

Final Independent External Peer Review Report John Day Dam Mitigation Program Draft Post-Authorization Change Report (PACR)

Prepared by
Battelle Memorial Institute

Prepared for
Department of the Army
U.S. Army Corps of Engineers
National Planning Center of Expertise for Ecosystem Restoration
Mississippi Valley Division

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Executive Summary

PROJECT BACKGROUND AND PURPOSE

The John Day Mitigation (JDM) program was originally authorized to offset mainstem fall Chinook production losses that resulted from construction of The Dalles and John Day dams, located on the Columbia River in Oregon. John Day Lock and Dam (John Day) is located on the Columbia River between Oregon and Washington 215.6 miles upstream from the river's mouth. The JDM program objective is to produce sufficient juvenile fall Chinook salmon to support an escapement of 30,000 returning adults.

The purpose of the Post-Authorization Report (PACR) is to document the need and justification for modifications to the authorized John Day Mitigation Program. An additional purpose of this report is to determine if recommended modifications are consistent with the current authorization or if specific authorizing language is required for implementation. John Day Lock and Dam and The Dalles Lock and Dam projects were authorized under the Flood Control Act of 1950 (Public Law 516, 81st Congress, Second Session). The authorization included mitigation, by artificial propagation, of fish losses sustained by inundation of spawning and rearing areas.

Although adjustments to the JDM program have been made over time, the current JDM program does not fulfill the 30,000 adult escapement, "in-place and in-kind" mitigation objectives, and Federal Indian Trust responsibilities related to The Dalles and John Day dams. Provisions to evaluate additional changes to the JDM program in an effort to minimize impacts on Lower Columbia River Chinook salmon and to address "in-place and in-kind" mitigate losses have been included in the 2008 Federal Columbia River Power System Biological Opinion. They are also identified in the 2008 Columbia Basin Fish Accords Memorandum of Agreement between the Action Agencies (Bonneville Power Administration, U.S. Army Corps of Engineers [USACE], and U.S. Bureau of Reclamation) and Columbia Basin Treaty Tribes.

In August of 2011, as a part of the Columbia River Fish Mitigation Program, USACE formally initiated studies to address adjustments in the JDM program that are necessary to achieve "in-place and in-kind" mitigation objectives. This has included an assessment of alternatives to increase production of upriver bright (URB) Chinook and preparation of this PACR.

Based on the evaluation and comparison of the five alternatives, a tentatively selected plan was identified, referred to as Ringold/I-182 plan. This alternative meets 107,000 adult returns for an escapement of 30,000 adult Chinook, meets a production ratio of 75 percent URB Chinook and 25 percent tule fall Chinook salmon, provides for "in-place and in-kind" mitigation of lost spawning areas above John Day Dam, and is economically efficient and environmentally sound.

The tentatively selected plan is a combination of actions that include an expansion of facilities at the Ringold Springs Washington State Fish Hatchery (Ringold), an increase in on-station production at Ringold, and construction of acclimation facilities at the I-182 site. The existing facilities at the Little White Salmon National Fish Hatchery, Prosser Tribal Fish Hatchery, and Umatilla Oregon State Fish Hatchery would continue to be used for URB Chinook. Spring Creek National Fish Hatchery would continue to be used for production and release of tule fall Chinook, but other production of tule fall Chinook is assumed to be reduced under the tentatively selected plan. The first cost of the plan is estimated at \$83.9 million, which includes planning, engineering, design, construction, management, and contingency.

Based on an assessment of the tentatively selected plan, the proposed changes are within the scope of the currently authorized mitigation program. There are no changes related to the scope, project purpose, or project outputs. The plan would produce the authorized mitigation output level to support a run of 30,000 adult Chinook based on current fisheries science and best management practices to better mitigate “in-place and in-kind” losses associated with the project.

The Independent External Peer Review (IEPR) will focus on the new information provided in the PACR and the Environmental Assessment. The purpose of the IEPR is to analyze the adequacy and acceptability of economic, engineering, and environmental methods, models, data and analyses.

Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. USACE is conducting an IEPR of the John Day Dam Mitigation Program, Draft Post-Authorization Change Report (PACR) (hereinafter John Day Dam IEPR). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2012). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate the IEPR of the John Day Dam. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2012) and OMB (2004). This final report presents the Final Panel Comments of the IEPR Panel (the Panel). Details regarding the IEPR (including the process for selecting panel members, the panel members' biographical information and expertise, and the charge submitted to the Panel to guide its review) are presented in appendices.

Based on the technical content of the John Day Dam IEPR review documents and the overall scope of the project, Battelle identified potential candidates for the Panel in the following key technical areas: fish hatchery biology, Civil Works planning/National Environmental Policy Act (NEPA) review, mechanical/design engineering, and cost engineering. Battelle screened the candidates to identify those most closely meeting the selection criteria and evaluated them for COIs and availability. USACE was given the list of final candidates to confirm that they had no COIs, but Battelle made the final selection of the four-person Panel.

The Panel received electronic versions of the John Day Dam IEPR review documents (426 pages in total), along with a charge that solicited comments on specific sections of the documents to be reviewed. USACE prepared the charge questions following guidance provided in USACE (2012) and OMB (2004), which were included in the draft and final Work Plans.

The USACE Project Delivery Team briefed the Panel and Battelle during a kick-off meeting held via teleconference prior to the start of the review to provide the Panel an opportunity to ask questions of USACE and clarify uncertainties. Other than Battelle-facilitated teleconferences, there was no direct communication between the Panel and USACE during the peer review process. The Panel produced individual comments in response to the charge questions.

IEPR panel members reviewed the John Day Dam documents individually. The panel members then met via teleconference with Battelle to review key technical comments and reach agreement on the Final Panel Comments to be provided to USACE. Each Final Panel Comment was documented using a four-part format consisting of: (1) a comment statement; (2) the basis for the comment; (3) the significance of the comment (high, medium/high, medium, medium/low, or low); and (4) recommendations on how to resolve the comment. Overall, 12 Final Panel Comments were identified and documented. Of these, three have high significance, three have medium/high significance, one has medium significance, four have medium/low significance, and one has low significance.

Battelle received public comments from USACE on the John Day Dam (two letters equaling five pages of written comments) and provided them to the IEPR panel members. The panel members were charged with determining if any information or concerns presented in the public comments raised any additional discipline-specific technical concerns with regard to the John Day Dam review documents. After completing the review, the Panel confirmed that no new issues or concerns were identified other than those already covered in the Final Panel Comments.

Results of the Independent External Peer Review

The panel members agreed on their “assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used” (USACE, 2012; p. D-4) in the John Day Dam review documents. Table ES-1 lists the Final Panel Comment statements by level of significance. The full text of the Final Panel Comments is presented in Section 4.2 of this report. The following summarizes the Panel’s findings.

From a Civil Works planning point of view, the project formulation was done in a very logical fashion proceeding in a systematic process across the entire set of objectives.

Mechanical/Design Engineering: The report provides adequate levels of detail for most aspects of the project, but does not clearly describe the specific design criteria used in the development of the facilities to support the fish rearing and thereby meet mitigation goals. In addition, it is unclear whether groundwater capacity at the site are sufficient for the planned facility. The actual quantity available is estimated using a test well. The test well and pump test indicate that the upper aquifer is insufficient for providing the needed quantity of well water; it appears that the pump test did not evaluate the lower aquifer. The Panel suggests that this problem could be addressed by conducting a geohydrological investigation.

Cost Engineering: There are significant cost and schedule risks that have not been addressed since the I-182 site may require Congressional authorization. The risk of not obtaining authorization for the use of the site as proposed could have a major impact on the recommended plan (i.e. tentatively selected plan) and the project costs. Project costs could also be affected if the authorization is not obtained in time to meet the current project schedule. The Panel suggests that the report should describe the need for

Congressional authorization and provide more detail on the consequences of not obtaining authorization at all or in time to meet the proposed project schedule.

Environmental: From an environmental perspective, the project is implementing an appropriate approach with the project objectives focused on developing an environmentally sound program based on hatchery best management practices (BMP); however, it is not clear that BMPs were used when developing alternatives or the recommended plan. Additionally, the panel identified three significant environmental-related issues. The first focuses on the potential effects on wild (non-ESA listed) fall Chinook populations by the planned hatchery program. Without an analysis of these effects, the Panel is concerned that, even though the mitigation level of 30,000 adult spawners planned for the authorized JDM program may be reached, it might not meet the objective of doing so without adverse effects on wild (non-ESA listed) fall Chinook populations. This concern can be addressed by analyzing the impact of current and alternate hatchery programs using accepted modeling methods. The analysis should discuss the potential effects of these programs on the abundance, productivity, diversity, or spatial structure of wild (non-ESA listed) middle Columbia mainstem and tributary fall Chinook populations.

The second significant issue highlights the need for further evaluation of the estimated survival rates for releases from the redesigned Ringold Springs Hatchery. The Panel is concerned that using current Priest Rapids Hatchery survival rates for planning purposes may be too optimistic and lead to development of a mitigation plan that cannot reach the mitigation goals. Further discussion is needed on why Priest Rapids Hatchery survival rates were used rather than the current Ringold Spring Hatchery survival rates.

Finally, the Panel has critical concerns regarding the water quality of the rearing water. The noted presence of lead and cadmium, as well as, the lack of CO₂ data creates risk and uncertainty surrounding the fish husbandry and production at the proposed facility. If the water includes toxins of cadmium and lead that exceed standards for fish health, the risk to meeting actual goals of fish production are high which could impact the project success. The Panel recommends that USACE measure and test the water quality at both sites during each season of use and develop a plan to provide a water supply that does not exceed standards for chronic exposure by aquatic life.

Table ES-1. Overview of 12 Final Panel Comments Identified by the John Day Dam IEPR Panel

No.	Final Panel Comment
Significance – High	
1	Potential effects on wild (non-ESA listed) fall Chinook populations directly affected by the planned hatchery programs are not specifically addressed in the Environmental Assessment (EA) as required by NEPA nor are they addressed in the PACR of the Hatchery and Genetic Management Plan (HGMP).
2	A justification for using Priest Rapids Hatchery rather than Ringold Springs Hatchery survival rates has not been provided.
3	The need for Congressional authorization to use the I-182 wetland mitigation site introduces cost and schedule risks, which have not been addressed.
Significance – Medium/High	
4	Risks and uncertainties affecting fish health, and ultimately fish survival, from rearing water containing high amounts of toxins (cadmium and lead) or high levels of carbon dioxide are not addressed.
5	The current design of the multiple use ponds at the Ringold Springs Hatchery and I-182 Ponds does not use industry-accepted fish culture standards that allow for monitoring fish behavior and pond conditions.
6	The quantity of groundwater available at the Ringold Springs Hatchery site is uncertain, and could be a risk to planned production and affect the design and implementation schedule.
Significance – Medium	
7	The use of hatchery best management practices, which is a stated project objective, is not addressed.
Significance – Medium/Low	
8	The validity of the costs presented for the recommended plan cannot be determined because the sources of pricing data are not provided.
9	The effects of climate change on local natural fish populations have not been addressed.
10	It is unclear how production costs per fish at the alternative facilities evaluated in the PACR compare with other Columbia River production facilities.
11	The justification for specific design criteria is not clearly provided and could impact the program Smolt to Adult Return ratios (SARs).
Significance – Low	
12	The impact of this project on the fishing rights of the affected tribes has not been adequately discussed.

