary, and elsewhere, related to the various Banks Lake drawdown scenarios. Just as importantly, Enclosure (1) and its Attachment A estimate the resulting changes in juvenile fish survival. The East District contends that by omitting an analysis of the anadromous fish benefits, the DEIS is seriously flawed. 05

Enclosure (1) utilizes the CRiSP model to evaluate juvenile salmon survival benefits that should be expected from the proposed action(s). "The model results indicate that the effect on fish survival would be infinitesimal" (page ES-2). "A Banks Lake drawdown of 10 ft. from the early, late or uniform drawdown periods over August would increase the number of smolts reaching Bonneville Dam by between 6 to 13 smolts out of the total of 630,000" (pages 22 and A-5). 06

Few, if any, of these 6 to 13 juvenile fish would be Snake River fall chinook, the ESA listed species intended to benefit by the proposed action(s). "Over 90 percent of all sub yearling chinook salmon have passed McNary Dam by July 31. The same holds true for Snake River fall chinook salmon. Based on similar data, over 89 percent of the in-river migrants have passed Lower Monumental Dam by July 31" (page 22, also see Figures 3-6 and 3-7). 07

Enclosure (1) also evaluates water particle travel time and river velocity which are sometimes used as indicators of migration times for juvenile salmon. Attachment A uses the CRiSP model for these estimates. "The corresponding reduction in travel time between McNary and Bonneville Dams is at most one hour on a 9 day travel time." (page A-5). "But where effects were estimated the reduction was typically about 14 minutes of travel time in this reach out of a total travel time of an estimated 6 to 9 days" (pages ES-3 and 22). 08

Section 4 of Enclosure (1) uses hydraulic analyses to make similar estimates. "The approximate residence time through the three lower Columbia River reservoirs at 200,000 cfs is about 224.7 hours (see Table 4-2). With the maximum flow augmentation from Banks Lake, the approximate residence time would be about 216.1 hours..." (page 32). "With the maximum Banks Lake flow augmentation of 72923 cfs, the velocity increase at the 100,000 cfs and 318,000 cfs levels would be less that 0.05 fps..." (page 31).

Section 3 of Enclosure (1) discusses recent and current trends regarding Columbia River flow augmentation and its relationship to juvenile salmon survival. "Giorgi et.al (1997) did not find a relationship between flow and migration rate in the middle Columbia River" (page 5). From the Independent Science Advisory Board (ISAB 2003): "The prevailing flow-augmentation paradigm, which asserts that in-river smolt survival will be proportionately enhanced by any amount of water, is no longer supportable. It does not agree with information now available" (page 6). "Prior to the ISAB review, another major review evaluated the effects of flow augmentation, among other factors, affecting survival (Giorgi, et al. 2002)" (page 8). "Much of the information in the ISAB report was derived from a summary document prepared by Giorgi, etal. (2002)" (page 7). 09

Mr. Jim Blanchard
April 10, 2003
Page 5

Besides studies beginning to question the efficacy of flow augmentation, it is now becoming a regional policy question. "...the Northwest Power Planning Council (NPPC) in October 2002 developed new plans for the operation of the Federal Columbia River Power System (FCRPS) that are not based on attempts to meet the NMFS-directed goal of 200 thousand cubic feet per second (kcfs) at McNary Dam in July and August (NPPC 2002). The meeting of the flow target for August was the main reason that flows developed by RPAs 23 and 31 were included in the draft EIS. Specifically, the NPPC stated on page 30 of the Draft Mainstem Amendments to the Columbia River Basin Fish and Wildlife Program that "The Council does not support the NMFS 2000 BIOP spring and summer flow target due to lack of evidence that they are related to survival within the range of the operating agencies' control given reservoir and other system constraints." This position by the NPPC, a major regional planning agency, supports the need for greater detail in the EIS concerning the predicted effects to the resource of primary interest, anadromous fish of the Columbia River." (page 4) 10

If Reclamation proceeds to a final EIS and a record of decision the benefits for ESA listed anadromous fish should be evaluated (biologically and/or hydrologically) and measured against the impacts at Banks Lake to hydropower, irrigation, recreation, resident fish, economies and communities. This evaluation should also consider current views and trends in both the science and policy related to flow augmentation. The East District realizes that RPAs 23 and 31 were conceived prior to 2000, during a previous federal administration, when flow augmentation was in vogue. Those times may be passing.

- **The geographic scope of the resource impact assessments of the DEIS are not consistent.** 11

"The draft EIS is inconsistent in its treatment of the scope of the impacts. For the economic analysis, the area includes Grant County and the Federal Columbia River Power System (FCRPC) and five Public Utility Districts' hydro powerplants, but the fisheries analysis is limited to Banks Lake. The fisheries and water resources analyses should include the entire affected environment, which includes the lower Columbia River. There is no section in the "Affected Environment Chapter" of the draft EIS that describes water resources, and no section on the impacts to water resources, other than water quality in Banks Lake. A hydrologic report appears in Appendix C of the draft EIS, but it is not referenced in the main body of the document. Any EIS should address the resources that would likely be affected, either positively or negatively, regardless of their geographical location." (Enclosure (1), page ES-2)

If Reclamation proceeds to a final EIS and a record of decision these inconsistencies need to be corrected or at least the basis for the variations needs to be explained.

- **The cumulative hydrologic effects of the proposed action(s) do not show the relative contribution of Banks Lake.** 12

The DEIS makes the following statement: "While individually not significant in the overall flow of the Columbia River, the contribution to that flow by Banks Lake water, coupled with water from other sources, makes it possible to meet flow targets a majority of years" (page 4-45). However, the DEIS fails to demonstrate this contribution or to evaluate it comparatively.

Mr. Jim Blanchard
April 10, 2003
Page 6

"There should be some quantification of the flow augmentation contribution of the other RPAs and a comparison to the Banks Lake contribution. In the draft EIS, Reclamation simply refers to the Banks Lake drawdown as a small but important piece of the total flow augmentation plan for the Columbia-Snake River system. 12

The CRiSP model results showed the increase in fish survival in lower Columbia River due to Banks Lake flow augmentation relative to the cumulative effects of all of the flow augmentation RPAs implemented according to the 2000 BIOP. The model did not analyze the pre-2000-BIOP (no-action) conditions. A complete cumulative effects analysis would compare fish survival resulting from implementation of all other flow augmentation to that of implementing only the proposed Banks Lake drawdowns. 13

Furthermore, a complete analysis should show how the effects change farther downstream. By the time flow reaches the estuary, additional flow has entered the Columbia River from the John Day, Deschutes, Willamette and other rivers below Bonneville Dam, so that the relative contribution of any flow from Banks Lake would be diluted." (Enclosure (1) page ES-4). 14

The East District feels this cumulative effects comparison is important given the complexity of mainstem operations so that a true evaluation of mainstem benefits vs. Banks Lake impacts can be made. The DEIS assumes a 5000 cfs uncertainty factor at McNary relative to the 200,000 cfs flow target. The maximum proposed contribution by Banks Lake is 7923 cfs, not hugely different than the uncertainty factor. How does 7923 cfs compare to other flow augmentation actions in the upper Snake, the Clearwater or in Montana? Will operations elsewhere simply offset the Banks Lake contribution thus making the local impacts be all for nothing? 15

This cumulative effects analysis should also consider the Northwest Power Planning Council's proposed Mainstem Amendments. This comparison is done by Foster-Wheeler in Enclosure (1), Section 3.2.4, pages 9-15. Figures 3-1 and 3-2 on page 10 compare Banks Lake to Biop flows and the figures 3-3 and 3-4 on page 13 compare the NPPC proposal to Biop flows. The NPPC proposed changes are for the most part larger and in a contrary direction to the proposed Banks Lake action(s). "During the months of July and the first half of August under the average flow, the NPPC flows are lower than the BIOP flows by about 5,000 to 18,000 cfs (Figure 3-5). Even during low flow, the NPPC reduces flows in July and the first half of August by 18,000 cfs, but increases the flows in the second half of August by about 9,000 cfs. These reductions are in contrast to the expected average monthly contribution of about 2,100 to 4,200 cfs from Banks Lake under uniform drawdown (only about 2,100 cfs maximum over the BIOP because it already includes the flow from the first 5 feet of drawdown)" (page 12). 16

If Reclamation proceeds to a final EIS and a record of decision additional cumulative effects analysis needs to be included. Again, given that RPAs 23 and 31 were developed some time ago, this cumulative effects evaluation needs to question whether this proposed minor addition to flow augmentation is still timely, especially in view of the direction in which NPPC appears to be moving.

Mr. Jim Blanchard
April 10, 2003
Page 7

- **The impacts of the proposed action(s) to resident fish in Banks Lake are underestimated.** 17

On page ES-5 and in Section 5, pages 35-42, Enclosure (1) critiques the coverage of resident fish in the DEIS, including some inconsistencies between the Fish and Wildlife Coordination Act Report (Appendix A, DEIS) and the main body of the DEIS. Foster Wheeler concludes that the DEIS may be underestimating the impacts to resident fish in Banks Lake. A conclusion they reach is that the duration of the drawdown is a critical factor regarding resident fish and their food chain. The shorter the duration, the smaller the impact.

If Reclamation proceeds to a final EIS and a record of decision some reconsideration should be given to the analysis of impacts to resident fish. Also, shorter drawdown durations should be considered.

- **The impacts to the FCRPS hydropower capacity at Grand Coulee Dam, particularly peaking power ability related to the Pump/Generator Plant are either not addressed or underestimated.** 18

The DEIS in Chapters 3 and 4 does discuss the operation of the GCD P/G Plant, the FCRPS hydropower impacts, the mid-Columbia PUDs' Columbia River hydroplants and the CBP Districts' hydroelectric plant at Dry Falls Dam. The Chapter 3 discussion includes an explanation of the load following and peaking power operations at the P/G Plant. However, it appears that there is no analysis in Chapter 4 of the impacts to this peaking ability that would occur due to the proposed action(s).

It would appear that some diminishment of peaking ability will occur with both a 5 ft. or a 10 ft. drawdown. This peaking ability is an important asses to the FCRPS and the entire region.

Enclosure (3) was written by Reclamation in 1983 at about the time the 6 P/G units at GCD were being transferred to O&M status when the pumpback storage features and peaking ability were first being implemented. Page 3 of that document indicates a Banks Lake elevation of 1568.5 +/- 0.5' is necessary to generate with the P/G units. Enclosure (2) was written by Reclamation in January 2000 at a time when the P/G operations, load following operations and peaking capacity functions had matured. The "Discussion" portion of that document describes the value of the P/G plant's 900-mw load swing capability. Also described is the eight-fold increase in pump and P/G units starts and stops that have become necessary due to load following and peaking power operations. Enclosure (1) approximately confirms the Banks Lake level required for P/G unit generation with 1567.5 being the current bottom limit (page 42).

Load following can probably continue with either the 5 ft. or 10 ft. drawdowns. However, it appears that peaking ability will be diminished by 300 mw for either scenario due to the loss of P/G unit generation.

If Reclamation proceeds to a final EIS and a record of decision this diminishment in peaking power capacity needs to be evaluated both economically and operationally. Also, the DEIS's approach to evaluating hydropower impacts on the basis of the cost of purchasing replacement power needs to include some assurance that replacement power will be available, or have a contingency plan in the event it isn't. 2001 was only two years ago and replacement power was in very limited supply.

Mr. Jim Blanchard
April 10, 2003
Page 8

- **The impacts of the proposed action(s) will diminish established economic and social benefits of the Columbia Basin Project with little or no assurance of off-Project ESA/environmental benefits.** 19

Pages 4-27 through 4-33 of the DEIS describes the likely impacts of the proposed action(s) to Banks Lake area recreation, Banks Lake area businesses and to Banks Lake area communities. The loss of 10 of 12 boat launches for a 10 ft. drawdown, the dewatering of the navigation channels at Coulee City and Devil's Punch Bowl, the loss of the swimming beaches at Steamboat Rock and Coulee City, the dewatering of Osborne Bay and all the other resulting mud flats and bathtub ring will make Banks Lake unattractive to many visitors during the drawdown and refill periods. This resulting unattractiveness may extend over a longer period if potential visitors don't understand the true duration of the affected period. All of August and part of September is bad enough and blacks out a peak recreation period.

The DEIS somewhat callously glosses over the likely impacts to individual Banks Lake area businesses and communities by stating that "the overall economic impact on the Grant County economy is expected to be negligible. In 1999, Grant County's economy provided over 38,000 jobs and more than $900 million in earnings to workers." (page 4-30). That statement may be true but will be of little comfort to those individuals suffering the immediate impact. No doubt similar rationalizations have been used at other rural areas sacrificed to ESA such as Forks, Washington, Orofino, Idaho and Klamath Falls, Oregon.

Considering the small ESA benefit, 6 to 13 additional smolt surviving their migration through the lower Columbia, is this economic and community impact to the Banks Lake area justifiable? The Columbia Basin Project is authorized as a multiple purpose project and it has achieved a wide range of benefits. While the East District's fundamental interest is the irrigation purpose of CBP, the District and its waterusers benefit from all of CBP's multiple purposes. It appears that Reclamation is proposing to sacrifice a portion of the established CBP benefits in the Banks Lake area for infinitesimal ESA benefits elsewhere.

If Reclamation proceeds to a final EIS and a record of decision some consideration should be given to mitigating economic, recreational and community losses in the Banks Lake area. Also, if Reclamation finds itself compelled by superior federal authority to carry out some type of Banks Lake drawdown scenario, revision of the proposed action(s) may be appropriate. Referring to Figures 3-2 and 3-3 of the DEIS, it appears that Banks Lake elevations above 1562 will keep the Steamboat Rock and Coulee City boat launches usable which should tend to lessen negative recreation and economic impacts and also probably lessen impacts to resident fish. Alternate drawdown scenarios that stay above that level could be considered. Also, drawdown scenarios of shorter duration could be considered. Figures 3-6 and 3-7 and the associated explanatory text of Enclosure (1) (pages 14-15) demonstrate that the vast majority of in-river migrants have passed McNary Dam by July 31st and most of the remaining late migrants have passed by August 15. Drawdown scenarios limited to the first week or two of August would better fit the actual migration situation and would also lessen recreation, economic and resident fish impacts at Banks Lake. Another possible modification to any drawdown scenario could be to carry them out only in especially dry, low flow years.

20

21

Mr. Jim Blanchard
April 10, 2003
Page 9

- **The proposed action(s) will introduce a further element of risk to the late season Columbia Basin Project water supply, albeit small, with little or no assurance of off-Project ESA/environmental benefits.** 22

The proposed 10 ft. drawdown would leave Banks Lake about 2/3 full at some point in August which amounts to about 1/5 of a season's irrigation supply. In a typical year about 1/6 of the season's supply is delivered during September and October. Another 1/6 is typically delivered during August. Whether the proposed 10 ft. drawdown threatens the reliability of late season irrigation supplies for CBP depends on when during August the drawdown is accomplished and how soon after August pumping and refill resumes. The pumps and pump/ generators at Grand Coulee clearly have the capacity to catch up if they are allowed to pump and if they don't suffer any catastrophic breakdowns.

But let's remember the recent record. In 2000, a late summer fire in Grand Coulee's left powerhouse idled the P/G Plant for a period of time and then left it with diminished capacity for the balance of the season. In 2001, a cascade of electrical and mechanical breakdowns in the P/G Plant left us with only 25% of normal pumping capacity for an extended period. If it weren't for that being the season that the BPA irrigation buyback fallowed 15% of the Project there would have been a serious drawdown, well over 10 ft., that year. Then in 2002, when refill following the 5 ft. drawdown was supposed to happen beginning Labor Day weekend, Reclamation and the Biop's Technical Advisory Team independently decided to leave Banks Lake down 5 feet for September too to accomplish certain Montana reservoir operations. The past 3 years don't inspire much trust or confidence.

Another concern of the East District is the established track record in the northwest of ESA requirements being systematically and incrementally ratcheted in their severity, through both subsequent Section 7 consultations and third party lawsuits. The East District recalls that several years ago only a 5 ft. Banks Lake drawdown was being proposed. Now a 10 ft. drawdown is being studied. Where will this end?

If Reclamation proceeds to a final EIS and a record of decision the proposed action(s) should be conditioned such that the extent and duration of any drawdown will be modified to recognize any existing or foreseeable pumping limitations at Grand Coulee. Also, it should be an absolute constraint that refill will take place immediately following any drawdown, regardless of circumstances elsewhere in the FCRPS, or elsewhere in the Columbia River system.

- **Conclusion** 23

In conclusion, the East District strongly recommends that Reclamation not proceed to a final EIS and that it issue a record of decision, or other appropriate notice, at this time rejecting both the No Action and Action Alternatives and that Banks Lake operations will revert to the pre-2000 norm. Such a decision is appropriate given the information gathered to date, specifically that the local Banks Lake adverse impacts identified in Reclamation's DEIS are severe compared to the infinitesimal ESA/environmental benefits identified by Enclosure (1).

Such a decision will have the effect of completing or terminating RPAs 23 and 31 of the 2000 FCRPS Biological Opinion. That action is supportable by the information gathered to date.

Mr. Jim Blanchard
April 10, 2003
Page 10

The East District is prepared and willing to support Reclamation, to the extent we are able, in implementing and defending such a decision. 23

Finally, the East District recognizes that infrequent drawdowns of Banks Lake for maintenance or construction purposes will continue to be necessary. The last one was in 1994. The DEIS does provide important information to better manage future drawdowns of that type. Those need to be planned well in advance and coordinated to simultaneously satisfy all foreseeable maintenance and construction needs in order to keep drawdowns as infrequent as possible.

Thank you for your consideration.

Sincerely,

Richard L. Erickson
Secretary-Manager

RLE:jd

Enclosures

cc: Directors
Attorney
SCBID
QCBID
GCPHA

REVIEW OF DRAFT ENVIRONMENTAL IMPACT STATEMENT ON THE PROPOSED BANKS LAKE DRAWDOWN

Prepared for

East Columbia Basin Irrigation District
Quincy-Columbia Basin Irrigation District
South Columbia Basin Irrigation District
Grand Coulee Project Hydroelectric Authority

Prepared by

TETRA TECH FW, INC.

April 2003

ISO 14001

EXECUTIVE SUMMARY

On behalf of the East, South, and Quincy-Columbia Basin Irrigation Districts and the Grand Coulee Project Hydroelectric Authority (the Districts), Tetra Tech FW, Inc. (TtFW) reviewed and prepared comments on the Draft Environmental Impact Statement on the proposed Banks Lake Drawdown (draft EIS), which was prepared by the U.S. Bureau of Reclamation (Reclamation) in January 2003. The review focuses on the fish and flow issues related to the Proposed Action, which is the Reasonable and Prudent Alternative Action 31 (RPA 31) of the Biological Opinion (BIOP) for the Federal Columbia River Power System issued in December 2000 (NMFS 2000a). RPA 31 recommends study of an additional 5-foot drawdown of the lake level below the 1,565-foot level, which is 10 feet below full pool, during August.

A briefing on the main themes emphasized in the review comments is included in this Executive Summary. The Districts are concerned that the proposed 10-foot drawdown is certain to create adverse environmental and economic impacts, but is not certain to create any benefits. There are five main themes identified in this review:

- The No-Action Alternative is an action, and is different than current operations.
- Benefits to anadromous fish in the lower Columbia River were not demonstrated.
- The geographic scope of the resource impact assessments were inconsistent.
- The cumulative effects did not show the relative contribution of Banks Lake.
- Impacts to resident fish in Banks Lake were underestimated.

Issues related to each of the five main themes are summarized below. Because the draft EIS did not demonstrate benefits to fish in the lower Columbia River that could result from Banks Lake flow augmentation, an analysis of the potential benefits was conducted for this review using the CRiSP model. The model computed fish survival in the lower Columbia River for the 2000 BIOP. This scenario represented the baseline condition to which the various Banks Lake flow augmentation scenarios were compared. It is important to note that drawdown of the upper 5 feet of Banks Lake during August is included in the 2000 BIOP; therefore, the effects of this action, and all other flow augmentation RPAs implemented according to the 2000 BIOP, are included in the baseline condition. No other issues were further analyzed for this review, except to compare CRiSP-computed water velocities with actual measurements.

EXECUTIVE SUMMARY (CONTINUED)

No-Action Alternative

Reclamation considered the No-Action Alternative to be the 5-foot drawdown of Banks Lake, which was proposed under RPA 23 of the 2000 BIOP. The operation of Banks Lake under the No-Action Alternative is different than pre-2002 operations. The No-Action Alternative is not a true representation of no action because, historically, the lake in August has been above 1,565 feet 95 percent of the time. There is no assessment of this normal condition.

Additionally, there is no discussion in the draft EIS for the rationale behind the selection of a 5- and 10- foot drawdown. Reclamation does not present a master manual for the operation of the lake in the draft EIS. If such a manual existed, it would have provided a clear description of the No-Action Alternative. The selection of the no-action and action drawdown levels appear to be arbitrary. An analysis of the impacts of a lesser drawdown would provide better resolution of the change in impacts with drawdown below historical levels.

Lower Columbia River Anadromous Fish

The draft EIS lacked a demonstration of effects of fish in the lower Columbia River that would be derived from flow augmentation provided by a Banks Lake drawdown. The area that was to have been positively affected was not addressed in the draft EIS. This area is the lower Columbia River (downstream of McNary Dam). Reclamation focused the draft EIS on the immediate area surrounding Banks Lake. As part of this review, the effects of flow augmentation from the 10-foot drawdown of Banks Lake on fish survival in the lower Columbia River were analyzed. The CRiSP model was used for this analysis. The model results indicate that the effect on fish survival would be infinitesimal. Therefore, there is great uncertainty about the ability of the Proposed Action to achieve the intended benefit.

The following are the main points regarding the benefits of flow augmentation from a 10-foot drawdown of Banks Lake:

- The timing of the Banks Lake drawdown is such that most of the fish that would be intended to benefit from the flow augmentation would not be present in the lower Columbia River during the period of increased flows. The vast majority of the fish migrate through the lower Columbia River during June and July, but the drawdown would occur one month later, during August.

EXECUTIVE SUMMARY (CONTINUED)

- The benefits of any flow augmentation, in general, for the subyearling chinook salmon in the mid- and lower Columbia are in question based on recent analysis and interpretation of flow effects (ISAB 2003). The Independent Science Advisory Board (ISAB) (2003) stated that the assumption of proportional survival benefits of flow could not be supported. For subyearling chinook salmon in the mid-Columbia, ISAB indicated that no variable was found to correlate with migration speed. Additionally, ISAB did not believe that incremental flow as now mandated would result in "dramatic benefits" to inriver smolt survival.
- CRiSP model results indicate that none of the Banks Lake alternatives increase estimated subyearling chinook salmon survival, relative to the estimated survival of the 2000 BIOP, by more than 0.006 percent. This is an increase in estimated smolt survival of less than one fish for every 10,000 smolts beginning the migration.
- CRiSP model results indicate that fish travel time, another factor often considered important in survival, would not be affected at all in the reach between McNary Pool and Bonneville Dam for most simulations. But where effects were estimated, the reduction was typically about 14 minutes of travel time in this reach out of a total travel time of an estimated 6 to 9 days.
- The regional managers at the NPPC are considering flow changes, including deviations from the BIOP-recommended flows, that would be much greater than those proposed in the Banks Lake alternatives. These changes would result in reduced flow in the lower Columbia River reach during much of the period when juvenile subyearling chinook salmon would be migrating through this region, including part of August when Banks Lake flows are to be released. The current NPPC position is that these changes would be adequate to protect the anadromous endangered fish species of the Columbia River.

As part of this review, the impact of flow augmentation from Banks Lake drawdown on water particle travel time through the lower Columbia River was analyzed. The U.S. Geological Survey (USGS) computed discharge from measurements taken on the Columbia River downstream of The Dalles. Velocity measurements were comparable to the velocities computed by the CRiSP model, which verified the model estimates of velocity. Also, water particle travel time was estimated using reservoir data from the HEC-5Q model of the Columbia River. These estimates also verified the CRiSP model estimates of velocity and water particle travel time.

EXECUTIVE SUMMARY (CONTINUED)

Inconsistent Geographic Scope

The draft EIS is inconsistent in its treatment of the scope of the impacts. For the economic analysis, the area includes Grant County and the Federal Columbia River Power System (FCRPC) and five Public Utility Districts' hydro powerplants, but the fisheries analysis is limited to Banks Lake. The fisheries and water resources analyses should include the entire affected environment, which includes the lower Columbia River. There is no section in the "Affected Environment Chapter"of the draft EIS that describes water resources, and no section on the impacts to water resources, other than water quality in Banks Lake. A hydrologic report appears in Appendix C of the draft EIS, but it is not referenced in the main body of the document. Any EIS should address the resources that would likely be affected, either positively or negatively, regardless of their geographical location.

Cumulative Effects

There are two key issues related to cumulative effects: the contribution of Banks Lake to the total flow augmentation specified in the 2000 BIOP, and the latest ISAB opinion on the benefits of flow augmentation. As mentioned above, the ISAB has stated that the assumption of proportional survival benefits of flow could not be supported. The ISAB position obviously casts doubt on the usefulness of flow augmentation. Nevertheless, the other issue of relative contribution should have been addressed in greater detail in the draft EIS. There should be some quantification of the flow augmentation contribution of the other RPAs and a comparison to the Banks Lake contribution. In the draft EIS, Reclamation simply refers to the Banks Lake drawdown as a small but important piece of the total flow augmentation plan for the Columbia-Snake River system.

The CRiSP model results showed the increase in fish survival in lower Columbia River due to Banks Lake flow augmentation relative to the cumulative effects of all of the flow augmentation RPAs implemented according to the 2000 BIOP. The model did not analyze the pre-2000-BIOP (no-action) conditions. A complete cumulative effects analysis would compare fish survival resulting from implementation of all other flow augmentation to that of implementing only the proposed Banks Lake drawdowns.

Furthermore, a complete analysis should show how the effects change farther downstream. By the time flow reaches the estuary, additional flow has entered the Columbia River from the John Day, Deschutes, Willamette and other rivers below Bonneville Dam, so that the relative contribution of any flow from Banks Lake would be diluted.

