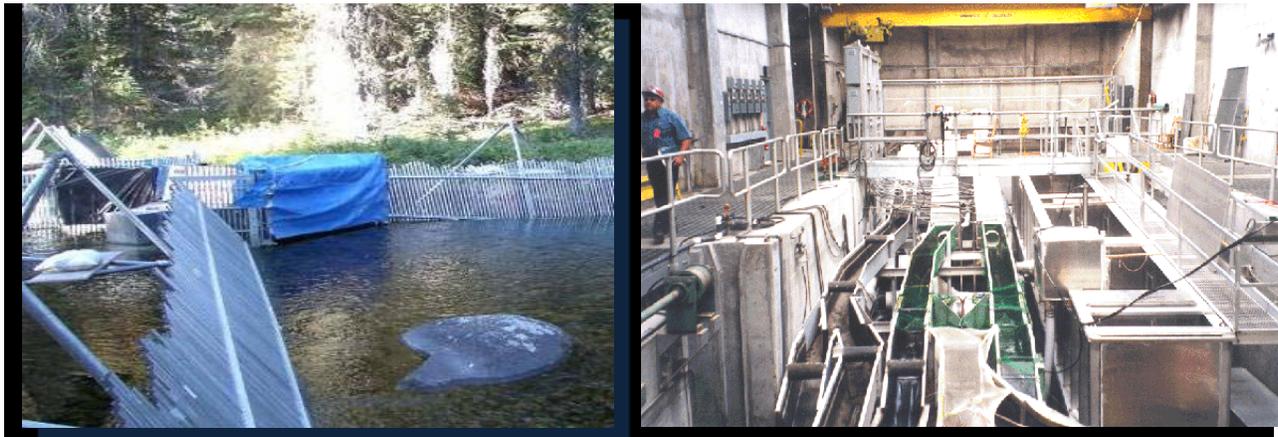




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# Final Review of 2010 Proposals for the Research, Monitoring, and Evaluation and Artificial Production Category

## Part 2. Recommendations and Comments on Individual Proposals



**ISRP 2010-44B**  
**December 16, 2010**

# Final Review of 2010 Proposals for the Research, Monitoring, and Evaluation and Artificial Production Category

## Part 2: Recommendations and Comments on Individual Proposals

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# Final Review of 2010 Proposals for the Research, Monitoring, and Evaluation and Artificial Production Category

## Part 2: Recommendations and Comments on Individual Proposals

### Background

This document is the second part of the ISRP's Final Review of 2010 Proposals for the Research, Monitoring, and Evaluation and Artificial Production Category. It contains ISRP comments and recommendations for each of the 99 proposals submitted. Part 1 of the report describes the ISRP's review process, criteria, and other background information needed to best understand and use this portion of the report. Part 1 also identifies programmatic issues that cut across the set of proposals and are intended to inform Fish and Wildlife Program development.

This document starts with a table of the proposals, which provides some basic information on the proposal, the ISRP's preliminary recommendation, and the page number for comments on the proposal. The proposals and our recommendations are grouped below by topic or research area starting with the ocean and estuary studies; followed by mainstem passage studies; harvest monitoring; conservation enforcement; basinwide habitat work and status and trends monitoring; and hatchery production and studies including associated production monitoring and reintroduction assessments. Within the topic groupings, proposals are arranged by geographic area and project number, oldest first. The "short descriptions" were imported from Taurus and written by the project proponents.

The ISRP's comments and recommendations are also available on-line embedded in the electronic proposal information in Taurus: [www.cbfish.org](http://www.cbfish.org).

A page index by proposal number is at end of the document.

### Recommendation Categories

For each proposal, we provide a recommendation:

- Meets Scientific Review Criteria
- Meets Scientific Review Criteria (Qualified)
- Meets Scientific Review Criteria - In Part
- Meets Scientific Review Criteria - In Part (Qualified)
- Does Not Meet Scientific Review Criteria
- Not Applicable

For preliminary reviews we also use:

- Response Requested

The full definitions for our recommendation categories are:

**1. Meets Scientific Review Criteria** is assigned to a proposal that substantially meets each of the ISRP criteria. Each proposal does not have to contain tasks that independently meet each of the criteria but can be an integral part of a program that provides the necessary elements. For example, a habitat restoration project may use data from a separate monitoring and evaluation project to measure results as long as such proposals clearly demonstrate this integration. Unless otherwise indicated, a “Meets Scientific Criteria” recommendation is not an indication of the ISRP’s view on the priority of the proposal, nor an endorsement to fund the proposal, but rather reflects its scientific merit and compatibility with Program goals.

**2. Meets Scientific Review Criteria - In Part** is assigned to a proposal that includes some work that substantially meets each of the ISRP criteria and some work that does not. The ISRP specifies which elements do not meet the review criteria and recommends that initiating work be delayed until certain technical issues are properly addressed. Examples are proposals that include objectives that are not scientifically supported, for instance, a proposal for both background assessment work and concurrent on-the-ground implementation that cannot be justified before results of the assessment are known, or proposals that include use of unsound methods to meet a particular objective. “In Part” is also used for proposals that are justified for a portion of the years proposed for funding, but would benefit from an interim review within those years – for example, a proof of concept research project for which methods need to be tested at a pilot scale before full implementation. Required changes to a proposal will be determined by the Council and BPA in consultation with the project proponents in the final project selection process.

**(Qualified)** is assigned to recommendations in the two categories above for which additional clarifications and adjustments to methods and objectives by the proponent are needed to fully justify the entire proposal. The ISRP expects that needed changes to a proposal will be determined by the Council and BPA in consultation with the project proponent in the final project selection process. The ISRP also uses “Qualified” for proposals that are technically sound but appear to offer marginal or very uncertain benefits to fish and wildlife and when further ISRP review of a project’s final implementation plan or analysis of results will be needed before the project moves to full implementation. Regardless of the Council’s or BPA’s recommendations, the ISRP expects that, if a proposal is funded, subsequent proposals for continued funding will address the ISRP’s comments.

**3. Does Not Meet Scientific Review Criteria** is assigned to a proposal that is significantly deficient in one or more of the ISRP review criteria. One example is a proposal for an ongoing project that might offer benefits to fish and wildlife, but does not include provisions for monitoring and evaluation or reporting of past results. Another example is a research proposal that is technically sound but does not offer benefits to fish and wildlife because it substantially duplicates past efforts or is not sufficiently linked to management actions. In most cases, proposals that receive this recommendation lack detailed methods or adequate provisions for monitoring and evaluation, and some propose actions that have the potential for significant deleterious effects to non-target fish or wildlife. The ISRP notes that proposals in this category may address needed actions or are an integral part of a planned watershed effort, but the proposed methods or approaches are not scientifically sound. In some cases, a targeted RFP may be warranted to address the needed action.

**4. Not Applicable** is assigned to proposals that are not amenable to scientific review, such as coordination or administrative proposals that need to be grouped with other projects that require scientific review.

**5. Response Requested** is assigned to a proposal in a preliminary review that requires a response on specific issues before the ISRP can make its final recommendation. This does not mean that the proposal has failed the review. In general, the ISRP requests responses on a majority of proposals, and a majority of proposals provide sufficient information in the response loop to meet the ISRP's scientific review criteria.

# Table of proposals and recommendations

Click page numbers to jump to proposal reviews.

<b>ID</b>	<b>Title</b>	<b>Proponent</b>	<b>Meets scientific criteria?</b>	<b>Page</b>
<a href="#">199801400</a>	Ocean Survival of Salmonids	National Oceanic and Atmospheric Administration (NOAA)	Yes (Qualified)	<b>9</b>
<a href="#">200300900</a>	Salmon Shelf Survival Study	Canada Department of Fisheries and Oceans	Yes (Qualified)	<b>13</b>
<a href="#">200311400</a>	Coastal Ocean Acoustic Salmon Tracking (COAST)	Kintama Research	Yes (Qualified)	<b>17</b>
<a href="#">200300700</a>	Lower Columbia River Estuary Ecosystem Monitoring	Lower Columbia River Estuary Partnership (LCREP)	In Part (Qualified)	<b>23</b>
<a href="#">198331900</a>	Development and Evaluation of Fish-Tracking Technologies	NOAA	Yes (Qualified)	<b>25</b>
<a href="#">200100300</a>	Installation and Evaluation of Established PIT-tag Technologies	Digital Angel Corporation, NOAA, PSMFC	Yes (Qualified)	<b>28</b>
<a href="#">200850600</a>	Smolt Monitoring Video Feasibility Project	Columbia River Inter-Tribal Fish Commission (CRITFC)	No	<b>30</b>
<a href="#">199008000</a>	Columbia Basin PIT Tag Information System	PSMFC	Yes	<b>31</b>
<a href="#">199403300</a>	Fish Passage Center	PSMFC, Fish Passage Center	Yes (Qualified)	<b>32</b>
<a href="#">198712700</a>	Smolt Monitoring by Non-Federal Entities	CRITFC, Fish Passage Center, Idaho Department of Fish and Game (IDFG), Oregon Department of Fish and Wildlife (ODFW), PSMFC, US Fish and Wildlife Service (USFWS), Washington Department of Fish and Wildlife (WDFW)	Yes (Qualified)	<b>33</b>
<a href="#">200500200</a>	Lower Granite Dam Adult Trap Operations	NOAA	Yes	<b>35</b>
<a href="#">199602000</a>	Comparative Survival Study (CSS)	CRITFC, Fish Passage Center, IDFG, ODFW, PSMFC, USFWS, WDFW	Yes (Qualified)	<b>36</b>
<a href="#">199302900</a>	Survival Estimates for the Passage of Juvenile Salmonids Through Snake and Columbia River Dams and Reservoirs	NOAA	Yes	<b>37</b>
<a href="#">200304100</a>	Evaluate Delayed (Extra) Mortality Associated with Passage of Yearling Chinook Salmon through Snake River Dams	NOAA	Yes	<b>39</b>
<a href="#">201007600</a>	Characterizing migration and survival for juvenile Snake River sockeye salmon between the upper Salmon River basin and Lower Granite Dam	IDFG, NOAA	In Part	<b>40</b>
<a href="#">199602100</a>	Gas Bubble Disease Monitoring	US Geological Survey (USGS)	Yes	<b>42</b>
<a href="#">199102800</a>	Pit Tagging Wild Chinook	NOAA	Yes (Qualified)	<b>42</b>
<a href="#">198910700</a>	Statistical Support For Salmonid Survival Studies	University of Washington	Yes	<b>44</b>
<a href="#">199105100</a>	Modeling and Evaluation Statistical Support for Life-Cycle Studies	University of Washington	Yes	<b>45</b>
<a href="#">200851800</a>	Upstream Migration Timing	CRITFC	Yes (Qualified)	<b>46</b>
<a href="#">200890800</a>	FCRPS Water Studies & Passage of Adult Salmon & Steelhead	Colville Confederated Tribes	Not Applicable	<b>47</b>