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LIST OF ACRONYMS

ATR	Agency Technical Review
BMP	Best Management Practices
CCAPS	Climate Change Adaptation Policy Statement
COI	Conflict of Interest
CSRA	Cost and Schedule Risk Analysis
DrChecks	Design Review and Checking System
EA	Environmental Assessment
EC	Engineer Circular
ER	Engineer Regulation
ESA	Endangered Species Act
HGMP	Hatchery and Genetic Management Plan
IEPR	Independent External Peer Review
JDM	John Day Mitigation
MCACES	Micro Computer Aided Cost Estimating System
NEPA	National Environmental Policy Act
NTP	Notice to Proceed
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
PACR	Post-Authorization Change Report
PDT	Project Delivery Team
URB	Upriver Bright
USACE	United States Army Corps of Engineers
SAR	Smolt to Adult Return
TPCS	Total Project Cost Summary
VE	Value Engineering
VSP	Viable Salmonid Population

1. INTRODUCTION

The John Day Mitigation (JDM) program was originally authorized to offset mainstem fall Chinook production losses that resulted from construction of The Dalles and John Day dams, located on the Columbia River in Oregon. John Day Lock and Dam (John Day) is located on the Columbia River between Oregon and Washington 215.6 miles upstream from the river's mouth. The JDM program objective is to produce sufficient juvenile fall Chinook salmon to support an escapement of 30,000 returning adults.

The purpose of the Post-Authorization Report (PACR) is to document the need and justification for modifications to the authorized John Day Mitigation Program. An additional purpose of this report is to determine if recommended modifications are consistent with the current authorization or if specific authorizing language is required for implementation. John Day Lock and Dam and The Dalles Lock and Dam projects were authorized under the Flood Control Act of 1950 (Public Law 516, 81st Congress, Second Session). The authorization included mitigation, by artificial propagation, of fish losses sustained by inundation of spawning and rearing areas.

Although adjustments to the JDM program have been made over time, the current JDM program does not fulfill the 30,000 adult escapement, "in-place and in-kind" mitigation objectives, and Federal Indian Trust responsibilities related to The Dalles and John Day dams. Provisions to evaluate additional changes to the JDM program in an effort to minimize impacts on Lower Columbia River Chinook salmon and to address "in-place and in-kind" mitigate losses have been included in the 2008 Federal Columbia River Power System Biological Opinion. They are also identified in the 2008 Columbia Basin Fish Accords Memorandum of Agreement between the Action Agencies (Bonneville Power Administration, U.S. Army Corps of Engineers [USACE], and U.S. Bureau of Reclamation) and Columbia Basin Treaty Tribes.

In August of 2011, as a part of the Columbia River Fish Mitigation Program, USACE formally initiated studies to address adjustments in the JDM program that are necessary to achieve "in-place and in-kind" mitigation objectives. This has included an assessment of alternatives to increase production of upriver bright (URB) Chinook and preparation of this PACR.

Based on the evaluation and comparison of the five alternatives, a tentatively selected plan was identified, referred to as Ringold/I-182 plan. This alternative meets 107,000 adult returns for an escapement of 30,000 adult Chinook, meets a production ratio of 75 percent URB Chinook and 25 percent tule fall Chinook salmon, provides for "in-place and in-kind" mitigation of lost spawning areas above John Day Dam, and is economically efficient and environmentally sound.

The tentatively selected plan is a combination of actions that include an expansion of facilities at the Ringold Springs Washington State Fish Hatchery (Ringold), an increase in on-station production at Ringold, and construction of acclimation facilities at the I-182 site. The existing facilities at the Little White Salmon National Fish Hatchery, Prosser Tribal Fish Hatchery, and Umatilla Oregon State Fish Hatchery would continue to be used for URB Chinook. Spring Creek National Fish Hatchery would continue to be used for production and release of tule fall Chinook, but other production of tule fall Chinook is assumed to be reduced under the tentatively selected plan. The first cost of the plan is estimated at \$83.9 million, which includes planning, engineering, design, construction, management, and contingency.

Based on an assessment of the tentatively selected plan, the proposed changes are within the scope of the currently authorized mitigation program. There are no changes related to the scope, project purpose, or project outputs. The plan would produce the authorized mitigation output level to support a run of 30,000 adult Chinook based on current fisheries science and best management practices to better mitigate “in-place and in-kind” losses associated with the project.

The Independent External Peer Review (IEPR) will focus on the new information provided in the PACR and the Environmental Assessment. The purpose of the IEPR is to analyze the adequacy and acceptability of economic, engineering, and environmental methods, models, data and analyses. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The objective of the work described here was to conduct an IEPR of the John Day Dam Mitigation Program, Draft Post-Authorization Change Report (PACR) (hereinafter: John Day Dam IEPR) in accordance with procedures described in the Department of the Army, USACE, Engineer Circular (EC) *Civil Works Review* (EC 1165-2-214) (USACE, 2012) and the Office of Management and Budget (OMB) *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Supplemental guidance on evaluation for conflicts of interest (COIs) was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

This final report presents the Final Panel Comments of the IEPR Panel (the Panel) on the existing Civil Works Planning, mechanical/design engineering, cost engineering, and fish hatchery biology analyses contained in the John Day Dam IEPR documents (Section 4). Appendix A describes in detail how the IEPR was planned and conducted. Appendix B provides biographical information on the IEPR panel members and describes the method Battelle followed to select them. Appendix C presents the final charge to the IEPR panel members for their use during the review; the final charge was submitted to USACE on October 3, 2014.

2. PURPOSE OF THE IEPR

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses IEPR to complement the Agency Technical Review (ATR), as described in USACE (2012).

In general, the purpose of peer review is to strengthen the quality and credibility of the USACE decision documents in support of its Civil Works program. IEPR provides an independent assessment of the engineering, economic, and environmental analyses of the project study. In particular, the IEPR addresses the technical soundness of the project study’s assumptions, methods, analyses, and calculations and identifies the need for additional data or analyses to make a good decision regarding implementation of alternatives and recommendations.

In this case, the IEPR of the John Day Dam was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by EC 1165-2-214). Battelle, a 501(c)(3) organization under the U.S. Internal Revenue Code, has experience conducting IEPRs for USACE.

3. METHODS FOR CONDUCTING THE IEPR

The methods used to conduct the IEPR are briefly described in this section; a detailed description can be found in Appendix A. Table 1 presents the major milestones and deliverables of the John Day Dam IEPR. Due dates for milestones and deliverables are based on the award/effective date of August 28, 2014.

Note that the work items listed under Task 6 occur after the submission of this report. Battelle anticipates submitting the pdf printout of the USACE's Design Review and Checking System (DrChecks) project file (the final deliverable) on January 8, 2015. The actual date for contract end will depend on the date that all activities for this IEPR are completed.

Table 1. Major Milestones and Deliverables of the John Day Dam IEPR

Task	Action	Due Date
1	Award/Effective Date	8/28/2014
	Review documents available	9/30/2014
2	Battelle submits list of selected panel members ^a	9/12/2014
	USACE confirms the panel members have no COI	9/16/2014
3	Battelle convenes kick-off meeting with USACE	9/5/2014
	Battelle convenes kick-off meeting with USACE and panel members	10/3/2014
4	Panel members complete their individual reviews	10/24/2014
	Battelle sends public comments to panel members for review	10/28/2014
5	Battelle submits Final IEPR Report to USACE ^a	11/21/2014
6 ^b	Battelle convenes Comment-Response Teleconference with panel members and USACE	12/16/2014
	Battelle submits pdf printout of DrChecks project file to USACE ^a	1/8/2015
	Contract End/Delivery Date	1/28/2015

^a Deliverables

^b Task 6 occurs after the submission of this report.

Battelle identified, screened, and selected four panel members to participate in the IEPR based on their expertise in the following disciplines: fish hatchery biology, Civil Works Planning/NEPA review, mechanical/design engineering, and cost engineering. The Panel reviewed the John Day Dam documents and produced 12 Final Panel Comments in response to 34 charge questions provided by USACE for the review. This charge included two questions added by Battelle that sought summary information from the IEPR Panel. Battelle instructed the Panel to develop the Final Panel Comments using a standardized four-part structure:

1. Comment Statement (succinct summary statement of concern)
2. Basis for Comment (details regarding the concern)

3. Significance (high, medium/high, medium, medium/low, or low; in accordance with specific criteria for determining level of significance)
4. Recommendation(s) for Resolution (at least one implementable action that could be taken to address the Final Panel Comment).

Battelle reviewed all Final Panel Comments for accuracy, adherence to USACE guidance (EC 1165-2-214, Appendix D), and completeness prior to determining that they were final and suitable for inclusion in the Final IEPR Report. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Panel's findings are summarized in Section 4.1; the Final Panel Comments are presented in full in Section 4.2.

4. RESULTS OF THE IEPR

This section presents the results of the IEPR. A summary of the Panel's findings and the full text of the Final Panel Comments are provided.

4.1 Summary of Final Panel Comments

The panel members agreed on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2012; p. D-4) in the John Day Dam IEPR review document. The following summarizes the Panel's findings.

From a Civil Works planning point of view, the project formulation was done in a very logical fashion proceeding in a systematic process across the entire set of objectives.

Mechanical/Design Engineering: The report provides adequate levels of detail for most aspects of the project, but does not clearly describe the specific design criteria used in the development of the facilities to support the fish rearing and thereby meet mitigation goals. In addition, it is unclear whether groundwater capacity at the site are sufficient for the planned facility. The actual quantity available is estimated using a test well. The test well and pump test indicate that the upper aquifer is insufficient for providing the needed quantity of well water; it appears that the pump test did not evaluate the lower aquifer. The Panel suggests that this problem could be addressed by conducting a geohydrological investigation.

Cost Engineering: There are significant cost and schedule risks that have not been addressed since the I-182 site may require Congressional authorization. The risk of not obtaining authorization for the use of the site as proposed could have a major impact on the recommended plan (i.e. tentatively selected plan) and the project costs. Project costs could also be affected if the authorization is not obtained in time to meet the current project schedule. The Panel suggests that the report should describe the need for Congressional authorization and provide more detail on the consequences of not obtaining authorization at all or in time to meet the proposed project schedule.

Environmental: From an environmental perspective, the project is implementing an appropriate approach with the project objectives focused on developing an environmentally sound program based on hatchery best management practices (BMP); however, it is not clear that BMPs were used when developing alternatives or the recommended plan. Additionally, the panel identified three significant environmental-related issues. The first focuses on the potential effects on wild (non-ESA listed) fall Chinook populations by the planned hatchery program. Without an analysis of these effects, the Panel is

concerned that, even though the mitigation level of 30,000 adult spawners planned for the authorized JDM program may be reached, it might not meet the objective of doing so without adverse effects on wild (non-ESA listed) fall Chinook populations. This concern can be addressed by analyzing the impact of current and alternate hatchery programs using accepted modeling methods. The analysis should discuss the potential effects of these programs on the abundance, productivity, diversity, or spatial structure of wild (non-ESA listed) middle Columbia mainstem and tributary fall Chinook populations.

The second significant issue highlights the need for further evaluation of the estimated survival rates for releases from the redesigned Ringold Springs Hatchery. The Panel is concerned that using current Priest Rapids Hatchery survival rates for planning purposes may be too optimistic and lead to development of a mitigation plan that cannot reach the mitigation goals. Further discussion is needed on why Priest Rapids Hatchery survival rates were used rather than the current Ringold Spring Hatchery survival rates.

Finally, the Panel has critical concerns regarding the water quality of the rearing water. The noted presence of lead and cadmium, as well as, the lack of CO₂ data creates risk and uncertainty surrounding the fish husbandry and production at the proposed facility. If the water includes toxins of cadmium and lead that exceed standards for fish health, the risk to meeting actual goals of fish production are high which could impact the project success. The Panel recommends that USACE measure and test the water quality at both sites during each season of use and develop a plan to provide a water supply that does not exceed standards for chronic exposure by aquatic life.

4.2 Final Panel Comments

This section presents the full text of the Final Panel Comments prepared by the IEPR panel members.

Final Panel Comment 1

Potential effects on wild (non-ESA listed) fall Chinook populations directly affected by the planned hatchery programs are not specifically addressed in the Environmental Assessment as required by NEPA nor are they addressed in the PACR of the Hatchery and Genetic Management Plan (HGMP).