EXECUTIVE SUMMARY (CONTINUED)

Resident Fish

Resident fish and their associated habitat are one of the major resources that will be affected by the alternatives. In general, Reclamation describes the existing condition of a broad range of resources and potential impacts to these resources. However, it appears that the magnitude and risk of impacts to these resources may be more severe than characterized in the draft EIS. The main points of the review are noted below:

- The impacts that would result from the No-Action Alternative scenarios need to be discussed more fully. In several areas, the effects of these scenarios are not differentiated from historical operations (see Section 2 of this document).
- Some of the No-Action Alternative scenarios have the potential to adversely affect submergent and emergent vegetation compared to historical operations. These adverse affects would result from exposure of area where this vegetation grows from 21 to more than 30 days. This exposure would reduce any benefit to fish resources. Benthic resources, important as food for fish, would also be affected by "No-Actions," although at a lower level than would occur under the 10-foot drawdown associated with the Action Alternative scenarios.
- The Action Alternative scenarios pose a greater risk of adverse effects to lake fish resources. Some vegetation would be adversely affected, juvenile fish would be subjected to greater predation from a loss of habitat during a period of high-food demand, and the overall habitat area will be reduced, at least for the short term.
- The level of effects of the Action Alternatives on fish appears to be greater than noted in the draft EIS, as indicated by statements in the USFWS CAR report.
- Summary tables need to include the impacts of the No-Action Alternative scenarios as well as the Action Alternative scenarios.
- The proposed mitigation (e.g., studies of effects, use of hatchery, fish habitat enhancement) may not be adequate to offset impacts.

There is one final issue, which primarily relates to resident fish, but it also is important to other resources within Banks Lake. The issue is the duration of drawdown. The duration is directly proportional to the amount of impact. The draft EIS indicates a range of target dates for refilling the lake: from early September to late November. The impact of longer durations should be addressed in the final EIS.

CONTENTS

TABLES

FIGURES

1. INTRODUCTION

This report is an independent third-party technical review of the Banks Lake Drawdown Draft Environmental Impact Statement (draft EIS), which was prepared by the U.S. Bureau of Reclamation (Reclamation) in January 2003. Tetra Tech FW, Inc. (TtFW) (formerly Foster Wheeler Environmental Corporation) was retained by the East Columbia Basin Irrigation District, Quincy-Columbia Basin Irrigation District, South Columbia Basin Irrigation District, and the Grand Coulee Project Hydroelectric Authority (the Districts) to conduct this review and to prepare this report. The review focuses on fish and flow issues related to the Proposed Action, which is Reasonable and Prudent Alternative Action 31 (RPA 31) of the Biological Opinion (BIOP) for the Federal Columbia River Power System issued in December 2000 (NMFS 2000a). RPA 31 recommends study of an additional 5-foot drawdown of the lake level below the 1,565-foot level, which is 10 feet below full pool, during August of each year.

Five categories of issues concerning the draft EIS are identified and discussed in Sections 2 through 6 of this report:

- Alternatives Development
- Anadromous Fish
- Water Particle Travel Time
- Resident Fish
- Other Issues

Section 3, "Anadromous Fish Issues," refers to an additional analysis, the results of which appear in Attachment A of this document.

Section 4, "Water Particle Travel Time Issues," includes an analysis in addition to comments on the draft EIS, in accordance with the contract scope of work.

The page numbers shown in italics in the following sections refer to page numbers of the draft EIS.

2. ALTERNATIVE DEVELOPMENT ISSUES

Page 1-1

The draft EIS states that "under current historical August operations, the reservoir may be lowered from its maximum elevation of 1,570 feet to a minimum elevation of 1,565 feet." However, on p. 2-1, it states that "Banks Lake has always been authorized to operate between full pool elevation of 1,570 feet and a minimum elevation of 1,545 feet at any time of the year." There is no clear information presented to indicate what operating manual or operating "instrument" would be modified by a new "decision" contemplated in the draft EIS. Given that Reclamation apparently has the authority to draw the reservoir down to as low as 1,545 feet, there is no information presented concerning why the recent change in operations that has Reclamation operate Banks Lake at an elevation 5 feet below full during August (RPA 23) (to elevation 1,565) is not considered an action in this EIS, but somehow the next 5 feet (to elevation 1,560) does constitute a federal action requiring an EIS.

Page 1-2

The Scope section states that the "area included in the draft EIS consists of the actual lake and its surrounding areas." This is not the same as the area affected by the Proposed Action. According to the National Environmental Policy Act (NEPA) and Council on Environmental Quality (CEQ) guidance, an EIS should address the resources that would likely be affected, either positively or negatively, regardless of their geographic location. On page 3-34, under "Regional/Local Economy," Grant County was "selected as the affected area for this study." However, the lower Columbia River would clearly also have to be "affected" by the action and thus resources in that "area" should be described and the effects on those resources analyzed.

The bulleted list described as issues identified during scoping are not issues. It is instead a list of resource topics. The issues under each topical area need to be called out so one can see the connection to the alternatives and mitigation.

Page 1-5

RPA 23 of the BIOP specifically directs Reclamation to operate Banks Lake at an elevation 5 feet below full pool during August, but this very relevant activity is not mentioned or described in the "Other Related Actions and Activities" section of Chapter 1. The 2002 Water Management Plan specifically called for a summer draft of Banks Lake to elevation 1,565 feet by the end of August to provide more water for summer flow augmentation (U.S. Army Corps of Engineers, Northwest Division, May 22, 2002).

Pages 2-1 to 2-8

While Banks Lake has often been drawn down to 1,565 feet, the proposed operating manner for which this level is being considered differs from what has occurred in the past (see Appendix C, Figures 2 through 5). Historically, the lake in August has been above 1,565 feet 95 percent of the time. In fact, the elevation has been within 1 foot of full pool 75 percent of the time (Appendix C, Figure 2). While the draft EIS indicates that operation to 1,565 feet is "normal" for August, the manner, frequency, and duration that the lake would be drawn down to this level all differ markedly from historical operations. While Reclamation does assess the effects of the No-Action and the Action Alternatives, it does not supply an alternative that is representative of historical operations. The No-Action Alternative appears to be based on the directive of the BIOP (NMFS 2000a). RPA 23 indicates that Reclamation would operate Banks Lake with the 5-foot drawdown as specified in the No-Action Alternative. RPA 23 was not noted in the Draft EIS as an action that Reclamation is taking to comply with the BIOP. While the inclusion of an additional alternative may not be required, such an alternative could help better define the range of options that could occur at Banks Lake, especially since drawing the reservoir down to just 1,565 feet does have potential adverse effects within the system (see comments below).

3. ANADROMOUS FISH ISSUES

The whole purpose of the actions being considered in the draft EIS is to benefit downstream anadromous fish stocks of the Snake and Columbia Rivers that are listed as threatened or endangered under the Endangered Species Act (ESA). However, Reclamation chose to not address the details and depth of the potential effects of the Proposed Action on these anadromous fish. Therefore, this section is provided primarily as a source of information to help Reclamation address this critical issue so that the analysis in the EIS will be more complete. In this section, we have provided: 1) a section addressing the NEPA requirements for this analysis, 2) the background of what the historical and current information indicates about the effects of flow on the stocks of interest, 3) the methods available to quantitatively assess these effects, 4) the current thinking about the need for flow in the river at this time, and 5) a state-of-the-art quantitative model estimate of the effects that Reclamation's actions would have on anadromous stocks.

3.1 NEPA AND BIOLOGICAL OPINION DIRECTIVES

One of the requirements of NEPA is to disclose the direct and indirect effects, both positive and negative, of a proposed action. Reclamation's NEPA Handbook (Reclamation 2000) states that "the analysis should be in sufficient detail to determine if any significant impacts would result from the action." The draft EIS does not achieve this requirement for fish resources, specifically anadromous fish resources in the Columbia River system. While there are topical references to the effects on these resources, the presentation should be greatly enhanced to meet NEPA requirements.

As stated in the draft EIS, the purpose of the Proposed Action is to meet the directive of RPA 31 in the NMFS BIOP. Since the whole purpose of this RPA is to benefit listed anadromous fish species, the benefits need to be fully disclosed to allow managers, as well as the public, to weigh all effects of the considered actions. Without supplying this information, as required under NEPA guidelines, the analysis is not complete.

The draft EIS does note that the proposed flow augmentation in August is to benefit primarily Snake River fall chinook salmon. It also states that there is some "uncertainty" surrounding the benefits for fish survival, but does not elaborate on these environmental effects. It does not attempt to quantify the "benefits" or explain the controversy in a more quantitative or more detailed qualitative manner than the two paragraphs supplied on page 4-18. One of the main purposes of NEPA is to "insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken" (40 CFR 1800 1(b)). This is especially important in light of information that has been developed since the RPAs were issued by NMFS. For example, the Northwest Power Planning Council (NPPC) in October 2002 developed new plans for the operation of the Federal Columbia River Power System (FCRPS) that are not based on attempts to meet the NMFS-directed goal of 200 thousand cubic feet per second (kcfs) at McNary Dam in July and August (NPPC 2002). The meeting of the flow target for August was the main reason that flows developed by RPAs 23 and 31 were included in the draft EIS. Specifically, the NPPC stated on page 30 of the Draft Mainstem Amendments to the Columbia River Basin Fish and Wildlife Program that "The Council does not support the NMFS 2000 BIOP spring and summer flow target due to lack of evidence that they are related to survival within the range of the operating agencies' control given reservoir and other system constraints." This position by the NPPC, a major regional planning agency, supports the need for greater detail in the EIS concerning the predicted effects to the resource of primary interest, anadromous fish of the Columbia River.

3.2 DOWNSTREAM FLOW EFFECTS ON ANADROMOUS STOCKS

There are varying and sometimes conflicting sources of information about the benefits to summer migrating subyearling chinook salmon from flow augmentation. The relevant information needs to be summarized in the EIS. Flow is often considered relative to its effects on water particle travel time through the river reservoirs. This parameter is often used as a measure of effects on migrating fish. The effects of the alternative flows on water particle travel time are presented in Section 4. While we have not attempted to develop a complete picture of the effects of flow on survival, we have provided a summary of the relevant information below. We hope Reclamation finds this of use in completing the Final EIS.

3.2.1 ORIGINAL RATIONALE FOR SUMMER FLOWS FOR SUBYEARLING CHINOOK SALMON

The main thinking behind the need for flows in the summer was discussed in the National Marine Fisheries Service (NMFS) white paper addressing flow effects on survival in the Columbia River basin (NMFS 2000b). The majority of the studies cited in the white paper address fall chinook salmon in the Snake River. NMFS noted several studies, particularly on Snake River passage, that found a significant correlation of the migration rate of fall chinook salmon with flow (Berggren and Filardo 1993, Berggren 1994). However, Giorgi et al. (1997) did not find a relationship between flow and migration rate in the middle Columbia River.

One of the characteristics of subyearling chinook salmon that affects the interpretation of results, especially those concerning flow, is the fact that, unlike yearling smolts, subyearlings are rearing in the systems, not just outmigrating. But many of the results concerning travel time and flow have been conflicting for subyearlings. In particular, the relationship of flow, water temperature, fish length, and release date have all correlated significantly at times with migration rate in both the mid-Columbia and Snake River. On the Snake River, turbidity also correlated with migration rate (Muir et al. 1999). But correlation among the variables makes it difficult to determine what specific parameter affects movement.

The question of survival followed somewhat similar patterns in the data reviewed. Generally, on an annual flow basis, in-river survival of fall chinook salmon in the Snake River increased with increased flow, decreased with increased temperature, and increased with increased turbidity. Again, correlation among the parameters made interpretation of the effects impossible. However, within-year survival correlations with flow (1995 to 1998) were less clear, although often significant with these same factors. Some data from

Priest Rapids suggested that there was a significant relationship between the number of returning adults of subyearling chinook salmon outmigrants and flow, but when the data were reanalyzed, they were not sufficient to draw this conclusion (Hilborn et al. 1993, Skalski et al. 1996). The result is that movement is affected not only by the physical conditions to which to which subyearlings are exposed but also by their state of development and readiness to migrate.

The review conducted by NMFS (2000b) in its white paper concluded: "Evidence for survival benefits to fall chinook salmon from flow management is supported by research results. Data sets consistently demonstrate strong relationships between flow and survival, and temperature and survival. Thus, with the existing project configuration and outmigration timing, additional flow augmentation to benefit Snake River fall chinook salmon would likely increase survival." However, as indicated, the review was directed at Snake River fall chinook salmon and enhanced flows within the Snake River. This document was a primary basis for the recommendations for flow augmentations activities in the NMFS BIOP for the FCRPS.

3.2.2 RECENT INFORMATION

Since the development of the NMFS BIOP, a number of studies, particularly those using PIT tag data, have advanced the knowledge of the effects of augmentation flows on fall chinook salmon. While the picture is still not clear, the benefits of augmentation flows for fall chinook salmon appear to be more well defined and are less critical than portrayed in earlier documents. The primary example of the advance in the state of the knowledge concerning the benefits of flow augmentation is found in the Independent Science Advisory Board's (ISAB's) *Review of Flow Augmentation: Update and Clarification* (ISAB 2003). This document addresses questions specifically directed at the NPPC's consideration of modifying the flow operations of the FCRPS and cites many of the newer studies that cover the effects of flow on survival. Here too, most of the studies on which the ISAB based its assessment concerned data from Snake River stocks, with little data concerning middle or lower Columbia River fish. This document states that "The prevailing flow-augmentation paradigm, which asserts that in-river smolt survival will be proportionally enhanced by any amount of water, is no longer supportable. It does not agree with information now available." This statement sets the stage for the ISAB's new assessment of the effects of flow, particularly flow augmentation, on smolts.

Specifically addressing subyearling chinook salmon in the mid-Columbia, the ISAB stated, "For subyearling chinook salmon, no environmental variable was found to affect migration speed in the mid-Columbia." The document noted that there were only limited data on the mid- and lower Columbia regions. It also noted that: "The studies to date do not indicate any statistically significant effect of flow on survival of juvenile salmonids in the mid-Columbia Reach, other than Hanford Reach, where stable flows are an issue." Much of the information in the ISAB report was derived from a summary document prepared by Giorgi et al. (2002). ISAB did not specifically address the issue of flow enhancement from the Columbia River on Snake River fall chinook salmon.

In addition, the ISAB document noted two other factors that could influence survival in the lower Columbia that are affected by flow. ISAB noted that temperature strongly influenced survival of subyearling chinook salmon. It also identified the timing of arrival at the Columbia River estuary as a factor that might affect survival. Addressing the potential benefits of augmentation on the estuary, ISAB stated, "the effects of the current management of flow augmentation on subsequent estuary and ocean survival are unknown."

Concerning the relationship of flow to survival for fall chinook salmon in the Snake River, ISAB presented information from Berggren of the Fish Passage Center (Berggren 2000) that indicated a curvilinear relationship between survival and flow from release points to the Lower Granite tailrace (not the hydrosystem pools below the tailrace). ISAB noted that there may be a "break point" below which survival may be affected by flow and estimated that the break point in the Snake River may be in the range of 40 to 50 kcfs. The ISAB study concluded that the reduction in summer flows considered by the NPPC would result in discernable reductions in fall chinook salmon survival. The study noted, however, that the effects on survival of peaking operations at dams might be as important as flow augmentation during these periods.

In response to questions concerning the mandated flow augmentation, ISAB stated: "Based on a literal interpretation of studies reviewed, incremental flow augmentation of the magnitude presently mandated within a year is not likely to have dramatic beneficial effect on in-river smolt survival of out migrants. This conclusion holds for most likely yearling chinook and perhaps fall chinook salmon."

ISAB addressed another issue of importance to the Banks Lake operation. When asked about the effects of drawdown on storage reservoirs in the Columbia System that are being used to supply augmentation water, ISAB noted that drawdown has an adverse effect on reservoir fisheries and that the needs of anadromous fish and resident fish need to be balanced. ISAB pointed out that the larger and more severe the drawdown, the more severe the effects.

In its conclusion about the NPPC flow scenario, ISAB made another important statement that may relate to the considered actions, noting that the flow reductions in the summer considered by the NPPC might result in reductions in survival of fall chinook salmon.

Prior to the ISAB review, another major review evaluated the effects of flow augmentation, among other factors, affecting survival (Giorgi et al. 2002). This review relied primarily on information from Muir et al. (1999), Conner et al. (1998), and Giorgi and Schlecte (1997) concerning augmentation effects on fall chinook salmon. As noted above, temperature and turbidity were important factors correlated with survival that could not be separated from flow. However Giorgi et al. noted that a CRiSP model evaluation estimated benefits of flow augmentation on annual fall chinook salmon survival over a 5-year period (1991 to 1995). The model results estimated that the total increase in overall survival during passage from Lower Granite Dam to Ice Harbor Dam was less than 1.5 percent for fall chinook salmon as result of all flow augmentations. The authors noted that this conclusion might change if the analysis were conducted using more recent data and models. However, the conclusion regarding the small increase in survival of fall chinook salmon gives some perspective on the likely benefits of flow augmentation. The implication would be that small amounts of flow augmentation would have very low, if any, effects on overall survival.

3.2.3 MODELS FOR ESTIMATING EFFECTS OF ACTIONS

Because of the complexity of multiple actions within the FCRPS and the need to quantify the effects of a host of actions on the anadromous species of interest, various fish passage survival models have been developed by various groups. The most prominent models that have been most recently used have included FLUSH, CRiSP, and SIMPAS juvenile passage survival models. FLUSH was developed by state and Tribal entities. CRiSP was developed by University of Washington researchers and SIMPAS by NMFS. We will not attempt to describe in detail the differences among the various models but will note that they vary in the way they evaluate the effects of different parameters, for example, flow, temperature, dissolved gas saturation, and spill. In general, CRiSP is the most complex (i.e., it uses more variables) and SIMPAS the least complex. Versions of FLUSH and CRiSP were used most extensively to aid in evaluation of the potential effects of removal of the Snake River dams. In addition to using other models, NMFS used SIMPAS primarily for the 1995 and 2000 BIOPs on the FCRPS to determine the effects on all of the listed anadromous stocks in the Columbia River system.

While each of these models has a different way of analyzing the effects of actions on the system, any of them could estimate the likely effects of the actions being considered as part of the Banks Lake drawdown. The results of recent uses of the CRiSP and SIMPAS models were used to assess actions considered by the NPPC in Fall 2002. One of the key differences between the two models is that SIMPAS does not have a direct flow component in the model while CRiSP does. Suzumoto (2002) described how the SIMPAS model addressed the affects of flow changes. He indicated that reservoir survivals are fixed, based on past empirical data independent of flow. The only effect flow has on survival in this model is how fish are routed through dams. The survival changes that occur in this model are a result of fish taking different routes through a dam (e.g., there is greater mortality of fish that pass through turbines compared to those going over spillways). Suzumoto noted, "Other regionally developed juvenile passage models may be better suited to analyze flow effects." That is one of the reasons the CRiSP model was also used in the NPPC analysis of its proposed flow scenarios for the Snake and Columbia Rivers.

3.2.4 RELATIVE FLOW OF BANKS LAKE ALTERNATIVES AND NPPC ALTERNATIVES

The draft EIS noted that the relative change in flow in the lower Columbia River in August would be small, in the range of 1 to 2 percent, as a result of the alternatives considered. These changes are presented in Table 3-1 of Appendix C and in the text of the draft EIS. We have shown how these changes would appear in the Columbia River at McNary Dam compared to average and low-flow conditions based on outputs from the HYDROSIM models. We used the 1977 water year as representative of low flow and the average of the modeled 50-year period to represent the average flow conditions. We have presented how the No-Action Alternative with uniform drawdown and the Action Alternative with uniform drawdown compare to the BIOP flows without any Banks Lake contribution. The model of BIOP flows was based on HYDROSIM data received from the NPPC (personal communication, John Fazio, Hydrologist, NPPC, February 20, 2003). The average and low-flow years are shown in Figures 3-1 and 3-2 of this report. These figures show how the additional flow from Banks Lake would affect average monthly flows, assuming that no Banks Lake water would be contributed to the BIOP flows (e.g., BIOP w/o Banks in the figures). We have also estimated the change in flow for August for all of the alternative scenarios. These estimates appear in Table 3-1. As can be seen, the overall effect of flow is slight at McNary Dam, even during lowest flow years. For the No-Action Alternative, the range of monthly flow changed is 0 percent to less than 2 percent for any scenario, including the low-flow conditions. The increase at

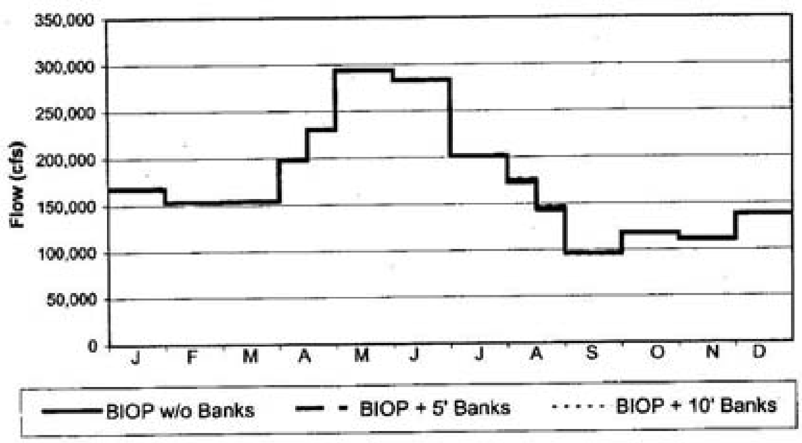

Figure 3-1. McNary Dam Average Flow under the BIOP Flows (without Banks Lake Flow) and Banks Lake Uniform 5- and 10-Foot Drawdown

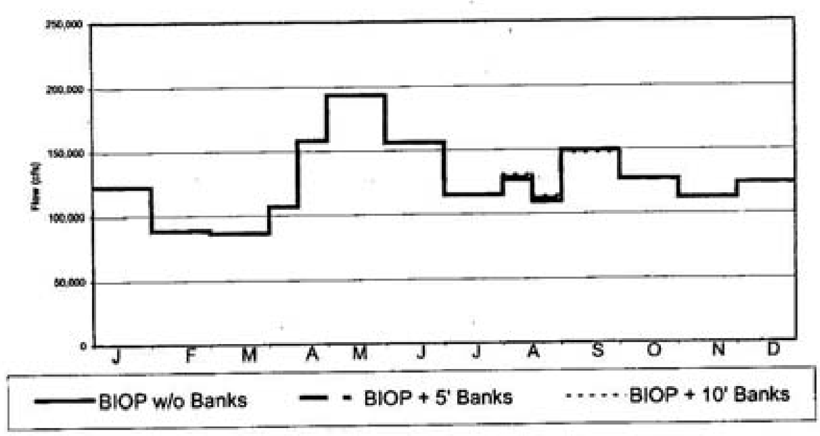

Figure 3-2. McNary Dam Low Flow (1977 Modeled) under the Modeled BIOP Flows (without Banks Lake Flow) and Banks Lake Uniform 5- and 10-Foot Drawdown

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Table 3-1. Flow Contribution at McNary Dam from Banks Lake Drawdown Alternative Scenarios for Low-Flow (1977) and Average Years (1929 to 1978)

Alternative	Scenario	Flow Year	Flow (cfs) Additions to BIOP		Flow (cfs) for BIOP w/o Banks			Flow (cfs) for BIOP + Banks			% Flow Increase with Banks		
			Aug 1-15	Aug 16-31	Aug 1-15	Aug 16-31	Average	Aug 1-15	Aug 16-31	Average	Aug 1-15	Aug 16-31	Average
No Action	Low Water	1977	0	0	126,657	109,521	118,089	126,657	109,521	118,089	0.0	0.0	0.0
		All	0	0	172,115	142,626	157,370	172,115	142,626	157,370	0.0	0.0	0.0
	Uniform Draft	1977	2,173	2,173	126,657	109,521	118,089	128,830	111,694	120,262	1.7	2.0	1.8
		All	2,173	2,173	172,115	142,626	157,370	174,288	144,799	159,543	1.3	1.5	1.4
	Early Draft	1977	4,490	0	126,657	109,521	118,089	131,147	109,521	120,334	3.5	0.0	1.9
		All	4,490	0	172,115	142,626	157,370	176,605	142,626	159,615	2.6	0.0	1.4
	Late Draft	1977	0	4,209	126,657	109,521	118,089	126,657	113,730	120,194	0.0	3.8	1.8
		All	0	4,209	172,115	142,626	157,370	172,115	146,835	159,475	0.0	3.0	1.3
Action	Low Early	1977	4,275	0	126,657	109,521	118,089	130,932	109,521	120,227	3.4	0.0	1.8
		All	4,275	0	172,115	142,626	157,370	176,390	142,626	159,508	2.5	0.0	1.4
	Uniform Draft	1977	4,242	4,242	126,657	109,521	118,089	130,899	113,763	122,331	3.3	3.9	3.6
		All	4,242	4,242	172,115	142,626	157,370	176,357	146,868	161,612	2.5	3.0	2.7
	Early Draft	1977	7,923	790	126,657	109,521	118,089	134,580	110,311	122,446	6.3	0.7	3.7
		All	7,923	790	172,115	142,626	157,370	180,038	143,416	161,727	4.6	0.6	2.8
	Late Draft	1977	1,468	6,750	126,657	109,521	118,089	128,125	116,271	122,198	1.2	6.2	3.5
		All	1,468	6,750	172,115	142,626	157,370	173,583	149,376	161,479	0.9	4.7	2.6

Sources: Flow from HYDROSIM model for BIOP flows, John Fazio of NPPC, February 20, 2003; Alternative Flow Contribution, Banks Lake Drawdown EIS, Appendix C

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McNary during August under the Action Alternative scenarios ranges from 1.4 to 3.7 percent. Even the largest discharge would increase flow by only 6.3 percent during a low-flow year for a 2-week period. As indicated, these changes are relative to no contribution from Banks Lake rather than having the No-Action flows (RPA 23) already added. The resulting flow changes in the lower Columbia River from any alternative scenario are slight, even during low-flow conditions.

To put some of these changes in flow in perspective, it is informative to compare them to possible future flow scenarios that are actively being considered for the Columbia River basin. As noted earlier, the NPPC is considering flow option changes that differ from those that would occur under the current BIOP plans. These were presented by the NPPC in October 2002 (NPPC 2002) and are currently being evaluated by concerned interests. The flows that are being considered are considerably different than the BIOP flows under average and especially under low-flow conditions. These flows are compared to the BIOP flows in Figures 3-3 and 3-4 for average and low-flow conditions. The relative changes from the BIOP flows resulting from the NPPC-considered flows are shown in Figure 3-5.