<b>ID</b>	<b>Title</b>	<b>Proponent</b>	<b>Meets scientific criteria?</b>	<b>Page</b>
<a href="#">199900301</a>	Evaluate Spawning of Fall Chinook and Chum Salmon Just Below the Four Lowermost Mainstem Dams	Pacific Northwest National Laboratory (PNNL), PSMFC, WDFW	Yes (Qualified)	<b>47</b>
<a href="#">199102900</a>	Research, monitoring, and evaluation of emerging issues and measures to recover the Snake River fall Chinook salmon ESU	USFWS, USGS	Yes	<b>50</b>
<a href="#">200203200</a>	Snake River Fall Chinook Salmon Life History Investigations	NOAA, PNNL, University of Idaho, USFWS, USGS	Yes	<b>52</b>
<a href="#">198201301</a>	Coded Wire Tag-Pacific States Marine Fisheries Commission (PSMFC)	PSMFC	Yes	<b>56</b>
<a href="#">198201302</a>	Coded Wire Tag-Oregon Department of Fish and Wildlife (ODFW)	ODFW	Yes	<b>59</b>
<a href="#">198201303</a>	Coded Wire Tag-US Fish and Wildlife Service (USFWS)	USFWS	Yes (Qualified)	<b>62</b>
<a href="#">198201304</a>	Coded Wire Tag-Washington Department of Fish and Wildlife (WDFW)	WDFW	Yes (Qualified)	<b>66</b>
<a href="#">200739000</a>	Tribal Conservation Enforcement- Confederated Tribe of Umatilla Indian Reservation (CTUIR)	Umatilla Confederated Tribes (CTUIR)	Yes (Qualified)	<b>70</b>
<a href="#">200739100</a>	Tribal Conservation Enforcement-Columbia River Inter-tribal Fish Commission (CRITFC)	CRITFC	Yes	<b>73</b>
<a href="#">200810600</a>	Tribal Conservation Enforcement-Colville Tribe	Colville Confederated Tribes	Yes (Qualified)	<b>75</b>
<a href="#">200206000</a>	Nez Perce Harvest Monitoring on Snake and Clearwater Rivers	Nez Perce Tribe	Yes (Qualified)	<b>78</b>
<a href="#">200810500</a>	Selective Gear Deployment	Colville Confederated Tribes	Yes (Qualified)	<b>82</b>
<a href="#">199702400</a>	Avian Predation on Juvenile Salmonids	Oregon State University, Real Time Research	Yes	<b>85</b>
<a href="#">199007700</a>	Development of Systemwide Predator Control	ODFW, PSMFC, WDFW	Yes (Qualified)	<b>88</b>
<a href="#">200727500</a>	Impact of American Shad in the Columbia River	USGS	Yes (Qualified)	<b>91</b>
<a href="#">199402600</a>	Pacific Lamprey Research and Restoration Project	Umatilla Confederated Tribes, NOAA	Yes (Qualified)	<b>95</b>
<a href="#">200201600</a>	Evaluate the Status of Pacific Lamprey in the Lower Deschutes River	Confederated Tribes of Warm Springs	Yes (Qualified)	<b>102</b>
<a href="#">198605000</a>	White Sturgeon Mitigation and Restoration in the Lower Columbia and Snake Rivers	ODFW	Yes (Qualified)	<b>109</b>
<a href="#">200301700</a>	Integrated Status and Effectiveness Monitoring Program (ISEMP)	NOAA, Eco Logical Research, Environmental Data Services, Quantitative Consultants Inc, Terraqua, Inc., Volk Consulting	Yes (Qualified)	<b>115</b>
<a href="#">201008200</a>	PNAMP Integrated Status and Trends Monitoring (ISTM) Demonstration Project	ODFW, OSU, USGS, WDFW, Bioanalysts, Inc., Lower Columbia Fish Recovery Board, Washington Department of Ecology	Yes	<b>119</b>
<a href="#">199801900</a>	Wind River Watershed	NOAA, Underwood Conservation District (UCD), US Forest Service (USFS), USGS, WDFW	Yes	<b>122</b>
<a href="#">199603501</a>	Yakama Reservation Watershed Project	Yakama Confederated Tribes	Yes (Qualified)	<b>126</b>
<a href="#">200205300</a>	Asotin Creek Salmon Population Assessment	WDFW	Yes	<b>130</b>

<b>ID</b>	<b>Title</b>	<b>Proponent</b>	<b>Meets scientific criteria?</b>	<b>Page</b>
<a href="#">200206800</a>	Implementation of the Columbia Habitat Monitoring Program in Lolo Creek, SF Clearwater, Lochsa, and Imnaha Rivers - NPT DFRM Watershed Division	Nez Perce Tribe	No	<b>133</b>
<a href="#">200302200</a>	Okanogan Basin Monitoring & Evaluation Program (OBMEP)	Colville Confederated Tribes	Yes (Qualified)	<b>136</b>
<a href="#">201007500</a>	Upper Columbia Implementation and Action Effectiveness Monitoring	Upper Columbia Salmon Recovery Board	Yes	<b>140</b>
<a href="#">201005100</a>	Upper Columbia Water Quality and Water Quantity Gauges	Upper Columbia Salmon Recovery Board	Yes (Qualified)	<b>144</b>
<a href="#">200725200</a>	Multiscale Hyporheic Exchange	Umatilla Confederated Tribes	Yes (Qualified)	<b>148</b>
<a href="#">200201301</a>	Water Entity - Water Transaction Program	National Fish and Wildlife Foundation	Yes (Qualified)	<b>153</b>
<a href="#">200733200</a>	Mitigation of Marine-Derived Nutrient Loss in Central Idaho	IDFG, Idaho State University, University of Idaho, Washington State University	Yes	<b>161</b>
<a href="#">198909600</a>	Genetic Monitoring and Evaluation (M&E) Program for Salmon and Steelhead	NOAA	Yes (Qualified)	<b>166</b>
<a href="#">200203000</a>	Salmonid Progeny Markers	Umatilla Confederated Tribes	Yes	<b>170</b>
<a href="#">200303900</a>	Monitoring the reproductive success of naturally spawning hatchery and natural spring Chinook salmon in the Wenatchee River	WDFW, NOAA	Yes	<b>172</b>
<a href="#">200305000</a>	Evaluate the Reproductive Success of Wild and Hatchery Steelhead in Natural and Hatchery Environments	University of Washington	Yes	<b>175</b>
<a href="#">200305400</a>	Evaluate the Relative Reproductive Success of Hatchery-Origin and Wild-Origin Steelhead Spawning Naturally in the Hood River	Oregon State University	Yes	<b>176</b>
<a href="#">200306300</a>	Natural Reproductive Success and Demographic Effects of Hatchery-Origin Steelhead in Abernathy Creek, Washington	USFWS	Yes	<b>178</b>
<a href="#">200729900</a>	Investigation of Relative Reproductive Success of Stray Hatchery & Wild Steelhead & Influence of Hatchery Strays on Productivity in the Deschutes	ODFW	Yes (Qualified)	<b>182</b>
<a href="#">201008500</a>	Columbia River Hatchery Effects Evaluation Team (CRHEET)	Bonneville Power Administration, NOAA	Yes	<b>185</b>
<a href="#">199703800</a>	Listed Stock Chinook Salmon Gamete Preservation	Nez Perce Tribe	Yes (Qualified)	<b>186</b>
<a href="#">200203100</a>	Growth Modulation in Salmon Supplementation	NOAA, University of Washington	Yes	<b>188</b>
<a href="#">200740200</a>	Snake River Sockeye Captive Propagation	IDFG, NOAA, Shoshone-Bannock Tribes	Yes	<b>189</b>
<a href="#">200740100</a>	Kelt Reconditioning and Reproductive Success Evaluation Research	CRITFC	No	<b>193</b>
<a href="#">199306000</a>	Select Area Fisheries Enhancement	ODFW, Clatsop County Fisheries, WDFW	Yes	<b>196</b>
<a href="#">200715600</a>	Rock Creek Fish and Habitat Assessment	Yakama Confederated Tribes	No	<b>200</b>
<a href="#">200852700</a>	John Day Reprogramming & Construction	CRITFC	Not Applicable	<b>202</b>
<a href="#">198343500</a>	Umatilla Hatchery Satellite Facilities Operations and Maintenance (O&M)	Umatilla Confederated Tribes	Yes	<b>203</b>
<a href="#">198903500</a>	Umatilla Hatchery Operations and Maintenance (O&M)	ODFW	Yes (Qualified)	<b>205</b>