Basis for Comment

The Environmental Assessment (EA) states that the purpose of the proposed action is to design facilities for increasing the number of upriver bright (URB) fall Chinook through the Zone 6 Tribal Fishery (Bonneville to McNary Dams), while minimizing effects on Endangered Species Act (ESA)-listed Lower Columbia River Chinook. The PACR also notes (Section 4.3, p. 4-3) the objectives of the plan are to provide “a mitigation program that is environmentally sound and minimizes adverse effects on wild populations and ESA-listed species and critical habitat.”

Risks to ESA-listed salmon populations are generally adequately addressed in the EA and PACR, however, there is no mention in either of these reports of the risk of direct mortality to other listed populations from collection of wild (non-ESA listed) fall Chinook broodstock for the proposed program in the Columbia River mainstem or the Yakima River. More importantly, risks to wild (non-ESA listed) populations of fall Chinook in the Hanford Reach and Yakima River are not addressed.

Although it is clear that hatchery programs may cause changes to viable salmonid population (VSP) parameters (abundance, distribution, diversity, and spatial structure) (McElhany et al., 2000; Williamson et al., 2000), none of the supporting documents for this project analyzes these potential effects for the alternatives considered or the preferred alternative. The EA contains two sentences describing wild (non-ESA listed) fall Chinook populations in the project area. The HGMP provides some information about abundance of natural spawners and the proportion of these spawners that are made up of hatchery fish. However, it does not provide information on conservation goals for these populations, or any analysis of the impacts of current or alternative hatchery programs on abundance, productivity, diversity, or spatial structure of these populations. Further, the HGMP lacks specific operational standards in terms of broodstock and escapement management to limit these impacts.

Without this analysis, the Panel is concerned that, even though the mitigation level of 30,000 adult spawners planned for the authorized John Day Mitigation (JDM) program may be reached, it might not meet the objective of doing so without adverse effects on wild (non-ESA listed) fall Chinook populations.

Significance – High

Although the planned hatchery programs could meet the mitigation goal, the programs could impact the viability of wild (non-ESA listed) fall Chinook populations in the project area.

Recommendation for Resolution

1. Analyze the impact of current and alternate hatchery programs using accepted modeling methods (see Hatchery Scientific Review Group (HSRG, 2009). The analysis should discuss the potential effects of these programs on the abundance, productivity, diversity, or spatial structure of wild (non-ESA listed) middle Columbia mainstem and tributary fall Chinook populations.
2. Consider these modeled outcomes when developing a recommended plan.

Literature Cited:

HSRG (2009). Columbia River hatchery reform system-wide report. Hatchery Scientific Review Group. (available on-line at www.hatcheryreform.us/hrp/reports/system/welcome_show.action)

McElhany, P., M.H. Ruckelshaus, M.J. Ford, T.C. Wainwright, and E.P. Bjorkstedt. 2000. Viable salmonid populations and the recovery of evolutionarily significant units. U.S. Dept. Commerce, NOAA Tech Memo NMFS-NWFSC-42. 158p.

Williamson, K. S., A. R. Murdoch, T. N. Pearsons, E. J. Ward, and M. J. Ford 2010. Factors influencing the relative fitness of hatchery and wild spring Chinook salmon (*Oncorhynchus tshawytscha*) in the Wenatchee River, Washington, USA. *Canadian Journal of Fisheries and Aquatic Sciences* 67:1840–1851.

Final Panel Comment 2

A justification for using Priest Rapids Hatchery rather than Ringold Springs Hatchery survival rates has not been provided.

Basis for Comment

Throughout the evaluation of alternatives in the PACR for the John Day Dam mitigation program, USACE has assumed that the survival rate for releases from the redesigned Ringold Springs Hatchery is best represented by the current survival rate from the distant Priest Rapids Hatchery rather than the current survival rate from the existing Ringold Springs Hatchery, approximately half the survival rate of Priest Rapids Hatchery. The only justification that has been given for this decision is that Priest Rapids Hatchery is the closest hatchery to Ringold Springs and therefore should be used to represent the expected survival rate. However, the existing Ringold Springs Hatchery is located exactly where the new facility will be located, so is much closer than the hatchery used for planning purposes.

The Panel is concerned that using current Priest Rapids Hatchery survival rates for planning purposes may be too optimistic and lead to development of a mitigation plan that cannot reach the mitigation goals. Additionally, it may lead to the design of facilities that are inadequate to reach those goals. For instance, if the actual survival from the redesigned Ringold Springs Hatchery is equal to the existing survival from that facility, using the USACE calculations in PACR Table 6-2 (p. 6-5), the mitigation program will miss its target for adult returns by approximately 25%.

The actual survival rate determines how large hatchery programs can meet mitigation goals. This includes defining the physical size and design of the facility, water flow requirements, operational and maintenance costs, and a host of operational variables. In addition, the size of the hatchery program will have a direct effect on the number of natural-origin fish that must be collected to properly integrate the hatchery programs with the mainstem and tributary natural-spawning populations

Significance – High

Determining the actual survival rate for releases from the redesigned Ringold Springs Hatchery has important implications for meeting mitigation and conservation goals, as well as the sizing and engineering of the facility.

Recommendation for Resolution

1. Provide better justification for using current Priest Rapids Hatchery survival rates rather than current Ringold Springs Hatchery survival rates to represent production from the redesigned Ringold Springs Hatchery.

Final Panel Comment 3

The need for Congressional authorization to use the I-182 wetland mitigation site introduces cost and schedule risks, which have not been addressed.

Basis for Comment

Table 6-9 (PACR, p. 6-17) states that the I-182 site may require Congressional authorization. Since authorization has yet to be obtained for the use of the I-182 site, it is not clear that Alternative 1B will ultimately be the recommended plan. There are cost and schedule risks associated with two separate scenarios related to authorization:

1. The risk of not obtaining authorization for the use of the site as proposed could have a significant impact on the recommended plan schedule and the project cost for the following reasons:
 - a. Without the possibility of authorization for the use of the I-182 site the project would require a different recommended plan. A different recommended plan would likely require the acquisition of real estate. This is a cost not included in the current recommended plan.
 - b. Re-evaluating the alternative selection process would likely prolong the project schedule. Prolonging the schedule would require higher escalation factors applied in the Total Project Cost Summary (TPCS) thereby increasing the fully funded total project cost.
2. The risk of not obtaining authorization in time to maintain the current schedule would affect the project cost. A delay in authorization would prolong the schedule likely requiring higher escalation factors applied in the TPCS, thereby increasing the fully funded total project cost.

The Cost and Schedule Risk Analysis (CSRA) states that any schedule impact of 6 months or greater should be considered at least “Significant.” It is reasonable to assume that Congressional authorization may require more than 6 months. The CSRA has one item under LANDS AND DAMAGES RISKS that most closely resembles addressing the issue, but it is not clear that it is related to Congressional authorization. LD-5 states the concern for I-182 is related to its previous mitigation use. The Panel assumes this is the reason for Congressional authorization, yet for this item the impact on schedule is listed as “Negligible.” The Panel therefore believes the risks for Congressional authorization either have not been addressed or, as defined by the CSRA constraints, have not been adequately addressed.

Significance – High

If Congressional authorization is not obtained or not obtained in time to maintain the current schedule, it may require a re-evaluation of the alternatives to identify one that does not require Congressional authorization thereby affecting the project cost and schedule.

Recommendation for Resolution

1. Provide clarity in the PACR, Section 6, by describing the need for Congressional authorization and including the expected date of the authorization.
2. If authorization is not imminent, provide more detail in the PACR, Section 6, on the consequences of not obtaining the authorization or not obtaining the authorization in time for successful implementation of the proposed project on schedule and cost.

Final Panel Comment 4

Risks and uncertainties affecting fish health, and ultimately fish survival, from rearing water containing high amounts of toxins (cadmium and lead) or high levels of carbon dioxide are not addressed.

Basis for Comment

Water quality is extremely important for the proper husbandry and production of the fish programmed for these facilities, therefore it is imperative to measure the water quality at the sites to determine what types of design requirements are needed and if the water quality deficiencies can be solved. Site evaluations for the fish production facilities at I-182 and the Ringold Springs Hatchery sites should include water quality sampling and testing for various water quality characteristics in the supply water from the springs, surface water, and groundwater sources.

Certain water quality constituents have been measured and compared to the Washington Department of Ecology Surface Water Quality Standards (2011). The results for lead exceed these standards at the Yakima River and Ringold deep well water sources and in the Yakima River main and side channels at the I-182 site. The result for cadmium concentration is noted in the EA to exceed standards at the Ringold main intake source. The test for CO₂ resulted in measurements that were not reported completely or were not measured over some threshold and therefore not reported. It was not determined what CO₂ concentrations were measured.

Lead, cadmium, and high levels of carbon dioxide in the facility water may cause egg and alevin deformities and mortalities the cause of which is not easily identified. High carbon dioxide concentrations likewise may cause mortalities and feed conversion problems with rearing fish and adults returning and holding for ripening before spawning.

Dissolved CO₂ gas must be measured on a basis that it is dependent on a three-point value of pH and Hardness and the CO₂ concentration. The threshold was indicated as <1 mg/L and <10 mg/L for ADFG (1983) and Wedemeyer (2001), respectively. The measured value was not shown in the EA. Also, common to water quality of groundwater sources are variations due to seasonal changes in pH and hardness. It is not shown that this was measured through several seasons and the Panel assumes that the measurements were not completed.

Significance – Medium/High

If the water quality includes toxins of cadmium and lead that exceed standards for fish health, the risk to meeting actual goals of fish production are high which could impact meeting project goals.

Recommendation for Resolution

1. Measure and test the water quality at both sites again during all-important seasons of use. Measure during the adult, incubation, and rearing seasons specifically at the appropriate site.
2. Measure the CO₂ dissolved gas concentration during the entire year for all water sources and especially the groundwater and spring sources, also being careful to determine the hardness and pH variations.
3. Develop a plan to provide a water supply that does not exceed water quality standards for chronic exposure by aquatic life.

Literature Cited:

ADFG (1983). Alaska Department of Fish and Game, FRED Division Fish Culture Manual, Juneau, Alaska.

WSDE (2011). Water Quality Standards for Surface Waters of the State of Washington, Chapter 173-201A WAC. Amended May 9, 2011. Revised January 2012. Publication no. 06-10-091. Watershed Management Section, Washington State Department of Ecology, Olympia, WA, Available online at: <https://fortress.wa.gov/ecy/publications/publications/0610091.pdf>.

Wedemeyer, G. ed. (2001). Fish Hatchery Management, 2nd Edition, American Fisheries Society.

Final Panel Comment 5

The current design of the multiple use ponds at the Ringold Springs Hatchery and I-182 Ponds does not use industry-accepted fish culture standards that allow for monitoring fish behavior and pond conditions.

Basis for Comment

The current design of the multiple use ponds at the Ringold Springs Hatchery and I-182 Ponds does not use a water depth typical of ponds designed for rearing juvenile salmon. These ponds are normally no more than 4 feet (on average) in depth, whereas the Ringold Springs Hatchery design calls for rearing juveniles in water that is 8 feet deep (on average), and the design of the multiple use ponds at the I-182 site calls for rearing juveniles in water that is 8 to 12 feet deep (on average), depending on the size of fish being reared.

Using ponds with the planned dimensions provides adequate rearing capacity in terms of pond density, but the Panel is concerned that using the current design, specifically the pond depth, may cause operational problems and may lead to lower than expected survivals. This is particularly a concern at the I-182 site, where water will be colored by glacial run-off, further complicating fish rearing.