During the months of July and the first half of August under the average flow, the NPPC flows are lower than the BIOP flows by about 5,000 to 18,000 cfs (Figure 3-5). Even during low flow, the NPPC reduces flows in July and the first half of August by 18,000 cfs, but increases the flows in the second half of August by about 9,000 cfs. These reductions are in contrast to the expected average monthly contribution of about 2,100 to 4,200 cfs from Banks Lake under uniform drawdown (only about 2,100 cfs maximum over the BIOP because it already includes the flow from the first 5 feet of drawdown) (Table 3-1).

The July period when the NPPC would reduce flows is when many subyearling chinook salmon would be migrating through the lower Columbia River. A figure showing the index count of all smolts and subyearling smolts passing McNary Dam over the last 10 years shows that many of the subyearling chinook salmon pass this region in July and a reduced number pass in August (Figure 3-6). As indicated by the index count at Lower Monumental Dam, the lowest dam on the Snake River with juvenile fish-counting facilities, the timing of migration of Snake River fall chinook salmon is similar (Figure 3-7). The subyearling chinook salmon from the Snake River are the primary stock that the BIOP flows were intended to benefit. The implication is that the NPPC does not consider maintaining flows directed by the BIOP as being as critical or

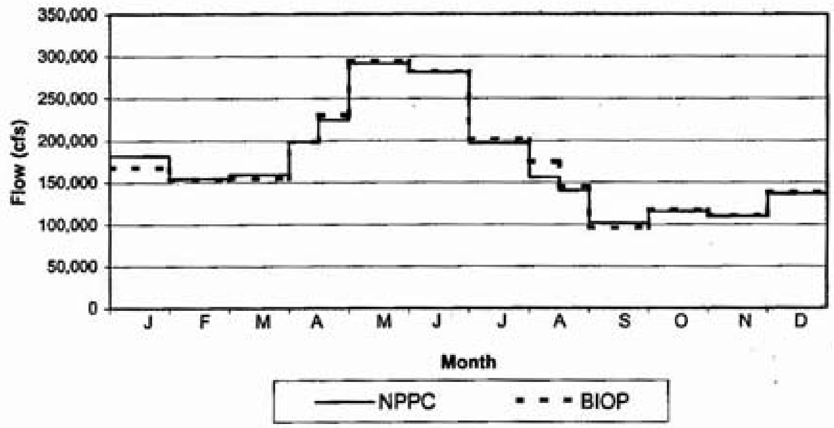

Figure 3-3. McNary Dam Average Flow under the BIOP and NPPC-Proposed Operations

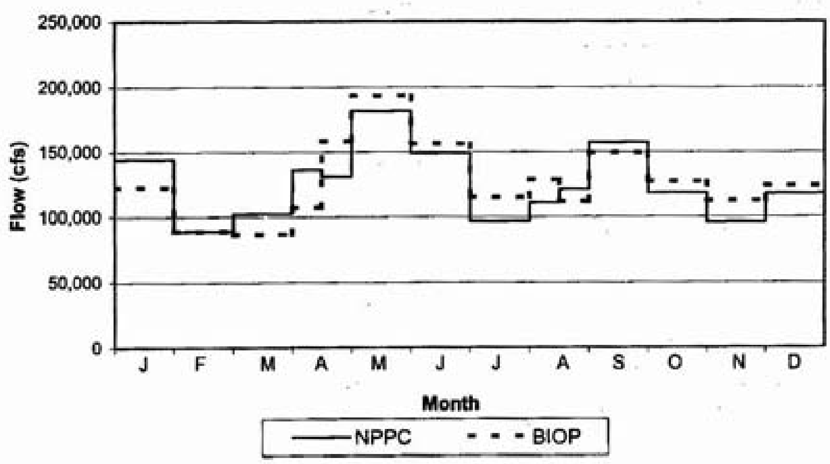

Figure 3-4. McNary Dam Low Flow under the BIOP and NPPC-Proposed Operations

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13

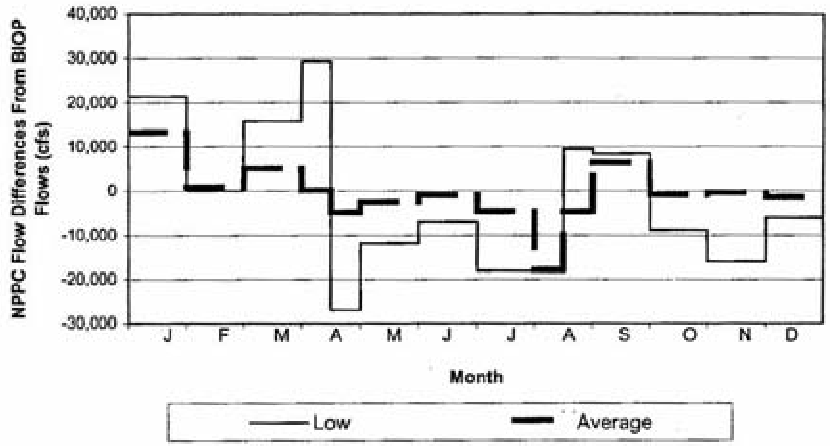

Figure 3-5. Flow Difference at McNary Dam between the NPPC and BIOP Operations

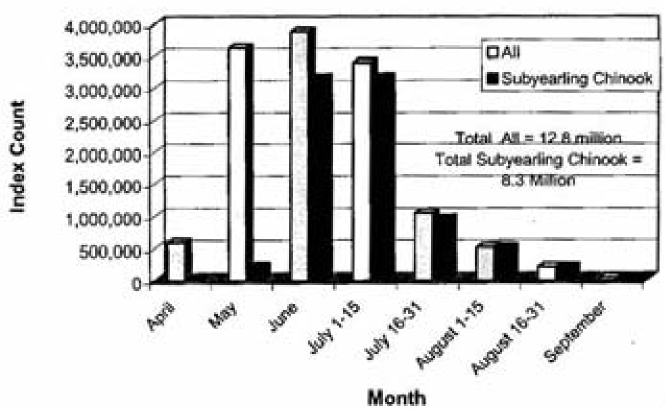

Figure 3-6. McNary Dam Average Total Smolt and Subyearling Chinook Salmon Smolt Indexes, 1993-2002

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14

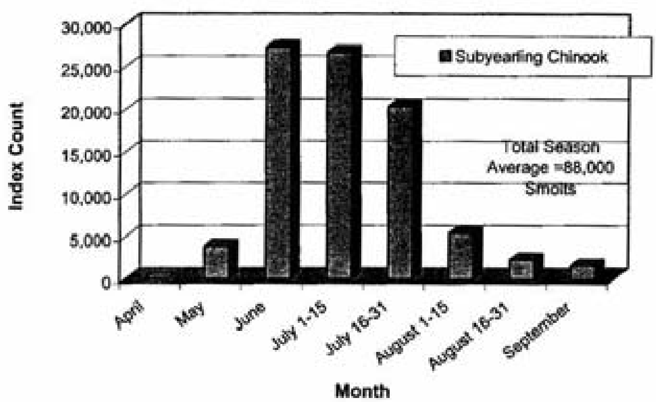

Figure 3-7. Lower Monumental Dam Average Subyearling Chinook Salmon Smolt Index, 1993-2002

necessary for fish in this reach of the river as it does for other flow uses. What is very apparent from the figures is that the NPPC alternative is much different in August at McNary than the BIOP. Also, contributions from Banks Lake flow are very small relative to the NPPC-proposed flow changes. The NPPC plan also recommends changes in the Snake River flows, which include a flow reduction of about 1,000 cfs in July during average years and 13,000 cfs in low-flow years during this period. The first-half-of-August flows were also reduced relative to the BIOP but the second half increased (HYDROSIM Model of NPPC and BIOP Flows: personal communication, John Fazio, Hydrologist, NPPC, Portland, Oregon, February 20, 2003).

Generally, during the highest outmigration period for juvenile fall chinook salmon (June and July, Figure 3-7), flows remained nearly the same or were reduced in the Snake River in the proposed NPPC plan. These changes may be important, particularly in July, which is typically a period of high outmigration of fall chinook salmon (subyearlings) in the Snake and Columbia River system (Figures 3-6 and 3-7). The NPPC attempted to address the effects of changes in flow partly through use of CRiSP and SIMPAS fish passage model estimates of juvenile salmon survival.

3.2.5 MODEL ESTIMATES OF SURVIVAL

Using models to estimate juvenile salmonid survival through the Columbia Basin hydrosystem has become an accepted and frequently used method for evaluating the effects of actions considered by federal agencies. While model estimates of fish survival have failings, they do provide a quantitative measure of the potential effects of actions. By their nature, they cannot include the effects of actions that do not have a quantitative measure or estimated effect.

We are unaware of model estimates being made for the scenarios being considered for the Banks Lake drawdown alternatives. We believe that Reclamation should have seriously considered using models to evaluate the alternatives so that an approximation of the benefits, if any, could be presented to the decision makers. Because Reclamation did not conduct this evaluation, the Districts retained Chris Van Holmes and Dr. James Anderson of Columbia Basin Research, University of Washington, to run their CRiSP juvenile passage model for a subset of the scenarios being considered. The results of this analysis and a description of the methods used are presented in Attachment A of this document (Van Holmes and Anderson 2003).

The CRiSP model was selected for several reasons. First, it has been used extensively in past analyses of the Columbia River. Second, it has recently been used by the NPPC in its evaluation of the various flow alternatives being considered for the newly proposed Draft Mainstem Amendments issued in October 2002. Third, it is continually being updated with recent empirical survival data to make it as current as possible. Finally, unlike SIMPAS, which has no flow component, CRiSP uses flow as one of the parameters for survival. We did not use the FLUSH model because we did not have direct access to it.

We selected five of the flow alternatives for evaluation with the CRiSP model. Relative survival comparisons use the BIOP flow conditions as the baseline against which the alternatives are compared. The current BIOP conditions include the 5-foot uniform drawdown of Banks Lake, so this alternative is the base case that other alternatives are compared against. The five flow alternatives encompassed the range of flow scenarios developed by Reclamation, as shown in Appendix C of the draft EIS:

- Low Water (LW): Banks Lake is at 1,565 feet at the start of August and no additional flow is supplied
- Uniform Draft 5 feet (UD5): Banks Lake is drawn down from 1,570 to 1,565 feet through August
- Uniform Draft 10 feet (UD10): Banks Lake is drawn down from 1,570 to 1,560 feet through August
- Early Draft 10 feet (ED10): Banks Lake is drawn down from 1,570 to 1,560 feet during the first half of August

- Late Draft 10 feet (LD10): Banks Lake is drawn down from 1,570 to 1,560 feet during the second half of August

The main emphasis of the CRiSP analysis was on the stock—Snake River fall chinook salmon—that the BIOP had intended to benefit through its drawdown-related RPAs for Banks Lake. In addition, the CRiSP model was run for all listed stocks that may be present in the river above Bonneville Dam during August. The model was run for the Hanford Reach fall chinook salmon, which is not listed under ESA but is important and is the most abundant stock in the river during August. The model was also run for lower Columbia River stocks. It was assumed that they would have the same survival as Snake River fall chinook salmon traveling in-river below the Dalles Dam. This reach is the first area in the lower Columbia River where this chinook salmon stock occurs in the system. Because of lack of specific data for this stock, survival estimates are less reliable.

All stocks were modeled from selected locations in the system for which tagging data were available to calibrate the models through Bonneville Dam. Modeling of survival through the estuary was also performed, but the results are not discussed because, unlike the survival modeled through the hydrosystem, the estimates for this lower area cannot be calibrated with empirical survival information from PIT tag data. While the estimates may supply some indication of changes in survival, the reliability of this information is much less than that through the hydrosystem. Also, considering the very low overall effects on survival estimated from the CRiSP model through Bonneville Dam and its lower reliability, we did not believe using this information would add to the analysis.

The CRiSP model was also used to estimate fish travel time through the system and water particle travel time.

The CRiSP model used three flow conditions to encompass the range of possible flows that may occur during Banks Lake drawdown. These modeled flows under the BIOP conditions with modification from the Banks Lake drawdown were: 1960 representing average, 1974 representing high flow, and 1977 representing low flow. These flow conditions were based on the HYDROSIM flows developed for the NPPC for the Draft Mainstem Amendments.

The results of all survival estimates are presented in Attachment A of this document. Table 3-2 summarizes the flow conditions and stocks for which the model estimated changes in survival. Based on the model results, spring migrating stocks, such as the

Table 3-2. Juvenile Passage Survival to Below Bonneville Dam of Five of the Banks Lake Drawdown Flow Scenarios Based on CRiSP Model Results

Drawdown Alternative[a]	Stock	Flow	In-River Survival	Total Survival	Fraction of Released Transported	In-River Survival Change from UD5		Total Survival Change from UD5		Change per 10,000 Smolts[b]	
						Absolute	Percent	Absolute	Percent	In-River	Total
LW	Hanford Fall Chinook	Average	0.40856	0.50023	0.217	-0.00001	-0.002%	-0.00001	-0.002%	-0.1	-0.1
UD5	Hanford Fall Chinook	Average	0.40857	0.50024	0.217						
UD10	Hanford Fall Chinook	Average	0.40859	0.50026	0.217	0.00002	0.005%	0.00002	0.004%	0.2	0.2
ED10	Hanford Fall Chinook	Average	0.40860	0.50026	0.217	0.00003	0.007%	0.00002	0.004%	0.3	0.2
LD10	Hanford Fall Chinook	Average	0.40856	0.50024	0.217	-0.00001	-0.002%	0.00000	0.000%	-0.1	0.0
LW	Hanford Fall Chinook	High	0.42732	0.51610	0.222	-0.00001	-0.002%	-0.00001	-0.002%	-0.1	-0.1
UD5	Hanford Fall Chinook	High	0.42733	0.51611	0.222						
UD10	Hanford Fall Chinook	High	0.42734	0.51611	0.222	0.00001	0.002%	0.00000	0.000%	0.1	0.0
ED10	Hanford Fall Chinook	High	0.42733	0.51610	0.222	0.00000	0.000%	-0.00001	-0.002%	0.0	-0.1
LD10	Hanford Fall Chinook	High	0.42735	0.51612	0.222	0.00002	0.005%	0.00001	0.002%	0.2	0.1
LW	Hanford Fall Chinook	Low	0.39530	0.56592	0.370	0.00000	0.000%	0.00001	0.002%	0.0	0.1
UD5	Hanford Fall Chinook	Low	0.39530	0.56591	0.370						
UD10	Hanford Fall Chinook	Low	0.39532	0.56592	0.370	0.00002	0.005%	0.00001	0.002%	0.2	0.1
ED10	Hanford Fall Chinook	Low	0.39530	0.56592	0.370	0.00000	0.000%	0.00001	0.002%	0.0	0.1
LD10	Hanford Fall Chinook	Low	0.39534	0.56593	0.370	0.00004	0.010%	0.00002	0.004%	0.4	0.2
LW	Snake Fall Chinook	Average	0.14200	0.43332	0.483	-0.00009	-0.063%	0.00000	0.000%	-0.9	0.0
UD5	Snake Fall Chinook	Average	0.14209	0.43332	0.483						
UD10	Snake Fall Chinook	Average	0.14216	0.43333	0.483	0.00007	0.049%	0.00001	0.002%	0.7	0.1
ED10	Snake Fall Chinook	Average	0.14228	0.43334	0.483	0.00019	0.134%	0.00002	0.005%	1.9	0.2
LD10	Snake Fall Chinook	Average	0.14224	0.43333	0.483	0.00015	0.106%	0.00001	0.002%	1.5	0.1
LW	Snake Fall Chinook	High	0.14946	0.42065	0.457	-0.00009	-0.060%	-0.00001	-0.002%	-0.9	-0.1
UD5	Snake Fall Chinook	High	0.14955	0.42066	0.522						
UD10	Snake Fall Chinook	High	0.14957	0.42066	0.457	0.00002	0.013%	0.00000	0.000%	0.2	0.0
ED10	Snake Fall Chinook	High	0.14954	0.42066	0.457	-0.00001	-0.007%	0.00000	0.000%	-0.1	0.0
LD10	Snake Fall Chinook	High	0.14956	0.42066	0.457	0.00001	0.007%	0.00000	0.000%	0.1	0.0

Table 3-2. Juvenile Passage Survival to Below Bonneville Dam of Five of the Banks Lake Drawdown Flow Scenarios Based on CRiSP Model Results (continued)

Drawdown Alternative[a]	Stock	Flow	In-River Survival	Total Survival	Fraction of Released Transported	In-River Survival Change from UD5 Absolute	In-River Survival Change from UD5 Percent	Total Survival Change from UD5 Absolute	Total Survival Change from UD5 Percent	Change per 10,000 Smolts[b] In-River	Change per 10,000 Smolts[b] Total
LW	Snake Fall Chinook	Low	0.13970	0.45703	0.522	-0.00009	-0.064%	0.00000	0.000%	-0.9	0.0
UD5	Snake Fall Chinook	Low	0.13979	0.45703	0.522						
UD10	Snake Fall Chinook	Low	0.13990	0.45704	0.522	0.00011	0.079%	0.00001	0.002%	1.1	0.1
ED10	Snake Fall Chinook	Low	0.14014	0.45705	0.522	0.00035	0.250%	0.00002	0.004%	3.5	0.2
LD10	Snake Fall Chinook	Low	0.13972	0.45703	0.522	-0.00007	-0.050%	0.00000	0.000%	-0.7	0.0
LW	Snake Steelhead	Low	0.06469	0.60227	0.632	-0.00003	-0.046%	0.00000	0.000%	-0.3	0.0
UD5	Snake Steelhead	Low	0.06472	0.60227	0.632						
UD10	Snake Steelhead	Low	0.06481	0.60227	0.632	0.00009	0.139%	0.00000	0.000%	0.9	0.0
ED10	Snake Steelhead	Low	0.06488	0.60227	0.632	0.00016	0.247%	0.00000	0.000%	1.6	0.0
LD10	Snake Steelhead	Low	0.06474	0.60227	0.632	0.00002	0.031%	0.00000	0.000%	0.2	0.0
LW	Lower River Chinook	Average	0.82889		0.000	-0.00051	-0.061%			-5.1	
UD5	Lower River Chinook	Average	0.82940		0.000						
UD10	Lower River Chinook	Average	0.82970		0.000	0.00030	0.036%			3.0	
ED10	Lower River Chinook	Average	0.83045		0.000	0.00105	0.127%			10.5	
LD10	Lower River Chinook	Average	0.82998		0.000	0.00058	0.070%			5.8	
LW	Lower River Chinook	High	0.84565		0.000	-0.00032	-0.038%			-3.2	
UD5	Lower River Chinook	High	0.84597		0.000						
UD10	Lower River Chinook	High	0.84599		0.000	0.00002	0.002%			0.2	
ED10	Lower River Chinook	High	0.84584		0.000	-0.00013	-0.015%			-1.3	
LD10	Lower River Chinook	High	0.84599		0.000	0.00002	0.002%			0.2	
LW	Lower River Chinook	Low	0.82941		0.000	-0.00051	-0.061%			-5.1	
UD5	Lower River Chinook	Low	0.82992		0.000						
UD10	Lower River Chinook	Low	0.83033		0.000	0.00041	0.049%			4.1	
ED10	Lower River Chinook	Low	0.83158		0.000	0.00166	0.200%			16.6	
LD10	Lower River Chinook	Low	0.82945		0.000	-0.00047	-0.057%			-4.7	

a/ See text for description of alternatives

b/ Indicates alternative resulting change in number of smolts relative to 10,000 smolts at the start of the migration

Source: Van Holmes and Anderson 2003

19

Snake River spring/summer chinook salmon and upper Columbia spring chinook salmon, are unaffected by flows in August because nearly all of these stocks have completely left the river system by this time (Attachment A of this document). While the model results showed some slight change in in-river survival during low-flow conditions for Snake River steelhead in-river migrants, there was no overall effect on survival even to the 1 in 100,000 (0.00001) level of estimated change in survival (Table 3-2). Based on the model, this means that the survival of not one spring migrating fish in over 100,000 beginning migration would be affected by the addition of flow under any of the scenarios.

Theoretically, the Hanford Reach fall chinook salmon and Snake River fall chinook salmon would be the stocks most likely to be affected by changes in the reaches below the Snake River from flows added in August. As shown in Table 3-2, estimated changes in survival are at the lowest limit of model precision. The estimated maximum increase in total survival over baseline conditions for any flow alternative or Banks Lake drawdown alternative was 0.00002 for these two stocks. If the uniform 5-foot drawdown were not included in the BIOP conditions, the maximum reduction in total survival estimated would be 0.00001. In other words, fewer than 0.5 smolt in 10,000 smolts beginning their migration to the sea would be affected through Bonneville Dam by any of the Banks Lake flow scenarios. Modeled effects would be greater for smolts remaining in the river, but very few of either the Snake River or Hanford Reach subyearling chinook salmon are in the river below McNary Dam because many of them are transported. Typically, 80 percent of Snake River fall chinook salmon that arrive below Bonneville Dam are transported. During the low-flow year of 2001, about 99 percent of the Snake River fall chinook salmon arrived by barge. While the portion that were transported is lower for Hanford Reach fish because they are collected only at McNary Dam, the majority arriving below Bonneville Dam were also in barges.

Slightly larger increases in survival are estimated for the portion of the lower Columbia River chinook salmon originating in the Bonneville pool (Table 3-2). However, the portion of lower Columbia River fish originating in the Bonneville pool is small; the vast majority of these fish originate in major tributaries below Bonneville Dam. Also, the model assumed that all fish began their passage from the base of the Dalles Dam, while in reality they would originate from several small streams entering the reservoir below the dam. Furthermore, as noted above, these values are based on Snake River fish passage survival, not Columbia River stock. Even so, the majority of model results show a less than 0.001 increase in survival, or a less than 0.1 percent increase in relative survival from increased flow.

As presented in Attachment A of this document, some additional effects on survival may occur for stocks below Bonneville Dam from increased flow, although we believe numerical estimates for this region to be unreliable due to the inability to calibrate the data. However, the extremely low estimate of survival changes within the reach for which data are available suggests that if flow from Banks Lake does have any effect, it would be extremely small below Bonneville Dam.

Another way to examine the effects of flow on fish is to consider how flow affects their travel time in the system. Travel time has often been considered a factor influencing survival of smolts in the Columbia River system. Table 3-3 presents the results of the CRiSP analysis for changes in estimated travel time resulting from the drawdown alternatives. This table shows only where travel time changes would occur between McNary Pool to below Bonneville Dam. Following the trend of survival numbers, changes in estimated travel time were extremely small for fish remaining in the river. While most stocks and conditions show no modeled changes in travel time (Table 4, Attachment A of this document), the largest modeled change from the base case (UD10) is on the order of minutes, not days or hours. The largest change estimated for Snake River fall chinook salmon was a reduction of 72 minutes out of a 8.9-day travel period though the reach. It is also interesting to note that changes in travel time were undetectable for Hanford Reach fall chinook salmon.

Table 3-3. Fish Travel Time (TT) for Stocks Showing Deviation from Base Case UD5 between McNary and Bonneville Dams

Drawdown Alternative[a/]	Release site	Stock	Flow	McNary-Bonneville TT (days)	Change in TT (days) from UD5	Change in TT (Minutes) from UD5
ED10	Snake R. Trap	Snake River Fall Chinook	Average	7.25	-0.01	-14
LD10	Snake R. Trap	Snake River Fall Chinook	Average	7.27	0.01	14
LW	Snake R. Trap	Snake River Fall Chinook	High	6.29	-0.01	-14
UD10	Snake R. Trap	Snake River Fall Chinook	High	6.29	-0.01	-14
ED10	Snake R. Trap	Snake River Fall Chinook	High	6.29	-0.01	-14
LW	Snake R. Trap	Snake River Fall Chinook	Low	8.98	0.01	14
UD10	Snake R. Trap	Snake River Fall Chinook	Low	8.96	-0.01	-14
ED10	Snake R. Trap	Snake River Fall Chinook	Low	8.92	-0.05	-72
LD10	Snake R. Trap	Snake River Fall Chinook	Low	8.98	0.01	14
LW	Snake R. Trap	Snake River Steelhead	Low	11.83	-0.02	-29
UD10	Snake R. Trap	Snake River Steelhead	Low	11.88	0.03	43
ED10	Snake R. Trap	Snake River Steelhead	Low	11.91	0.06	86
ED10	Rock Is. Tailrace	Upper Columbia Spring Chinook	Average	8.54	0.01	14

a/ See text for alternative descriptions
Source: Table 3 in Attachment A of this report

21

Van Holmes and Anderson's (2003) analysis of the effects of the alternatives included the following statement concerning survival changes and travel time influences:

> "To put these changes into perspective note that on the average (1992-2002) the total smolt index migrating past McNary Dam in August is 630,000 smolts of all species, of which 99 percent are fall chinook salmon. A Banks Lake drawdown of 10 ft from the early, late or uniform drawdown periods over August would increase the number of smolts reaching Bonneville Dam by between 6 to 13 smolts out of the total of 630,000. In comparison, the total yearly smolt index at McNary Dam is 12 million smolts. The corresponding reduction in travel time between McNary and Bonneville dams is at most one hour on a 9-day travel time. Most scenarios increased travel time to Bonneville Dam by less than 14 minutes on travel times of about 2 weeks."

Even if the flow amount had some influence on direct-passage survival of subyearling chinook salmon in the summer, it would have very little direct effect on the Snake River fall chinook salmon stock. This is because upwards of 80 percent of all Snake River fall chinook salmon may be barged to below Bonneville Dam, with only 20 percent or less actually traveling in the lower Columbia River. Many of the Hanford Reach fall chinook salmon stock are also barged at McNary Dam, although the percent is lower because McNary is the last facility with barging operations, while Snake River fish pass four dams with barging facilities. In addition, as is shown in Figures 3-6 and 3-7, most subyearling chinook salmon from both the Snake River and Hanford Reach have passed beyond McNary Dam by the first of August. Based on average passage index counts between 1993 and 2002, over 90 percent of all subyearling chinook salmon have passed McNary Dam by July 31 (DART passage data). The same holds true for the Snake River fall chinook salmon. Based on similar data, over 89 percent of the in-river migrants have passed Lower Monumental Dam by July 31. While some of the late July migrating fish that were not barged may still be in the reach below McNary Dam in early August, most of these would have passed through the region, based on estimated typical travel times of less than 9 days, even under low flow conditions (Table 3-3). Many of these factors ultimately are included in the CRiSP model, resulting in almost no estimated change in survival of any of the stocks originating upstream of McNary Dam. The lower Columbia River chinook salmon really do not enter the system until Bonneville pool or downstream of the dam, so they only pass one dam at most. Like the stocks originating upstream, most of these would have already outmigrated prior to August. The lower river chinook stocks included in the analysis consist primarily of subyearling outmigrating fish, although some yearling migrants are present (Myers et al. 1998). Yearling fish leave in the spring, while only some of the subyearlings would possibly still be in the river during August. By the time flow reaches this area, additional flow has entered the Columbia from the John Day, the Deschutes, and other rivers, and just below Bonneville, the Willamette River enters, so that the relative contribution of any flow from Banks Lake would be even more diluted. Other factors not modeled may also be of importance in overall survival relative to flow.