<b>ID</b>	<b>Title</b>	<b>Proponent</b>	<b>Meets scientific criteria?</b>	<b>Page</b>
<a href="#">199000500</a>	Umatilla Hatchery Monitoring and Evaluation (M&E)	ODFW	Yes	<b>207</b>
<a href="#">199000501</a>	Umatilla Basin Natural Production Monitoring and Evaluation (M&E)	Umatilla Confederated Tribes	In Part	<b>211</b>
<a href="#">198902401</a>	Umatilla Juvenile Salmonid Outmigration and Survival	ODFW	Yes	<b>214</b>
<a href="#">200820300</a>	Assess Reintroduction of Steelhead in Butter, Mc Kay & Willow Creeks	Umatilla Confederated Tribes	In Part (Qualified)	<b>218</b>
<a href="#">200820400</a>	Assess Reintroduction of Anadromous Fish in Burnt, Powder & Malheur Rivers	Umatilla Confederated Tribes	In Part (Qualified)	<b>222</b>
<a href="#">200901400</a>	Bio monitoring of Fish Habitat Enhancement	Umatilla Confederated Tribes	Yes (Qualified)	<b>227</b>
<a href="#">200003900</a>	Walla Walla River Basin Monitoring and Evaluation (M&E)	Umatilla Confederated Tribes, WDFW	Yes	<b>229</b>
<a href="#">199506325</a>	Yakima River Monitoring and Evaluation- Yakima/Klickitat Fisheries Project (YKFP)	WDFW, Yakama Confederated Tribes, Oncorh Consulting	Yes (Qualified)	<b>231</b>
<a href="#">199506425</a>	Policy, Plan and Technical Support of Washington Department of Fish and Wildlife (WDFW)- Yakima/Klickitat Fisheries Project (YKFP)	WDFW	Yes (Qualified)	<b>234</b>
<a href="#">199701325</a>	Yakima River Operations and Maintenance (O&M) for Hatcheries and Acclimation Sites- Yakima/Klickitat Fisheries Project (YKFP)	Yakama Confederated Tribes	Yes (Qualified)	<b>234</b>
<a href="#">201005000</a>	Evaluation of the Tucannon River Summer Steelhead Endemic Stock Hatchery Program	WDFW	Yes (Qualified)	<b>235</b>
<a href="#">198805301</a>	Northeast Oregon Hatchery Master Plan	Nez Perce Tribe	Not Applicable	<b>238</b>
<a href="#">200713200</a>	NEOH Monitoring & Evaluation Implementation (Formerly a component of 198805301)	Nez Perce Tribe, ODFW, Umatilla Confederated Tribes	Yes	<b>238</b>
<a href="#">198805305</a>	Northeast Oregon Outplanting Facilities	ODFW	Not Applicable	<b>239</b>
<a href="#">199800704</a>	Grande Ronde Spring Chinook on Lostine/Catherine Creek/ Upper Grande Ronde Rivers	ODFW	Response requested	<b>239</b>
<a href="#">199800703</a>	Grande Ronde Supplementation O&M on Catherine Creek/Upper Grande Ronde River	Umatilla Confederated Tribes	Yes (Qualified)	<b>241</b>
<a href="#">200708300</a>	Grande Ronde Spring Chinook Salmon Supplementation Monitoring and Evaluation (M&E) on Catherine Creek/Upper Grande Ronde River	Umatilla Confederated Tribes	Yes (Qualified)	<b>243</b>
<a href="#">199202604</a>	Life History of Grande Ronde River Spring Chinook Salmon and Steelhead	ODFW	In Part (Qualified)	<b>247</b>
<a href="#">200740400</a>	Spring Chinook Captive Propagation-Oregon	NOAA, ODFW, Umatilla Confederated Tribes	Yes (Qualified)	<b>248</b>
<a href="#">199701501</a>	Imnaha River Smolt Monitoring	Nez Perce Tribe	Yes (Qualified)	<b>251</b>
<a href="#">199801004</a>	Monitor and Evaluate (M&E) Performance of Juvenile Snake River Fall Chinook Salmon from Fall Chinook Acclimation Project	Nez Perce Tribe	Yes	<b>252</b>
<a href="#">199801005</a>	Fall Chinook Acclimation Facilities on Snake/Clearwater Rivers	Nez Perce Tribe	Yes	<b>255</b>
<a href="#">198335000</a>	Nez Perce Tribal Hatchery Operations and Maintenance (O&M)	Nez Perce Tribe	Yes	<b>256</b>
<a href="#">198335003</a>	Nez Perce Tribal Hatchery Monitoring and Evaluation (M&E)	Nez Perce Tribe	Yes	<b>258</b>
<a href="#">200723300</a>	Distribution and Abundance Monitoring of <i>Oncorhynchus mykiss</i> within the Lower Clearwater	Nez Perce Tribe	Yes (Qualified)	<b>261</b>

<b>ID</b>	<b>Title</b>	<b>Proponent</b>	<b>Meets scientific criteria?</b>	<b>Page</b>
<a href="#">201005700</a>	B-run Steelhead Supplementation Monitoring Project	IDFG, Nez Perce Tribe	Yes	<b>263</b>
<a href="#">199604300</a>	Johnson Creek Artificial Propagation Enhancement	Nez Perce Tribe	Yes (Qualified)	<b>266</b>
<a href="#">200740300</a>	Spring Chinook Captive Propagation-Idaho	IDFG, NOAA	Yes	<b>272</b>
<a href="#">200890500</a>	Supplementation, Monitoring, and Evaluation Program	Shoshone-Bannock Tribes	No	<b>274</b>
<a href="#">200890600</a>	Crystal Springs Planning and Operations/Maintenance	Shoshone-Bannock Tribes	Not Applicable	<b>277</b>
<a href="#">199902000</a>	Analyze the Persistence and Spatial Dynamics of Chinook Salmon	US Forest Service (USFS)	Yes (Qualified)	<b>278</b>

# ISRP Final Recommendations and Comments on each Proposal

## *Ocean and Estuary*

### 199801400 - Ocean Survival of Salmonids

**Proponents:** National Oceanic and Atmospheric Administration (NOAA)

**Short description:** A study to evaluate the role of changing ocean conditions on growth and survival of juvenile salmon from the Columbia River basin as they enter the Columbia River plume and PNW coastal habitats. Adult returns vary dramatically (over 10 fold) as a result of that changing (good or bad) ocean conditions that juveniles' experience. Evaluating the benefit of restoration efforts in the Columbia River to restore endangered salmon populations needs to consider ocean conditions as a contributing factor to recovery.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

Qualification: A synthesis of this project, as proposed by the proponents, should be completed and reviewed by the ISRP in 2011.

This is a productive and worthwhile project that has made significant contributions to understanding relationships between Chinook and coho salmon survival and ocean and plume conditions. The ISRP commends the proposed new research on abundance, distribution, timing and migration of smolts through the estuary. Another important new feature of the project is the proposed analysis of factors affecting sockeye, chum, and steelhead. However, the proposal was not clear on the extent to which data on these species were collected in previous years but not analyzed or reported. Rapid gains in knowledge could be accomplished if previous data on these species were collected, although the ISRP recognizes that these species may not be abundant in coastal research trawl samples. An important outcome of the project has been a qualitative method for forecasting salmon runs that appears to be an improvement over past methods. It is refreshing to see a project that directly addresses management concerns. The ISRP strongly concurs with the proponents that a major synthesis of this work should be completed in 2011.

Some important issues to be considered during the contracting process and in the synthesis are listed below:

1. Strategic plan. The ISRP recommends the use of synthesis results to develop a strategic plan that prioritizes project hypotheses and management objectives. The current approach is exploratory and observational, including numerous hypotheses and investigations of trails of evidence dealing with limiting factors ranging from lipids to parasites to bird predation. When arguing for an observational rather than experimental approach, the proponents state that each year/sampling season can be considered an "independent observation." It seems unlikely that the quantitative values of physical and biological variables are independent between years, that is,

there is no between-year autocorrelation. The proponents need to justify this assertion or adjust for it in their statistical analyses, as described in the synthesis objective. The strategic plan should explain in greater detail how interaction issues arising from studying four elements (bottom-up, top-down, food-web, and plume structure) at the same time will be addressed.

2. Achievable objectives. Consider whether stated objectives are achievable. For example, can the objective (discussed in proposal's introduction) to determine decadal-scale cycles in ocean productivity be achieved? If so, when will the periodic wave length in cycles be known? If changes are periodic events without a fixed wave length or chaotic events, then how will this objective be achieved?

3. Fishing operation effects. Consider important sources of variation in research trawl and other fishing operations and fishing efficiency with respect to what is known about diel, horizontal, vertical, and seasonal distribution of juvenile salmon that might affect time-series observational data on species composition, abundance, distribution, growth, etc., of juvenile salmon in the survey area.

4. Cruise planning and coordination. The ISRP recommends that the proponents provide annual cruise plans to other related projects. The plans should include sufficient detail on how cruises in the plume, estuary, and ocean will be organized and coordinated with these other projects. For example, the current proposal lacks details on how far upstream the estuary sampling will occur. It seems the sampling will occur only in the lower reaches, and this may not be sufficient to tie in with other work, e.g., POST tagging at Sand Island, LCREP work in the marshes, etc.

5. Monitoring ocean conditions. Consider greater use of ocean monitoring data collected by other (non-BPA funded) projects for developing indices of ocean conditions, such as hydroacoustics, remote sensing, oceanographic buoys and floats, and robotic vehicles. The ISRP recommends improved coordination and collaboration with other projects and programs collecting these data.