An example where unusually deep ponds caused rearing problems can be found in the original design of the Cowlitz Salmon Hatchery (owned by Tacoma Public Utilities and operated by the Washington Department of Fisheries). Its juvenile rearing ponds had a design rearing depth of 10 feet and an operational depth of 8 feet, after finding the 10 foot depth untenable. Even at the lower depth (8 feet), operational problems included the inability to properly monitor rearing conditions and fish behavior. These problems included the inability to monitor feeding behavior, behavior indicative of poor fish health, accumulation of feed, and mortalities on pond floors. These deep ponds also complicated routine tasks such as pond vacuuming. Ultimately, the design of the deep rearing ponds at the Cowlitz Salmon Hatchery was a major factor leading to a \$32 million design and rebuild.

Significance – Medium/High

Inability to properly monitor fish behavior and pond conditions may lead to unhealthy rearing conditions that have a negative effect on fish survival and ultimately the success of meeting the mitigation requirement for number of fish produced.

Recommendation for Resolution

1. Re-evaluate pond design to ensure the ability to monitor fish behavior and pond conditions.
2. Re-evaluate pond design to ensure pond cleaning can be done without affecting fish culture.

Final Panel Comment 6

The quantity of groundwater available at the Ringold Springs Hatchery site is uncertain, and could be a risk to planned production and affect the design and implementation schedule.

Basis for Comment

At the Ringold Springs site, the planned expansion requires an estimated 5 cfs of well water. The actual quantity available is estimated using a test well described in the EA and the John Day Mitigation Engineering Appendix (Tetra Tech, 2014). The test well and pump test indicate that the upper aquifer was insufficient in providing the needed quantity of well water. The pump test did not evaluate the lower aquifer that is presumed present from other well logs offsite. This is noted in the Engineering Appendix (p. 4-33). The lower aquifer and a proposed conceptual well field are recommended by the designer in the Technical Memorandum and its Appendix H as the location and method to obtain the entire well water quantities required for the Ringold expansion facility.

The actual groundwater test does not indicate that a geohydrological investigation has been completed that identifies the well water quantity and its tested quality for the actual aquifer to be used in the facility operations. The Panel has not been able to determine how this is addressed in the risk analysis and associated cost analysis.

Significance – Medium/High

Lack of the planned amount of groundwater will significantly affect design requirements and costs.

Recommendation for Resolution

1. Perform a hydrogeological study in much more detail for the well or groundwater quantities and qualities available at the Ringold Springs.
2. Investigate the well water with test wells and pumping tests to determine the best estimates in quantities of the specific aquifer that will be used. Estimate the available well and groundwater flows for each month of the year.
3. Sample the aquifer to be used for 12 months of the year.
4. Address recommendations 1-3 before proceeding with the design.

Literature Cited:

Tetra Tech (2014), Final Submittal Modification 2, John Day Mitigation Engineering Appendix. June.

Final Panel Comment 7

The use of hatchery best management practices, which is a stated project objective, is not addressed.

Basis for Comment

One of the objectives of the PACR (p. 4-3) is to “provide a mitigation program that is environmentally sound and minimizes adverse effects on wild populations and ESA-listed species and critical habitat. An environmentally sound program is consistent with hatchery best management practices and consistent with USACE Environmental Operating Principles.” It is not clear to the Panel that this was done, as the only operational hatchery best management practice (BMP) considered appears to have been a rather cursory evaluation of ecological effects of releasing increasingly large numbers of hatchery fish at Ringold Springs Hatchery versus some distribution of those releases among different sites in the middle Columbia River.

Extensive sets of hatchery BMPs are available and would have been useful in evaluating alternatives in the PACR. For instance, hatchery BMPs were developed by the Hatchery Scientific Review Group for both their Puget Sound (HSRG, 2004) and Columbia River hatchery reviews (NMFS, 2014). The BMPs developed for the Columbia River were used by the National Marine Fisheries Service in the Mitchell Act Hatchery Final Environmental Impact Statement (NMFS, 2014) and would have been useful in the PACR evaluation of alternatives as well.

Significance – Medium

Use of a more extensive set of hatchery best management practices to evaluate alternatives will strengthen the PACR in reaching the stated objectives.

Recommendation for Resolution

1. Document the hatchery BMPs used in the evaluation of alternatives in this PACR.
2. Provide details of how a comprehensive set of BMPs was used to evaluate alternatives.

Literature Cited:

HSRG (2004). Hatchery Reform: Principles and Recommendations of the HSRG. Hatchery Scientific Review Group: L. Mobrand (chair), J. Barr, L. Blankenship, D. Campton, T. Evelyn, T. Flagg, C. Mahnken, R. Piper, P. Seidel, L. Seeb, and B. Smoker. Seattle, WA. April. Available online at: http://www.hatcheryreform.us/hrp_downloads/reports/hsrg_princ_recs_report_full_apr04.pdf.

NMFS (2014). Final Environmental Impact Statement to Inform Columbia River Basin Hatchery Operations and the Funding of Mitchell Act Hatchery Programs. U.S. Department of Commerce, National Oceanographic and Atmospheric Administration, National Marine Fisheries Service. Available online at: http://www.westcoast.fisheries.noaa.gov/publications/hatchery/mitchellact_feis/mitchell_act_hatcheries_feis_final.pdf.

Final Panel Comment 8

The validity of the costs presented for the recommended plan cannot be determined because the sources of pricing data are not provided.

Basis for Comment

The narratives for the detailed MCACES (Micro Computer Aided Cost Estimating System) cost estimates (Ringold and I-182) state that the effective price level for the estimates is March 2014. The Total Project Cost Summary (TPCS) also documents the same effective price level. However, approximately 70% of the project items in the estimates are from the 2010 Costbook database. It is not clear that these items have been updated through material cost overrides or repricing of the 2010 Costbook database with the current version.

The documented preparation date (March 2014) of the MCACES estimates suggests that the 2012 Costbook would have been available to reprice the estimate at that time.

Approximately 40% of the total construction costs are based on the 2010 Costbook project items. The Panel recognizes that it would be an exorbitant task to cost override each of the 2010 Costbook items, but it is reasonable to expect the estimates to be repriced with the most current version of the Costbook database.

If 40% of the MCACES costs are based on 2010 material prices, without adjustment it would follow that 40% of the costs carried over to the TPCS "Estimated Cost" column have not been adequately escalated to the "Constant Dollar Basis" and the "Fully Funded" cost columns.

According to the Risk Register produced as a result of the CSRA performed December 9, 2013, "Crisis" level impact is attributed to project cost and schedule for "Adequacy of Funding." Similar concerns for funding availability are documented in the Risk Register for a project Value Engineering (VE) study performed March 4-8, 2013. The Panel agrees that adequate funding is critical to the success of the project and therefore the most current cost data available should be used to provide the most accurate cost estimate.

Significance – Medium/Low

The accuracy of the construction cost estimate and subsequently the TPCS are important to the success of the project.

Recommendation for Resolution

1. Reprice the MCACES cost estimates with the most current version of the Costbook.
2. Update the TPCS to reflect the changes in the MCACES estimates.

Final Panel Comment 9

The effects of climate change on local natural fish populations have not been addressed.

Basis for Comment

The potential effects of climate change are considered in the no action alternative as well as the recommended plan, but only at the regional level. The potential effects of climate change on the natural populations being reared in the proposed facilities and in this reach of the Columbia River are not presented, thus missing a source of uncertainty unless more specific analysis of climate change in the local area is undertaken.

USACE's Climate Change Adaptation Plan and Report 2011 set forth guidelines for all USACE missions, operations, programs, and projects to address the issue of climate change. The report includes a Climate Change Adaptation Policy Statement (CCAPS) expressing the following principles that are relevant to the PACR:

“It is the policy of the USACE to integrate climate change adaptation planning and actions into our Agency's missions, operations, programs, and projects. USACE shall continue undertaking its climate change adaptation planning, in consultation with internal and external experts and with our Districts, Divisions, and Centers, and shall implement the results of that planning using the best available – and actionable – climate science and climate change information.” (USACE, 2011)

The Climate Change Adaptation Plan and Report was reissued in 2013. That more recent report emphasizes the importance of the CCAPS, stating that the policy “remains in force in 2013 and provides the USACE policy framework for climate change adaptation” (USACE, 2013).

Significance – Medium/Low

Consideration of the effects of climate change on local natural fish populations, and in these reaches of the Columbia River, would decrease the uncertainty around fish survival.

Recommendation for Resolution

1. Develop a discussion, possibly in the risk and uncertainty section, that considers the impact of climate change on the relevant fish populations in this stretch of the Columbia River.

Literature Cited:

USACE (2011). USACE Climate Change Adaptation Plan and Report 2011. U.S. Army Corps of Engineers. Submitted to the Executive Office of the President's Council on Environmental Quality, Office of the Federal Environmental Executive on 3 June 2011. Available at http://corpsclimate.us/docs/usace_climate_change_adaptation_report_03_june_2011.pdf. Accessed May 20, 2014.

USACE (2013). USACE 2013 Climate Change Adaptation Plan. U.S. Army Corps of Engineers. June 2013. Available at http://www.corpsclimate.us/docs/2013_USACE_Adaptation_Plan_28_June_2013post_v1.pdf. Accessed May 20, 2014.

Final Panel Comment 10

It is unclear how production costs per fish at the alternative facilities evaluated in the PACR compare with other Columbia River production facilities.

Basis for Comment

PACR Table 6-10, Alternatives Cost Comparison, gives the relative costs to produce an adult fish returning to the various alternative facilities, shown as “production efficiency.” It is not clear how this table was developed. The Panel assumed when reviewing the table that several parameters influenced the cost comparison among alternatives: the promoted Smolt to Adult Return (SAR) ratio for the facility, the estimated numbers of adult fish at the facility holding pond, the fishery on the stock, and the estimated annualized costs of the facility.

The PACR also lacks a thorough comparison of how the production efficiencies at the alternative facilities compare to other mitigation facilities on the Columbia River, such as the Priest Rapids and the existing Ringold facilities.

Without a thorough discussion of the method used, the Panel cannot formulate a good comparison of the alternatives evaluated.

Significance – Medium/Low

Production costs per fish at alternative facilities compared with other Columbia River facilities appear high and may affect the understanding of the costs and risks associated with the facilities outside our review.

Recommendation for Resolution

1. Explain how the values in Table 6-10 were derived.
2. Compare production efficiencies of the alternatives to other facilities, such as the Priest Rapids and the existing Ringold facilities and additional facilities on the Columbia River.

Final Panel Comment 11

The justification for specific design criteria is not clearly provided and could impact the program Smolt to Adult Return (SAR) ratio.

Basis for Comment

The decisions to use certain fish egg incubation systems, raceway rearing sizes, fishway arrangements, fish crowders, fish lifts, sorting systems, fish anesthesia methods, and other management protocols are not clearly identified and explained in the EA or PACR and Engineering Appendices. The Panel finds that there are several methods of fish husbandry and fish hatchery practices that are outdated. The report should identify the reasons to use these systems and methods. The following systems are examples of detailed implementation requirements that are not clear in the review document:

1. The vertical stack incubators are designed to have a flow rate and supply arrangement that is different from designs at other facilities the Panel is familiar with.
2. The current design is within stated criteria established in the documents, but has no planned factor of safety for facility design and sizing. For example, the Panel did not find:
 - a. Discussions of design criteria for incubator egg loading as it relates to total production and per tray numbers. Just the per tray number is provided.
 - b. No indication that the top incubator tray is left empty of eggs.
 - c. No indication that the plumbing from the headbox is set up to flow to the top tray only, not to the top and the middle trays simultaneously.
3. Additional floor trench drains in the front work area of the incubator stacks are missing, these are needed to facilitate cleaning incubator room floors after rodding or cleaning egg trays.

The facility design as a whole from gross sizing down to the minute detail affects the resultant SAR anticipated for the entire program. More detailed justification should be presented in the documents

Significance – Medium/Low

Design criteria justifications that are based on current hatchery design, fish health, and fish husbandry practices are important to ensure project success.