The additional flow to the estuary may have benefits that cannot be modeled. Current models cannot be calibrated, so the validity of survival results cannot be confirmed and therefore should not be relied on at this time. At any rate, the effect of flow from Banks Lake on the estuary would be very slight, as the Columbia flow is greatly increased by the Willamette River, as well as many other major rivers, before reaching the estuary. Benefits to other lower river subyearling chinook salmon could not be determined with the CRiSP, but they are likely to be much less than those measured, as these fish are further downstream (most below Bonneville Pool and below), where flow effects would be greatly reduced because of the increased volume from other river inflows.

3.2.6 SUMMARY

To meet the requirements of NEPA, the EIS needs to not only evaluate the effects of reservoir changes on Banks Lake resources but also needs to answer the question: What are the effects of the intended actions on the resources of concern? NMFS has specified in its BIOP what resources would receive the benefits. We believe that Reclamation should evaluate the effects on these resources in as quantitative a manner as possible with available data and methods. We have included one set of model results addressing the range of flows on downstream passage survival using the CRiSP passage model. This analysis contributes to the full disclosure required under NEPA.

Our analysis makes the following major points:

- First, the benefits of any flow augmentation for the subyearling chinook salmon in the mid- and lower Columbia are in question, based on recent analysis and interpretation of flow effects (ISAB 2003). The ISAB (2003) stated that the assumption of proportional survival benefits of flow augmentation could not be supported. For subyearling chinook salmon in the mid-Columbia, ISAB indicated that no variable was found to correlate with migration speed. Additionally, ISAB did not believe that the incremental flow now mandated would result in "dramatic benefits" to in-river smolt survival.

- Second, based on the CRiSP model analysis, none of the Banks Lake scenarios increased estimated subyearling chinook salmon survival by more than 0.01 percent; in other words, there is an increase in estimated smolt survival of less than one fish for every 10,000 smolts beginning the migration. .
- Third, modeled fish travel time, another factor often considered important in survival, would not be affected at all in the reach between McNary Pool and Bonneville Dam for most fish under the flow and drawdown scenarios. Where effects were estimated, the reduction was typically about 14 minutes of travel time in this reach out of a total travel time of an estimated 6 to 9 days.
- Additionally, most subyearling chinook salmon pass the reach from McNary Dam to Bonneville in barges, and typically 80 to 90 percent of subyearling fish pass McNary Dam before August 1.
- Uncertainty concerning both the benefits and deficits of flow changes will remain because not all factors potentially affected by flows are included in the models, and different models use different sets of assumptions, giving different results.
- Finally, the regional managers at the NPPC are considering flow changes, including deviations from the BIOP recommended flows, that would be much greater than those proposed in the Banks Lake alternatives. These changes would result in reduced flows in the lower Columbia River reach during much of the period when juvenile subyearling chinook salmon would be migrating through this region, including part of August when Banks Lake flows are to be released. The current NPPC position is that its proposed flow changes would adequately protect the anadromous endangered fish species of the Columbia River.

4. WATER PARTICLE TRAVEL TIME ISSUES

The proposed changes in Columbia River flow volumes resulting from implementation of BIOP RPA 31 would affect flow velocity and water particle travel time in the lower Columbia. The draft EIS refers to this effect in several sections. Comments on these sections and evaluation of existing velocity relationships with flow (discharge and volume) in the lower Columbia River are included in this section. The proposed flow augmentation from Banks Lake drawdown was added to the existing flow data to determine the potential change in velocity and water particle travel time.

4.1 COMMENTS ON DRAFT EIS WATER PARTICLE TRAVEL TIME ASSESSMENT

The draft EIS did not thoroughly assess the effect of BIOP RPA 31 on water particle travel time through the lower Columbia reservoirs. The purpose of the Proposed Action as stated in the draft EIS was to enhance the probability of meeting flow objectives in the Columbia River at McNary Dam during the juvenile out-migration of ESA-listed salmonid stocks. However, the issues related to this action, as identified during the scoping process for the draft EIS, did not include the effect on Columbia River water particle travel time downstream of McNary Dam.

The No-Action Alternative is based on some other operation than historical operations. On page 2-7, the impact on Columbia River flow at McNary Dam was discussed. The increase in flow volume at the dam resulting from implementation of the Action Alternative scenarios would range from 1 to 2 percent during August, compared to the No-Action Alternative scenarios. This assessment should have been included in the Environmental Consequences chapter. The assessment of the effect on existing flow conditions in the Columbia River in the main body of the draft EIS is inadequate.

The Affected Environment chapter did not include a water resources subsection. This is where the existing water resources of the Columbia River would have been described if the list of issues included flow conditions in the lower Columbia River.

The Environmental Consequences chapter also did not assess impacts on the lower Columbia. The only water resources impact assessment was on Banks Lake surface water quality. There is no discussion in the main body of the draft EIS of the Hydrologic Report included in Appendix C, where calculations of changes in flow volume at McNary Dam appear.

The description of the hydrologic analysis method in Appendix C lacks sufficient detail to determine if the flow volume from RPA 31 was properly added to the flow at McNary Dam. On page 2 of Appendix C, the use of the Bonneville Power Administration (BPA) hydro-simulation data is discussed. The data include output from the FCRPS studies that reflect operations that comply with the 2000 BIOP. The additional flows resulting from the various draft scenarios at Banks Lake are added and subtracted from the modeled flows at McNary Dam. It is unclear how the Banks Lake flows were accounted for at McNary. If the hydro-simulation data are already included RPA 23 and 31, then there could have been double counting of the Banks Lake flow contribution at McNary Dam.

Methodology aside, the results of the hydrologic analysis indicate (page 5 of Appendix C) that the addition of Banks Lake flow augmentation water will not

25

significantly increase the probability of meeting the BIOP flow objective at McNary. A flow objective of 195,000 cfs was used rather than the actual BIOP objective of 200,000 cfs because of model uncertainty. On page 2 of Appendix C, this compensation for the model uncertainty is discussed. The uncertainty of the model results reinforces the comment on significance. The flow augmentation from Banks Lake drawdown ranges from 790 to 7,923 cfs. This range is the same order of magnitude of the 5,000 cfs compensation for model uncertainty. Any level of impacts inferred from the model results should consider the limits of the ability of the model to predict effects with sufficient certainty.

On page 4-18, there is a discussion of threatened, endangered, and special-status species (Snake River fall chinook salmon). The intended benefit of the 200,000 cfs flow objective at McNary Dam is stated, but there is no discussion of how this benefit would be achieved. There is no discussion of the particle travel time downstream of McNary at this or any other discharges.

On Page 4-45, in the Cumulative Impacts subsection, the contribution of Bank Lake flow augmentation to the total contributed by all sources adding flow is mentioned. There is no quantification of the amount of flow augmentation provided by other sources and no comparison to the amount provided by Banks Lake. The draft EIS states only that the individual contribution of Banks Lake is not significant to the overall flow of the Columbia River. Because there was not an impact assessment of flow conditions in the lower Columbia, the draft EIS did not demonstrate enhancements to juvenile out-migration of ESA-listed salmoid stocks.

4.2 EVALUATION OF WATER PARTICLE TRAVEL TIMES

Velocity measurements can be used to determine water particle travel time through a given river reach. In standard hydraulic engineering analysis, water velocity is related to flow (discharge or volume-per-time) through a specific river cross-section by use of a rating curve. A curve is developed by surveying the cross-sectional profile of the river and measuring depth and velocity at several points across the river cross-section. The U.S. Geological Survey (USGS) has been measuring depth, velocity, and cross-sectional area to calculate discharge at two locations on the lower Columbia River. Particle travel time was evaluated using USGS data from The Dalles location.

Additionally, water particle travel time can be determined without specific velocity data. For reservoirs in particular, an alternative method is typically used to determine water particle travel time. This method uses the volume of water in the reservoir and the discharge to determine the residence time of flow through the reservoir. Several hydraulic models, including the CRiSP model, use residence time to represent water particle travel time. Water particle travel time was evaluated using volume and discharge data for the reservoirs upstream of Bonneville, The Dalles and John Day dams, which were obtained from the U.S. Army Corps of Engineers (Corps) HEC-5Q models of the Columbia/Snake River system.

The HEC-5Q model input specifies the relationship between reservoir stage, volume, and discharge, where discharge is the maximum outlet capacity at the dam. It is important to note that the maximum discharge does not always occur for a given reservoir stage.

One of the most important aspects of velocity-flow relationships within reservoirs is the fact that the reservoir water-surface elevation (stage) is controlled by the dam outlet gates and spillways. There is a specific volume-stage relationship for each reservoir. Stage and volume are controlled at the dam outlet. Water particle travel time can also be controlled at the dam outlet because water particle travel time is dependent on reservoir volume. Furthermore, the NPPC has been considering theories regarding the effect of the rate of closure of dam outlet gates on reservoir residence time (ISAB 2003). According to the theories, a rapid gate closure could reduce the hydraulic gradient of the flow through the reservoir and therefore increase water particle travel time.

The velocity data that the USGS collected at its monitoring station ((#14105700) near The Dalles are shown in Table 4-1 (Attachment A of this document shows the complete USGS data sheets). The monitoring station is located just downstream of the dam. The period of record of the station begins on June 11, 1985, and ends on December 20, 2002. Width, area, mean velocity, gage height, and streamflow are reported. The streamflow (i.e., discharge) was measured by taking several velocity and depth measurements across the river. The relationship between these basic measurements and stage are shown in Figures 4-1 and 4-2. Generally, area increases with increasing stage, which is expected. However, velocity does not show this regular relationship. This is due to the control of stage at Bonneville Dam. Recall that velocity through a reservoir is a function of reservoir volume (i.e., stage) and discharge. The USGS calculated discharge, which is equal to the product of measured quantities: mean velocity and area of the wetted river cross-section. There were several zero mean velocity recordings with concurrent non-zero stages, areas and streamflows. Apparently, USGS was able to estimate discharge without measuring velocity. TtFW performed a regression analysis of the non-zero velocity, streamflow and stage. Discharge was specified as the independent variable, and stage and velocity were the dependent variables. A plot of the regression results is shown as Figure 4-3.

Table 4-1. USGS Velocity, Stage, and Area Measurements

Date/Time	Area (ft^2)	Velocity (fps)	Stage (ft)	Discharge (cfs)
19d	12s	12s	12s	12s
6/11/85	98700	2.88	78.49	284000
10/23/90 7:45	92800	1.67	74.74	155000
10/23/90 8:25	93800	1.64	74.75	154000
3/27/91 15:05	96100	1.88	76.63	181000
6/21/91 10:20	98300	2.74	78.29	269000
7/3/91 10:45	96900	2.95	77.5	286000
7/3/91 11:33	98200	2.84	77.57	279000
7/9/92 10:40	95100	1.23	76.17	117000
7/9/92 11:40	96700	1.16	76.17	112000
2/22/93 12:47		1.9	75.45	179000
6/8/93 15:05		3.2	79.3	318000
8/23/93 13:15		1.22	75.22	115000
9/28/93 14:06		0	76.09	131000
12/10/93 11:20		0	76.73	90800
4/12/94 11:23		0	74.56	152000
6/7/94 11:47		0	77.18	217000
10/12/94 9:18		0	76.81	132000
2/8/95 11:56		0	77.05	212000
5/23/95 11:34		0	78.49	289000
11/22/95 10:30		0	75.59	207000
5/22/97 10:00		0	85.14	510000
6/27/97 14:29		0	81.3	383000
1/21/98 10:59		0	76.88	218000
4/24/98 11:48		0	77.97	229000
7/22/98 14:28		0	77.71	211000
11/25/98 11:03		0	76.04	138000
5/18/99 12:44		0	77.85	220000
10/25/99 13:20	95900	0	76.71	112000
4/20/00 10:56	100000	0	80	303000
6/15/00	99300	0	79.29	284000
8/31/00	94500	1.47	75.7	139000
3/9/01 11:11	93100	1.5	74.62	140000
9/26/01 12:13	95700	1.36	76.61	130000
2/6/02 11:57		0	74.66	159000
7/24/02 10:07		0	78.71	214000
12/20/02 10:19	101000	1.03	76.56	104000
12/20/02 10:20	101000	1.03	76.52	104000

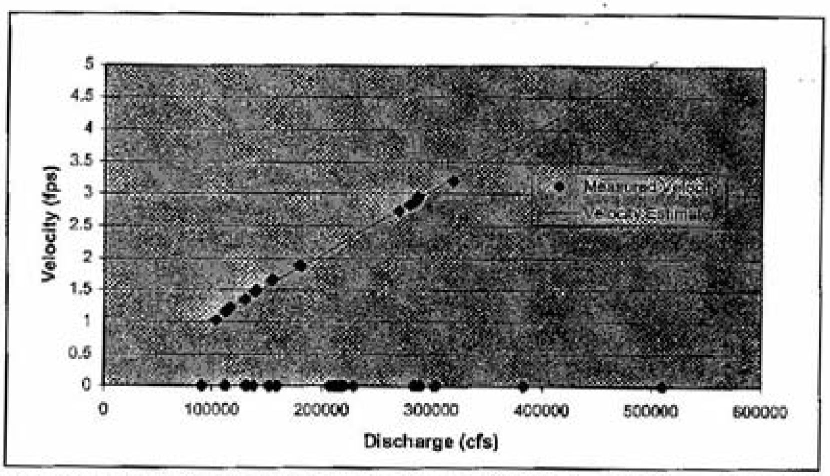

Figure 4-1. Velocity-Discharge Rating Curve, USGS Columbia River at The Dalles Gauge (14101500)

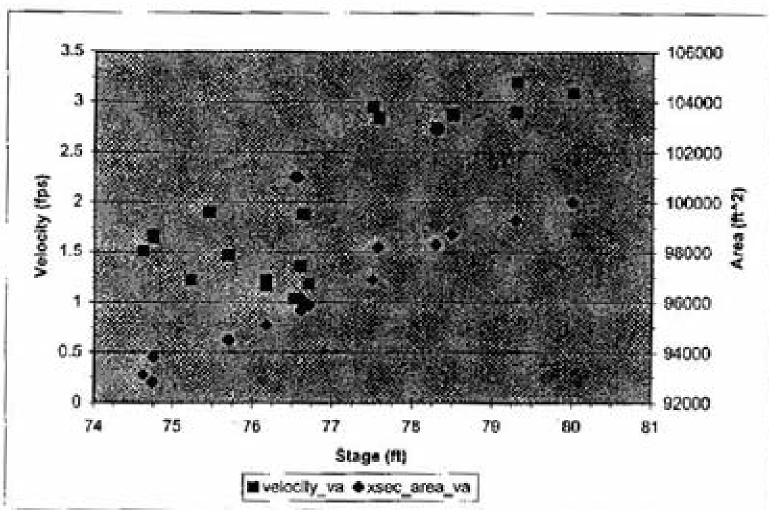

Figure 4-2. Stage-Velocity-Area Rating Curve, USGS Columbia River at The Dalles Gauge (14101500)

29

Table 4-2. Travel Time Estimate using HEC-5Q Model Data

John Day Pool					The Dalles Pool					Bonneville Pool				
Storage (ac-ft)	Discharge (cfs)	Stage (ft)	Residence Time (hrs)	Velocity (fps)	Storage (ac-ft)	Discharge (cfs)	Stage (ft)	Residence Time (hrs)	Velocity (fps)	Storage (ac-ft)	Discharge (cfs)	Stage (ft)	Residence Time (hrs)	Velocity (fps)
300000	50000	190	72.6	1.5	100	10	101	121.0	0.3	145000	50000	35	35.1	1.9
470000	100000	200	56.9	2.0	5000	20000	110	3.0	11.7	185000	125000	40	17.9	3.8
650000	300000	210	26.2	4.3	21000	50000	120	5.1	7.0	235000	250000	45	11.4	5.9
850000	500000	220	20.6	5.4	40000	100000	125	4.8	7.3	305000	500000	50	7.4	9.1
1120000	700000	230	19.4	5.8	67000	200000	130	4.1	8.7	385000	765000	55	6.1	11.1
1420000	1000000	240	17.2	6.5	102000	400000	135	3.1	11.5	485000	1000000	60	5.9	11.5
1760000	1350000	250	15.8	7.1	142000	600000	140	2.9	12.3	585000	1250000	65	5.7	11.9
2160000	1690400	260	15.5	7.2	184000	800000	145	2.8	12.7	690000	1396000	70	6.0	11.3
2400000	1995200	265	14.6	7.7	232000	1000000	150	2.8	12.6	795000	1550000	75	6.2	10.9
2640000	2300000	270	13.9	0.0	282000	1221460	155	2.8	12.7	900000	1700000	80	6.4	10.5
		257MOP			307000	1300000	157.5	2.9	12.4			70MOP		
2544000		268Normal Pool			333000	1463000	160	2.8	12.8	837000		77Normal Pool		
					384000	1800000	165	2.6	13.7					
Length	76.4mi						155MOP			Length	46.0mi			
					333000		160Normal Pool							
					Length	24.1 mi								
					113993.8	200000								
Comparison														
2544000	200000		153.9	0.7	333000	200000		20.1	1.8	837000	200000		50.6	1.3
2544000	207923		148.0	0.8	333000	207923		19.4	1.8	837000	207923		48.7	1.4

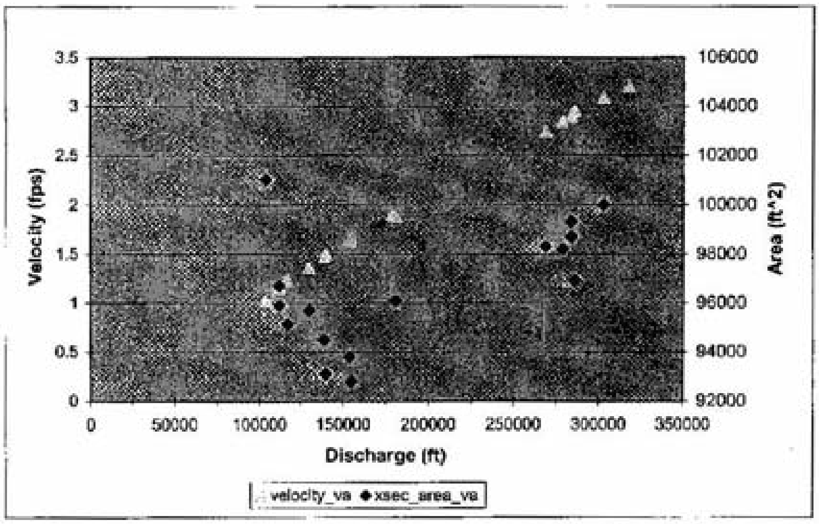

Figure 4-3. Discharge-Velocity-Area Rating Curve, USGS Columbia River at The Dalles Gauge (14101500)

The analysis results show that velocity increases with streamflow and that there is a strong correlation between these variables (r-squared equals 0.997). The velocity at 100,000 cfs is about 1.0 foot-per-second (fps). The velocity at 318,000 cfs is about 3.2 fps. With the maximum Banks Lake flow augmentation of 7923 cfs, the velocity increase at the 100,000 cfs and 318,000 cfs levels would be less than 0.05 fps, which is about a 1.5 to 5.0 percent increase.

The Corps' HEC-5Q model data showing reservoir stage, volume, and discharge were used to determine residence time. Table 4-2 shows these data and the corresponding residence times for reservoirs upstream of John Day, The Dalles, and Bonneville dams. The discharge data are the maximum outlet capacity for the given stage. The estimate of residence time using these data represents the lower limit. The estimate of velocity using these data represents the upper limit. The reservoirs could be operating at a higher stage for the discharges given, which would result in a greater residence time and lesser velocity.

The comparison of velocities measured by the USGS downstream of The Dalles with the velocity calculated using the Bonneville HEC-5Q data show that measured velocities are lower. This confirms that the calculated velocities represent the upper limit. To better estimate actual velocity and water particle travel time, the McNary flow objective was used for discharge along with the reservoir volume at normal operating pool level. These data were used to demonstrate the level of the effect of Banks Lake flow augmentation on water particle travel time in the lower Columbia River. The approximate residence time through the three lower Columbia River reservoirs at 200,000 cfs is about 224.7 hours (see Table 4-2). With the maximum flow augmentation from Banks Lake, the approximate residence time would be about 216.1 hours, which is about a 3.8 percent decrease.

Average velocity through the lower Columbia River was computed by the CRiSP model. The model simulated fish survival for five different Banks Lake drawdown scenarios. According to the CRiSP model, water velocity affects fish survival in reservoirs. The computed velocities for each lower Columbia pool and the reaches downstream of Bonneville Dam were averaged for comparison of the drawdown alternatives. Table 4-3 shows the Bonneville pool velocities, and average velocities through the lower Columbia River, for the five drawdown scenarios for three different flow conditions: average, high, and low. The discharges modeled for these scenario-flow-condition combinations ranged from about 110 kcfs to 216 kcfs. The computed Bonneville pool velocities ranged from 1.03 to 1.83 fps. These velocities and discharges closely match the velocity-discharge relationship at the USGS monitoring station downstream of The Dalles. Therefore, the CRiSP model appears to be accurately estimating velocity.

CRiSP model results indicate that the changes in average velocity with respect to the base case (scenario UD5) were about the same for each flow conditions—an increase of about 0.013 fps—except for the LW scenario. Under that scenario, velocity decreased with respect to the base case, but with the same insignificant magnitude as under the other scenarios. These results indicate that the 10-foot drawdown would reduce water particle travel time between McNary and Bonneville dams by at most 1 hour of a 9-day travel time (Van Holmes and Anderson 2003).

This result should be considered in the context of model uncertainty. Per the draft EIS Appendix C discussion, a 5000 cfs compensation for model uncertainty at the 200,000 cfs level represents an uncertainty of 2.5 percent. This uncertainty is only 1.3 percent less than the percent decrease in lower Columbia River reservoir residence time resulting from the Banks Lake flow augmentation.

Table 4-3. CRiSP Computed Velocities

Flow Condition	Location	Velocities in ft/s				
		ED10	LD10	LW	UD10	UD5
	Bonneville_Pool	1.424	1.428	1.390	1.426	1.408
Average	Average Velocity	0.997	0.999	0.973	0.999	0.986
	Δ from base (UD5)	0.011	0.014	-0.013	0.013	
	Bonneville_Pool	1.826	1.829	1.791	1.828	1.810
High	Average Velocity	1.278	1.281	1.254	1.280	1.267
	Δ from base (UD5)	0.011	0.013	-0.013	0.013	
	Bonneville_Pool	1.065	1.068	1.030	1.067	1.049
Low	Average Velocity	0.751	0.753	0.727	0.753	0.740
	Δ from base (UD5)	0.011	0.014	-0.013	0.013	

5. RESIDENT FISH ISSUES

Resident fish and their associated habitat are one of the major resources that will be affected by the alternatives. In general, Reclamation describes the existing condition of a broad range of resources and potential impacts to these resources. However, it appears that the magnitude and risk of impacts to these resources may be more severe than characterized in the draft EIS. Also, the impacts of the No-Action Alternative appear to be understated in general. While the No-Action Alternative activities have already been implemented, they are new reservoir conditions as they represent a change from what has normally occurred over the last 20 years of operations. Drawdown of 5 feet in August has been the exception, not the norm.

The full effects to reservoir resources from this action are not yet known because shoreline changes will continue to occur annually until the shorelines are stabilized (see soils impacts section of the draft EIS). Changes to the shoreline need to be brought out more clearly in the analysis of the impacts. While drawdown may be considered to have some benefits to the resources of interest, dewatering of littoral areas is rarely considered to have a net gain for aquatic resources (Ploskey 1983). Drawdown will generally kill macrophytes, at least in the short term, and eliminate their use as cover for fish during the drawdown period. The shoreline erosion that will occur from more exposed areas will increase turbidity, if only temporarily, possibly reducing primary production in the short term. The dewatered littoral areas, which typically are the highest production areas of lakes, whose levels do not fluctuate, may well experience a change in benthic resource composition, possibly losing benthic organisms that are important as fish food resources (Ploskey 1983). Movement of fish to deeper offshore water during high temperature periods may increase predation of prey resources and possibly important game species.

The drawdown will also reduce total lake volume to about 87 and 75 percent of full pool volume for the 5-foot and 10-foot drawdown, respectively. The net effect, although for short periods, would be concentration of the resident fish into a reduced area during the warmest period of year when food demand would be at its highest. The result is not clear at this time, but has the potential to be detrimental. The U.S. Fish and Wildlife Service (USFWS) noted that a 10-foot drawdown would cause ideal rearing habitat for some species to be "vastly reduced," that shallow vegetative structure would be changed, and that increased predation of prey species would occur (USFWS 2002, Attachment A). While the effects of a 10-foot drawdown would be more severe, similar types of effects will likely occur even with some of the 5-foot drawdown senarios being considered. We have noted in following sections where we think adding information concerning some of these effects would aid the document.

5.1 DRAFT EIS CHAPTER 3

Page 3-10, Under FISH

1st Paragraph: Check fish genus species names; some are in error. Also supply genus species name for burbot.

2nd Paragraph: Effects to lake whitefish need to addressed in the analysis of the effects of drawdown. Also the citation should be Stober et al. 1976.

Thomas (1978) noted that drawdown likely affected feeding habitats for lake whitefish and yellow perch. The result was that these fish relied more on pelagic zooplankton than benthic invertebrates than was expected based on known feeding characteristics. He suggested this might have been caused by low littoral benthic invertebrate abundance, possibly from large drawdowns that occurred during his studies. This type of feeding behavior was noted by Thomas (1978) in other reservoirs with drawdown. According to Thomas (1978), the reliance of lake whitefish and yellow perch on zooplankton in Banks Lake puts them in competition with kokanee for food resources.