6. Hatchery vs. wild salmon. Consider a detailed comparison of differences in condition, growth, and survival between hatchery and wild salmon of each species. The Endangered Species Act protects many salmon and steelhead ESUs in the Columbia Basin, yet this study does not address hatchery versus wild salmon issues. Hatchery salmon are released at a large size and have high lipid content, therefore hatchery fish may respond differently to environmental factors compared with wild salmon. In earlier years, many hatchery salmon were not marked and could not be readily identified. However, in recent years, including 2010, nearly all hatchery Chinook and coho salmon and steelhead, with the exception of some tribal and conservation hatchery fish, will receive an adipose fin clip. Relatively small numbers of hatchery Chinook raised in conservation hatcheries will not be marked. The ISRP recommends a detailed comparison of hatchery versus wild salmon of each species.

7. Genetic stock identification. The ISRP recommends standardization of genetic stock identification methods used by BPA-funded estuary and ocean survival projects so that results

are directly comparable among projects. Different projects may currently be using different methods, but this was not clearly explained in the proposal.

8. Otolith microchemistry. The ISRP considers the value of otolith microchemistry research uncertain. The proponents need to consider specifically how this method can provide new information without extensive baseline data collection. The validity of the proposed use of genetic methods to identify stock origin of individual fish sampled for otoliths needs to be demonstrated. Use of daily otolith increments to estimate estuary and plume residence times is also uncertain. For example, project results to date have estimated that yearling Chinook salmon spend several months in the estuary/plume, which is contrary to evidence from trawl survey and tagging research. Hatchery fish are known to have high Sr/Ca ratios because of their feed. Is this another factor that will confound the proposed microchemistry work? Also the Sr/Ca transition cannot distinguish between estuary and plume habitats, an issue that was not clearly described in the proposal. A useful reference is: Elsdon, T.S. and 9 others. 2008. Otolith chemistry to describe movements and life-history parameters of fishes: hypotheses, assumptions, limitations and inferences. *Oceanography and Marine Biology: An Annual Review*, 2008, 46, 297-330.

9. Avian predation and alternative prey. The ISRP recommends that the effects of Caspian terns be considered in proposed research on avian predation and alternative prey (anchovy). In the estuary, Caspian tern predation is known to be related to river flows and the Pacific Decadal Oscillation. Proponents need to demonstrate collaboration with other avian predation studies.

10. Tag recovery. In addition to collection of coded-wire tags (CWT), all salmon and steelhead sampled during fishing and tagging operations should be examined for recovery of PIT tags and acoustic tags, if this is not already being done. The ISRP recommends using a handheld wand detector, V-Detector, or tunnel detector onboard the survey vessels to examine all salmon and steelhead in survey catches for CWTs, as some Columbia River hatcheries release coded-wire tagged fish that do not have an adipose fin clip.

11. Tagging effects. New proposed research involves acoustic tagging of juvenile Chinook salmon smolts in the Columbia River estuary with VEMCO and JSATS tags and tracking them as they cross several acoustic listening-lines and with mobile units in the estuary to estimate site-specific survival during outmigration. An evaluation of the effects of tagging stress on fish that are smolting is needed, as stress may be considerable and could affect behavior and survival of tagged fish. Although the proponents think survival will be high because of positive test results in 2010, up-estuary release above the receivers at Astoria and Sand Island may be an added stress to smolts that could be evaluated.

12. Collaboration. This project is collaborating with the CDFO Salmon Shelf Survival Study (#200300900) and the Pacific Ocean Survey Tracking (#200311400, POST, re-named COAST) studies. The ISRP appreciates recent improvements in coordination with these projects. Linkages between these and others studies (e.g., JSATS tagging research) in the estuary, plume, and ocean are established, but the degree of coordination needs further explanation and development. For example, the approaches by NOAA and CDFO are somewhat similar, and integration of data

collection and analyses to a greater extent would strengthen results. Likewise, the proponents should consider how data from the NOAA, COAST, and JSATS tagging projects can be integrated to provide a more comprehensive analysis of factors affecting salmon survival.

13. Scientific workshop. The ISRP recommends a scientific workshop in 2011 focused on estimation of estuarine and ocean survival, forecasting of adult returns, and adaptive estuary, plume, and ocean environmental assessment for Columbia River Basin salmon and steelhead. Perhaps the proposal should include this workshop. A workshop would help to improve coordination and collaboration, standardization of methods (e.g., genetic stock identification), development of simulation and predictive models, and integration of results among Columbia River Basin estuary and ocean projects. One aspect of all projects that needs work is how to include more detail on sub-stock structure, including hatchery versus wild fish, hatchery release time, area comparisons, in-river migration and associated ocean migration, and more in the models. CDFO and NOAA seem to be taking somewhat different approaches to salmon forecasting, i.e., stoplight charts (red, yellow, and green) with a Bayesian belief network approach by CDFO versus ecosystem indicators by NOAA. Can this be reconciled?

14. Adaptive management. Consider how to better implement adaptive management to forecasted changes in ocean survival in the Columbia River system. Consider experiments designed in concert with hatchery, hydrosystem, and harvest managers to test specific hypotheses related to estuarine and early ocean survival. Proponents have indicated that management could respond to release timing and barging vs. in-river releases based on predictions from their 16 indicators and timing of upwelling, but what do managers say about the feasibility? How can managers respond to pathogen problems identified during this project? Or is this strictly an explanatory variable?

15. Sources of variation in forecasts. Consider whether ocean survival forecasts could be improved by integration of additional sources of variation in freshwater and ocean survival (e.g., ocean harvests of immatures, jacks, and adults in Alaska and Canada; bycatch in commercial groundfish fisheries; and climate and ocean conditions in offshore rearing areas)?

16. Quantitative forecasts. Qualitative methods of forecasting are helpful, but difficult for managers to apply and rely upon. That being said, proponents need to exercise caution in promoting the idea that their monitoring data will eventually lead to reliable, quantitative forecasts of ocean survival of salmon. Clearly, it is a goal of their agency to provide scientific forecasting tools to improve fishery management, but to date all quantitative ocean forecasting tools for salmon have failed, and thus expensive, long-term research vessel monitoring surveys are necessary.

17. Communicating results. Consider developing more effective approaches for communicating project results and forecasts of ocean survival of salmon directly to hatchery, hydrosystem, and harvest managers. The websites, scientific meetings, and peer-reviewed scientific publication are excellent methods for communicating with other scientists, government agencies, educational

institutions, and conservation organizations, but are likely not effective tools for communicating directly with hydro, harvest, and hatchery managers.

18. Online proposal. Consider improvements to the online proposal form. Descriptions of methods in the online proposal were overly brief for some reviewers. Methods should provide sufficient stand-alone detail in the online form to enable evaluation of scientific and technical merit. The proposal could be improved if methods and metrics were explicitly stated for each objective. This is a complex proposal with six general objectives, both broad and narrow hypotheses, and “Studies” that provide metrics and methods that are intended to address multiple objectives, but the association between each specific objective and the metrics and methods that are intended to address it are unclear. For example, Study One provides methods and metrics that the proponents indicate address objectives one through six, but it is not entirely clear what methods and metrics presented in Study One address which of the six general objectives. The discussion of results in the online form would benefit from an ecosystem diagram depicting important physical and biological variables and their known or hypothesized interactions (perhaps indicated by arrows between variables). Such a diagram would provide a synopsis of the proponent’s current view of the system and how it might work, and would be beneficial in understanding the proposal. More complete details are needed on sampling methodology and analyses, along with a format that reduces the redundancies. Information on the percent of salaries for the PIs and what outside support they have would also help.

### 200300900 - Salmon Shelf Survival Study

**Proponents:** Canada Department of Fisheries and Oceans

**Short description:** The Salmon Shelf Survival Study is an ongoing research and monitoring program jointly funded by CDFO and BPA aimed at understand the factors limiting the production of Columbia River salmon in the ocean environment, a key gap identified in the 2009 Fish and Wildlife Program. This research provides baseline data that can assist managers to discern climatic and oceanographic factors from the effects of habitat restoration, hatchery releases, hydrosystem operation, and harvest regulation.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

This project provides an important link to NOAA project #199801400 (Ocean Survival of Salmonids) for coastwide investigations of survival of northward-migrating Columbia River salmon distributed over the continental shelf off British Columbia and Southeast Alaska. The results benefit Columbia River salmon by potentially enabling managers to understand mechanisms of ocean survival and adaptively manage for changes in ocean conditions. The working hypothesis of this project is that “marine survival of salmon is mediated by the effects of ocean conditions on salmon growth during their first year at sea.” Overall, the project has made good progress on evaluating factors that affect early ocean growth and survival of Columbia River salmon. The ISRP believes it is highly important to keep building on the existing time series of data. The investigators continue to examine new ideas that develop

through analyses of existing data. This project examines all species and races of salmon, and it is apparent that hatchery and wild fish are identified when possible. A major accomplishment of ongoing research is the identification of a potential growth/survival bottleneck (in some years) for juvenile Columbia River salmon related to ocean conditions off the west Coast of Vancouver Island. Another important result is the observation that the majority of Columbia River fish caught off British Columbia during summer are of hatchery origin. During the last three to four years the proportion of hatchery fish relative to wild fish has decreased despite fairly stable releases, which may indicate increased production of wild Columbia River salmon. Although the ISRP is not requesting a response to this proposal, we have one major qualification.

Qualification: Address the issues listed below during the contracting process and in the project's 2011 annual report, which will be reviewed by ISRP.

1. Strategic Plan. As noted by the ISRP in previous reviews, the project would benefit from a strategic plan that prioritizes objectives in the event that only partial funding is available for this project.