Recommendation for Resolution

1. In the Engineering Appendices and the PACR, discuss how the methods for fish egg incubation, fish rearing, and handling were chosen.
2. Provide a rationale for choosing deep raceways rather than more shallow raceways to get the same volume but a larger footprint.
3. Discuss the significance of smaller numbers of eggs per tray, and more shallow rearing raceways, and how it would change the size of the facilities and the costs.
4. Update the design criteria to include additional floor trench drains in the front work area of the incubator stacks

Final Panel Comment 12

The impact of this project on the fishing rights of the affected tribes has not been adequately discussed.

Basis for Comment

Tribal fisheries and rights are critical considerations in the restoration or replacement of lost fish stocks in the region. The Environmental Assessment contains some discussion in a general fashion of the fishing rights of the affected tribes, but there is little or no discussion of the specific need for in-place and in-kind mitigation for the lost stocks. This lack of region-specific historical, legal, and ethical perspective on the issue weakens the understanding of the rationale for the project.

Significance – Low

Consideration and review of tribal rights for fish restoration in the discussions would strengthen the goals of the current project.

Recommendation for Resolution

1. Add discussion of tribal rights in this region relative to the goals and structure of this project.

5. REFERENCES

- ADFG (1983). Alaska Department of Fish and Game, FRED Division Fish Culture Manual, Juneau, Alaska.
- HSRG (2004). Hatchery Reform: Principles and Recommendations of the HSRG. Hatchery Scientific Review Group: L. Mobrand (chair), J. Barr, L. Blankenship, D. Campton, T. Evelyn, T. Flagg, C. Mahnken, R. Piper, P. Seidel, L. Seeb, and B. Smoker. Seattle, WA. April. Available online at: http://www.hatcheryreform.us/hrp_downloads/reports/hsrg_princ_recs_report_full_apr04.pdf.
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- Tetra Tech (2014), Final Submittal Modification 2, John Day Mitigation Engineering Appendix. June.
- USACE (2011). USACE Climate Change Adaptation Plan and Report 2011. U.S. Army Corps of Engineers. Submitted to the Executive Office of the President's Council on Environmental Quality, Office of the Federal Environmental Executive on 3 June 2011. Available at http://corpsclimate.us/docs/usace_climate_change_adaptation_report_03_june_2011.pdf. Accessed May 20, 2014.
- USACE (2012). Water Resources Policies and Authorities: Civil Works Review. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Circular (EC) 1165-2-214. December 15.
- USACE (2013). USACE 2013 Climate Change Adaptation Plan. U.S. Army Corps of Engineers. June 2013. Available at http://www.corpsclimate.us/docs/2013_USACE_Adaptation_Plan_28_June_2013post_v1.pdf. Accessed May 20, 2014.
- WSDE (2011). Water Quality Standards for Surface Waters of the State of Washington, Chapter 173-201A WAC. Amended May 9, 2011. Revised January 2012. Publication no. 06-10-091. Watershed Management Section, Washington State Department of Ecology, Olympia, WA, Available online at: <https://fortress.wa.gov/ecy/publications/publications/0610091.pdf>.
- Wedemeyer, G. ed. (2001). Fish Hatchery Management, 2nd Edition, American Fisheries Society.

Williamson, K. S., A. R. Murdoch, T. N. Pearsons, E. J. Ward, and M. J. Ford 2010. Factors influencing the relative fitness of hatchery and wild spring Chinook salmon (*Oncorhynchus tshawytscha*) in the Wenatchee River, Washington, USA. *Canadian Journal of Fisheries and Aquatic Sciences* 67:1840–1851.

OMB (2004). Final Information Quality Bulletin for Peer Review. Executive Office of the President, Office of Management and Budget, Washington, D.C. Memorandum M-05-03. December 16.

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APPENDIX A

IEPR Process for the John Day Dam Project

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A.1 Planning and Conduct of the Independent External Peer Review (IEPR)

Table A-1 presents the schedule followed in executing the John Day Dam Mitigation Program, Draft Post-Authorization Change Report (PACR) Independent External Peer Review (hereinafter: John Day Dam IEPR). Due dates for milestones and deliverables are based on the award/effective date of August 28, 2014. The review documents were provided by the U.S. Army Corps of Engineers (USACE) on September 30, 2014. Note that the work items listed under Task 6 occur after the submission of this report. Battelle will enter the 12 Final Panel Comments developed by the Panel into USACE's Design Review and Checking System (DrChecks), a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle. Battelle will provide USACE and the Panel a pdf printout of all DrChecks entries, through comment closeout, as a final deliverable and record of the IEPR results.

Table A-1. John Day Dam Complete IEPR Schedule

Task	Action	Due Date
1	Award/Effective Date	8/28/2014
	Review documents available	9/30/2014
	Battelle submits draft Work Plan ^a	9/5/2014
	USACE provides comments on draft Work Plan	9/10/2014
	Battelle submits final Work Plan ^a	10/3/2014
2	Battelle requests input from USACE on the conflict of interest (COI) questionnaire	9/3/2014
	USACE provides comments on COI questionnaire	9/5/2014
	Battelle submits list of selected panel members ^a	9/12/2014
	USACE confirms the panel members have no COI	9/16/2014
	Battelle completes subcontracts for panel members	9/26/2014
3	Battelle convenes kick-off meeting with USACE	9/5/2014
	Battelle sends review documents to panel members	10/2/2014
	Battelle convenes kick-off meeting with panel members	10/2/2014
	Battelle convenes kick-off meeting with USACE and panel members	10/3/2014
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	10/20/2014
4	Panel members complete their individual reviews	10/24/2014
	Battelle sends public comments to panel members for review	10/28/2014
	Battelle provides panel members with talking points for Panel Review Teleconference	10/29/2014

Table A-1. John Day Dam Complete IEPR Schedule (continued)

Task	Action	Due Date
4	Battelle convenes Panel Review Teleconference	10/30/2014
	Battelle provides Final Panel Comment templates and instructions to panel members	10/31/2014
	Panel members provide draft Final Panel Comments to Battelle	11/6/2014
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	11/6/2014 - 11/14/2014
	Panel finalizes Final Panel Comments	11/14/2014
5	Battelle provides Final IEPR Report to panel members for review	11/18/2014
	Panel members provide comments on Final IEPR Report	11/19/2014
	Battelle submits Final IEPR Report to USACE ^a	11/21/2014
6 ^b	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	11/25/2014
	Battelle convenes teleconference with USACE to review the Post-Final Panel Comment Response Process	11/25/2014
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process	11/25/2014
	USACE provides draft Project Delivery Team (PDT) Evaluator Responses to Battelle	12/5/2014
	Battelle provides the panel members the draft PDT Evaluator Responses	12/9/2014
	Panel members provide Battelle with draft BackCheck Responses	12/12/2014
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	12/16/2014
	Battelle convenes Comment-Response Teleconference with panel members and USACE	12/16/2014
	USACE inputs final PDT Evaluator Responses to DrChecks	12/18/2014
	Battelle provides final PDT Evaluator Responses to panel members	12/23/2014
	Panel members provide Battelle with final BackCheck Responses	12/30/2014
	Battelle inputs the Panel's final BackCheck Responses in DrChecks	1/7/2015
	Battelle submits pdf printout of DrChecks project file ^a	1/8/2015
	Contract End/Delivery Date	1/28/2015

^a Deliverable.

^b Task 6 occurs after the submission of this report

At the beginning of the Period of Performance for the John Day Dam IEPR, Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., clarify expertise areas needed for panel members). Any

revisions to the schedule were submitted as part of the final Work Plan. In addition, 34 charge questions were provided by USACE and included in the draft and final Work Plans. Battelle added two questions that seek summary information from the IEPR Panel. The final charge also included general guidance for the Panel on the conduct of the peer review (provided in Appendix C of this final report).

Prior to beginning their review and within 5 days of their subcontracts being finalized, all members of the Panel attended a kick-off meeting via teleconference planned and facilitated by Battelle in order to review the IEPR process, the schedule, communication procedures, and other pertinent information for the Panel. Battelle planned and facilitated a second kick-off meeting via teleconference during which USACE presented project details to the Panel. Before the meetings, the IEPR Panel received an electronic version of the final charge as well as the John Day Dam review documents and reference materials listed below. The documents and files in bold font were provided for review; the other documents were provided for reference or supplemental information only.

- **John Day Dam Mitigation Program, Draft PACR (94 pages)**
 - **Appendix A - Environmental Compliance (90 pages)**
 - **Appendix B - Technical Appendix (Design Drawings) (76 pages)**
 - **Appendix C - Real Estate Plan (48 pages)**
 - **Appendix D – Methodology (7 pages)**
- **Hatchery Genetic Management Plan (HGMP) (106 pages)**
- **Public Review Comments/Responses (5 pages)**
- USACE guidance Civil Works Review, (EC 1165-2-214, 15 December 2012)
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).

About halfway through the review of the John Day Dam IEPR documents, a teleconference was held with USACE, the Panel, and Battelle so that USACE could answer any questions the Panel had concerning either the review documents or the project. Prior to this teleconference, Battelle submitted 36 panel member questions to USACE. USACE was able to provide responses to all of the questions during the teleconference or within two days via email.

In addition, throughout the review period, USACE provided documents at the request of panel members. These documents were provided to Battelle and then sent to the Panel as additional information only and were not part of the official review. The following additional documents were requested by the Panel:

- John Day Mitigation Engineering Appendix, Final Submittal, Modification 2, Tetra Tech, June 2014
- John Day Mitigation, I-182 Acclimation Facility, Engineering Appendix, Final Submittal, Modification 2, Tetra Tech, June 2014
- John Day Mitigation I-182 MII Files
- John Day Mitigation Ringold MII Files
- John Day Dam Mitigation, draft Cost and Schedule Risk Analysis Report, Tetra Tech, March 2014

A.2 Review of Individual Comments

The Panel was instructed to address the charge questions/discussion points within a charge question response table provided by Battelle. At the end of the review period, the Panel produced individual comments in response to the charge questions/discussion points. Battelle reviewed the comments to identify overall recurring themes, areas of potential conflict, and other overall impressions. At the end of the review, Battelle summarized the individual comments in a preliminary list of 12 overall comments and discussion points. Each panel member's individual comments were shared with the full Panel in a merged individual comments table.

A.3 IEPR Panel Teleconference

Battelle facilitated a 4.5 hour teleconference with the Panel so that the panel members could exchange technical information. The main goal of the teleconference was to identify which issues should be carried forward as Final Panel Comments in the Final IEPR Report and decide which panel member would serve as the lead author for the development of each Final Panel Comment. This information exchange ensured that the Final IEPR Report would accurately represent the Panel's assessment of the project, including any conflicting opinions. The Panel engaged in a thorough discussion of the overall positive and negative comments, added any missing issues of significant importance to the findings, and merged any related individual comments. At the conclusion of the teleconference, Battelle reviewed each Final Panel Comment with the Panel, including the associated level of significance, and confirmed the lead author for each comment.

The Panel also discussed responses to five specific charge questions where there appeared to be disagreement among panel members. The conflicting comments were resolved based on the professional judgment of the Panel, and all sets of comments were determined not to be conflicting. Each comment was either incorporated into a Final Panel Comment, determined to be consistent with other Final Panel Comments already developed, or determined to be a non-significant issue.

At the end of these discussions, the Panel identified 14 comments and discussion points that should be brought forward as Final Panel Comments.

A.4 Preparation of Final Panel Comments

Following the teleconference, Battelle prepared a summary memorandum for the Panel documenting each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the John Day Dam IEPR:

- **Lead Responsibility:** For each Final Panel Comment, one Panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed the merged individual comments table, a summary detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.