Page 3-12, Table 3-3

Kokanee and lake whitefish should be included in the table. Kokanee, which historically were very abundant in Banks Lake, are currently still receiving much attention by the Washington Department of Fish and Wildlife (WDFW) through an intensive stocking program. Lake whitefish, while not a major game species, was (Thomas 1978), and likely still is, the largest fish biomass in Banks Lake.

Information from Thomas (1978) should be directly cited when discussing some of the characteristics of the species on this list. Site-specific information is better when available. For example, kokanee were reported to spawn in 1 to 8 meters of water along the shoreline of Banks Lake.

5.2 DRAFT EIS CHAPTER 4

Page 4-9, No-Action Alternative

The impacts of the No-Action Alternative appear to be understated based on the data presented. Two of the four scenarios have water levels down to 1,565 feet for 21 to 31 days. The littoral area would therefore be exposed during what is typically the hottest and driest periods of the summer. Another scenario would have about half of this area exposed for at least 15 days. In the subsection on susceptibility of juvenile fish to predation, it was noted that the reservoir level would remain "at or above 1,565 elevation through August, keeping emergent vegetation available to juvenile fish for cover and protection from predation." But, according to the vegetation discussion, all of the emergent vegetation is found above 1,566 feet, which would imply that much of this habitat would not be available through much of August. As indicated in Section 3, aquatic vegetation is used by many fish life stages and is highly productive for benthic invertebrates. Additionally, benthic invertebrates in the littoral areas are typically the most diverse and productive in lake and reservoir systems (Ploskey 1983). The discussion of fish feeding habits notes that benthic invertebrates are often major food sources for fish found in Banks Lake. This likely includes rainbow trout as well as other important game fish. Studies have noted that in some reservoirs, the diversity of invertebrates in drawdown areas is greatly reduced and many of the taxa lost are those most often consumed by fish (Ploskey 1983).

It appears that drawdown under at least some of the No-Action Alternative scenarios would adversely affect each of the three habitat/life stage categories noted.

Page 4-10, under "Shallow Emergent Vegetation"

In general, the conclusion appears correct. As was noted earlier in the draft EIS, the abundance of some plants like pondweed may be reduced. While long-term effects on plant communities may generally require extended desiccation (i.e., greater than 3 months, Ploskey 1983), these communities would be lost for the season as it is unlikely that plants would regrow in the fall once the water level is returned to full pool. However, it seems probable that the amount of vegetation, especially in the shallowest water, would be reduced because the exposure period would be longer. Even plants that are somewhat tolerant to desiccation may be affected. The USFWS noted this in in its CAR report (Attachment A). If drawdown extends into the falls, the emergent vegetation

35

would likely suffer even greater impacts. Therefore, plant community structure and distribution may be altered from the Proposed Action, especially if lake levels remain low.

Page 4-10, under "Shallow Unvegetated Flats"

The drawdown should be referred to as a 10 foot drawdown, not a 5-foot drawdown.

While similar habitat morphology would replace that lost, the production of benthic resources of the region will be reduced because the greatest diversity of benthic resources is generally present in the littoral regions (Ploskey 1983), which is the area being dewatered.

The soils section (page 4-42) should be referred to in assessing the likely effects of drawdown. That section notes the potential for loss of vegetation and disturbance of spawning beds from soil erosion. The soil section indicates that the erosion will occur at the lake surface elevation. While the lake surface elevation may be at 1,560 feet for only 30 to 40 days, wind and wave action, either from natural conditions or boats and other water craft, would cause increases in erosion not often experienced in the past. The increased erosion has the potential to increase turbidity and reduce primary production, as well as affect benthic production within the wave area.

Page 4-11, under "Centrarchidae"

Black crappie is an abundant and popular recreational species in the lake (Stober et al. 1977, Reclamation 2001); black crappie juveniles remain near shore. Other centrarchids such as pumpkinseed are also typically present in the shallow vegetative areas of the lake. Loss of vegetative cover would expose these fish to greater predation. Another important point related to predation is that the food requirements of cold-blooded animals are a function of temperature. August typically contains some the warmest water temperatures of the year, with surface temperatures typically near 18 to 20°C (Knutzen 1977). The effect is that, in order for a predator to maintain growth during warmer periods, it will need to consume a much higher number or biomass of prey. For example, the consumption rate of largemouth bass doubles between 15 and 20°C, with the near-maximum consumption rate at 20°C (Coutant 1975). Increased consumption was demonstrated in the John Day Pool by northern pikeminnow consuming about four times the biomass of salmonid prey in July and August than they did in May and June when temperatures were much cooler (Poe et al. 1991). While the period of displacement of juveniles from the littoral areas may be relatively short, it will occur during a period when predators will have high-energy requirements, and are likely to have high predation rates.

Page 4-11, Last Paragraph

One other factor not noted that will also affect predation within the system is total reservoir volume and surface area. A drawdown of 5 feet and 10 feet from full pool (1,570 feet) will reduce Banks Lake volume to 87 and 75 percent of full pool volume. Total reservoir surface area will also be reduced but likely not to the magnitude of the volume due to steep banks along much of the shoreline. These reductions would also affect predation, which is not dependent only on changes in shoreline cover. In effect, all predators and prey will be concentrated in a smaller area and in a smaller volume during a high-temperature, energy-demanding period. This will contribute to greater predation rates on many of the young-of-the-year and probably on larger fish also, including those that have moved away from the shoreline, making them more susceptible to major picsivorous predators like walleye and bass.

Page 4-12, 2nd and 3rd paragraph

See comments on page 4-11

The analysis appears to suggest that predation pressure may be significant for some species within the system due to the duration, timing (during high temperatures), and magnitude of the action. Even the smaller drawdown period of the No-Action Alternative, if maintained for the longer periods, differs from what has occurred in the past and may cause adverse effects to some of the lake fish population, such as crappie, other sunfish, and possibly yellow perch. It may also increase the growth of predator species, such as walleye and smallmouth bass. Such occurrences have been noted with minor reservoir drawdowns in late summer (Ploskey 1986, Groen and Schroeder 1978). The net effect is likely to be adverse, however, as it may well alter the current fish population structure in the lake, with potentially positive and negative effects to different game and prey species. If refill of the lake is delayed into the fall, these impacts would increase as the drawdown duration increases.

Page 4-12, Benthic Invertebrates

Drawdown will adversely affect major fish food resources in the reservoir. The shallow shoreline areas are typically the regions with the highest benthic production and abundance in lakes (Ploskey 1983). These areas, because they are in the photic zone, grow macrophytes where substrate is suitable, but also grow attached periphytic algae. Both macrophytes and periphyton supply a food source and attachment areas for benthic invertebrates. Drawdown for the period being considered will reduce access by fish to these littoral resources and additionally eliminate much of the production of this area as a benthic food source for the fish, lasting for a period after the reservoir refills. Thomas

(1978) noted that in Banks Lake, yellow perch relied heavily on zooplankton as opposed to benthic invertebrates, which is more common in many other systems. This may have been partly a result of low benthic abundance from extensive drawdowns during his study periods. He noted that benthic studies conducted along the Banks Lake shorelines indicated a reduction in abundance in the drawdown zones of the lake, with the highest benthic organism abundance below the maximum drawdown depth. Within the same year, however, abundance levels appeared to increase substantially in the drawdown areas if additional drawdown did not occur (Thomas 1978). He also suggested that the restriction of the main fish food source to small zooplankton may well have been a factor in the slower growth of yellow perch and the reduced longevity of both yellow perch and lake whitefish, which feed on zooplankton almost exclusively in Banks Lake.

Reservoir aging may be affecting overall production within Banks Lake (Korth 1996). Although other factors, such as increased predation, may have contributed to the loss of the once highly abundant kokanee, their lack of success in sustaining their high abundance and good growth may be partly the result of the aging of this reservoir and a resulting decline in food production. If these are major factors, any additional loss of food sources in the system may well contribute to a further reduction in overall fish production, either from direct loss of food resources or increased competition for the major remaining food base, zooplankton.

Page 4-13, 2nd Paragraph

A change in fish composition and abundance in Banks Lake appears to be a possibility if the 10-foot drawdown is implemented. Maintaining the existing fish abundance with a 10-foot or even the 5-foot drawdown is questionable. The reservoir may well be suffering from overall reduced production as a result of aging, and, as you noted, other studies have shown that drawdown does affects production of fish resources. In its Coordination Act Report (Attachment A of the draft EIS), the USFWS concurred that several adverse effects would occur to fish and fish habitat from a 10 foot drawdown (Page 24 of Attachment A). USFWS noted that ideal rearing habitat would be "vastly reduced," that vegetative structure and shallow water habitat would also be reduced, and that the quality of habitat for cover from predators would be "vastly lowered." They noted a loss of fish habitat in Osborn Bay and other important protected areas during the period of drawdown, loss of vegetative structure, die back of several macrophytic and other plant species, increased fish predation, and a large loss of the forage base of fish forced to deeper water as a result of drawdown. The USFWS concluded that the level of predation would increase as a result of the drawdown. It appears to us that even the 5-

foot drawdown of the No-Action Alternative, if maintained for the longer periods, would have similar impacts, although at somewhat reduced levels.

While the USFWS notes several potential mitigation measures to help offset these impacts, it is not clear that they would ultimately mitigate for the impacts of this action.

Pages 4-13 to 4-15

Slight changes in water temperature from the drawdown may have significant effects, under the right conditions, on some abundant and important fish stocks. We agree that the overall water temperature effects are not likely to be large. However, lake whitefish and kokanee are two fish that could be adversely affected by increasing lake temperatures in August. During August, lake thermal heating has typically been at its maximum (Knutzen 1977). While the surface temperature may peak in July, the highest bottom temperatures, particularly in the south pool, are at their highest in August. While we have seen no predictions of the magnitude of the changes in temperature that would result from the drawdown, the temperature in the lake would undoubtedly increase for several reasons: first, no cool water would be pumped into the lake from Lake Roosevelt; second, irrigation withdrawal would be taking water from the cooler mid to deep water of the lake, leaving the warmer surface water; and, third, there would be a reduced body of water to absorb solar heating.

Lake whitefish likely are one of the highest biomass fish in Banks Lake. Past studies have found that lake whitefish are nearly absent from the main lake body, with vast numbers of these fish migrating to the Devil's Punchbowl area in the hottest part of summer to avoid high lake temperatures. In fact, they have been found to concentrate in regions of very low oxygen (3 mg/l), a stressful dissolved oxygen level, to avoid the higher lake temperatures that occur throughout the lake at this time (Stober et al. 1977). Lake whitefish are already stressed at this time of the year because of high temperatures. Should this drawdown occur during an extremely hot August, the effects to these fish could be significant if they are unable to find adequate refuge from high temperatures. Whether this would be considered a positive or negative effect on the Banks Lake fish resources is debatable, since few people fish for them and because of their high abundance, they consume a large share of the limited food resourcess) but it would certainly be a very negative effect to the species.

Kokanee, while now primarily maintained through stocking, are often temperature-stressed during the warm summer months in Banks Lake (Thomas 1978). Their optimum temperature is closer to 12 to 15°C, depending on food supply (Brett 1952), while in August, the near-bottom temperatures have typically been over 16°C in most of the south

39

pool lake bottom and over 18°C on the surface. Even moderate temperature increases in August would be detrimental to this stock.

It should be noted that some species, such as smallmouth bass and walleye, have optimum growth at higher temperatures and may benefit from warmer water if they are able to maintain sufficient food intake.

Page 4-13, Table 4.2

Items in the No Action column are not "impact(s)" as the title states. The No-Action Alternative scenarios have impacts over historical operations. Please enter these in the table. A few examples are presented below.

Page 4-13, under "Shallow Aquatic Emergent Habitat"

According to the plant discussion, this topic includes submergent vegetation also, such as Pondweed species.

- No Action –Note that there will be some temporary seasonal loss of submergent vegetation from desiccation
- Action – Note that there will be seasonal loss of access by nearshore fish stocks

Page 4-13, under "Shallow Unvegetated Flats"

- No Action – Note that there will be a loss of littoral benthic production in the short term
- Action – Note that there will be reduced benthic diversity and potential fish food resources

5.3 DRAFT EIS CHAPTER 5

Page 5-5, last two paragraphs

While studies may be good for determining effects, there is no indication of what will be done if the impacts are considered significant and the only mitigation would be to change back to the previous way of operating. Would Reclamation consider changing operations back (i.e., reduced August drawdown) if drawdown was found to have unacceptable impacts even after implementation of the mitigation included in the draft EIS? Should reverting to the previous operating scenario be added to the list of mitigation measures?

Page 5-6, 5th bullet

Many fish species are not good candidates for hatchery operations. Also, as has been found with kokanee in Banks Lake, once a species has problems in a system, it is difficult to have success at achieving the former conditions. As has been well documented in the Columbia River system for salmon and steelhead, hatcheries have not been the answer that many intended them to be. While resident fish populations are a different story, the lessons are similar.

The point is that if impacts do occur to fish resources and their habitat in Banks Lake, and they likely will from either alternative, the mitigations being proposed may well not be adequate to mitigate for the affected fish habitat population conditions. The actions being considered have risks to the resources of interest in Banks Lake that may not be fully evaluated.

5.4 SUMMARY

The primary points of the review of the Resident Fish sections were noted in the introduction to this section and will be summarized briefly. Overall impacts to resident fish and their habitat are well discussed and referenced in the draft EIS. However, our review of the information suggests areas where the level of impact may differ from that presented and a few areas where Reclamation may need to expand or modify its discussion. The major points are noted below.

- The impacts that would result from the No-Action Alternative scenarios need to be discussed more fully. In several areas, the effects of these scenarios are not differentiated from historical operations (see Section 2 of this document).
- Some of the No-Action Alternative scenarios have the potential to adversely affect submergent and emergent vegetation compared to historical operations. These adverse affects would result from exposure of area where this vegetation grows from 21 to more than 30 days. This exposure would reduce any benefit to fish resources. Benthic resources, important as food for fish, would also be affected by "No-Actions," although at a lower level than would occur under the 10-foot drawdown associated with the Action Alternative scenarios.
- The Action Alternative scenarios pose a greater risk of adverse effects to lake fish resources. Some vegetation would be adversely affected, juvenile fish would be subjected to greater predation from a loss of habitat during a period of high-food demand, and the overall habitat area will be reduced, at least for the short term.
- The level of effects of the Action Alternatives on fish appears to be greater than noted in the draft EIS, as indicated by statements in the USFWS CAR report.
- Summary tables need to include the impacts of the No-Action Alternative scenarios as well as the Action Alternative scenarios.

41

- The proposed mitigation (e.g., studies of effects, use of hatchery, fish habitat enhancement) may not be adequate to offset impacts.

6. OTHER ISSUES

6.1 DRAFT EIS CHAPTER 3

Page 3-1

Reclamation makes substantial use of the Banks Lake Resource Management Plan (RMP) of March 2001 in characterizing the affected resources indicated on page 3-1; however, the environmental conditions of those resources are different than those of today (drawdown years 2001 and 2002) and beyond, as described under the No-Action Alternative. Based on Figure 2 of Appendix C, August water levels in Banks Lake from 1981 to 2000 were above elevation 1,565 feet over 95 percent of the time. Therefore, using resource characterizations that were based on that historic lake level regime represent a different set of resource conditions than those conditions that would be realized under the No-Action Alternative, which would lead to a higher frequency of August days reaching elevation 1,565 feet. The EIS should highlight the condition of each specific resource in years 2001 and 2002 to describe how the resources were actually affected in years when the reservoir was operated in a manner similar to the No-Action Alternative.

Page 3-4 and Table 3-1

Pondweed, duckweed, and Eurasian water milfoil are not true emergent plants. They are macrophytes that remain floating on or below the water surface.

Page 3-32

The description of existing hydropower resources should include the historical operation of the pump/generation units for power production. The Grand Coulee Operations Office reported that between Banks Lake elevations of 1,570 feet and 1,568 feet, all six units can run. Below 1,568 feet, one unit drops off with the loss of every 1.5 feet in Banks Lake elevation. At the present time, Reclamation operating criteria allows for no generations below elevation 1,567.5 feet (John O'Callaghan, Reclamation, personal communication February 13, 2003). The total August power generation flows through the units for the period 1992 to 2002 ranged from 0 (6 out of 11 years) to 2,015 second-feet-day (sfd) in 1997. Figure 4 of Appendix C of the draft EIS shows that during August 1997, the Banks Lake elevation exceeded the 1,567.5-foot power generation cut-off level.

Page 3-34

It is stated that "any impacts on the economic environment from the Action Alternative due to changes in recreation use of the lake would be expected to occur in Grant County." However, on page 3-37, it is stated that both local residents and people who generally travel 100 to 200 miles use the area. It goes on to state that most out-of-area users are from the Puget Sound (Seattle/Tacoma) area. Clearly, if many users are from the Puget Sound area, then any changes in recreation use would lead to some economic effects in areas outside of Grant County, where many of these visitors reside. Many studies have shown expenditures for recreation trips start in the place of origin and include spending along the way, both to and from the destination. In the case of water skiing, decisions to spend several thousands of dollars on boats could be made based on perceived opportunities to use such equipment on reservoirs like Banks Lake. If potential users feel constrained in their opportunities to boat because of low pool conditions during the prime summer month of August, their capital expenditures for recreation equipment may also be constrained, thus affecting other industries throughout the area.

6.2 DRAFT EIS CHAPTER 4

Page 4-1, Last Paragraph

The range of depth report for the littoral region seems narrow. Is this the depth where macrophytes grow, or only where emergent vegetation grows? It appears the definition used here would be considered the upper littoral if significant macrophytes are present below this depth (Wetzel 1975). Based on Figure 4-1 in the draft EIS, it appears that the definition used refers only to the emergent plant zone. If macrophytes are present in moderate abundance below 1,566 feet, the depth to which they extend should be included as part of the littoral zone.

Page 4-5, 1st Paragraph

While in general this statement appears correct, effects to pondweed may be significant under some of the No-Action scenarios. The USFWS Coordination Act Report (see Attachment A) noted plant loss of some of these species from drawdown.

Page 4-5, 4th Paragraph

If pondweed and duckweed are affected by drawdown, would it not constitute a change in "structure and function" of the aquatic vegetation?

Table 4-1

The descriptions under No-Action Alternative need to indicate the impacts that would result from this alternative. For example, under pondweed and duckweed, no impacts are disclosed. Compared to historical operations, there would be impacts to these species even under the No-Action Alternative.

Page 4-9

Under the No-Action Alternative, there clearly would be some effects to fish resources that are different from the historic conditions to which these fish have adjusted.

Page 4-20

The geographic scope of the impact assessment of hydropower resources includes power generation facilities downstream of Grand Coulee Dam. This geographic area was not included in the fish resources impact assessment. There should be consistency in the geographic scope of all resource impact assessments.

Page 4-21

The reference to BPA's 2002 Final Power Rate Proposal Marginal Cost Analysis Study is (May 2000). This reference should be corrected. If the actual date of the document is 2000, then the information should be updated to reflect current economic conditions.

The FCRPS impacts should describe what the change from historical power generation would be under the No-Action and Action Alternative scenarios. For example, the operation of all six pump/generation units would be cut off for both alternatives. In 1997, the power generation reduction associated with the loss of 2,015 second-foot-day (sfd) generation flows in 1997 should be reported as the greatest change from historical operations.

Page 4-27

The No-Action Alternative is not presented under Regional Local Economy.

Page 4-31

In Recreation, it is stated that, "historically, elevation changes to Banks Lake have an effect on the availability of recreational resources surrounding the lake. Under the No-Action Alternative, there are no additional effects on the current recreation opportunities at Banks Lake." However, because Banks Lake level only drops below 1,565 feet 5 percent of the time (see Appendix C, Figure 2) in August, there would indeed be some adverse effects resulting from implementing the No-Action Alternative.

Page 4-32

Under Recreation Visits, it is stated that "a degree of difficulty regarding watercraft access may be present at water elevations below 1,565 feet." However, as with most boat launching and access facilities, there is always some difficulty with any site and elevation. The statement as it is currently worded is therefore meaningless. If 7 out of 12 boat ramps become unusable at 1,565 feet (page 2-11), then the impact is large enough to warrant consideration as a significant impact. If 10 out of 12 boat launches are rendered unusable at elevation 1,562 feet under the Action Alternative, then the impact to boating in August would be significant.

Page 4-41

It is stated under "Visual Quality" for the No-Action Alternative that the visual quality of Banks Lake will not be affected. However, the lake is going to be operated differently than it has for the past 20 years (see 1981-2000 frequency of lake levels shown in Figure 2 of Appendix C of the draft EIS). Under the "Lake Classification" of the State of Washington water quality regulations, the reservoir should support beneficial uses, including "recreation for primary contact, boating, sport fishing, and <u>aesthetic</u> enjoyment" (Page 3-48). Because the lake will be operated at a slightly lower level than it has in the past, there would be some adverse effect on visual quality under the No-Action Alternative due to an increased presence and duration of exposed shoreline in the drawdown condition below elevation 1,570 feet.

Under the Action Alternative, the analysis concludes there will be a "minimal" visual quality effect "because of the 5-foot strip of bare land during the drawdown period." This is highly inaccurate, since the strip of land is much more than 5 feet in width at all locations. Furthermore, this conclusion is not supported by other conclusions found throughout the draft EIS. For instance, in the Vegetation Section, it is stated that the littoral zone will be exposed from anywhere between 21 and 41 days, which would be during the high-use recreation season. This effect is certain to present more than a "minimal effect" on visual quality. Under "Soils" for the No-Action Alternative, erosion of the shoreline between elevation 1,570 and 1,565 feet would be in "previously undisturbed areas" that "would cause mechanical disturbance to the soil surface and destruction of the protective vegetative cover including vascular plants and soil stabilizing microbiotic soil crusts." To further support that there is more than just a "minimal effect," it is concluded on page 4-32 that "at lower lake levels, sandy beach areas may be far from the water's edge with unattractive and unappealing mud flats being exposed." All of the effects are related in that they take place in the drawdown zone of the No-Action Alternative. Beyond the simplistic analysis found in the EIS, more effects would be found by performing a simple analysis in the field using key viewpoints to document viewsheds at the various lake levels in order to fully characterize the extent and magnitude of the effects.

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ATTACHMENT A

LOWER COLUMBIA RIVER MODELED SALMONID SURVIVAL AND WATER VELOCITIES UNDER PROPOSED BANKS LAKE AUGUST DRAWDOWN SCENARIOS

LOWER COLUMBIA RIVER MODELED SALMONID SURVIVAL AND WATER VELOCITIES UNDER PROPOSED BANKS LAKE AUGUST DRAWDOWN SCENARIOS

Chris Van Holmes and Dr. James Anderson

March 17, 2003

The NMFS 2000 Biological Opinion directed in their Reasonable and Prudent Alternatives (#23 and #31) that the drawdown of Banks Lake be considered in August to enhance flows in the lower river to help meet the objective of 200 kcfs at McNary Dam in August. The intent of achieving of 200 kcfs, as indicated in the Biological Opinion, was to benefit "subyearling Chinook salmon in the lower Columbia River." As part of the review of the US Bureau of Reclamation's Banks Lake Drawdown Draft Environmental Impact Statement, Columbia Basin Research (CBR) modeled the effects of the flow contributed from the Proposed Actions on downstream anadromous endangered species units: native Snake River fall chinook, Lower Columbia chinook and, potentially, the Snake River spring chinook and steelhead. Unlisted naturally spawning Hanford Reach fall chinook are also included in the analysis.

The impacts of Banks Lake flows were simulated with the Columbia River Salmon Passage model (CRiSP) by altering the equivalent flow from Grand Coulee Dam (the source of water for Banks Lake). CRiSP predicted survivals, travel times and water velocities over a range of Banks Lake outflow scenarios resulting from scenario drawdowns.

Scenarios

The drawdown scenarios were modeled under three flow regimes of average, high, and low flow years as determined by HYDROSIM modeling. The base case was established as the Northwest Power Planning Council's BIOP HYDROSIM model for the 1960 (average), 1974 (high), and 1977 (low) water years. These modeled flows incorporated the 5-foot uniform draft of Banks Lake from 1,570-1,565 during the month of August, representing a flow augmentation of 2,173 cfs. Adjustment of Grand Coulee outflow was made to these modeled flows to represent 4 additional drawdown scenarios. The drawdown scenarios analyzed are presented in Tables 1 and 2.

All scenarios were run with the same stock release schedules, headwater dissolved gas levels, water temperatures and transport schedules with the exception of using 2001's water temperatures and full transport at Snake River projects in the low flow scenarios to more closely model warm conditions and low flow transport operations.

Table 1. Flow Scenario for Banks Lake Drawdown Study

		Δ from Base Case (cfs)	
Drawdown Scenario	**Scenario Description**	**Aug 1-15**	**Aug 16-31**
UD5	Uniform Draft at Banks lake from elevation 1,570 to 1,565 spread evenly throughout August	Base Case	
LW	Low Water – Banks Lake held at elevation 1,565 though August	-2173	-2173
UD10	Uniform Draft – 10ft of draft at Banks lake from elevation 1,570 to 1,560 spread evenly throughout August.	2069	2069
ED10	Early Draft – 10 ft of draft at Banks Lake from elevation 1,570-1,560 during first ½ of August	5750	-1383
LD10	Late Draft – 10 ft of draft at Banks Lake from elevation 1,570-1,560 during last ½ of August	-705	4577

Release Sites

Snake River stocks were released at the Snake Trap at the head of Lower Granite pool. Upper Columbia spring chinook and steelhead were released in the Rock Island Dam tailrace. Hanford Reach fall chinook were released at river kilometer 590, the average release location of PIT-tagged wild Hanford Reach fall chinook. All stocks were modeled through the Bonneville Dam tailrace as well as the estuary. Modeled release timing was determined by averaging actual passage timing at each release site over the past 10 years.

Model Description

CRiSP.1 models passage and survival of multiple salmon stocks through the Snake and Columbia rivers, their tributaries, and the Columbia River Estuary. The model recognizes and accounts for several aspects of the life-cycle of migratory fish—fish survival, migration, and passage—and their interaction with the river system in which they live.