2. Linkages between CDFO and NOAA Sampling. The linkages between CDFO sampling off British Columbia and Alaska relative to NOAA sampling off Washington and Oregon need to be clarified. Can one project proceed without the other or are the two sampling programs interlinked so tightly that incomplete understanding would result if one project did not go ahead? The proponents state, "In addition, CDFO and NOAA Fisheries are planning to extend the CDFO winter survey to the Washington and Oregon coasts to provide additional information on the distribution of Columbia River salmon and to describe the biophysical environment they encounter in these waters during winter. This area has never been sampled for juvenile salmon at that time of the year due to inclement weather." However, this survey is not described as an objective, and the CDFO work is only to "complement" NOAA work. Presumably similar methods will be used in both CDFO and NOAA surveys, but this needs further explanation. Does NOAA now have a vessel that can handle heavier weather or is there some other reason why the winter survey is now feasible? Have the data from CDFO winter surveys been used to evaluate the winter starvation hypothesis (Beamish and Mahnken 2001)? NOAA is now proposing to look at sockeye salmon (assuming they have a few fish in their samples). Sockeye is a specific species that the two projects need to collaborate on since Columbia sockeye increased during a period when Fraser River sockeye collapsed (the 2005 & 2007 Fraser smolt years produced very low adult returns compared to what was expected from the long-term Ricker relationships).

3. Interannual Variations in Salmon Distribution. The proponents state, "This project will be successful if interannual variations in the marine distribution of Columbia River salmon are detected." Proponents should keep in mind that even if interannual variations are detected and significant, we need to know about the mechanisms that determine the variations and how much they vary in time and space. How many years will it take before success can be determined or will this go on forever? The proponents need to consider important sources of variation in research trawl fishing operations and fishing efficiency with respect to what is known about diel,

horizontal, vertical, and seasonal distribution juvenile salmon. How might these sources of variation affect time-series observational data on species composition, abundance, distribution, growth, etc., of juvenile salmon in the survey area?

4. Invasive Species (Objective 3). No details were provided in Objective 3 of the proposal, although section 3.4 of the Major Accomplishments section mentions Humboldt squid. What invasive species will be investigated? How will this information be used? Pacific whiting migrations and potential predation could be integrated with estimates to the south. Nothing is mentioned in the proposal about forage fish as a buffer to smolt predation, although the proponents note that a subset of the pelagic forage fish caught in the trawl is sampled. The ISRP encourages proponents to assess the availability, size, and abundances of forage and predatory fishes and squids in their trawl survey catches.

5. Coordination with Other Projects. This project benefits greatly from in-kind match support from CDFO, which funds two of the three project surveys each year. The effort includes analysis of stocks from other regions, and this provides for interesting comparisons with Columbia River salmon. The project also has shared information with NOAA's Ocean Survival of Salmonids Project. Still, it would be good for the BPA-funded CDFO, NOAA, and Kintama investigators to coordinate and integrate their efforts and their findings to a greater extent than shown in the proposals. Also, consider greater use of ocean monitoring data collected by other (non-BPA funded) projects for developing indices of ocean conditions, such as hydroacoustics, remote sensing, oceanographic buoys and floats, and robotic vehicles. The ISRP recommends improved coordination and collaboration with other projects and programs collecting these data.

6. Genetic stock identification. The ISRP recommends standardization of genetic stock identification methods used by BPA-funded ocean survival projects so that results are directly comparable among projects. Different projects may currently be using different methods but this was not clearly explained in the proposal.

7. Tag recovery and reporting. In addition to collection of coded-wire tags and PIT tags, all salmon and steelhead sampled during fishing operations should be examined for recovery of acoustic tags, if this is not already being done (no mention of this in the proposal). The ISRP recommends using a handheld wand detector, V-Detector, or tunnel detector onboard the survey vessels to examine all salmon and steelhead in survey catches for coded-wire tags (CWTs), as some Columbia River hatcheries release CWT fish that do not have an adipose fin clip. Apparently, data on CWT recoveries collected by this project have not been reported to the Pacific States Marine Fisheries Commission's (PSMFC) RMIS database since 2005. Are PIT tag recovery data reported in the PSMFC's PTAGIS database? The ISRP strongly recommends that reporting of recovered CWTs and PIT tags to the PSMFC's RMIS and PTAGIS databases should be done on an annual basis.

8. Forecast models. The proponents state, "With more than a decade of observations on the ocean conditions experienced by juvenile salmon on the west coast of BC, this CDFO-BPA study has started to develop simple forecasting models for the marine survival of Columbia River salmon

1-2 years prior to the return of adult salmon to their natal river.” However no elaborations of these models are provided - can this be done? Can confidence intervals be placed on the qualitative information in the red-yellow-green traffic-light charts or some kind of probabilistic statistic? The proponents state, “Given that the C:N ratio is an indicator of lipids, and that prey size and lipid contents generally increase with trophic position in aquatic food webs (Rasmussen et al. 1990), salmon growth should also be positively correlated to the C:N ratio in plankton, their trophic position, and plankton biomass.” Has this hypothesis been tested before? Why not correlate growth, boreal copepods, C/N of plankton with SARs of Chinook (as with Oregon Production Index Hatchery survival) rather than numbers returning? Consider whether ocean survival forecasts could be improved by integration of additional sources of variation in freshwater and ocean survival (e.g., ocean harvests of immatures, jacks, and adults in Alaska and Canada, bycatch in commercial groundfish fisheries, climate and ocean conditions in offshore rearing areas)? Are anoxic conditions considered in forecast models?

9. In-river versus ocean survival. In the proposal, the proponents state, “Finally, the in-river survival of salmon smolts is similar in large rivers with and without dams (Welch et al. 2008).” Is this a defensible generalization? For example, several organizations have said there were too few years in the Welch et al. study to reach this conclusion. This leads to the larger issue of whether proponents can deliver accurate quantitative forecasts of Columbia River salmon survival and adult returns without also considering in-river effects.

10. Scientific workshop. ISRP recommends a scientific workshop in 2011 focused on estimation of estuarine and ocean survival, forecasting of adult returns, and adaptive estuary, plume, and ocean environmental assessment for Columbia River Basin salmon and steelhead. Perhaps the proposal should include this workshop. A workshop would help to improve coordination and collaboration, standardization of methods (e.g., genetic stock identification), development of simulation and predictive models, and integration of results among Columbia River Basin estuary/ocean projects. One aspect of all projects that needs work is how to include more detail on sub-stock structure, including hatchery versus wild fish, hatchery release time, area comparisons, in-river migration and associated ocean migration, and more in the models. CDFO and NOAA seem to be taking somewhat different approaches to salmon forecasting, i.e., stoplight charts (red, yellow, and green) with a Bayesian belief network approach by CDFO versus ecosystem indicators by NOAA. Can this be reconciled?

11. Adaptive Management. Project proponents might be overselling their ability to provide quantitative estimates of ocean conditions to help forecast runs. A case in point seems to be CDFO’s recent failure to forecast near record returns of Fraser River sockeye salmon in 2010. A project focus directed toward use of information on ocean conditions for adaptive management of Columbia River hatchery operations, hydrosystem operations, and habitat restoration might be more appropriate.

12. Communicating results. Consider developing more effective approaches for communicating project results and forecasts of ocean survival of salmon directly to Columbia River Basin hatchery, hydrosystem, and harvest managers. The websites, scientific meetings, and peer-

reviewed scientific publication are excellent methods for communicating with other scientists, government agencies, educational institutions, and conservation organizations, but are likely not effective tools for communicating directly with hydro, harvest, and hatchery managers.

13. Update Online Proposal Format. The format of this proposal was confusing and difficult to follow. Proponents should reformat their online proposal to better conform to the specific information requested in each section of the online form. The repetition of the same deliverables under several objectives seems unnecessarily repetitive. Objectives providing the same deliverables could be combined into one objective. Specific objectives need to be clearly stated as desired outcomes in the proponent's section 2.0 of the problem statement, instead of describing the methodological approaches. These should correspond to objectives in the objectives and deliverables part of the proposal form. At present, objectives are not stated as desired outcomes, for example, Objective 1 is "Ocean Conditions," and this might be better stated as, "Assess effects of ocean conditions on Columbia River salmon survival." The problem statement section is unnecessarily long, and describes the entire proposal including methods, timelines for deliverables, etc. This section could be shorted by moving methods, etc., to other more appropriate sections of the proposal. This proposal needs to address the online tailored questions for tagging as it involves recovery of CWTs and genetic stock identification.

### 200311400 - Coastal Ocean Acoustic Salmon Tracking (COAST)

**Proponents:** Kintama Research

**Short description:** By providing direct data on smolt movements and survival in the early ocean period, this proposal addresses a number of BiOp requirements and objectives in both the F&W Program and the MERR Plan. It also extends Kintama's 2006-2010 work and results. The intent is to inform FCRPS management with detailed data about listed Chinook stocks, including patterns of migration; seasonal changes in ocean survival relative to the hydrosystem and estuary; and survival correlations with ocean indicators.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

This is one of three BPA-funded projects that address the critical uncertainty of ocean effects on survival of Columbia River salmon. The ISRP appreciates that project proponents have followed some of ISRP's past recommendations to develop approaches tailored specifically to Columbia River salmon in the estuary, plume, and ocean. Coordination with other ocean and estuary projects has improved. However, a number of past issues raised by ISRP and ISAB have not been addressed. In addition, there are new issues resulting from proposed changes in project design and methods that need to be addressed. Although the ISRP is not requesting a response at this time, we do have one major qualification.

Qualification 1: Address the issues listed below during the contracting process and in the project's 2011 annual report, which will be reviewed by the ISRP:

1. Feasibility of COAST Approach. How can the proposed objectives be achieved if the open-coast acoustic array is still being developed? Are there other approaches that would be more cost-effective for estimating life-stage specific open ocean distribution and survival of salmonids?

The proposed work could yield important new data on coastal and estuarine distribution of Columbia River Basin salmonids and endangered ESUs. However further information is requested on how the proponents view the strategic balance of this project between assessing broad “offshore” distributions (where it appears more development work is needed as mentioned below) versus detailed monitoring to estimate survival between closely spaced reaches in the estuary.