- Directive to the Lead: Each lead was encouraged to communicate directly with the other panel member as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- Format for Final Panel Comments: Each Final Panel Comment was presented as part of a four-part structure:
 1. Comment Statement (succinct summary statement of concern)
 2. Basis for Comment (details regarding the concern)
 3. Significance (high, medium/high, medium, medium/low, and low; see description below)
 4. Recommendation(s) for Resolution (see description below).
- Criteria for Significance: The following were used as criteria for assigning a significance level to each Final Panel Comment:
 1. **High:** Describes a fundamental issue with the project that affects the current recommendation or justification of the project, and which will affect its future success, if the project moves forward without the issue being addressed. Comments rated as high indicate that the Panel determined that the current methods, models, and/or analyses contain a “showstopper” issue.
 2. **Medium/High:** Describes a potential fundamental issue with the project, which has not been evaluated at a level appropriate to this stage in the Planning process. Comments rated as medium/high indicate that the Panel analyzed or assessed the methods, models, and/or analyses available at this stage in the Planning process and has determined that if the issue is not addressed, it could lead to a “showstopper” issue.
 3. **Medium:** Describes an issue with the project, which does not align with the currently assessed level of risk assigned at this stage in the Planning process. Comments rated as medium indicate that, based on the information provided, the Panel identified an issue that would raise the risk level if the issue is not appropriately addressed.
 4. **Medium/Low:** Affects the completeness of the report at this time in describing the project, but will not affect the recommendation or justification of the project. Comments rated as medium/low indicate that the Panel does not currently have sufficient information to analyze or assess the methods, models, or analyses.
 5. **Low:** Affects the understanding or accuracy of the project as described in the report, but will not affect the recommendation or justification of the project. Comments rated as low indicate that the Panel identified information that was mislabeled or incorrect or that certain data or report section(s) were not clearly described or presented.
- Guidelines for Developing Recommendations: The recommendation section was to include specific actions that USACE should consider to resolve the Final Panel Comment (e.g.,

suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. During the Final Panel Comment development process, the Panel determined that two of the Final Panel Comments no longer met the criteria for at least a low-level of significance. At the end of this process, 12 Final Panel Comments were prepared and assembled. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Final Panel Comments are presented in the main report.

A.5 Conduct of the Public Comment Review

Battelle received a PDF file containing five pages of public comments on the John Day Dam project (two written comments) from USACE on September 30, 2014. Battelle then sent the public comments to the panel members on October 28, 2014 after their review of the IEPR documents was complete, along with the following two charge questions:

1. Does information or concerns raised in the public comments raise any additional discipline-specific technical concerns with regard to the overall report?
2. Has adequate stakeholder involvement occurred to identify issues of interest and to solicit feedback from interested parties?

The panel members were charged with responding to the two charge questions above.

The Panel produced individual comments in response to the two charge questions. Battelle reviewed the comments to identify any new technical concerns that had not been previously identified during the initial IEPR. Upon review, Battelle determined and the Panel confirmed that no new issues or concerns were identified other than those already covered in their Final Panel Comments. The Panel also determined that adequate stakeholder involvement had occurred.

APPENDIX B

Identification and Selection of IEPR Panel Members for the John Day Dam Project

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B.1 Panel Identification

The candidates for the John Day Dam Mitigation Program, Draft Post-Authorization Change Report (PACR) (hereinafter: John Day Dam IEPR) Panel were evaluated based on their technical expertise in the following key areas: fish hatchery biology, Civil Works planning/NEPA review, mechanical/design engineering, and cost engineering. These areas correspond to the technical content of the John Day Dam IEPR review documents and overall scope of the John Day Dam project.

To identify candidate panel members, Battelle reviewed the credentials of the experts in Battelle's Peer Reviewer Database, sought recommendations from colleagues, contacted former panel members, and conducted targeted Internet searches. Battelle evaluated these candidate panel members in terms of their technical expertise and potential conflicts of interest (COIs). Of these candidates, Battelle chose the most qualified individuals, confirmed their interest and availability, and ultimately selected four experts, who constituted the final Panel. The remaining candidates were not proposed for a variety of reasons, including lack of availability, disclosed COIs, or lack of the precise technical expertise required.

The candidates were screened for the following potential exclusion criteria or COIs.¹ These COI questions serve as a means of disclosure and to better characterize a candidate's employment history and background. Providing a positive response to a COI screening question did not automatically preclude a candidate from serving on the Panel. For example, participation in previous USACE technical peer review committees and other technical review panel experience was included as a COI screening question. A positive response to this question could be considered a benefit.

- Previous and/or current involvement by you or your firm² in the John Day Dam Mitigation Program, Draft Post-Authorization Change Report (PACR) (hereinafter: John Day Dam PACR)
- Previous and/or current involvement by you or your firm² in ecosystem restoration, mitigation, or flood control projects in the Pacific Northwest, specifically along or in the Columbia River Basin.
- Previous and/or current involvement by you or your firm² in the John Day Dam PACR related projects.
- Previous and/or current involvement by you or your firm² in the conceptual or actual design, construction, or operation and maintenance of any projects in the John Day Dam PACR related projects.
- Current employment by the U.S. Army Corps of Engineers (USACE).

¹ Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. See OMB (2004, p. 18), "...when a scientist is awarded a government research grant through an investigator-initiated, peer-reviewed competition, there generally should be no question as to that scientist's ability to offer independent scientific advice to the agency on other projects. This contrasts, for example, to a situation in which a scientist has a consulting or contractual arrangement with the agency or office sponsoring a peer review. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Furthermore, if a scientist has repeatedly served as a reviewer for the same agency, some may question whether that scientist is sufficiently independent from the agency to be employed as a peer reviewer on agency-sponsored projects."

² Includes any joint ventures in which a panel member's firm is involved and if the firm serves as a prime or as a subcontractor to a prime.

- Previous and/or current involvement with paid or unpaid expert testimony related to the John Day Dam PACR.
- Previous and/or current employment or affiliation with members of the cooperating agencies or local sponsor (for pay or pro bono), including U.S. Fish and Wildlife (USFWS), Bonneville Power Administration, U.S. Bureau of Reclamation, and Columbia Basin Treaty Tribes.
- Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to the Columbia River Basin system.
- Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the Portland District.
- Previous or current involvement with the development or testing of models that will be used for, or in support of, the John Day Dam PACR project.
- Current firm² involvement with other USACE projects, specifically those projects/contracts that are with the Portland District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please also clearly delineate the percentage of work you personally are currently conducting for the Portland District. Please explain.
- Any previous employment by USACE as a direct employee, notably if employment was with the Portland District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Any previous employment by USACE as a contractor (either as an individual or through your firm²) within the last 10 years, notably if those projects/contracts were with the Portland District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning ecosystem restoration or flood management, and include the client/agency and duration of review (approximate dates).
- Pending, current, or future financial interests in the John Day Dam PACR related contracts/awards from USACE.
- A significant portion (i.e., greater than 50%) of personal or firm² revenues within the last 3 years came from USACE contracts.
- Any publicly documented statement (including, for example, advocating for or discouraging against) related to the John Day Dam PACR.
- Participation in relevant prior and/or current Federal studies relevant to this project, John Day Dam PACR and/or the John Day Mitigation Program, including the Federal Columbia River Power System Biological Opinion and the 2008 Columbia Basin Fish Accords Memorandum of Agreement.
- Previous and/or current participation in prior non-Federal studies relevant to this project, John Day Dam PACR and/or the John Day Mitigation Program.
- Is there any past, present, or future activity, relationship, or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project? If so, please describe:

Other considerations:

- Participation in previous USACE technical review panels
- Other technical review panel experience.

B.2 Panel Selection

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. Two of the four final reviewers are affiliated with a consulting company; the other two are independent consultants. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed COI form. USACE was given the list of candidate panel members, but Battelle selected the final Panel.

An overview of the credentials of the final four members of the Panel and their qualifications in relation to the technical evaluation criteria is presented in Table B-1. More detailed biographical information regarding each panel member and his area of technical expertise is presented in Section B.3.

Table B-1. John Day DAM IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Barr	Casavant	Kidder	Hegre
Fish Hatchery Biology				
Minimum 10 years of demonstrated experience in working with anadromous fishery programs in the Pacific Northwest	X			
An understanding and experience with implementing Hatchery Genetic Management Plans (HGMP) and hatchery program monitoring	X			
Familiarity with northwest salmon and tribal fishery issues is encouraged	X			
Civil Works Planning/NEPA Review				
Minimum 10 years of planning experience		X		
High familiarity with USACE Civil Works planning policies, methodologies, and procedures		X		
Minimum 10 years of demonstrated experience in evaluating and conducting complex multi-objective public works projects with competing trade-offs		X		
Experience in the above should encompass projects with high public and interagency interests		X		
Experience with NEPA and its application and compliance		X		
M.S. degree in a relevant field		X		
Mechanical/Design Engineering				
Minimum 10 years of demonstrated experience in mechanical/design engineering			X	
Familiarity with fish hatchery design and operation			X	
Active participation in related professional societies			X	
Cost Engineering				
Minimum 10 years of demonstrated experience in preparing and evaluating cost estimates for complex engineering projects				X
Active participation in related professional societies				X

B.3 Panel Member Qualifications

John Barr

Role: Fish hatchery biology expertise.

Affiliation: Independent Consultant

Mr. John Barr, an independent consultant, earned his Bachelor of Science degree from the University of Washington in 1981. He has 30 years of experience in fisheries biology, with 17 years focused on hatchery management and fisheries enhancement. His experience in anadromous fishery programs in the Pacific Northwest derives from his work as a regional fisheries biologist with the Point No Point Treaty Council (Skokomish Indian Tribe), as well as his work as a fishery enhancement (hatchery) biologist with the Nisqually Indian Tribe and the Squaxin Island Indian Tribe. For ten years (1991-2000), Mr. Barr served as the Chief Enhancement Biologist and the Salmon Restoration Program Supervisor with the Nisqually Indian Tribe. As Chief Enhancement Biologist, he was responsible for tribal fishery enhancement operations at two facilities rearing fall Chinook, spring Chinook, coho, and chum salmon. As Salmon Restoration Program Supervisor, he supervised the salmon restoration program and coordinated all salmon restoration activities in the Nisqually basin. This included development and implementation of habitat restoration programs, as well as review, modification, and implementation of new hatchery programs consistent with basin recovery efforts.

More recently (1999-2006), Mr. Barr served as tribally designated member and vice-chair of the Puget Sound Hatchery Scientific Review Group (HSRG). Here he worked with group members to review all hatchery programs in Puget Sound and coastal Washington. This included participating in the deliberations of the HSRG, recommending region-wide research and monitoring priorities, developing hatchery operational guidelines, monitoring and evaluating protocols, and reviewing hatchery programs for consistency with scientific recommendations. He has also served as an independent member and vice-chair of the Columbia River HSRG (2006-2009). In total, 178 Columbia River hatchery programs affecting 351 natural populations were analyzed and reviewed, with technical recommendations provided for each program to help make them more consistent with managers' harvest and conservation goals. He continued to review hatchery programs and hatchery reform implementation actions as an independent member of the HSRG through 2011.

Mr. Barr has an understanding of and experience implementing Hatchery Genetic Management Plans (HGMPs) and hatchery program monitoring. He has developed and implemented HGMPs for all tribal hatchery programs at the Nisqually Indian Tribe. In addition, HGMPs were used as reference documents for program information as part of the HSRG review process for Puget Sound and coastal Washington and the Columbia River, so he has reviewed hundreds of these documents prepared by state, Tribal, and Federal agencies, as well as programs operated by non-governmental organizations.

Mr. Barr is also familiar with Northwest salmon and tribal fishery issues through his work as a biologist for the Skokomish Indian Tribe and from his time at the Nisqually Tribe. He has provided input and advice on issues other than simply artificial production of salmon, including harvest management and salmon recovery issues. As the tribal designee to the Puget Sound and coastal Washington HSRG, and as a member of the Columbia River HSRG, he maintained contact with tribal representatives (policy and technical) throughout the region during hatchery program reviews and subsequent evaluations of hatchery reform implementation.