Fish Survival though a dam depends on:

- Spill percent and spill efficiency
- Turbine, spill, and bypass mortality estimates
- Fish Guidance Efficiency

Fish survival through reservoirs depends on:

- Predator density
- Temperature dependent predator activity
- Spill dependent total dissolved gas (TDG) super saturation levels
- Travel time through the reservoirs.

Fish migration rate depends on:

- Smolt age.
- Migration experience.
- Flow-dependent water velocity.
- Day of migration season.

CRiSP.1 computes daily fish passage on a release-specific basis for all river segments and dams. Passage and survival of fish through a reservoir is expressed in terms of the fish travel time through the reservoir, the predation rate in the reservoir, and a mortality rate resulting from fish exposure to total dissolved gas supersaturation, an effect called gas bubble disease (GBD). Fish enter the forebay of a dam from the reservoir and may experience predation during delays due to diel and flow related processes. They leave the forebay and pass the dam mainly at night through spill, bypass or turbine routes, or the fish are diverted to barges or trucks for transportation. Once they leave the forebay, each route has an associated mortality rate and fish returning to the river are exposed to predators in the dam tailrace before they enter the next reservoir. CRiSP.1.6 integrates a number of submodels that describe interactions of isolated components. Together they represent the complete model.

Travel Time

The smolt migration submodel, which moves and spreads releases of fish down river, incorporates flow, river geometry, fish age and date of release. The arrival of fish at a given point in the river is expressed through a probability distribution.

The underlying fish migration theory was developed from ecological principles. Each fish stock travels at an intrinsic velocity as well as a particular velocity relative to the water velocity. The velocities can be set to vary with fish age and experience. In addition, within a single release, fish spread as they move down the river.

PIT-tagged data over the past 10 years was used to calibrate the travel time parameters for Rock Island, Hanford Reach, and Snake River trap releases though the tailrace of Bonneville dam. Post-Bonneville migration is an extension of these migration parameters through the estuary but no travel-time data past Bonneville was available for the calibration.

Predation Rate

The predation rate submodel distinguishes mortality in the reservoir, the forebay, and the tailrace of dams. The rate of predation depends on temperature, smolt age, predator density, and reservoir elevation.

The predation rate parameters were calibrated using laboratory studies of the response of predators to temperature and field studies of smolt migration survival. The model is calibrated for spring and fall chinook salmon and steelhead from the Snake River Basin and the Upper Columbia River Basin using NMFS published survival data though Bonneville dam. Wild Hanford Reach fall chinook salmon were calibrated using survival estimates through Bonneville generated from PIT-tag release and observation data (Ptagis) available at Columbia Basin Research's DART web pages. Post-Bonneville predation is an extension of these parameters through the estuary but no survival data from below Bonneville was available for calibration.

The calibrated predation rate parameters for Snake River fall chinook salmon were used as a surrogate for Lower Columbia fall chinook salmon as no PIT-tag migration or survival data is available for this stock.

Gas Bubble Disease

A separate component of the mortality submodel is mortality from gas bubble disease produced by total dissolved gas (TDG) supersaturation. The mortality rate is species specific, and it is adjusted to reflect the relationship of fish length and population depth distribution to TDG supersaturation experienced by the fish. The gas bubble disease rate is calibrated from laboratory studies.

Dam Passage

Timing of fish passage at dams is developed in terms of a species dependent distribution factor and the distribution of fish in the forebay. The model uses the current best estimates of fish guidance efficiency (FGE), spill efficiency, and route specific mortalities as incorporated into NMFS's Simpass model.

Transportation Passage

Transportation of fish at collection dams is in accordance with the methods implemented by the U.S. Army Corps of Engineers. Low flow years employ full transport at Snake River projects.

Total Dissolved Gas Supersaturation

Total dissolved gas (TDG) supersaturations are described by mechanistic models, which include information on geometry of the spill bay and physics of gas entrainment. The TDG generation equations used for gas production include the newest developments by U.S. Army Corps of Engineers, Waterways Experiment Station (WES) as well as additional work done by Columbia Basin Research. The gas calibration has been verified for 13 dams for the years 1995 through 2001.

Flow

In these scenarios, flow is specified at dams using results of system hydro regulation models and historical flows as provided by the NPPC for the years 1960, 1974 and 1977. Augmentation scenarios are developed by adjusting Grand Coulee outflow volumes.

Water Velocity

Water velocity is used in CRiSP.1.6 as one of the elements defining fish migration. Velocity is determined from flow, reservoir geometry and reservoir elevation.

Results

Spring migrants are not affected by the modeled August flow adjustments because the fish have migrated out of the river system before August.

On a base survival of about 0.5 from McNary Pool and Bonneville Dam the maximum increase in survival from the Banks Lake Baseline drawdown is 0.00001 and 0.00002 for average and low flows. Under high flow conditions the maximum survival increase is less than 0.000005. Removing all Banks Lake drawdown the survival decreases by at most – 0.00001. These increases and decreases only occur for Snake River fall chinook salmon and Hanford Reach fall chinook salmon. Banks Lake drawdowns had no effect on spring chinook salmon.

To put these changes in to perspective note that on the average (1992-2002) the total smolt index migrating past McNary Dam in August is 630,000 smolts of all species, of which 99 percent are fall chinook salmon. A Banks Lake drawdown of 10 ft from the early, late or uniform drawdown periods over August would increase the number of smolts reaching Bonneville Dam between by 6 to 13 smolts out of the total of 630,000. In comparison, the total yearly smolt index at McNary Dam is 12 million smolts. The corresponding reduction in travel time between McNary and Bonneville dams is at most one hour on a 9 day travel time. Most scenarios increased travel time to Bonneville Dam by less than 14 minutes on travel times of about 2 weeks.

Table 2. McNary August Flow (kcfs) and Percent Change from Base Case (UD5)

Flow	Flow Period	UD5	UD10	LW	ED10	LD10
Average	Aug 1-15	197.5	199.6	195.3	203.2	196.8
	Aug 16-31	119.4	121.4	117.2	118.0	124.0
High	Aug 1-15	210.1	212.1	207.9	215.8	209.4
	Aug 16-31	200.0	202.1	197.8	198.6	204.6
Low	Aug 1-15	128.8	130.9	126.7	134.6	128.1
	Aug 16-31	111.7	113.8	109.5	110.3	116.3
Average	Aug 1-15		1.04%	-1.11%	2.83%	-0.36%
	Aug 16-31		1.04%	-1.11%	-0.68%	2.33%
High	Aug 1-15		0.98%	-1.04%	2.66%	-0.33%
	Aug 16-31		0.98%	-1.04%	-0.64%	2.19%
Low	Aug 1-15		1.58%	-1.71%	4.27%	-0.55%
	Aug 16-31		1.59%	-1.71%	-1.02%	3.58%

Table 3. Smolt Survivals in Scenarios and Change from Base Case UD5

				Survival thru BON		Survival thru Estuary			Survival Change from base	
Scenario	Rel_Site	Stock	Flow	In-river	Total System	In-river	Total System	transport fraction	Absolute	Percent
ED10	Hanford Reach	Fall Chinook	Average	0.409	0.500	0.310	0.380	0.217	0.00002	0.004%
ED10	Hanford Reach	Fall Chinook	High	0.427	0.516	0.326	0.394	0.222	-0.00001	-0.002%
ED10	Hanford Reach	Fall Chinook	Low	0.395	0.566	0.288	0.412	0.370	0.00001	0.002%
ED10	Rock Is. Tailrace	Steelhead	Average	0.546	0.511	0.482	0.452	0.036	0.00000	0.000%
ED10	Rock Is. Tailrace	Steelhead	High	0.568	0.553	0.513	0.499	0.091	0.00000	0.000%
ED10	Rock Is. Tailrace	Steelhead	Low	0.219	0.289	0.112	0.147	0.237	0.00000	0.000%
ED10	Rock Is. Tailrace	Yearling Chinook	Average	0.456	0.443	0.422	0.410	0.029	0.00000	0.000%
ED10	Rock Is. Tailrace	Yearling Chinook	High	0.461	0.476	0.418	0.432	0.153	0.00000	0.000%
ED10	Rock Is. Tailrace	Yearling Chinook	Low	0.265	0.350	0.148	0.195	0.261	0.00000	0.000%
ED10	Snake R. Trap	Steelhead	Average	0.343	0.657	0.251	0.480	0.605	0.00000	0.000%
ED10	Snake R. Trap	Steelhead	High	0.456	0.775	0.363	0.615	0.734	0.00000	0.000%
ED10	Snake R. Trap	Steelhead	Low	0.065	0.602	0.039	0.364	0.632	0.00000	0.000%
ED10	Snake R. Trap	Subyearling Chinook	Average	0.142	0.433	0.092	0.282	0.483	0.00002	0.005%
ED10	Snake R. Trap	Subyearling Chinook	High	0.150	0.421	0.105	0.294	0.457	0.00000	0.000%
ED10	Snake R. Trap	Subyearling Chinook	Low	0.140	0.457	0.081	0.265	0.522	0.00002	0.004%
ED10	Snake R. Trap	Yearling Chinook	Average	0.381	0.661	0.273	0.473	0.567	0.00000	0.000%
ED10	Snake R. Trap	Yearling Chinook	High	0.443	0.688	0.341	0.530	0.553	0.00000	0.000%
ED10	Snake R. Trap	Yearling Chinook	Low	0.348	0.835	0.264	0.633	0.667	0.00000	0.000%
LD10	Hanford Reach	Fall Chinook	Average	0.409	0.500	0.310	0.380	0.217	0.00000	0.000%
LD10	Hanford Reach	Fall Chinook	High	0.427	0.516	0.326	0.394	0.222	0.00001	0.002%
LD10	Hanford Reach	Fall Chinook	Low	0.395	0.566	0.288	0.412	0.370	0.00002	0.004%
LD10	Rock Is. Tailrace	Steelhead	Average	0.546	0.511	0.482	0.452	0.036	0.00000	0.000%
LD10	Rock Is. Tailrace	Steelhead	High	0.568	0.553	0.513	0.499	0.091	0.00000	0.000%
LD10	Rock Is. Tailrace	Steelhead	Low	0.219	0.289	0.112	0.147	0.237	0.00000	0.000%
LD10	Rock Is. Tailrace	Yearling Chinook	Average	0.456	0.443	0.422	0.410	0.029	0.00001	0.002%
LD10	Rock Is. Tailrace	Yearling Chinook	High	0.461	0.476	0.418	0.432	0.153	0.00000	0.000%
LD10	Rock Is. Tailrace	Yearling Chinook	Low	0.265	0.350	0.148	0.195	0.261	0.00000	0.000%

Table 3. Smolt Survivals in Scenarios and Change from Base Case UD5 (continued)

				Survival thru BON		Survival thru Estuary			Survival Change from base	
Scenario	Rel_Site	Stock	Flow	In-river	Total System	In-river	Total System	transport fraction	Absolute	Percent
LD10	Snake R. Trap	Steelhead	Average	0.343	0.657	0.251	0.480	0.605	0.00000	0.000%
LD10	Snake R. Trap	Steelhead	High	0.456	0.775	0.363	0.615	0.734	0.00000	0.000%
LD10	Snake R. Trap	Steelhead	Low	0.065	0.602	0.039	0.364	0.632	0.00000	0.000%
LD10	Snake R. Trap	Subyearling Chinook	Average	0.142	0.433	0.092	0.282	0.483	0.00001	0.002%
LD10	Snake R. Trap	Subyearling Chinook	High	0.150	0.421	0.105	0.294	0.457	0.00000	0.000%
LD10	Snake R. Trap	Subyearling Chinook	Low	0.140	0.457	0.081	0.265	0.522	0.00000	0.000%
LD10	Snake R. Trap	Yearling Chinook	Average	0.381	0.661	0.273	0.473	0.567	0.00000	0.000%
LD10	Snake R. Trap	Yearling Chinook	High	0.443	0.688	0.341	0.530	0.553	0.00000	0.000%
LD10	Snake R. Trap	Yearling Chinook	Low	0.348	0.835	0.264	0.633	0.867	0.00000	0.000%
LW	Hanford Reach	Fall Chinook	Average	0.409	0.500	0.310	0.380	0.217	-0.00001	-0.002%
LW	Hanford Reach	Fall Chinook	High	0.427	0.516	0.326	0.394	0.222	-0.00001	-0.002%
LW	Hanford Reach	Fall Chinook	Low	0.395	0.566	0.288	0.412	0.370	0.00001	0.002%
LW	Rock Is. Tailrace	Steelhead	Average	0.546	0.511	0.482	0.452	0.036	0.00000	0.000%
LW	Rock Is. Tailrace	Steelhead	High	0.568	0.553	0.513	0.499	0.091	0.00000	0.000%
LW	Rock Is. Tailrace	Steelhead	Low	0.219	0.289	0.112	0.147	0.237	0.00000	0.000%
LW	Rock Is. Tailrace	Yearling Chinook	Average	0.456	0.443	0.422	0.410	0.029	0.00000	0.000%
LW	Rock Is. Tailrace	Yearling Chinook	High	0.461	0.476	0.418	0.432	0.153	0.00000	0.000%
LW	Rock Is. Tailrace	Yearling Chinook	Low	0.265	0.350	0.148	0.195	0.261	0.00000	0.000%
LW	Snake R. Trap	Steelhead	Average	0.343	0.657	0.251	0.480	0.605	0.00000	0.000%
LW	Snake R. Trap	Steelhead	High	0.456	0.775	0.363	0.615	0.734	0.00000	0.000%
LW	Snake R. Trap	Steelhead	Low	0.065	0.602	0.039	0.364	0.632	0.00000	0.000%
LW	Snake R. Trap	Subyearling Chinook	Average	0.142	0.433	0.092	0.282	0.483	0.00000	0.000%
LW	Snake R. Trap	Subyearling Chinook	High	0.149	0.421	0.104	0.294	0.457	-0.00001	-0.002%
LW	Snake R. Trap	Subyearling Chinook	Low	0.140	0.457	0.081	0.265	0.522	0.00000	0.000%
LW	Snake R. Trap	Yearling Chinook	Average	0.381	0.661	0.273	0.473	0.567	0.00000	0.000%
LW	Snake R. Trap	Yearling Chinook	High	0.443	0.688	0.341	0.530	0.553	0.00000	0.000%

A-7

Table 3. Smolt Survivals in Scenarios and Change from Base Case UD5 (continued)

Scenario	Rel_Site	Stock	Flow	Survival thru BON In-river	Survival thru BON Total System	Survival thru Estuary In-river	Survival thru Estuary Total System	transport fraction	Survival Change from base Absolute	Survival Change from base Percent
LW	Snake R. Trap	Yearling Chinook	Low	0.348	0.835	0.264	0.633	0.867	0.00000	0.000%
UD10	Hanford Reach	Fall Chinook	Average	0.409	0.500	0.310	0.380	0.217	0.00002	0.004%
UD10	Hanford Reach	Fall Chinook	High	0.427	0.516	0.326	0.394	0.222	0.00000	0.000%
UD10	Hanford Reach	Fall Chinook	Low	0.395	0.566	0.288	0.412	0.370	0.00001	0.002%
UD10	Rock Is. Tailrace	Steelhead	Average	0.546	0.511	0.482	0.452	0.036	0.00000	0.000%
UD10	Rock Is. Tailrace	Steelhead	High	0.568	0.553	0.513	0.499	0.091	0.00000	0.000%
UD10	Rock Is. Tailrace	Steelhead	Low	0.219	0.289	0.112	0.147	0.237	0.00000	0.000%
UD10	Rock Is. Tailrace	Yearling Chinook	Average	0.456	0.443	0.422	0.410	0.029	0.00000	0.000%
UD10	Rock Is. Tailrace	Yearling Chinook	High	0.461	0.476	0.418	0.432	0.153	0.00000	0.000%
UD10	Rock Is. Tailrace	Yearling Chinook	Low	0.265	0.350	0.148	0.195	0.261	0.00000	0.000%
UD10	Snake R. Trap	Steelhead	Average	0.343	0.657	0.251	0.480	0.605	0.00000	0.000%
UD10	Snake R. Trap	Steelhead	High	0.456	0.775	0.363	0.615	0.734	0.00000	0.000%
UD10	Snake R. Trap	Steelhead	Low	0.065	0.602	0.039	0.364	0.632	0.00000	0.000%
UD10	Snake R. Trap	Subyearling Chinook	Average	0.142	0.433	0.092	0.282	0.483	0.00001	0.002%
UD10	Snake R. Trap	Subyearling Chinook	High	0.150	0.421	0.105	0.294	0.457	0.00000	0.000%
UD10	Snake R. Trap	Subyearling Chinook	Low	0.140	0.457	0.081	0.265	0.522	0.00001	0.002%
UD10	Snake R. Trap	Yearling Chinook	Average	0.381	0.661	0.273	0.473	0.567	0.00000	0.000%
UD10	Snake R. Trap	Yearling Chinook	High	0.443	0.688	0.341	0.530	0.553	0.00000	0.000%
UD10	Snake R. Trap	Yearling Chinook	Low	0.348	0.835	0.264	0.633	0.867	0.00000	0.000%

A-8

Table 4. Fish Travel Time Between McNary and Bonneville Dams and Deviation from Base Case UD5

Scenario	Release site	Stock	Flow	MCN-Bon TT (d)	Change in TT (d) from UD5
ED10	Hanford Reach	Fall Chinook	Average	18.08	0.00000
ED10	Hanford Reach	Fall Chinook	High	17.43	0.00000
ED10	Hanford Reach	Fall Chinook	Low	19.75	0.00000
ED10	Rock Is. Tailrace	Steelhead	Average	7.44	0.00000
ED10	Rock Is. Tailrace	Steelhead	High	3.9	0.00000
ED10	Rock Is. Tailrace	Steelhead	Low	15.07	0.00000
ED10	Rock Is. Tailrace	Yearling Chinook	Average	8.54	0.01000
ED10	Rock Is. Tailrace	Yearling Chinook	High	9.32	0.00000
ED10	Rock Is. Tailrace	Yearling Chinook	Low	14.12	0.00000
ED10	Snake R. Trap	Steelhead	Average	11.31	0.00000
ED10	Snake R. Trap	Steelhead	High	6.01	0.00000
ED10	Snake R. Trap	Steelhead	Low	11.91	0.06000
ED10	Snake R. Trap	Subyearling Chinook	Average	7.25	-0.01000
ED10	Snake R. Trap	Subyearling Chinook	High	6.29	-0.01000
ED10	Snake R. Trap	Subyearling Chinook	Low	8.92	-0.05000
ED10	Snake R. Trap	Yearling Chinook	Average	10.24	0.00000
ED10	Snake R. Trap	Yearling Chinook	High	8.44	0.00000
ED10	Snake R. Trap	Yearling Chinook	Low	9.34	0.00000
LD10	Hanford Reach	Fall Chinook	Average	18.08	0.00000
LD10	Hanford Reach	Fall Chinook	High	17.43	0.00000
LD10	Hanford Reach	Fall Chinook	Low	19.75	0.00000
LD10	Rock Is. Tailrace	Steelhead	Average	7.44	0.00000
LD10	Rock Is. Tailrace	Steelhead	High	3.9	0.00000
LD10	Rock Is. Tailrace	Steelhead	Low	15.07	0.00000
LD10	Rock Is. Tailrace	Yearling Chinook	Average	8.53	0.00000
LD10	Rock Is. Tailrace	Yearling Chinook	High	9.32	0.00000
LD10	Rock Is. Tailrace	Yearling Chinook	Low	14.12	0.00000
LD10	Snake R. Trap	Steelhead	Average	11.31	0.00000
LD10	Snake R. Trap	Steelhead	High	6.01	0.00000
LD10	Snake R. Trap	Steelhead	Low	11.85	0.00000
LD10	Snake R. Trap	Subyearling Chinook	Average	7.27	0.01000
LD10	Snake R. Trap	Subyearling Chinook	High	6.3	0.00000
LD10	Snake R. Trap	Subyearling Chinook	Low	8.98	0.01000
LD10	Snake R. Trap	Yearling Chinook	Average	10.24	0.00000
LD10	Snake R. Trap	Yearling Chinook	High	8.44	0.00000
LD10	Snake R. Trap	Yearling Chinook	Low	9.34	0.00000
LW	Hanford Reach	Fall Chinook	Average	18.08	0.00000
LW	Hanford Reach	Fall Chinook	High	17.43	0.00000
LW	Hanford Reach	Fall Chinook	Low	19.75	0.00000
LW	Rock Is. Tailrace	Steelhead	Average	7.44	0.00000
LW	Rock Is. Tailrace	Steelhead	High	3.9	0.00000
LW	Rock Is. Tailrace	Steelhead	Low	15.07	0.00000
LW	Rock Is. Tailrace	Yearling Chinook	Average	8.53	0.00000
LW	Rock Is. Tailrace	Yearling Chinook	High	9.32	0.00000
LW	Rock Is. Tailrace	Yearling Chinook	Low	14.12	0.00000
LW	Snake R. Trap	Steelhead	Average	11.31	0.00000
LW	Snake R. Trap	Steelhead	High	6.01	0.00000
LW	Snake R. Trap	Steelhead	Low	11.83	-0.02000

Table 4. Fish Travel Time Between McNary and Bonneville Dams and Deviation from Base Case UD5 (continued)

Scenario	Release site	Stock	Flow	MCN-Bon TT (d)	Change in TT (d) from UD5
LW	Snake R. Trap	Subyearling Chinook	Average	7.26	0.00000
LW	Snake R. Trap	Subyearling Chinook	High	6.29	-0.01000
LW	Snake R. Trap	Subyearling Chinook	Low	8.98	0.01000
LW	Snake R. Trap	Yearling Chinook	Average	10.24	0.00000
LW	Snake R. Trap	Yearling Chinook	High	8.44	0.00000
LW	Snake R. Trap	Yearling Chinook	Low	9.34	0.00000
UD10	Hanford Reach	Fall Chinook	Average	18.08	0.00000
UD10	Hanford Reach	Fall Chinook	High	17.43	0.00000
UD10	Hanford Reach	Fall Chinook	Low	19.75	0.00000
UD10	Rock Is. Tailrace	Steelhead	Average	7.44	0.00000
UD10	Rock Is. Tailrace	Steelhead	High	3.9	0.00000
UD10	Rock Is. Tailrace	Steelhead	Low	15.07	0.00000
UD10	Rock Is. Tailrace	Yearling Chinook	Average	8.53	0.00000
UD10	Rock Is. Tailrace	Yearling Chinook	High	9.32	0.00000
UD10	Rock Is. Tailrace	Yearling Chinook	Low	14.12	0.00000
UD10	Snake R. Trap	Steelhead	Average	11.31	0.00000
UD10	Snake R. Trap	Steelhead	High	6.01	0.00000
UD10	Snake R. Trap	Steelhead	Low	11.88	0.03000
UD10	Snake R. Trap	Subyearling Chinook	Average	7.26	0.00000
UD10	Snake R. Trap	Subyearling Chinook	High	6.29	-0.01000
UD10	Snake R. Trap	Subyearling Chinook	Low	8.96	-0.01000
UD10	Snake R. Trap	Yearling Chinook	Average	10.24	0.00000
UD10	Snake R. Trap	Yearling Chinook	High	8.44	0.00000
UD10	Snake R. Trap	Yearling Chinook	Low	9.34	0.00000

Table 5. In-river Survivals of Snake River Fall Chinook Salmon from the Head of McNary Pool through Bonneville Dam

		UD5	UD10	LW	ED10	LD10
1960	Survival	0.56362	0.56393	0.56327	0.56440	0.56421
	Δ from base		0.055%	-0.062%	0.138%	0.105%
1974	Survival	0.58662	0.58671	0.58628	0.58657	0.58665
	Δ from base		0.015%	-0.058%	-0.009%	0.005%
1977	Survival	0.53037	0.53076	0.53001	0.53169	0.53010
	Δ from base		0.073%	-0.069%	0.247%	-0.051%

Table 6. Snake River Fall Chinook Salmon In-river Survivals from the Head of the Bonneville Pool through Bonneville Dam as a Surrogate for the Listed Lower Columbia Chinook Stock

		UD5	UD10	LW	ED10	LD10
1960	Survival	0.82940	0.82970	0.82889	0.83045	0.82998
	Δ from base		0.036%	-0.062%	0.127%	0.069%
1974	Survival	0.84597	0.84599	0.84565	0.84584	0.84599
	Δ from base		0.002%	-0.038%	-0.016%	0.002%
1977	Survival	0.82992	0.83033	0.82941	0.83158	0.82945
	Δ from base		0.049%	-0.061%	0.200%	-0.057%

Table 7. Water Velocity between McNary Pool and Bonneville Dam for the Five Scenarios

		Velocities in ft/s				
	Location	**ED10**	**LD10**	**LW**	**UD10**	**UD5**
Average Flow	Estuary	0.513	0.514	0.500	0.514	0.507
	Jones_Beach	1.418	1.421	1.384	1.420	1.402
	Columbia_Gorge	0.843	0.845	0.823	0.844	0.834
	Bonneville_Tailrace	1.371	1.374	1.338	1.373	1.356
	Bonneville_Pool	1.424	1.428	1.390	1.426	1.408
	The_Dalles_Pool	0.986	0.989	0.962	0.988	0.975
	John_Day_Pool	0.480	0.482	0.468	0.481	0.475
	Deschutes_Confluence	1.244	1.247	1.213	1.246	1.230
	McNary_Pool	0.695	0.696	0.677	0.696	0.686
	Average Velocity	**0.997**	**0.999**	**0.973**	**0.999**	**0.986**
	Δ from base (UD5)	**0.011**	**0.014**	**-0.013**	**0.013**	
High Flow	Estuary	0.662	0.663	0.649	0.663	0.656
	Jones_Beach	1.830	1.833	1.796	1.832	1.814
	Columbia_Gorge	1.088	1.090	1.068	1.089	1.079
	Bonneville_Tailrace	1.770	1.773	1.737	1.772	1.755
	Bonneville_Pool	1.826	1.829	1.791	1.828	1.810
	The_Dalles_Pool	1.254	1.257	1.230	1.256	1.243
	John_Day_Pool	0.619	0.620	0.607	0.619	0.613
	Deschutes_Confluence	1.588	1.591	1.556	1.590	1.573
	McNary_Pool	0.869	0.871	0.851	0.870	0.861
	Average Velocity	**1.278**	**1.281**	**1.254**	**1.280**	**1.267**
	Δ from base (UD5)	**0.011**	**0.013**	**-0.013**	**0.013**	
Low Flow	Estuary	0.391	0.392	0.378	0.392	0.385
	Jones_Beach	1.080	1.084	1.046	1.082	1.065
	Columbia_Gorge	0.642	0.644	0.622	0.644	0.633
	Bonneville_Tailrace	1.045	1.048	1.012	1.047	1.030
	Bonneville_Pool	1.065	1.068	1.030	1.067	1.049
	The_Dalles_Pool	0.722	0.725	0.698	0.724	0.711
	John_Day_Pool	0.358	0.359	0.346	0.359	0.353
	Deschutes_Confluence	0.906	0.908	0.874	0.907	0.891
	McNary_Pool	0.552	0.554	0.534	0.553	0.544
	Average Velocity	**0.751**	**0.753**	**0.727**	**0.753**	**0.740**
	Δ from base (UD5)	**0.011**	**0.014**	**-0.013**	**0.013**	