After several years of research the project is still in the process of demonstrating “proof of concept” of the effectiveness of the open coast arrays to detect tagged Columbia River and Snake River spring Chinook salmon (no other species have been evaluated). The project now recognizes some of its current limitations. For example, recent results (May 2010) showing incomplete detection histories for several jacks returning to the Columbia River in 2009 and two adults returning in 2010 have highlighted this uncertainty, together with the findings of a fairly uniform spatial distribution along the Willapa Bay sub-array to its current offshore bottom-depth limit of 250 meters. These observations affect a key assumption: 100% or consistent detection by the acoustic array. It will be important to evaluate how this issue could affect key studies involving mortality of transported versus in-river smolts.

The project claims that its methodology is the only experimental technique available for addressing these issues, including early marine survival of salmon. While the approach is innovative and more direct, other studies have used incremental scale and otolith growth to examine size- and life-stage dependent mortality during specific periods at sea.

Estimation of survival at sea is important for separating freshwater versus marine-related factors of survival. Smolt counts and coded-wire tags (CWT) have been traditionally used to estimate survival at sea. This project provides an estimate of mortality for yearling Chinook salmon smolts specific to each phase of early marine life, instead of release to recovery survival (CWT estimates). But results to date seem to show an exponential decline in survival with distance from the river, as expected. This seems to be the primary unique quality of this study of interest to managers. Migration rates are also unique, though other researchers have used short-term tracking to document travel rates.

Interannual and seasonal variability in migration rates, estimated survival, etc. all need to be closely related to measured ocean conditions, either from ships or satellites. What have the proponent’s results shown so far? The proponent’s decay model of survival seems too simplistic, based on the research of others, and this needs further evaluation by the proponents.

The low reported survival at sea is not surprising given the history of low survival rates of yearling and subyearling Chinook salmon based on CWT data. Chinook salmon are well-known

to have lower ocean survival rates than other salmon species. The declining survival with distance from the Columbia is expected. For fisheries management, the key information is the evaluation of survival of in-river versus transported smolts. It would be of interest to compare results from CWT and PIT tagged salmon with those from this study and evaluate the benefit of the acoustic tag versus CWT and PIT tag for this management question because the acoustic tag approach is much more costly.

2. Strategic Plan for COAST Array Location. Does COAST have a strategic plan for COAST array location, developed in cooperation with other Columbia River projects that use or plan to use BPA-funded arrays for their projects? If not, such a plan needs to be developed.

We reiterate our suggestion in past reviews that the proponents coordinate development of the COAST acoustic array design with other projects in the Columbia River Basin and ocean, as this issue was inadequately addressed in the proponent's previous response. The proponents assume that Columbia River spring Chinook salmon migrate northward along a coastal corridor that is adequately sampled by the acoustic arrays. However, evidence exists for migratory patterns in other directions (southward, straight offshore). COAST proposes to remove the only listening line located south of the mouth of the Columbia River. The ISRP reiterates our previous recommendation that two ocean listening lines located to the south are needed to demonstrate the feasibility of this project. If COAST is to provide accurate estimates, arrays to the south of the Columbia River and additional tags to expand the proposed study to a 2-directional design are necessary. In addition, a closer examination of the location of arrays with respect to hypothesized locations of juvenile salmon survival bottlenecks is important to developing a strategic plan for potential future locations of arrays.

3. Coordination with other projects. What specific process is used by COAST to coordinate with other projects to estimate survival of Columbia River salmon?

Coordination with other projects has improved, but it could be better. The proponents promise to tie in closely with the CDFO Shelf Survival proposal (#200300900) and the NOAA Ocean Survival of Salmonids proposal (#199801400). All three projects promise a key deliverable - survival. However, the coordination appears rather loose and further information on exactly how the three projects will work together is required. The proposal presents a possibly unbalanced review of VEMCO tags relative to JSATS, and no discussion is provided in reference to McMichael et al. (2010) regarding their survival estimates. Nevertheless it is encouraging to see the increased discussions and joint work with USACE contractors and others working on survival estimates in the lower river and estuary. The ISRP recommends increased coordination with JSATs research in the estuary, since all COAST smolts are proposed to be released below Bonneville Dam. A component linking COAST to the nearshore studies and restoration work in the estuary, however, is missing. As well, the inner estuary proposals (e.g., LCREP, #200300700) should be tied in to the proposed COAST work.

4. COAST Study Design. What are the likely magnitudes of the effects of assumptions in the COAST study design on results and what are the consequences for conclusions?

The ISRP reviewed the appendix attached to the proposal with extensive documentation of the power analysis and resulting study design implications for the POST project. The development of the likelihood approach is clear and the assessment of the results via simulation is useful. The explicit statement of assumptions is particularly appreciated by the ISRP. These assumptions include:

- Survival per day is the same in the estuary, plume, and ocean
- All surviving fish travel a given segment in the same time
- Detection probabilities are the same for the groups being compared
- Observed high and low survival rates bracket rates that are likely to be observed in future
- Effect of dam passage or transport is fully expressed by one month after migrating.

The validity of these assumptions may be debated, but it is clear that they have effects on results from this analysis, although the likely magnitude of these effects is not presented nor the consequences for conclusions. Nevertheless, it appears that the study design and power analysis presents an approach for planning tagging effort and array deployment.

5. Deliverable V. Testing the Delayed Mortality Theory. Can the proponents provide stronger justification for continuation of work on this deliverable? If the work continues, are there other more cost-effective methods for achieving the objective?

The Independent Scientific Advisory Board ([ISAB 2007-1](#)) advised against continuing efforts to measure absolute latent mortality, suggesting instead that the focus should be on estimating processes such as in-river versus transport mortality that can be measured directly. Proponents acknowledge the ISAB recommendation but argue for continuation in part by citing Welch et al. (2008; (<http://www.plosbiology.org/article/info:doi/10.1371/journal.pbio.0060265>), a comparison of the un-dammed Fraser/Thompson River with the dammed Columbia. The ISAB (2007-1) concluded that determining latent mortality relative to a damless reference is not measurable. The argument in the proposal does not convince the ISRP that this ISAB conclusion warrants reconsideration.

Can acoustic tags provide a more accurate and precise estimate of differential delayed (latent) mortality than a similar study approach that used greater numbers of coded wire tagged fish (at a much lower cost)? The acoustic tags estimate survival after a few months, but CWTs measure survival to adults. Has a comparison of the two approaches been made? If research on this objective continues, it would be important to incorporate survival of hatchery versus wild fish into the analysis. Will Chinook salmon tagged by COAST below Bonneville be identified as hatchery versus wild fish? The proposal notes that wild salmon tend to have higher survival rates; therefore, the ratio may affect the survival findings. What is the expected hatchery/wild tagging ratio? It would be interesting to compare data of tagged and untagged Chinook. Also, the study might compare survival rates with those from CWT salmon. This could tell us the fraction of mortality that occurs during early versus late marine life.

6. Detection Efficiencies. The ISRP has a number of questions about tag detection efficiencies that were not addressed in the proposal. What percentages of fish are detected only once, for example, and not again? Are these deemed mortalities or did fish residualize in areas outside of the detection range of arrays? Along the arrays in the ocean, what about fish that migrate close inshore where there are no receivers? And how often are receivers down or lost? On page 22 - the detection range for V7 tags is less than 300m. The detection probability for V7 tags is about 70%. The accuracy and precision of the estimates is questionable. It seems that COAST has given up a lot by going from the V9 to the V7 tag. The depth of a proposed new array at Cape Elizabeth would extend to 500m, but is this depth beyond the detection range of the V7 tags? Are tagged fish easily detected if they are at or near the surface and the cable is in 500m deep water? What is the effect of wave action on detection of tagged fish?

7. Genetic stock identification (GSI). How many genetic stocks of juvenile spring Chinook salmon can be identified by the proposed GSI? Procedures for GSI need to be described. Proponents need to demonstrate that current techniques are capable of identifying origins of individual fish that are tagged and released. Ocean studies should advance toward designs that can also evaluate differences/similarities in survival of hatchery vs. wild fish of the same genetic stock. Is there a way to standardize genetic stock identification methods so that results of the three BPA-funded ocean projects are directly comparable (different labs are using different methods)?

8. Definition of the plume. Why is the plume defined as Sand Island to Willapa Bay? The proponents' definition of the plume (Sand Island to Willapa Bay) is very different than accepted terminology, and the proposal would be improved by an explanation as why they chose this definition. The plume is usually described as outside the Columbia River bar, and the plume disperses both to the north along the Washington coastline and to the south along the Oregon coastline. See for example:

Fielder, P.C., and R.M. Laurs. 1990. Variability of the Columbia River plume observed in visible and infrared satellite imagery. *Int. J. Remote Sens.* 11, 999-1010.

*Hickey, B., S. Geir, N. Kachel, and A. MacFadyen. 2005. A bi-directional river plume: the Columbia in summer. Cont. Shelf Res. 25:1631-1635. [Added after preliminary review.]*

9. Alternatives to Fixed Arrays. Are there other more innovative techniques than fixed acoustic arrays that could be employed in the future to track open coast and ocean distribution, migration patterns, and survival of Columbia River spring Chinook? For example, what about the use of robotic vehicles to measure ocean conditions and track tagged salmon to extend coverage beyond the detection range of fixed listening lines on the continental shelf/slope?

10. Scientific workshop. The ISRP recommends a scientific workshop in 2011 focused on estimation of estuarine and ocean survival, forecasting of adult returns, and adaptive estuary, plume, and ocean environmental assessment for Columbia River Basin salmon and steelhead. Perhaps the proposal should include this workshop. A workshop would help to improve

coordination and collaboration, standardization of methods (e.g., genetic stock identification), development of simulation and predictive models, and integration of results among Columbia River Basin estuary/ocean projects. One aspect of all projects that needs work is how to include more detail on sub-stock structure, including hatchery versus wild fish, hatchery release time, area comparisons, in-river migration and associated ocean migration, and more in the models.