Ken Casavant, Ph.D.

Role: Civil Works planning and NEPA review expertise.

Affiliation: Independent Consultant

Dr. Ken Casavant is a professor and agricultural economist at the School of Economic Sciences at Washington State University, Director of the Freight Policy Transportation Institute, and adjunct professor at North Dakota State's Upper Great Plains Transportation Institute since 2002. He earned his Ph.D. in agricultural economics from Washington State University in 1971. During his 47-year career, he has gained extensive experience as an economist, planner, university professor, and consultant, with specific expertise in transportation economics and planning, Civil Works planning, and National Environmental Policy Act (NEPA) compliance.

Dr. Casavant has over 10 years of experience in plan formulation, evaluation, and comparison of alternative plans for USACE projects. He has served as the Civil Works planning and plan formulation expert for seven previous USACE IEPRs and has served as the economics expert on four others; for several other reviews, he fulfilled both roles. For these reviews, Dr. Casavant tested assumptions, examined alternatives, replicated and corroborated analyses, and requested changes using USACE's Planning Principles and Guidelines framework. In addition, he evaluated projects against the USACE six-step planning process governed by ER 1105-2-100. Three specific projects—the Upper Mississippi and Illinois Navigation Study, the Lower Columbia River Channel Deepening Project, and the Savannah Harbor Improvement Project—demonstrate Dr. Casavant's breadth and depth of experience evaluating complex, multi-objective public works projects with high public and interagency interests. The Upper Mississippi and Illinois Navigation Study focused on lock and stream improvements for navigation on riverine and environmental components. Numerous Federal, state, local, and commercial entities expressed varying positions and requests for protection. The Lower Columbia River Channel Deepening project involved traditional stakeholders, from state and Federal fish and wildlife agencies to local fishers associations, many with competing, yet defensible, concerns. The Savannah Harbor Improvement Project considered positions from environmental interests such as agencies and local fishing organizations that were blended into the mitigation strategies and plans. For all three of these projects, multiple public hearings were conducted and testimonies gathered.

Other relevant IEPRs Dr. Casavant has participated in include the Louisiana Coastal Area (LCA) 6 Atchafalaya Ecosystem Restoration Project, the Barataria Basin Barrier Shoreline Restoration Study, the Donaldsonville to the Gulf Flood Control Project, the Morganza to the Gulf of Mexico Hurricane Protection Project, and the Mississippi River Gulf Outlet Ecosystem Restoration Plan. Most of these projects involved the evaluation and comparison of USACE-developed environmental impact statements (EISs) requiring NEPA analysis. Dr. Casavant's technical reviews involved analyzing, evaluating, and comparing alternative plans and analyses under NEPA, including, as an economist and planner, evaluating socioeconomic impact analyses. He has also taught courses on the EIS and NEPA process.

Dr. Casavant has published more than 70 journal articles and has contributed to hundreds of other publications. He is a member of numerous professional associations, including the Transportation Research Board, National Research Council, the International Agricultural Economics Association, and the Logistics and Physical Distribution Association.

Jay Kidder, P.E.

Role: Mechanical/design engineering expertise.

Affiliation: Chinook Engineering

Mr. Jay Kidder is the principal engineer and owner of Chinook Engineering. He has experience working across the Pacific Northwest, Alaska, Great Basin, and the Midwest, completing fisheries biology and fisheries engineering projects over the past 32 years. He has extensive experience in new design, and renovation and modification of existing hatchery facilities in Alaska, Washington, and Idaho. His experience also includes specific habitat restoration projects in which he dealt with fisheries biology, population analysis, habitat composition, fish passage, species composition, and habitat restoration. When combining his fisheries biology and civil engineering expertise, Mr. Kidder has bridged the two disciplines to arrive at a balanced approach to engineered solutions for fisheries biology. He is an active member of the American Fisheries Society and the American Society of Civil Engineers.

In the past, Mr. Kidder has focused much of his effort on fisheries issues within the Columbia River system and Puget Sound Basin. His work includes the evaluation and analysis of fish mortality and behavior in hydroelectric turbines, stream bypasses, diversions, and the development of recommendations for improving fish passage success at man-made and natural barriers. Much of his current project load relates to on-the-ground facility improvements for many of the local Puget Sound and Eastern Washington Indian Tribal hatchery facilities that provide a method to prevent Federal intervention on Endangered Species Recovery plans. This includes the preparation of bidding documents and the construction management of the project he designs.

Mr. Kidder has extensive experience with fish hatchery design and operation. Specific project experience includes the Prince William Sound Aquaculture Association, Esther Hatchery, aka Wally Noerenberg Hatchery 1984-1986 project. He was the project fisheries engineer and worked with a large team to design the largest salmon hatchery in North America in Prince William Sound, Alaska. Mr. Kidder was in charge of conceptual, preliminary, and final design, leading drafting and contract document development. On the Kootenai Tribe of Indians White Sturgeon Hatchery Facility project he planned, designed, and managed construction of an experimental, low-cost white sturgeon hatchery capable of future expansions to supplement the endangered white sturgeon population in that area. In addition, he was the project engineer for the Medvejie Creek Hatchery Facility expansion project, which was selected by the State of Alaska to be one of several chinook mitigation projects designed to offset some of the catch reductions to Southeast Alaska fishermen resulting from the U.S./Canada Salmon Treaty. Recently, Mr. Kidder worked in Puget Sound with new and innovative techniques to facilitate the separation of Hatchery Origin Chinook salmon from Natural Origin fish in an effort to separate significant genetic mixing for the management of the Nisqually Tribal Chinook fishery and their recovery plan. The project includes a full river width floating weir and twin sampling stations with traps, and two 38-foot long augers with sorting tables to sample the fish and pass Natural Origin fish upstream. He has also used his design expertise for the development and construction of a 250-foot-long PVC pinned exclusion fence with the Tulalip Tribes to protect their Chinook hatchery adult returns as the fish stage to enter the hatchery fish ladder.

Paul Hegre, P.E., CCS, CCCA

Role: Cost engineering expertise.

Affiliation: Short Elliott Hendrickson, Inc.

Mr. Hegre is a senior professional engineer with 16 years of experience on environmental projects involving flood control and flood risk management. He earned his B.S. in civil engineering from the University of Minnesota in 1997, and is a registered professional engineer in Minnesota and Wisconsin. He also is a certified construction specifier (CCS) and a certified construction contract administrator (CCCA). Mr. Hegre provides project design engineering, construction documents, and cost estimating for budgets and construction. He has received formal, advanced training in cost estimating software tools, including Micro Computer Aided Cost Estimating Software (MCACES) and Crystal Ball.

For the past 13 years, Mr. Hegre has worked on heavy civil engineering projects that include flood risk reduction elements of design and construction. His cost engineering experience includes his work on the Underwood Creek Rehabilitation and Flood Management project for USACE (Detroit District). For this project, he produced the cost estimate for the detailed project report using MCACES second generation (MII), Version 4.1, and participated in the Cost and Schedule Risk Analysis (CSRA). Elements of this project included demolition of a concrete channel and storm sewer, excavation of a channel thalweg and side slopes, construction of retaining walls and drop structures, and re-establishment of native floodplain vegetation. Mr. Hegre also served as the lead design and construction engineer on the Crookston Flood Risk Management and Bank Stabilization project in Crookston, Minnesota. He coordinated engineering disciplines involved in the project and produced the engineer's cost estimates, preliminary funding documents, and construction documents. He also served as the lead civil design engineer for the Berens Monaldi Pump Station in Dyer, Indiana. For that project, Mr. Hegre's responsibilities included production of cost estimates, construction drawings, and project manuals and coordination of the design effort.

Other projects for which Mr. Hegre has developed estimates using MCACES MII include the feasibility phase for the Stillwater, Minnesota, Flood Control Project Stage 3; the planning, engineering, and design phase for the East Grand Forks, North Dakota, Flood Control Project; and the Little Calumet River Combined Sewer Overflow West Interceptor Project in Hammond, Indiana. In addition, as a field engineer for USACE, he developed estimates for contract modifications during the construction phase for the Orwell Dam Rehabilitation Project and phases 3 through 5 of the Crookston Flood Control Project.

Mr. Hegre was the project specifier and cost estimator for the Heartsville Coulee Diversion for USACE (St. Paul District), a project that involved earthen levees, diversion channels, a new highway bridge, gravity outlets, and road raises. For that project, he coordinated and produced construction specifications using SPECSINTACT software.

Mr. Hegre is an active member of the Society of Military Engineers (serving on its scholarship review board for three years) and the American Society of Civil Engineers. He is also a member of the Construction Specifications Institute (CSI) and provides in-house training on CSI standards for construction, contract document development, and specification writing.

APPENDIX C

Final Charge to the IEPR Submitted
to USACE on October 3, 2014 for
the John Day Dam Project

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CHARGE QUESTIONS AND GUIDANCE TO THE PANEL MEMBERS FOR THE IEPR OF THE John Day Dam Mitigation Program Draft Post-Authorization Change Report (PACR)

BACKGROUND

The John Day Mitigation (JDM) program was originally authorized to offset mainstem fall Chinook production losses that resulted from construction of The Dalles and John Day dams, located on the Columbia River in Oregon. John Day Lock and Dam (John Day) is located on the Columbia River between Oregon and Washington 215.6 miles upstream from the river's mouth. The reservoir behind John Day is known as Lake Umatilla. The JDM program objective is to produce sufficient juvenile fall Chinook salmon to support an escapement of 30,000 returning adults.

The purpose of the Post-Authorization Change Report (PACR) is to document the need and justification for modifications to the authorized John Day Mitigation Program. An additional purpose of this report is to determine if recommended modifications are consistent with the current authorization or if specific authorizing language is required for implementation. John Day Lock and Dam and The Dalles Lock and Dam projects were authorized in the Flood Control Act of 1950 (Public Law 516, 81st Congress, Second Session). The authorization included mitigation, by artificial propagation, of fish losses sustained by inundation of spawning and rearing areas.

Although adjustments to the JDM program have been made over time, the current JDM program does not fulfill the 30,000 adult escapement, "in-place and in-kind" mitigation objectives, and Federal Indian Trust responsibilities related to The Dalles and John Day dams. Provisions to evaluate additional changes to the JDM program to minimize impacts on Lower Columbia River Chinook salmon and to mitigate losses "in-place and in-kind" have been included in the 2008 Federal Columbia River Power System Biological Opinion, and also identified in the 2008 Columbia Basin Fish Accords Memorandum of Agreement between the Action Agencies (Bonneville Power Administration, U.S. Army Corps of Engineers [USACE], and U.S. Bureau of Reclamation) and Columbia Basin Treaty Tribes.

In August of 2011, as a part of the Columbia River Fish Mitigation Program, USACE formally initiated studies to address adjustments in the John Day Mitigation Program that are necessary to achieve in-kind and in-place mitigation objectives. This has included an assessment of alternatives to increase production of upriver bright (URB) Chinook and preparation of this Post-Authorization Change Report.

Based on the evaluation and comparison of the five alternatives, a tentatively selected plan was identified, referred to as Ringold/I-182. This alternative meets 107,000 adult returns for an escapement of 30,000 adult Chinook, meets a production ratio of 75 percent URB and 25 percent tule fall Chinook salmon, provides for in-place and in-kind mitigation of lost spawning areas above John Day Dam, and is economically efficient and environmentally sound. Environmental compliance, public review, and final design will proceed for this plan.