ATTACHMENT B

USGS COLUMBIA RIVER MEASUREMENTS NEAR THE DALLES

H:\WP\2737\19459.doc

Surface water measurements
Further descriptions of the columns and codes used can be found at:
http://waterdata.usgs.gov/nwis/help?output_formats_help#streamflow_measurement_data
Stations in this file include:
USGS 14105700 COLUMBIA RIVER AT THE DALLES, OR

site_no	agency_cd	measurement_nu	measurement_dt	party_nm	channel_width_va	xsec_area_va	velocity_va	inside_gage_va	outside_gage_va	discharge_t	measured_rating_diff	sections_va	gage_va_change	gage_va_time	measurement_type_cd	control_type_cd
15s	5s	5s	19d	12s	12s	12s	12s	12s	12s	12s	12s	2s	6s	6s	12s	12s
14105700	USGS	350	6/11/85	STA/FF	1140	98700	2.88	78.49		284000	G	24	0.2	1.7	BOAT	
14105700	USGS	351	10/23/90 7:45	JEP/KKL	1140	92800	1.67	74.74		155000	G	20		0	BOAT	
14105700	USGS	352	10/23/90 8:25	JEP/KKL	1130	93800	1.64	74.75		154000	G	22		0	BOAT	
14105700	USGS	353	3/27/91 15:05	KKL/DOC	1140	96100	1.88	75.63		181000	G	23	0.52	1.2	BOAT	
14105700	USGS	354	6/21/91 10:20	KAK/TAH	1140	98000	2.74	78.29	78.2	269000	G	25	0.05	1	BOAT	
14105700	USGS	355	7/3/91 10:45	JEP/TAH	1140	96900	2.95	77.5	77.5	286000		25	0.3	0.8	BOAT	
14105700	USGS	356	7/3/91 11:33	JEP/TAH	1170	98200	2.84	77.57	77.57	279000	G	25	-0.13	0.7	BOAT	
14105700	USGS	357	7/9/92 10:40	TAH/GWO	1150	95100	1.23	76.17	76.17	117000	G	21	-0.15	1	BOAT	
14105700	USGS	358	7/9/92 11:40	TAH/GWO	1150	96700	1.16	76.17	76.17	112000	F	20	0.08	1	BOAT	
14105700	USGS	359	2/22/90 12:47	TAH/MJS			1.9	75.45		179000	G			0	BOAT	
14105700	USGS	360	6/8/90 15:05	TAH/RST			3.2	79.3		318000	F			0	BOAT	
14105700	USGS	361	8/23/90 13:15	KKL/MJS			1.22	75.22		115000	P			0	BOAT	
14105700	USGS	362	9/28/90 14:06	CGK/TAH			0	76.09		131000	G			0	BOAT	
14105700	USGS	363	12/10/90 11:20	KKL/BJF			0	76.73		90800	G			0		
14105700	USGS	364	4/12/94 11:23	KKL/OP			0	74.56		152000	G			0	BOAT	
14105700	USGS	365	6/7/94 11:47	KKL/DQT			0	77.18		217000	G			0	BOAT	
14105700	USGS	366	10/12/94 9:18	RLK/REW			0	76.81		132000				0	BOAT	
14105700	USGS	367	2/8/95 11:56	REW/RLK			0	77.05		212000				0	BOAT	
14105700	USGS	368	5/23/95 11:34	RLK/REW			0	78.49		289000				0	BOAT	
14105700	USGS	369	11/22/95 10:30	RLK/REW			0	75.59		207000	G			0	BOAT	
14105700	USGS	370	5/22/97 10:00	REW/TKE			0	85.14		510000	G		0.14	0.4	BOAT	CLEAR
14105700	USGS	371	6/27/97 14:29	REW/KKL			0	81.3		383000			0.01	0.6	BOAT	CLEAR
14105700	USGS	372	1/21/98 10:59	RLK/REW			0	76.88		218000			0.23	0.6	BOAT	CLEAR
14105700	USGS	373	4/24/98 11:48	REW/RLK			0	77.97		229000	G		-0.06	0.5	BOAT	
14105700	USGS	374	7/22/98 14:28	REW/MJS			0	77.71		211000	G		0.02	0.7		
14105700	USGS	375	11/25/98 11:03	REW/RLK			0	76.04		138000	G		0.09	0.6	BOAT	CLEAR
14105700	USGS	376	5/18/99 12:44	RLK/REW			0	77.85		220000	F		0.35	0.8	BOAT	
14105700	USGS	377	10/25/99 13:20	REW/RLK		95900	0	76.71		112000	G		0.25	1.3	BOAT	CLEAR
14105700	USGS	378	4/20/00 10:56	REW/RLK		100000	0	80		303000	G			0	BOAT	
14105700	USGS	379	6/15/00	RLK/REW		99000	0	79.29		284000				0		
14105700	USGS	380	8/31/00	REW/GWO		94500	1.47	75.7		139000	G		-0.03	0.7		
14105700	USGS	381	3/9/01 11:11	GWO/REW		93100	1.5	74.62		140000	G		0.08	0.9	BOAT	
14105700	USGS	382	9/26/01 12:13	RLK/REW		95700	1.36	76.61		130000	G		0.12	0.9	BOAT	
14105700	USGS	383	2/6/02 11:57	GWO/REW	1100		0	74.66		159000	P			0	BOAT	
14105700	USGS	385	7/24/02 10:07	GWO/JDS	1110		0	78.71		214000	G			0	BOAT	CLEAR
14105700	USGS	386	12/20/02 10:19	GWO/RLK	1110	101000	1.03	76.56		104000	F		0.06	0.6	BOAT	
14105700	USGS	386	12/20/02 10:20	GWO/RLK	1110	101000	1.03	76.52		104000	F		0.06	0.6	BOAT	

United States Department of the Interior

BUREAU OF RECLAMATION
Ephrata Field Office
P. O. Box 815
Ephrata, Washington 98823

E.C.B.I.D.
RECEIVED
MAR 29 2000

IN REPLY REFER TO:
EPH-2000
FIN-1.10

MAR 28 2000

Mr. Richard Erickson
Secretary-Manager
East Columbia Basin Irrigation District
PO Box E
Othello WA 99344

Mr. Keith Franklin
Manager
Quincy-Columbia Basin Irrigation District
PO Box 188
Quincy WA 98848

Mr. Shannon McDaniel
Secretary-Manager
South Columbia Basin Irrigation District
PO Box 1006
Pasco WA 99301

Subject: 2000-04 Diversion Rate (DR) Columbia Basin Project

Gentlemen:

We are in receipt of the East, Quincy, and South Columbia Basin Irrigations District's (Districts) joint-letter of March 9, 2000, in which the Districts accepted the draft narrative and proposed DR for Calendar Year (CY) 2000-04 as outlined in our January 13, 2000 letter.

The DR for the CY 2000-04 has been set at $1.0676 per acre-foot and is in accordance with your March 9 letter. We have enclosed a final copy of the narrative, Columbia Basin Diversion Rate 2000-2004, dated January 11, 2000, which outlines the methodology used to develop the rate and the spread sheet, Diversion Rate: CY 2000 through 2004, dated December 17, 1999, which provides a breakdown of the rate calculation. Both documents are consistent with the drafts provided in our January 13 letter.

As stated in your letter, we are in agreement that the CY 2000-04 DR is set without prejudice to the respective positions of Reclamation and the Districts regarding the allocation and inclusion of replacement costs in future diversion rates.

Sincerely,

William D. Gray
Deputy Area Manager

Enclosures

Enclosure (2)

January 11, 2000

Columbia Basin Diversion Rate

2000-2004

The methodology associated with setting the Columbia Basin Diversion Rate relies on the Theory of Ultimate Development (TUD). TUD distributes costs based on development levels at the time of the rate setting. This diversion rate setting shall continue to use the TUD process with an adjustment for equipment operating conditions. Under the TUD process, the ultimate development of the basin is projected to be a diversion of 21,847,000 acre-feet over a five-year rate period, of which, 19,710,000 acre-feet (3,942,000 per year) is identified with irrigation and 2,137,000 acre-feet (427,400 per year) is identified with pump/back generation. Pump/back generation is the operation of the pump/generator (p/g) plant for power purposes.

Under the TUD methodology, the distribution of costs is in proportion to the development level of the project. In the current case, irrigation diversions for the 2000-2004 year period are projected to be 2,500,000 acre-feet per year or 12,500,000 acre-feet over the five-year rate period. The projected diversion of 12,500,000 acre-feet is 57.22% of the ultimate diversion. Under the TUD methodology, this 57.22 % is applied as irrigation costs of operation and maintenance of the p/g plant. The remaining percentage would be paid by power.

The establishment of 427,400 acre-feet per year as the pump/back generation development level is based on use of the plant, three months out of the year, typically during winter high-power demand periods. Planned pumping occurs for eight hours per day with generation also occurring eight hours per day during weekday periods. Assuming a pumping rate of 1,795 cfs for a p/g unit, 6 units pumping eight hours a day will pump 7,123 acre-feet per day. For a three month period (20 weekdays per month or 60 pumping days) the total pumped is 427,400 acre-feet.

The amount of water used for pump/back generation contributes to the ultimate development level of 21,847,000 acre-feet, but does not affect the irrigation diversion rate setting except to establish a basis for cost of storage and transmission services. In these cases, the cost is distributed on a "prorata" basis in proportion to the number of acre-feet diverted.

Discussion:

Only in the past four years has the pump/back generation feature of the plant been used to any great extent. For a number of years in the 1980's and early 1990's, pg-7, and pg-8 were in a "decommissioned" status due to design deficiencies, maintenance problems and the lack of plant operation in the pump/back mode. P/g-7 and p/g-8 were put back into service in 1996. Since 1996, the plant has been used extensively to help meet the requirements and flexibility demanded of the power system. Pumping for irrigation purposes now takes place during light load hours and weekends. Light load hours are generally from about 10:00 p.m. to about 6:00 a.m. on week days,.and during all weekend hours. During heavy irrigation periods, all available pump and p/g units may be started at 10:00 p.m. and pumping normally continues until around 6:00 a.m. when shutdown occurs. When the irrigation demand lessens, fewer pump and p/g units are used. When daily power demands are such that generation is necessary from the p/g plant, the p/g units may be started at midnight for pumping and shutdown in the morning, restarted in the generation mode during the morning peak then shut down, restarted for the evening peak and shut down again before starting the cycle over the next day. Weekends typically call for pump and p/g units to be started and run throughout the weekend and then shutdown Monday morning at about 6:00 a.m.

Operation in the above manner allows for significant flexibility in operation of the power system. During high pumping periods, pumping power loads can be as much as 600 megawatts. Shutdown and reversal of the p/g units allows generation of as much as 300 megawatts. The flexibility to "adjust" the power system load by up to 900 megawatts (-600 to + 300) provides significant operational flexibility. Operation of the p/g plant in the generation mode also allows for power sales during "heavy load" conditions and maximizes revenue opportunities.

Deregulation of the power industry has contributed greatly to the current plant operating conditions. Load shaping through pump timing, power generation through use of the p/g units, and use of the p/g units to meet spinning reserve requirements have all become important considerations. These considerations have manifested themselves largely due to deregulation of the power industry and the sales and marketing opportunities it has created.

Not all of this has happened without cost. The substantial increase in starting and stopping of the pump and p/g units has taken its toll on the equipment. Unit circuit breaker operations have risen by a factor of over eight. In the period from 1990 to 1994, the average annual number of circuit breaker operations was 178, with a high of 267 and a low of 143. The average number of breaker operations for the period of 1996 to 1999 was 1,485 with a high of 1,893 and a low of 1,139. The year 1996 was omitted, because it is considered a transition year between past and current operations. This increase in the starting and stopping of units has also increased operation and maintenance requirements. Costs associated with the plant maintenance have nearly doubled in the past three years. Plant equipment, particularly circuit breakers, have required overhaul and refurbishment on an increased basis. Much of the equipment is nearly 50 years old, and parts are difficult to obtain. The increased service conditions have accelerated maintenance requirements and shortened the remaining useful life of the equipment accordingly.

The TUD principle, when used to figure cost distribution for the Columbia Basin, is premised on a distribution of benefits as compared to ultimate development. This works well in a project where capacity was built and unutilized. It worked well for the pumping plant when the primary purpose in its use was irrigation pumping. However, with the dramatic increase in use of the plant due to power deregulation and the corresponding increase in maintenance costs, without refinement, use of TUD may now be distributing a disproportionate share of the plant maintenance costs to irrigation interests.

2

The reliability of pump and p/g units is critical to both irrigation and power interests; however, different degrees of reliability are required to serve the needs of both. Irrigation interests can normally be met with seven pump or p/g units. Power interests are met best when all units are available as maximum load shaping and generation ability is then available. This apparent conflict and the costs associated with ensuring those different levels of reliability require TUD to be modified when costs of pump and pump generating equipment O&M are considered. On the one hand, irrigation interests are paying for the majority of the costs for O&M (57%); while on the other hand, power operations are subjecting the units to increased operating requirements and much harsher maintenance conditions.

Adjustment for Power Operating Conditions:

Since the operation and maintenance conditions of the p/g plant does not affect storage or transmission costs, those costs continue to be calculated using TUD methods. In addition, the costs of the p/g plant structure and associated equipment such as sump pump, elevators, lighting, janitorial, etc., are unaffected by the service conditions of the pumps and p/g's. Therefore, the irrigation share of these items shall continue to be determined using the TUD methodology.

However, a straight application of TUD does not provide an equitable distribution of operation and maintenance costs when applied to pumps, pump generators and associated equipment. Under TUD, the cause of significantly increased maintenance costs and loss of equipment service life, namely power operations, would continue to pay a minor share (43%) of the cost.

An adjustment to the cost distribution for equipment replacement, and extraordinary maintenance (RAX) items on pumps and p/g's, transformers, other associated equipment and the daily maintenance cost associated with the pump and p/g units and equipment is in order to account for the increases caused by the "deregulated" operational conditions. For purposes of this rate setting, the following process was used to establish a distribution rate to be applied to "deregulated" equipment. A new distribution factor is based on comparison of the adjusted estimated daily O&M costs of the previous rate period to the increased estimated costs for the current rate period. It is assumed that the estimate for daily O&M for the last rate period was reasonably accurate, if the effects of power deregulation had not raised costs. It is also assumed, that daily O&M costs would have risen at approximately the same rate as inflation, if the plant had continued to operate under historic conditions without power deregulation

The estimate for basic routine maintenance for the previous five-year rate period was $4,500,000. This amount is then considered the cost "baseline." This amount is escalated by inflation (consumer price index factor of 1.12117 since September of 1994, approximately 2.3%) and becomes $5,045,265. This would be the "baseline" amount for the new rate period. Application of the TUD percentage of 57.22% would result in an irrigation share of $2,886,704 ($5,045,265 x .5722). Under the assumption that increases beyond this amount are attributable to the effects of deregulation and power operations, the remaining cost should be borne by power. The "calculated" irrigation share of $2,886,704 is 36.10% of the new rate period estimate of $7,996,000. This 36.10% is then applied to expenses associated with the maintenance of equipment such as pumps and pump/generators.

Operations costs should also be subject to the 36.10% irrigation share. The increased number of operations of plant units requires a corresponding increase in the attendance of operations staff in the pumping plant. Operations costs are increased due to power operations requirements; therefore, it is appropriate that these additional costs be borne by the power interest.

Since facility maintenance costs, other than those associated with pump and p/g units and associated equipment, are not effected by increased service factors, costs for these items should continue to be paid by applying the TUD process resulting in an irrigation assessment of 57.22%.

660.

620 JUL 15 1983

Memorandum

To: Regional Director, Boise, Idaho
Attention: PN 770

From: Project Manager, Grand Coulee, Washington

Subject: Proposed Operating Plan for Banks Lake and Grand Coulee Pumping/Generating Plant

Several Project personnel have been in discussion with both Regional office staff and Columbia Basin Project personnel related to future operations with implementation of pumped storage. We felt that it would be advantageous to draft an Operating Plan for your use which could also be used as a reference in future power and water discussions; e.g., NWPP-OC meetings.

The enclosed Operating Plan also serves to document several telephone conversations between your staff and Grand Coulee Operations.

R. E. Etheridge

Enclosure

cc: Regional Director, Boise, Idaho
Attn: PN 240, PN 400, PN 460 (all w/encl.)

Project Manager, Columbia Basin Project, Ephrata, Washington
Attn: CBP 400, CBP 430, CBP 470 (all w/encl.)

bcc: Files, Chron, 100, 140, 150, 320, 400, 600, 620, 630, 1000
(all w/encl.except Chron)

JA Pederson:lin:06-30-83

Enclosure (3)

BANKS LAKE
and
GRAND COULEE PUMPING/GENERATING PLANT
OPERATING PLAN

INTRODUCTION

As we gradually convert from a pure irrigation pumping plant to a two-season pumped storage and pumping plant, careful consideration should be given to a new operating plan. The planned maintenance program will undergo major change since: (a) 12 units will require maintenance instead of 6 and (b) units will be in daily operation every month except March and November. The inspection and attendance by Operations personnel will be intensified due to load factoring in the summer months and the many unit starts during the winter peaking period for both modes of operation.

We can expect a strong "learning curve" for the first couple of years before we settle into a smooth "modus operandi" and firm Maintenance schedule.

SUMMER PUMPING PLAN

Background (Historical). In 1983 a total of 520,000 acres are under irrigation by waters delivered to Banks Lake by the P/G Plant. Over the last 7 years an average of 2,200,000 acre-feet of water has been delivered for irrigation purposes. The pump operation may start anywhere from March 26 to May 4 and typically the last pump is shutdown on October 20--22. The total energy consumed by the pump motors (including P/G-7-8) on an annual basis has varied from a minimum of 485,733,000 kWh to a maximum 997,607,000 kWh over the period 1975--1982. (See Attachment No. 1) Normal operating range of Banks Lake during the summer varies between elevation 1568.0 and elevation 1570 which is full pool. The maximum water delivery through the main canal to date was 9700 cfs on June 22, 1982. The total water pumped exceeds the South Dam withdrawals by about 4% primarily due to evaporation. (See Attachment No. 2) An unusual operating level occurred during the winter of 1980--81 to provide a maximum drawdown for: (a) freezing roots of the Eurasian Watermilfoil and (b) cofferdam work associated with the Grand Coulee Feeder Canal expansion contract. For this purpose, the lake was lowered to El. 1545.13 (10/31/80) and remained there until February 12 to freeze the roots of the milfoil.

Future. With the expansion of the Columbia Basin Project irrigated lands, additional water deliveries will be required each year until a maximum of over 1,000,000 acres is realized. The present water delivery profile will be valid with a factor applied directly to acreage additions; i.e., the starting and stopping pump dates will never change dramatically. If a major crop change occurred (similar to the demise of the sugar beet), some shifting of delivery times may occur but overall volume of water required should be fairly predictable.

The South Dam outlet works has a minimum delivery capacity of 10,400 cfs with a Banks Lake elevation of 1537 and a maximum capacity of 19,000+ cfs at El. 1570. With the second Bacon Siphon tunnel in service the Main Canal is rated at 19,300 cfs. Water deliveries are expected to peak in the future at 19,000 cfs for a projected irrigated land development of 1,095,000 acres.

A minimum of 10 units will be in service in the P/G Plant to meet this demand and maintain an acceptable water surface elevation during parts of June, July, and August. Maximum power demands will be approximately 470 MW during the June, July period at the full development level.

P-1---6 Limitations. The pump units P-1---6 may be operated at any FDR Lake elevation above 1208.00. There are certain gross head combinations of the G-1-2-3 turbines and P-1---6 pumps which preclude attaining synchronous speed during a two-pump start. This can be determined by overlaying a pump requirement curve (MW vs. gross head) on a generator output curve (MW vs. gross turbine/load) and determining the net difference in MW. A one-pump start is always possible at FDR elevation above 1208.00 regardless of the elevation of Banks Lake.

There are several major reasons to minimize pumping at higher pump heads. The major consideration is to attain the maximum volume of water pumped for a given amount of energy consumed. For this reason, it is desirable for FDR to be ≥ El. 1240 when the pumping requirement climbs to a first peak of 6000 cfs on May 10--20 each year.

Gross Head	CFS Pumped
362 (1570-1208)	967
328 (1568-1240)	1363
280 (1570-1290)	1605

P/G-7-8 Limitations. The Pump/Generators P/G-7-8 are not to be operated at heads greater than 317' except in an emergency. Normal operation (by choice) will not exceed a gross head of 306'. This gross head should include a contingency of the siphon breaker opening inadvertently which approximates an upper pool elevation of 1580. With these considerations, pumping should occur when FDR Lake is ≥ 1263 elevation (1580 minus 317).

Gross Head	CFS Pumped
317	1645
307	1735
280	1948

P/G-9---12 Limitations. These units appear satisfactory for operation at a pumping head up to 339' which was performed during a test of P/G-9 on April 12, 1983. Again considering the possibility of the siphon breaker opening, pumping should occur at FDR elevations ≥ 1241 feet (1580 minus 339).

Gross Head	CFS Pumped
340	1372
330	1440
300	1742
280	1912

2

Overall Recommendations. Taking into considerations the above water requirements and technical limitations plus recreation and fish and wildlife concerns the following plan is proposed:

Date	Banks Lake	FDR Lake
3/11 - start withdrawals	1570.0	1250 - 1260
3/26--4/5 - start pumping	1568.5	1235 - 1245
5/10 - pumping ≅ 6000 cfs	1568.5 ±0.5	1220 - 1235
6/25 - max. pumping required	1568.5 ±0.5	1275 - 1285
Minimum elevations	1565.0	1208
10/25 - stop pumping	1570.0	1286.0 - 1290

NOTE: At upper elevations of Banks Lake, each foot of elevation change ≅ 26,700 acre-feet or 8.4 conventional pump days. Actual diversions will depend on flood control operation of FDR.

WINTER PEAKING (Pumped Storage) OPERATION

Load Projections. Rather than try to forecast loads, a plan to provide maximum generation capability in a minimum amount of time and operate on a weekly cycle is our objective.

Gross Head	MW Capability P/G-7-8	MW Capability P/G-9---12
280	46.6	45.67 1/
290	48.8	---
≥ 293.5	49.5	---

The BPA will be apprised of unit availability and operating flexibility on a daily basis.

1/ January 28-29, 1983 - P/G-9 at 100% gate for commissioning.

P/G-7-8 Limitations. The major operating constraint is a maximum wicket gate opening of 82% for any given head. Although the generator is capable of a 115% continuous overload rating or 53 KVA, a 46.5 - 48.5 MVA will be used for nominal output capability.

P/G-9---12 Limitations. No known limitations at this time. At 280' gross head, the full gate output is over 45 MW with about a 1 MW increase at 290' head. Specific operating criteria will be developed during commissioning and acceptance tests.

Overall Operating Plan. A weekly cycle of pumped storage is planned during the months of December, January, and February. Pumping would occur between 2200 on Friday night and 0600 on Monday morning for a maximum of 56 hours depending on excess generation available to the Federal system for such pumping use. At 280' gross head:

	Pumped Unit CFS	Pumped Total CFS	A/F (56 hours)
P/G-7-8	1948	3896	18,031
P/G-9---12	1912	7648	35,396
		Total - 56 Hours	53,427

	Generating		
	Unit CFS	Total CFS	A/F (8-hour day)
P/G-7-8	2260	4520	2,988
P/G-9---12	2320	8880	5,871
	Total - 8-hour day		8,859

40 hour week ≅ 44,295 acre-feet; 53,427 acre-feet ≅ 48 hour week. As noted below, pumping with conventional pumps may also be required.
Minimum Banks Lake elevation for different generator configurations will be developed from experience. Weir and headwall will be limiting factors.

OFF-SEASON MAINTENANCE

Winter Period, P-1---6. Pump units P-1---6 may be available for maintenance activities from late October until April each year. If increased generation periods were required during winter peaking that exceeded P/G unit weekend pumping capability, some conventional pump operation may be required during the December---February period. (Drum gate maintenance may affect manpower.)

Summer Period, P/G-7---12. The major maintenance activities should be limited to March, April, May, and September, October, November. During the peak pumping periods of June---August, 10 of the 12 units will be in operation with one or both standby units available for immediate operation for first contingency failures.

Feeder Canal and Waterways. With the onset of winter peaking operation, the only two months available for Feeder Canal inspection/maintenance are March and November. Special consideration will have to be given to waterway maintenance until the wave dampening gates are modified and because we can now "saturate" the UNW header and backfill open suction elbows and draft tubes.