11. Adaptive management. Are the proponents overselling their ability to use this approach to improve real-time management of spill and transport? How can adaptive management with respect to estimates of ocean survival be implemented in the Columbia River system? Is it possible that tagging experiments could be designed in concert with hatchery, hydrosystem, and harvest managers to test specific hypotheses related to estuarine and early ocean survival?

The proposal would be improved by further details on how POST results have influenced on-the-ground management decisions by fishery or hydrosystem agencies. For example, has the Welch et al. (2008) paper (“Survival of migrating salmon smolts in large rivers with and without dams”) resulted in any changes in operations of the Columbia River Basin dams? How do COAST indicators tie in with those being developed by CDFO, NOAA, and other projects in this review?

In the past several reviews, the ISRP asked, “How would the fully-implemented ocean array and long-term monitoring data on seasonal and interannual variations in survival rates or migration rates among years or stocks actually be used by managers of the Columbia River Basin hydrosystem?” The ISRP agrees with the proponents’ past response that estimates of ocean survival for tagged release groups of hatchery fish can be used to inform policy makers, fishery managers, and researchers. However, the proponents have never answered the ISRP’s question about how hydrosystem managers would actually use the data. The proponents still do not seem to recognize that ocean variability will make the concept of tracking the geography of ocean mortality and subsequent adjustment of hydropower system very difficult to manage.

The project is clearly significant to regional programs, but the proposal could be improved by attention to unrealistic objectives and expectations that implementation of acoustic tagging technology would result in improved real-time management of spill and transport. The proponents state that the latter two options could be decided upon by measurement of marine survival with their methods: “For example, if marine survival is exceptionally low, transportation and/or increased spill may not be beneficial, as smolts would reach the ocean sooner thereby exposing them to unfavorable ocean conditions (e.g., increased predation or decreased food supply), leading to lower survival.” Explain the specific processes that would be used to achieve real-time management. Do managers think this process would work?

12. Communicating Results. Can the proponents develop more effective approaches for communicating their results directly to Columbia River Basin hatchery, hydrosystem, and harvest managers? Websites, scientific meetings, and peer-review scientific publication are excellent methods for communicating with scientific peers, other government agencies, educational institutions, and conservation organizations, but are likely not effective tools for communicating directly with hydro, harvest, and hatchery managers.

13. Update Online Proposal Format. The format of this proposal was confusing and difficult to follow. Proponents should reformat their online proposal to better conform to the specific information requested in each section of the online form. The repetition of the same deliverables under several objectives seems unnecessarily repetitive. Objectives providing the same deliverables could be combined into one objective. The important information on study design that was included only as an attachment should be incorporated into the online form. The online form should present the complete proposal as a stand-alone document.

### 200300700 - Lower Columbia River Estuary Ecosystem Monitoring

**Proponents:** Lower Columbia River Estuary Partnership (LCREP)

**Short description:** This project builds on our previous projects that created and began an ecosystem based monitoring program focused on improving the survival of juvenile salmonids through the lower Columbia River and estuary. This project will comprehensively assess habitat, fish, food web, and abiotic conditions in the lower river, focusing on shallow water and vegetated habitats used extensively by juvenile salmonids for rearing and refugia, and begin tracking impacts of climate change and ocean acidification.

**ISRP final recommendation:** Meets Scientific Review Criteria - In Part (Qualified)

**Comment:**

This is a worthwhile project that promises to provide vital information necessary to recovery of estuarine habitats and improvement of estuarine survival of salmonids. However, the ISRP recommended one major qualification and concluded one particular task did not meet scientific review criteria, as follows:

Qualification: The proponents should prepare a synthesis and integration of results (as mentioned in Objective 2, Deliverable 6), detailing major conclusions after the estuarine classification system is completed and a monitoring design is fully developed, preferably at the end of 2011. Preparation of this document should involve all the partners (NOAA, PNNL, Columbia Lands Trust, and the Columbia River Estuary Study Taskforce) and should also include methods and monitoring protocols from all subcontractors. The synthesis should be reviewed by the ISRP.

In Part: Objective 1, Task 1 (g) - Does not meet review criteria

“Evaluate the historic shift in base of salmon food web from macrodetrital to microdetrital sources and terrestrial versus marine derived organic matter sources.” A version of the proposal for this subproject was requested in the 2007/2009 project solicitation (200702600-Historic Changes in Organic Nutrient Sources and Productivity Proxies in the Columbia River Estuary in Relation to Juvenile Salmon Habitat Restoration Priorities). The ISRP concluded the project did not meet review criteria primarily because of weak application of the data to management actions, and this comment is still valid.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The proposal is very significant to regional programs and describes a key project for implementation of the BiOp. The project is responsive to many regional programs/plans - 2008 BiOp (many RPAs), NOAA's recovery plan for the estuary (Estuary Module, in press), MERR, and the NPCC Research Plan (regarding the overall estuary program). However, connections to estuary-wide goals of other agencies, such as the 16,000 acre restoration goal of EPA described at the September 2009 Astoria Science-Policy meeting, are not evident.

### *2. History: Accomplishments, Results, and Adaptive Management*

The project has a list of impressive accomplishments that should contribute significantly to improving understanding of estuarine ecology and serve as a basis for estuarine restoration efforts that should benefit salmon. Specific results were sometimes lacking, but this can be expected for a project of this scope. The proponents' publication record can be improved; more documentation in the proposal is needed on results as the ISRP should not have to refer to papers and reports for results. Complete evaluation of the proposal would likely require review of partners' proposals or statements of work. Furthermore, almost all accomplishments are models or studies that are under subcontract and in various stages of completion.

A major synthesis is needed that includes major results and data analyses. The synthesis should be prepared after the estuarine classification is completed (August 2011) and a monitoring design is fully developed, preferably at the end of 2011. The synthesis should be reviewed by the ISRP.

The proponents have accurately stated their commitment to adaptive management.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The proponents work cooperatively with numerous agencies and a university. As a major coordination/umbrella project, this project is very closely linked to many different ongoing projects in the region and this is well documented in the proposal. In particular it integrates with NOAA-Fisheries' Columbia River Estuary ESA Recovery Plan Module for Salmon and Steelhead, MERR, and the Subbasin Plan.

The proponents have identified low dissolved oxygen, changing pH levels in the estuary in relation to offshore ocean processes, and climate change (increased temperature and changing precipitation patterns) as emerging factors that could affect estuarine ecosystems. The ISRP agreed these are important areas of near term or future studies.

Tracking fish via PIT tags installed by others is being done in collaboration with regional PIT tag database managers and is well coordinated. PIT tag detection in the estuary is a valuable new advance in technology.

This is clearly an RME project, but the proponents' partners seem to be doing most of the reporting and publishing of the data from the project. A critical review of the reporting by primary authors and their affiliations should be included in the recommended synthesis.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

The project has numerous important deliverables, including a classification system that will form the basis of a monitoring sampling design as well as specific projects to address estuarine habitat, food web structure, and salmon distribution and abundance.

As noted previously, the ISRP needs further details on methods and metrics to evaluate the scientific merit of this proposal. In several instances the information is given in cited documents (e.g., Roegner et al. 2008). More information is also required on document deliverables (reports, scientific papers) that give results of previous work.

### ***Mainstem Passage and Life History Studies***

#### **198331900 - Development and Evaluation of Fish-Tracking Technologies**

**Proponents:** National Oceanic and Atmospheric Administration (NOAA)

**Short description:** The project goal is to expand fish-tracking technologies by developing new technologies that help monitor fish at critical (if possible, all) life stages and locations. This goal covers developing PIT-tag systems that will collect data on migrating juvenile and adult salmonids through mainstem dams including surface-bypass systems and all life-stages transiting small streams. These are used by the RME program to assess the effectiveness of management actions for recovery of ESA-listed salmonids.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

The ISRP believes that this project has assisted in providing significant monitoring tools for listed salmonids and other stocks and species in the Columbia River Basin, and there is a continuing need for further development and evaluation of these PIT tag technologies. The project proponents have a long history of involvement that contributes to collection of valuable data and the proposed expansions of PIT tag detection systems and capabilities are welcomed. However, the ISRP has two qualifications that the project proponents need to address:

Qualification 1: The project proponents need to provide more supporting data in the proposal to back up detection efficiency test results for new systems. More detailed methods need to be provided in the proposal for each of the proposed deliverables (location maps and diagrams would help).

Qualification 2: Reporting of results and progress has been limited and the project proponents need to improve on timely release of information to a wider audience via annual reports,

published research papers, and web site postings. A timeline for completion of reports, papers, and postings should be scheduled during contracting.

The ISRP does not need to review a response on these items.

Other specific ISRP comments:

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The ubiquitous application of PIT tagging in the region explains the significance of the project to regional programs, and the proponents list the project as responding to the 2008 FCRPS BiOp (RPA 52.2, RPA 53.5, RPA 54.9, RPA 54.13, RPA 54.14, RPA 54.1, RPA 55.4, RPA 55.5, RPA 55.9, RPA 55.7, RPA 55.8), the 2010 Draft Columbia River Basin Monitoring, Evaluation, Research and Reporting Plan, the 2004 UPA, and the Fish and Wildlife Program. Instead of just a list, the proponents could improve the proposal by providing a brief explanation of how the project relates to each of these programs and plans.

The proponents have a long history of PIT tag technology development as shown by the technical background of the project. However, the proposal offers little evidence of how the technical background relates to the cutting edge of fish-tracking technologies.

The objectives of expanding PIT tag detection capabilities in the Columbia River Basin are clearly explained and supported with a list of deliverables and supporting work elements.