The tentatively selected plan is a combination of actions that include an expansion of facilities at the Ringold Springs Washington State Fish Hatchery (Ringold) to allow for the production and release of 10.4 million juvenile URB fall Chinook. In addition to an increase in on-station production at Ringold, the facility would be modified to support production of an additional 3.4 million smolts for intermediate rearing. This would bring the total production at Ringold for incubation and intermediate rearing to 13.8 million. The plan also includes construction of acclimation facilities at the I-182 site, which would be used for acclimation and release of the 3.4 million smolts produced at the expanded Ringold facility. The existing facilities at the Little White Salmon National Fish Hatchery, Prosser Tribal Fish Hatchery, and Umatilla Oregon State Fish Hatchery would continue to be used for URB. Spring Creek National Fish Hatchery would continue to be used for production and release of tule fall Chinook, but other production of tule fall Chinook is assumed to be reduced under the tentatively selected plan. The cost of the plan is estimated at \$68.6 million, which includes planning, engineering, design, construction, management, and contingency.

Based on an assessment of the tentatively selected plan, the proposed changes are within the scope of the currently authorized mitigation program. There are no changes related to the scope, project purpose, or project outputs. The plan would produce the authorized mitigation output level to support a run of 30,000 adult Chinook based on current fisheries science and best management practices to better mitigate in-place and in-kind losses associated with the project. Under the plan, the JDM program would be focused on the geographic location that was impacted by construction of John Day and The Dalles dams. The ratio of tule to URB Chinook would also be better aligned with the Chinook stock that was affected by the dams. The tentatively selected plan requires expansion and construction of additional facilities to produce URB that more closely align with the ratio of losses from URB and tule fall Chinook salmon and take into account treaty fishing rights. The location and design of the plan are similar in relation to the current JDM program. There are no recommended changes related to local cooperation requirements, cost-allocation, or cost apportionment.

The Independent External Peer Review (IEPR) will focus on the new information provided in the PACR and the Environmental Assessment. The purpose of the IEPR is to analyze the adequacy and acceptability of economic, engineering and environmental methods, models, data and analyses.

OBJECTIVES

The objective of this work is to conduct an IEPR of the John Day Dam Mitigation Program, Draft Post-Authorization Change Report (PACR) (hereinafter: John Day Dam IEPR) in accordance with the Department of the Army, USACE, Water Resources Policies and Authorities' *Civil Works Review* (Engineer Circular [EC] 1165-2-214, December 15, 2012), and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).

Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. Peer review typically evaluates the clarity of hypotheses, validity of the research design, quality of data collection procedures, robustness of the methods employed, appropriateness of the methods for the hypotheses being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product.

The purpose of the IEPR is to assess the “adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used” (EC 1165-2-214; p. D-4) for the John Day Dam documents. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR panel members) with extensive experience in fish hatchery biology, Civil Works planning/NEPA review, mechanical/design engineering, and cost engineering issues relevant to the project. They will also have experience applying their subject matter expertise to ecosystem restoration.

The Panel will be “charged” with responding to specific technical questions, as well as providing a broad technical evaluation of the overall project. Per EC 1165-2-214, Appendix D, review panels should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analyses and the conclusions based on analyses are reasonable. Reviews should focus on assumptions, data, methods, and models. The panel members may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

DOCUMENTS PROVIDED

The following is a list of documents, supporting information, and reference materials that will be provided for the review.

Documents for Review

The following documents are to be reviewed by designated discipline:

Review Documents	
Title	Number of Pages
John Day Dam Mitigation Program, Draft PACR	94
Appendices	
Appendix A - Environmental Compliance	90
Appendix B - Technical Appendix (Design Drawings)	76
Appendix C - Real Estate Plan	48
Appendix D – Methodology	7
Hatchery Genetic Management Plan (HGMP)	106
Public Review Comments/Responses	5
Total Pages	426

Documents for Reference

- USACE guidance *Civil Works Review* (EC 1165-2-214; 15 December 2012)
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).

SCHEDULE

This final schedule is based on the September 30, 2014, receipt of the final review documents.

Task	Action	Due Date
Conduct Peer Review	Battelle sends review documents to panel members	10/2/2014
	Battelle convenes kick-off meeting with panel members	10/2/2014
	Battelle convenes kick-off meeting with USACE and panel members	10/3/2014
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	10/20/2014
	Panel members complete their individual reviews	10/24/2014
Prepare Final Panel Comments and Final IEPR Report	Battelle provides panel members with talking points for Panel Review Teleconference	10/29/2014
	Battelle convenes Panel Review Teleconference	10/30/2014
	Battelle provides Final Panel Comment templates and instructions to panel members	10/31/2014
	Panel members provide draft Final Panel Comments to Battelle	11/6/2014
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	11/6/2014 - 11/14/2014
	Panel finalizes Final Panel Comments	11/14/2014
	Battelle provides Final IEPR Report to panel members for review	11/18/2014
	Panel members provide comments on Final IEPR Report	11/19/2014
	Battelle submits Final IEPR Report to USACE	11/21/2014
Comment/Response Process	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	11/25/2014
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process (if necessary)	11/25/2014
	USACE provides draft PDT Evaluator Responses to Battelle	12/5/2014
	Battelle provides the panel members the draft PDT Evaluator Responses	12/9/2014
	Panel members provide Battelle with draft BackCheck Responses	12/12/2014
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	12/16/2014

Task	Action	Due Date
	Battelle convenes Comment-Response Teleconference with panel members and USACE	12/16/2014
	USACE inputs final PDT Evaluator Responses to DrChecks	12/18/2014
	Battelle provides PDT Evaluator Responses to panel members	12/23/2014
	Panel members provide Battelle with final BackCheck Responses	12/30/2014
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	1/7/2015
	Battelle submits pdf printout of DrChecks project file	1/8/2015

CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the John Day Dam documents are credible and whether the conclusions are valid. The Panel is asked to determine whether the technical work is adequate, competently performed, and properly documented; satisfies established quality requirements; and yields scientifically credible conclusions. The Panel is being asked to provide feedback on the economic, engineering, environmental resources, and plan formulation. The panel members are not being asked whether they would have conducted the work in a similar manner.

Specific questions for the Panel (by report section or appendix) are included in the general charge guidance, which is provided below.

General Charge Guidance

Please answer the scientific and technical questions listed below and conduct a broad overview of the John Day Dam documents. Please focus your review on the review materials assigned to your discipline/area of expertise and technical knowledge. Even though there are some sections with no questions associated with them, that does not mean that you cannot comment on them. Please feel free to make any relevant and appropriate comment on any of the sections and appendices you were asked to review. In addition, please note the following guidance. Note that the Panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-214; Appendix D).

1. Your response to the charge questions should not be limited to a "yes" or "no." Please provide complete answers to fully explain your response.
2. Assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, and any biological opinions of the project study.
3. Assess the adequacy and acceptability of the economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, and models used in evaluating economic or environmental impacts of the proposed project.

4. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation.
5. Identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods.
6. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable.
7. Please focus the review on assumptions, data, methods, and models.

Please **do not** make recommendations on whether a particular alternative should be implemented, or whether you would have conducted the work in a similar manner. Also please **do not** comment on or make recommendations on policy issues and decision making. Comments should be provided based on your professional judgment, **not** the legality of the document.

1. If desired, panel members can contact one another. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Agency Technical Review (ATR).
2. Please contact the Battelle Project Manager (Jessica Tenzar, tenzari@battelle.org) or Program Manager (Karen Johnson-Young (johnson-youngk@battelle.org)) for requests or additional information.
3. In case of media contact, notify the Battelle Program Manager, Karen Johnson-Young (johnson-youngk@battelle.org) immediately.
4. Your name will appear as one of the panel members in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

Please submit your comments in electronic form to Jessica Tenzar, tenzari@battelle.org, no later than October 24, 2014, 10 pm ET.

IEPR of the John Day Dam Mitigation Program Draft Post-Authorization Change Report (PACR)

CHARGE QUESTIONS AND RELEVANT SECTIONS AS SUPPLIED BY USACE

General

1. Was all hatchery science used in the analyses used in an appropriate manner?
2. Were risk and uncertainty sufficiently considered?
3. In your opinion, are there sufficient analyses upon which to base the recommendation?

Problem, Needs, Constraints, and Opportunities

4. Are the problems, needs, constraints, and opportunities adequately and correctly defined?

Existing and Future Without Project Resources.

5. Has the character and scope of the study area been adequately described and is the identified study area appropriate in terms of hatcheries?
6. Do you agree with the general analyses of the existing social, financial, and natural resources within the study area?
7. For your particular area of expertise, provide an in-depth review of whether the analyses of the existing social, financial, and natural resources within the project area are sufficient to support the estimation of impacts of the array of alternatives.
8. Given your area of expertise, does this section appropriately address the existing conditions of all resources pertinent to the study?
9. Were the surveys conducted to evaluate the existing social, financial, and natural resources adequate? If not, what types of surveys should have been conducted?
10. Were socioeconomic conditions adequately addressed? Were specific socioeconomic issues not addressed?
11. Was the hydrology discussion sufficient to characterize current baseline conditions and to allow for evaluation of water specific needs, both surface water and groundwater?
12. Was the discussion of natural resources sufficient to characterize current baseline conditions and to allow for evaluation of forecasted conditions (with and without proposed actions)?
13. Were the assumptions used as the basis for developing the no action project conditions reasonable? Were adequate scenarios effectively considered (applied during analyses where relevant and/or reasonably investigated)? Were the potential effects of climate change addressed?

14. Are the future conditions expected to exist in the absence of a Federal project logical and adequately described and documented?
15. Please comment on the conclusion of the most probable future without-project condition. Do you envision other potential probable outcomes?

Plan Formulation / Evaluation

16. Was a reasonably complete array of possible measures considered in the development of alternatives?
17. Did the formulation process follow the requirement to avoid, minimize, and then mitigate adverse impacts on resources?
18. Does each alternative meet the formulation criteria of being effective, efficient, complete, and acceptable? Definitions -
19. Were the assumptions made for use in developing the future with-project conditions for each alternative reasonable? Were adequate scenarios considered? Were the assumptions reasonably consistent across the range of alternatives and/or adequately justified where different?
20. Are the uncertainties inherent in our evaluation of benefits, costs, and impacts, and any risk associated with those uncertainties, adequately addressed and described for each alternative?
21. Are future Operation, Maintenance, Repair, Replacement, and Rehabilitation efforts adequately described and are the estimated cost of those efforts reasonable for each alternative?
22. Please comment on the screening of the proposed alternatives. Are the screening criteria appropriate? In your professional opinion, are the results of the screening acceptable? Were any measures or alternatives screened out too early?
23. Were the engineering, economic, and environmental analyses used for this study consistent with generally accepted methodologies? Why or why not?

Recommended Plan

24. Comment on the plan formulation. Does it meet the study objectives and avoid violating the study constraints?
25. Please comment on the likelihood of the recommended plan to achieve the expected outputs.
26. Please comment on the completeness of the recommended plan, i.e. will any additional efforts, measures, or projects be needed to realize the expected benefits?
27. Please comment on the appropriateness of location, sizing, and design of plan features.

Purpose Specific Questions

Environmental

28. Is it clear that the restored ecological resource quality will be sustainable over the long run?

29. Are the risks facing successful restoration of sustainable ecological resource quality clearly shown to be managed and any residual risks identified in terms of :
- a. Sufficient hydrology(water supply)?
 - b. Sufficient environmental chemistry (water quality)?
 - c. Are the required long-term commitments (both Federal and non-Federal) to sustaining the restored ecological resource quality adequately described and adequately demonstrated?
 - d. Are assumptions supported by hatchery science and are SAR values appropriate?

Cost

30. Are appropriate contingencies applied?
31. Comment on construction costs of recommended facilities (i.e. relative costs compared to similar facilities).
32. Comment on O&M costs of recommended facilities.

Overview Questions as Supplied by Battelle

33. Please identify the most critical concerns (up to five) you have with the project and/or review documents. These concerns can be (but do not need to be) new ideas or issues that have not been raised previously.
34. Please provide positive feedback on the project and/or review documents