REFERENCES

Drawings. The historical hydrographs of Project water levels and flows will be useful in projecting future operations. (All are 222-117-xxxxx drawings)

	1975	1976	1977	1978	1979	1980	1981	1982
Dam Hydrograph	15176	15235	15662	15768	16249	16442	16178	17047
Head, Gen. & Efficiency	15238	16824	15637	16073	16250	16443	16180	17048
Weekly Releases	15237	16823	15644	16074	16251	16444	16179	17049
FDR Lake	15236	16822	15645	15769	16252	16441	16177	17046

Columbia Basin Farm Deliveries, 1975--82

222-117-12364 Banks Lake Live Storage Capacity and Surface Area

Standing Operating Procedures (SOP's). Nameplate data and operating limitations are available in:

B-5 Pumps, P-1---6
B-6 Pump/Turbines, P/G-7-8
B-7 Pump/Turbines, P/G-9---12

B-16 Motor, P-1---6
B-17 Generator/Motors, P/G-7-8
B-18 Generator/Motors, P/G-9---12

Rating Tables for Pumping P-1---6
Rating Tables for Pumping/Generating P/G-7-8
Rating Tables for Pumping/Generating P/G-9---12

Memoranda

From	To	Subject	Dated
Chief, Operations Branch	Operations Personnel	Pump Operation	5/11/65
Project Manager, Ephrata	Chief Engineer, Denver	Capacity Test on P-3	6/25/69
Chief, Operations Division	Project Manager	Pumping-Past, Present & Future	6/28/76
Project Manager	Regional Director	Primary Pumping - Preferred Operation at Grand Coulee	7/14/82

Attachment No. 1

Energy Consumption (kWh)

Year	P-1---6	P/G	Total
1975	763,272,000	6,712,000	769,984,000
1976	628,313,000	214,567,000	842,880,000
1977	924,788,000	0	924,788,000
1978	718,139,000	65,569,000	783,708,000
1979	801,626,000	121,112,000	922,738,000
1980	311,286,000	174,447,000	485,733,000
1981	923,617,000	73,990,000	997,607,000
1982	858,412,000	0	858,412,000
		Annual Average	823,231,000

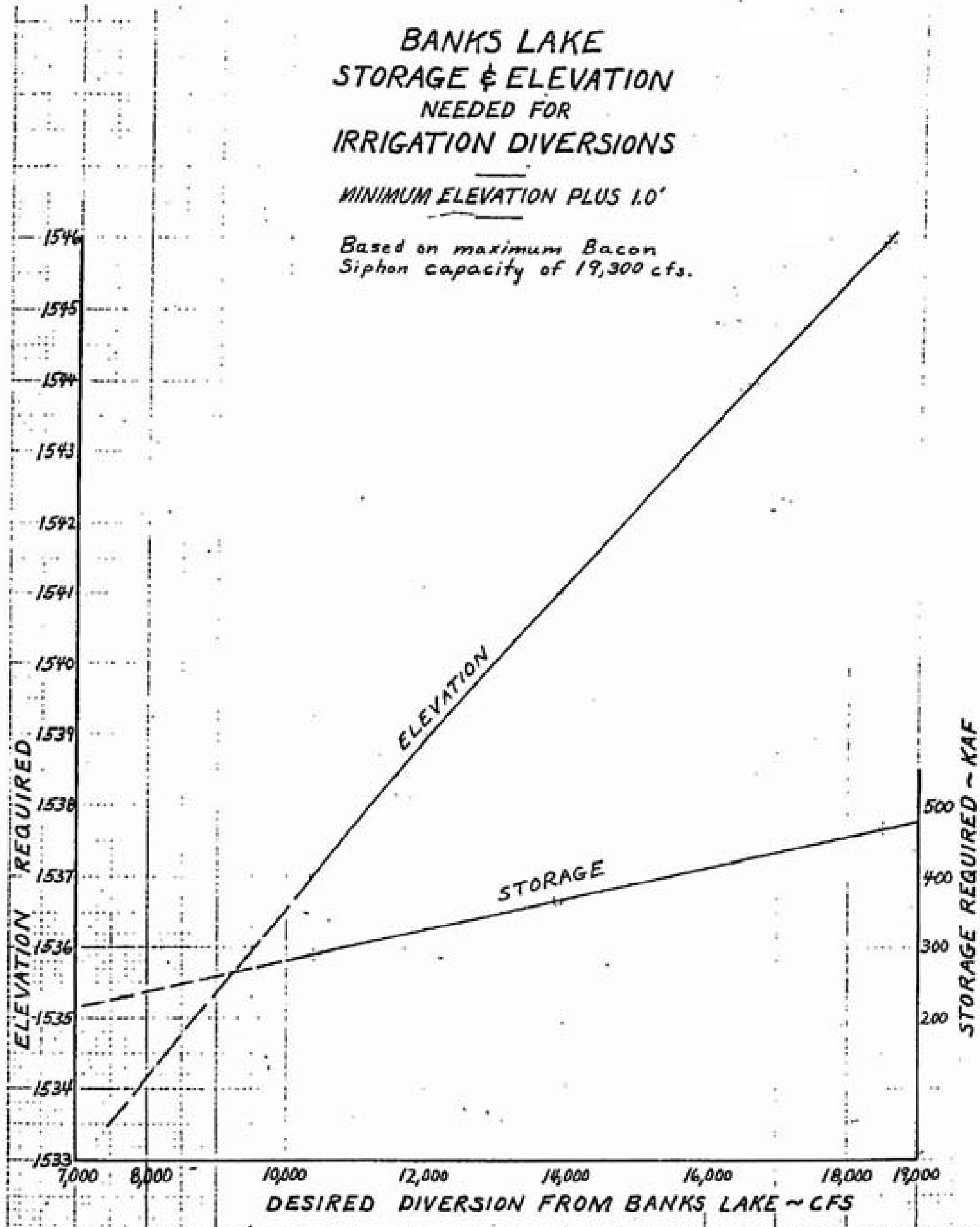
Attachment No. 2

Difference in Irrigation Withdrawals and Our Total Pumped

Year	Acre-feet	
1973	+ 215,969	
1974	+ 35,638	
1975	+ 59,145	
1976	+ 108,448	
1977	+ 95,496	
1978	+ 38,470	
1979	+ 125,621	
1980	- 579,255	1/
1981	+ 701,257	1/
1982	+ 77,691	
Annual Average =	87,848	

1/ The unusually large numbers reflect the drawdown for Eurasion Watermilfoil freezing. A negative number indicates more water was withdrawn than pumped.

Attachment No. 3



Sources: Banks Lake storage chart of 7-29-57, Main Canal Headworks Discharge Cap. charts of 5-3-60

Attachment No. 4

Page 1 of 2

PUMPING REQUIREMENTS AT GRAND COULEE
Electric Power and Energy and Water for Primary Pumping
at Grand Coulee-Median or Adverse Hydro

	July	Aug. 1-15	Aug. 16-31	Sept.	Oct.	Nov.	Mar.	May	June
*1980-81									
Peak MW	373	272	0	0	0	0	361	258	272
Energy MW	372	272	0	0	0	0	226	106	264
Water cfs	13,580	9,680	0	0	0	0	11,380	3,290	9,090

	July	Aug. 1-15	Aug. 16-31	Sept.	Oct.	Nov.	May	June
*1980-81								
Peak MW	373	272	180	135	90	0	258	272
Energy MW	372	272	180	131	56	0	128	264
Water cfs	13,580	9,680	6,400	4,690	2,000	0	3,970	9,090
1981-82								
Peak MW	373	272	180	135	90	0	258	272
Energy MW	372	272	180	131	56	0	135	264
Water cfs	13,580	9,680	6,400	4,690	2,000	0	4,180	9,090
1982-83								
Peak MW	373	272	180	135	90	0	258	272
Energy MW	372	272	180	131	56	0	140	264
Water cfs	13,580	9,680	6,500	4,690	2,000	0	4,340	9,090
1983-84								
Peak MW	373	272	180	135	90	0	258	272
Energy MW	372	272	180	131	56	0	144	264
Water cfs	13,580	9,680	6,400	4,690	2,000	0	4,460	9,090
1984-85								
Peak MW	373	272	180	135	90	0	258	272
Energy MW	372	272	180	131	56	0	146	264
Water cfs	13,580	9,680	6,400	4,690	2,000	0	4,540	9,090

* Alternative schedules depending on Eurasian watermilfoil eradication program.

Page 2 of 2

	July	Aug. 1-15	Aug. 16-31	Sep.	Oct.	May	June
1985-86							
Peak MW	373	272	180	135	90	258	272
Energy MW	372	272	180	131	56	149	264
Water cfs	13,580	9,680	6,400	4,690	2,000	4,620	9,090
1986-87							
Peak MW	373	272	180	135	90	258	272
Energy MW	372	272	180	131	56	151	264
Water cfs	13,580	9,680	6,400	4,690	2,000	4,700	9,090
1987-88							
Peak MW	373	272	180	135	90	258	272
Energy MW	372	272	180	131	56	154	264
Water cfs	13,580	9,680	6,400	4,690	2,000	4,780	9,090
1988-89							
Peak MW	373	272	180	135	90	258	272
Energy MW	372	272	180	131	56	156	264
Water cfs	13,580	9,680	6,400	4,690	2,000	4,830	9,090

1989-90 through 1999-2000 same as 1988-89

COMMENT ID 03

"The Green Spot of the Columbia Basin"

South Columbia Basin Irrigation District

OFFICE: 1135 E. HILLSBORO, SUITE A

TELEPHONE 509/547-1735, FAX 509/547-8669 • P.O. BOX 1006 • PASCO, WASHINGTON 9930*

April 10, 2003

Mr. James Blanchard
Special Projects Officer
Ephrata Field Office
U.S. Bureau of Reclamation
P.O. Box 815
Ephrata, WA 98823-0815

Dear Mr. Blanchard:

Subject: Draft Environmental Impact Statement
Banks Lake Drawdown
Douglas and Grant Counties, Washington

01

Thank you for the opportunity to comment on the Banks Lake Draft Environmental Impact Statement dated January 2003, which analyzes the environmental impacts of the proposed action to lower the water surface elevation for Banks Lake from 1,565 feet to 1,560 feet in August of each year.

It is the District's position that the DEIS does not evaluate all the impacts of the proposed action. For this reason, the South Columbia Basin Irrigation District joined with the East and Quincy-Columbia Basin Irrigation Districts and Grand Coulee Project Hydroelectric Authority to hire Tetra Tech (Foster Wheeler Environmental Corporation) to conduct a complete, independent third-party technical review of the DEIS. The District's goal was to have an impartial review of the applicability of NEPA requirements and to fill in the voids of a scientific analysis. Additionally, the District contracted with Chris Von Holmes and James Anderson of Columbia Basin Research to model the proposed flows addressed in the scenarios put forth in the DEIS to identify the actual benefits to Snake River fall chinook smolts migrating through the Columbia River System during the proposed drawdown period.

The Tetra Tech review is attached hereto and included in these written comments by reference. The document in its entirety encompasses the District's views, concerns, and comments. The final EIS needs to address all the issues identified.

Mr. James Blanchard
Page 2
April 10, 2003

The District realizes the need for the operational drawdowns of Banks Lake on an infrequent basis for maintenance activities. The District is firm in its standpoint that the operational flexibility for Banks Lake be maintained for Project purposes, which would include deep drafts to elevation 1,545 feet as needed for maintenance activities. 01

The District emphasizes that the actual implementation of RPA 23, the 5-foot drawdown, is not identified in the document as an Action Alternative. We believe that a 5-foot drawdown IS an Action Alternative because it differs from the normal operation of the reservoir. For the past decade or more, Banks Lake has been operated during the irrigation season at 1,568 to 1,570 feet. Elevations have varied due to load volume and pumping conditions in order to accommodate the most efficient power generation and pumping efficiencies for BPA. Any change in that historical operation should be identified in the DEIS as an Action Alternative. 02

The American Heritage Dictionary defines *opinion* as "a belief or conclusion held with confidence but not substantiated by positive knowledge or proof." The 2000 FCRPS Biological Opinion, RPA 31, is an opinion, and the lack of proof of an ESA-listed salmonid benefit does not merit the implementation of drawing down Banks Lake to elevation 1,560 during the month of August of each year. 03

The independent third-party technical review indicates that the flow augmentation effect on ESA-listed salmonid stocks in the lower Columbia River would be infinitesimal—***less than one fish for every ten thousand smolts.*** The 5-foot and 10-foot drawdowns listed in RPA 23 and RPA 31 have not been selected by the use of any scientific process. The numbers seem to have been selected arbitrarily for their convenience. The District does not support and will not support the use of Columbia Basin Project facilities under conditions that are not supported by sound science.

Sincerely,

Shannon McDaniel
Secretary/Manager

SM:kgn
Enclosure
cc/enc: Senator Patty Murray
Senator Maria Cantwell
Representative Doc Hastings
Representative George Nethercutt
USBR Commissioner John Keys

Review of Draft Environmental Impact Statement on the Proposed Banks Lake Drawdown

prepared for

East Columbia Basin Irrigation District
Quincy-Columbia Basin Irrigation District
South Columbia Basin Irrigation District
Grand Coulee Project Hydroelectric Authority

prepared by

Tetra Tech (Foster Wheeler Environmental Corporation), Inc.

April 2003

This report was included with the East Columbia Basin Irrigation District letter of comments, which begins on page 299, and is not repeated here.

COMMENT ID 04

Quincy-Columbia Basin Irrigation District
Telephone (509) 787-3591 Fax (509) 787-3906
Post Office Box 188
Quincy, Washington 98848

April 10, 2003

Mr. Jim Blanchard
United States Bureau of Reclamation
PO Box 815
Ephrata, WA 98823-0815

RE: Comments to Banks Lake Drawdown Draft Environmental Impact Statement

Dear Mr. Blanchard:

The Quincy Columbia Basin Irrigation District appreciates this opportunity to comment on the Banks Lake Drawdown Draft Environmental Impact Statement. 01

To aid the Columbia Basin Irrigation Districts in evaluating and commenting on the proposed DEIS, the Districts contracted with an environmental corporation Tetra Tech FW, Inc., who's report will be referred to and made a part of the Quincy Districts comments.

The Quincy District is opposed to the No Action Alternative as outlined in the DEIS. "No action" should be meant to mean Banks Lake would continue to operate in the same historical manner as it has been in the past which shows the lake at above 1565 95% of the time. However, the proposed No Action Alternative seems to have been derived from the 2000 Federal Columbia River Power System Biological opinion where the Bureau of Reclamation would operate Banks Lake with a five foot drawdown in the month of August. The Bureau should include a third alternative in the DEIS that contain drawdown scenarios to elevation 1565 as an action item.

By drawing the lake down to elevation 1565, the DEIS says there would be 133,600 acre-feet of water available to increase stream flow for fish migration targets during August. As part of the DEIS process, the Bureau should have made an investigation as to whether or not there is any real scientific justification to return 133,600 acre-feet to the Columbia River. As will be discussed further, the Quincy District believes there is evidence to show little or no benefit exists. 02

In addition to the No Action Alternative, the Quincy District is also very much opposed to any proposal that includes an annual drawdown to an elevation of 1560 for the possibility of meeting flow augmentation targets at McNary Dam. The District is again of the opinion that the DEIS is flawed by not addressing whether or not there is any scientific justification that additional water from Banks Lake will aid in the ESA-listed juvenile salmonid stocks out-migration. The District believes the Bureau must address 03 the issue of justification before any action involving drawdowns are proposed or implemented. 03

On February 10, 2003, the Independent Scientific Advisory Board for the Northwest Power Planning Council, the National Marine Fisheries Service and the Columbia River Basin Indian Tribes issued a report the purpose of which was to update and clarify its review of flow augmentation on the lower Columbia and Snake Rivers. The Advisory Board concluded the prevailing flow-augmentation model, which asserts that in-river smolt survival will be proportionally enhanced by any amount of added water, is no longer supportable and does not agree with information now available. 04

This latest information, from the science community, would support an argument for an action to leave the operation of Banks Lake status quo until alternatives have been developed that have both scientific justification and practical value for managing the hydro-system for multiple uses including salmon recovery.

In addition, Tetra Tech FW, Inc. evaluated the impacts of the various proposed Banks Lake drawdowns to the lower Columbia by using the Columbia River Salmon Passage model (CRiSP) to see if there is any benefit to migrating smolts. Modeled August flow adjustments indicated spring migrants were not affected because the fish have migrated out of the river system before August. At average to low flows, the survival change from the Banks Lake drawdown is between 0.00001 and 0.00002 and at high flows the maximum survival rate increase was less than 0.000005. To put these changes in perspective, a Banks Lake drawdown of ten feet in August would only increase the number of smolts reaching Bonneville Dam by between 6 to 13 smolts out of an average total of 630,000. The corresponding reduction in travel time between McNary and Bonneville Dams is, at most, one hour in a nine-day travel time. Most scenarios increased travel time to Bonneville Dam by less than 14 minutes on travel times of about two weeks. 05

This modeled analysis clearly shows, for all practical purposes, an insignificant benefit to migrating smolts and further substantiates the Districts position of no drawdowns.

In regards to irrigated agriculture, the DEIS stated it's possible for Reclamation to deliver the capacity of the main Canal (10,000 cfs) down to elevation 1537 and put forth conditions that may trigger a lesser drawdown such as drought, mechanical failure or Reclamation's inability to refill Banks Lake by September 10th. However, by locking into an annual drawdown for purposes other than O & M the Quincy District believes there remains an element of uncertainty for refill that could impact the next years irrigation season. Drawdowns for O & M purposes are justifiable necessities where a considerable amount of doubt exists as to whether the proposed Action or No Action Alternatives are justifiable to benefit fish. 06

On an annual basis, if the No Action Alternative is implemented to bring Banks Lake elevation down to elevation 1565 or the Action Alternative to elevation 1560 the impact to recreation is underestimated, not only to the user but to area businesses as well. 07

For instance, the DEIS points out that seven of the twelve boat launches will be unusable at elevation 1565 and only two will remain usable at elevation 1562 with no launches usable below the south half of the lake including Steamboat Rock State Park. The DEIS suggests users that would normally use Banks Lake during August could move to other available recreational facilities in the area such as Lake Roosevelt. This might be okay for the users if they are willing to go elsewhere, but the affected businesses don't have the flexibility to relocate. More than likely, traditional August lake visitors will quit coming to the area altogether. Again, why promote an action that will create a detrimental impact to area business without sound justification.

The Columbia Basin Project, of which Banks Lake is a major facility, was authorized by Congress as a multi-purpose federal reclamation project to provide benefits for irrigation, power, recreation, fish and wildlife, domestic, municipal, industrial, and miscellaneous uses. Practically every beneficial use intended by Congress is harmed and damaged to some degree (some to a much greater degree than others) by the proposals in the DEIS without any demonstrable, scientific or measurable benefit to out-migration of fish, which benefit in the final analysis should be the basis for any drawdown of Banks Lake other than for required operational purposes. 08

For a more thorough and in-depth analysis of the DEIS, the Quincy District includes Tetra Tech FW, Incorporation's review as part of its comments for Reclamation's consideration. If you have any questions feel free to contact me at this office.

Sincerely,

Keith E. Franklin

Keith Franklin
General Manager

KF/mb

cc: John Baird
East Columbia Basin Irrigation District
South Columbia Basin Irrigation District
Grand Coulee Project Hydroelectric Authority
Board of Directors

Review of Draft Environmental Impact Statement on the Proposed Banks Lake Drawdown

prepared for

East Columbia Basin Irrigation District
Quincy-Columbia Basin Irrigation District
South Columbia Basin Irrigation District
Grand Coulee Project Hydroelectric Authority

prepared by

Tetra Tech (Foster Wheeler Environmental Corporation), Inc.

April 2003

This report was included with the East Columbia Basin Irrigation District letter of comments, which begins on page 299, and is not repeated here.

COMMENT ID 05

Quincy-Columbia Basin Irrigation District
Telephone (509) 787-3591 Fax (509) 787-3906
Post Office Box 188
Quincy, Washington 98848

April 10, 2003

Jim Blanchard
United States Bureau of Reclamation
PO Box 815
Ephrata, WA 98823-0815

RE: Comments to the Banks Lake DEIS

Dear Mr. Blanchard:

On behalf of landowners and citizens of the State of Washington I am forwarding signed comments opposing the proposed drawdowns of Banks Lake as outlined in the Draft Environmental Impact Statement. 01

Sincerely,

Keith E. Franklin
General Manager

KEF/mb

Enclosure

Feb. 22, 2003

We, the undersigned, citizens of the United States of America, the State of Washington, do support the OPPOSED position of the three Columbia Basin Irrigation Districts in regard to the proposed drawdown of Banks Lake in Grant County for the following reasons: 02

1. The idea is theoretically supposed to help spawning salmon; however, statistics record that only once in 50 years would the effect actually have this effect.
2. The action WOULD DEFINITELY affect the recreational use of Banks Lake by leaving boat launches, and other attractions high and dry. Recreation is one of the primary focuses of the Columbia Basin Project and will definitely hurt those who use the lake for recreation and those who make a livelihood from recreation.
3. The draw down will also hurt the district's generating capacity at the hydropower plant at the south end of the lake.
4. There is a concern that the supply of irrigation water could be hampered in a scenario such as three years ago. Then, a fire knocked out some of the large pumps that draw water from behind Grand Coulee Dam into Banks Lake, which is then diverted through the project's system of canals and reservoirs. Since there have been late-season problems the last three years, this is a definite problem.
5. We will not stand idle as another example of sacrificing a rural community to the altar of Endangered Species Act goes forth. The Bureau of Reclamation cites the communities of Forks, Washington; Orofino, Idaho; and Klamath Falls, Oregon as examples of such sacrifice.
6. There have been no hearing in the Royal City community and by our signature we are requesting a public hearing before the close of the public comment. If not possible by the March 10 date, then we demand an extension of the public hearing process. Inadequate time for studying the documents and making intelligent comment has been allowed.

Signature	Printed Name	Address	Telephone	E-mail
[illegible]	Kenneth Wilson	[illegible] Road W	785-[illegible]	
[illegible]	Jason Reitsch	5951 SE Quincy	787-0153	
[illegible]	Anne Henshaw	PO Box 5525 George	785-2316	
[illegible]	Elaine Hanson	22864 Rd N.W. Quincy	785-6515	
[illegible]	Marvin Hanson	22864 Rd N.W. Quincy	785-6515	
[illegible]	[illegible]	1153 [illegible] Quincy	[illegible]	
Larry Van Diest	Larry Van Diest	7979 Rd M.7 NW Quincy	787-4618	
Mari M. Richman	MARI M. RICHMAN	9986 Dodson Rd NW Ephrata	787-4644	
Kenneth A. Richman	Kenneth A Richman	" " " Eph.	787-4644	
[illegible]	Samuel T Krautscheid	747 H ST SE SQL	754 7181	
Carl Blauert	CARL BLAUERT	1630 R4B NE Moses Lake WA	765-3947	

Feb. 22, 2003

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Signature	Printed Name	Address	Telephone	E-mail
[illegible]	Josh Roberts	5857 Rd 2 Ephrata	509-787 8411	
[illegible]	Clift Hildebrand	3986 Rd P NW, Quincy	509-787-2630	
[illegible]	Gerald K Hunde	18654 B N 10 Ephrata	509-754-9424	
[illegible]	Patric Connelly	371 Hwy 28 W Quincy	509 750-4602	
[illegible]	Kent T Karstetter	6258 Rd 11.5 N.W	509 787-4255	
[illegible]	Jeffrey R Loukhoor	417 I St SE Quincy	787-4821	
[illegible]	Jim Talbot	21452 Rd 8 NW Quincy	787-4296	
[illegible]	Tom Flint	5842 Rd 2 NW Ephrata	787-2003	
[illegible]	HELMUT H. HINTZ	1711-RD 5-NW. EPHRATA	787-2003	
[illegible]	LYNN A. CHILD	6243 RD P NW QUINCY	787-3052	
[illegible]	GEORGE V. JELUBSEK	12480 Rd 14.5 SW. ROYAL CITY, WA	346-2807	

Feb. 22, 2003

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Signature	Printed Name	Address	Telephone	E-mail
[signature]	Randy Allred	Royal City	509-346-2314	
[signature]		Royal City	346 2463	
[signature]	Mike LaPlant	Ephrata	509-787-2458	
[signature]	Bill Watson	Box 306 Quincy	509-787-1122	
[signature]	Delvin Scharzmann	E. Wenatchee, Wa	509-884-2010	
[signature]	Margaret Turner	Quincy, WA	(509)787-3591	
[signature]	Kirk DeLong	5354 Rd I NW, Ephrata Wa	(509) 787-3180	
[signature]				
[signature]	Audre Rose	Quincy, W.A.	509-785-2291	
[signature]	Marilyn Blurck	Quincy WA	(509)787-9107	
[signature]	Lyndsy Roberts	Ephrata WA	509 787-4144	
[signature]	Dean Evans	17188 Rd 5 NW Quincy Wa 98848		

TOTAL P.03

Feb. 22, 2003

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Signature	Printed Name	Address	Telephone	E-mail
Richard Stevens	Richard Stevens	22662 Rd F N.E Soap Lake, Wa 98851		
[illegible]	Steve Morris	6949 Rd G NW Ephrata, 98823		
Garth A. Gunter	GARTH A. GUNTER	11654 1st ave. SE. Royal Othello wa 99344		
Steve Brader	Steve Brader	6620 Chupparal Dr NE Moses Lake 98837		
[illegible]	JOHN SHORE	5501 Rd E NW Ephrata, Wa 98823		
Rocky [illegible]	Rocky Tyler	15291 [illegible] Hills Rd W Quincy WA 98848		
[illegible]	Brenda Lucas	1102nd Avenue NE Quincy, WA 98848	(509) 787-[illegible]	
Ann Morrill	ANN Morrill	214 J St SW Quincy WA	509-787-3147	
[illegible] Calloway	Dave Calloway	7023 Hwy 28 N	509-787-3201	
Shirley Noodworth	SHIRLEY NOODWORTH	4537 Rd D SNE - MOSES LAKE 98837		
[illegible]	Rich [illegible]	5554 Rd I NW Ephrata Wa 98823	787-[illegible]	
[illegible]				

Feb. 22, 2003

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Signature	Printed Name	Address	Telephone	E-mail
[signature]	Shed Smith	Quincy	(509)787-3765	[illegible]

Feb. 22, 2003

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3. The draw down will also hurt the district's generating capacity at the hydropower plant at the south end of the lake.
4. There is a concern that the supply of irrigation water could be hampered in a scenario such as three years ago. Then, a fire knocked out some of the large pumps that draw water from behind Grand Coulee Dam into Banks Lake, which is then diverted through the project's system of canals and reservoirs. Since there have been late-season problems the last three years, this is a definite problem.
5. We will not stand idle as another example of sacrificing a rural community to the altar of Endangered Species Act goes forth. The Bureau of Reclamation cites the communities of Forks, Washington; Orofino, Idaho; and Klamath Falls, Oregon as examples of such sacrifice.
6. There have been no hearing in the Royal City community and by our signature we are requesting a public hearing before the close of the public comment. If not possible by the March 10 date, then we demand an extension of the public hearing process. Inadequate time for studying the documents and making intelligent comment has been allowed.

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