### *2. History: Accomplishments, Results, and Adaptive Management*

The proponents include a list of significant accomplishments including successful development of a full flow PIT tag system at McNary Dam, development and successful testing of a flat plate detector at the B2 corner collector, development of detection systems for many Columbia River Basin tributaries, and assistance with improvements in the PIT tag (e.g., the ISO tag and the new 9 mm tag). However, the proponents do not include details on these accomplishments or provide summary results but rather note that results of the project are implemented by others in the region such as project #200100300 involving installation and evaluation of PIT tag technologies. It does appear that project #198331900 helps make useful and relevant data collection possible. The proposal contains several examples of a philosophy of flexibility and advance planning when proposed technologies fail to perform adequately. This strategy is quite useful for this research and development project.

Reporting of results and progress has been limited, and the project needs to improve on timely release of information to a wider audience via annual reports, published research papers, and web site postings. A timeline for completion of reports, papers, and postings should be scheduled during contracting.

The PIT tag is central to many of the major RME projects, and management decisions are frequently based on data from those projects. However, there is no specific description(s) of how the project has adapted by developing new technologies to improve precision of detecting pit-tagged fish. Examples of this type of adaptive management could be provided.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The project directly interacts with the PITAGIS Project (#199008000) and Installation and Evaluation of Established PIT-tag Technologies (#200100300). More information is needed on how the project is coordinated with the USACE and others developing PIT tag detection systems. Is there unnecessary overlap and duplication of work?

The proponents do not believe that emerging limiting factors, such as climate change, will have a direct effect on their work, but limiting factors regarding new applications for PIT tag detector arrays are very well described. That is what this project is about.

This is an RME tagging project with a long history of mostly successful projects, which have improved the PIT tag systems, and RME data collected. However, under the study design section, the proponents state that they do not do RME. This needs clarification.

### *4. Deliverables, Work Elements, Metrics, and Methods*

The deliverables are linked effectively to the overall objective with metrics and methods clearly associated. Some standards of performance are vague such as stating that a new configuration could “potentially increase detection rates significantly.” Inclusion of informed numerical targets for performance would be useful. In addition, when such targets are mentioned, such as a precision level of plus/minus 3%, some justification or history of use of the target would be useful.

More detailed methods need to be provided for each of the proposed deliverables (location maps and diagrams would help). Metrics for evaluation of effectiveness of project deliverables need to be developed.

## 200100300 - Installation and Evaluation of Established PIT-tag Technologies

**Proponents:** Digital Angel Corporation, National Oceanic and Atmospheric Administration (NOAA), Pacific States Marine Fisheries Commission (PSMFC)

**Short description:** The main goal of Project 200100300 is to fund the installation and evaluation of new PIT-tag sites, and to evaluate changes in PIT-tag technologies (tags, transceivers, & antennas) that could impact all of the existing PIT-tag sites. Whenever a new technology such as new tag model is adopted, it has the potential to significantly impact (positively and negatively) the fish data that are collected by PIT-tag sites. Therefore, we now evaluate the new technology before it is adopted or installed.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

### **Comment:**

The ISRP believes that this project, along with companion project 198331900, has assisted in providing significant monitoring tools for listed salmonids and other stocks and species in the Columbia River Basin, and there is a continuing need for further development, testing, and evaluation of these PIT tag technologies. The project proponents have a long history of involvement that contributes to collection of valuable data, and the proposed expansions of PIT tag detection systems and capabilities are welcomed. However, the ISRP has two qualifications that the project proponents need to address:

Qualification 1: The project proponents need to provide more supporting data in the proposal to back up detection efficiency test results for new systems. The ISRP especially recommends that sample sizes for supplemental tagging should be statistically evaluated prior to initiating tagging.

Qualification 2: Reporting of results and progress has been limited, and the project proponents need to improve on timely release of information to a wider audience via annual reports, published research papers, and web site postings. A timeline for completion of reports, papers, and postings should be scheduled during contracting.

The ISRP does not need to review a response on these two items.

Other ISRP comments:

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

Adequate descriptions are provided of how this project responds to the 2008 FCRPS BiOp, the Fish and Wildlife Program, and RME planning. Since all of the projects in the mainstem RME group rely to a large extent on information gathered from PIT-tagged fish, their success are dependent on the successful implementation of this project and two other projects (companion project -198331900 and PITAGIS - 199008000) that provide the fundamental structure for the network of PIT-tag systems. The evaluations of the technologies provided by this project are

critical because they determine the accuracy and precision of the data that will be collected by future users.

The Technical Background section needs more detail regarding the designs for new installations, and the plan to use previously tagged salmonids for evaluating newly installed or adopted PIT-tag technologies is applauded. The plan to tag 300 spring Chinook salmon at Bonneville Dam to determine if this is sufficient number to give statistically meaningful results should be evaluated by a statistician before tagging is initiated.

## *2. History: Accomplishments, Results, and Adaptive Management*

In the executive summary of the proposal a brief summary of the project history is given along with a list of significant accomplishments including: (1) PIT-tag systems have been installed at almost all of the dams for both juvenile and adult salmonids, (2) development of a short 9- mm tag that performs well for its size, (3) completion of evaluations of the orifice-based PIT-tag systems that showed that because of fish behavior, detection was lower for surface oriented species (e.g., summer Chinook salmon) and subsequent evaluations demonstrated that the vertical-slot and counting-window PIT-tag systems were able to detect the surface oriented species that were not detected by the orifice-based PIT-tag systems, (4) development of the full-flow systems that now enable tagged fish to be detected when the bypass facilities are not active. These PIT tag system additions have made it possible to make more accurate SAR and reach survival estimates for different salmonid stocks.

Reporting of results and progress has been limited and the project needs to improve on timely release of information to a wider audience via annual reports, published research papers, and web site postings. A timeline for completion of reports, papers, and postings should be scheduled during contracting.

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The project directly interacts with the PTAGIS Project (#199008000) and Development and Evaluation of Fish-Tracking Technologies (#1983311900). More information is needed on how the project is coordinated with the USACE and others developing PIT tag detection systems. Is there unnecessary overlap and duplication of work?

The proponents do not believe that emerging limiting factors, such as climate change, will have a direct effect on their work, but limiting factors regarding new applications for PIT tag detector arrays are very well described. That is what this project is about.

This is an RME tagging project with a long history of mostly successful deliverables, which have improved the PIT tag systems, and RME data collected. However, under the study design section, the proponents state that they do not do RME. This needs clarification.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

The project needs to improve by submitting reports in a timely manner. Reports also need to be referenced in the accomplishments section of the proposal. The project has a fair record on deliverables, including reasonable explanations for late submissions. Reports appear to vary widely in details and quality.

More detailed methods need to be provided in the proposal for each of the proposed deliverables (location maps and diagrams would help). Metrics for evaluation of effectiveness of project deliverables need to be developed.

#### **200850600 - Smolt Monitoring Video Feasibility Project**

**Proponents:** Columbia River Inter-Tribal Fish Commission (CRITFC)

**Short description:** The goal of this project is to assess whether video technology can be used to provide useful data on the abundance, species composition, and/or condition of outmigrating juvenile salmonids at the Bonneville Dam smolt bypass. If successful, this has the potential of reducing the handling of salmon smolts, with a likely corresponding decrease in mortality, while improving the quality and quantity of data on these fish.

**ISRP final recommendation:** Does Not Meet Scientific Review Criteria

**Comment:**

This feasibility study began in 2008 and has made relatively little progress to date. At present, video quality is inadequate to meet the project's objectives. Limited results indicate that species identification and condition of smolts cannot be determined by this technique. This application seems more suited to smaller situations such as tributaries. Application at large mainstem dams is highly uncertain. The technical background in the proposal is insufficient to determine scientific merit.

#### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

This project's objectives for improved monitoring of smolt runs are consistent with the 2009 Fish and Wildlife Program objectives and the 2008 FCRPS BiOp for "monitoring to document fish condition, and adverse fish passage conditions at all dams with bypass systems." It would be highly beneficial if a system could be developed and widely applied to provide information on species-specific abundance and condition of smolts. Such a development would be useful in monitoring as well as in the evaluation of changes in passage designs and conditions at dams and other passage structures and for evaluating fish condition under different spill scenarios.

## *2. History: Accomplishments, Results, and Adaptive Management*

There have been a few minimal accomplishments since 2008, mainly some preliminary videos of fish in the fish passage channel just upstream of the separator at the juvenile fish facility. The entire project is adaptive, in that it is largely a trial and error effort to develop the methodologies for enumerating and identifying smolts to species. This is a large order to fill; its accomplishment would have many potential applications, but it is not at all certain that it is feasible. The proponents do not provide substantive evidence that it will work or is close to being successful.

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

Other than one other study evidently related to this one on Bonneville Dam, there does not seem to be very much else ongoing in this area with regard to smolts. More video work is based on adults. Based on preliminary results prepared by the proponents, there are some legitimate questions as to how effective such a system can be for smolt enumeration on a large, multi-species system such as the Columbia. This approach for species-specific abundance applications seems much more suited to smaller systems with one primary migratory species, such as some Atlantic salmon rivers. It also may have applications for fish behavior work, where individuals can be focused on and total numbers to be enumerated is not the issue.

## *4. Deliverables, Work Elements, Metrics, and Methods*

Although this is primarily a research engineering project, engineering specifications, designs, etc., were not provided. No information was provided on statistical or other metrics and methods used to analyze video data and data quality or validate project feasibility. Because of the multi-year request for this proposed study, some specific intermediate project milestones or deliverables should be clearly identified if this project is continued. For example, by a given year, it should be determined whether and under what conditions visibility is adequate for evaluating numbers, species, and condition of fish, and what specific kinds of physical conditions at the counting site (e.g., width of counting chamber, lighting, water clarity, etc.) are needed.

### **199008000 - Columbia Basin PIT Tag Information System**

**Proponents:** Pacific States Marine Fisheries Commission (PSMFC)

**Short description:** The goal of this Columbia Basin PIT Tag Information System (PTAGIS) is to operate and maintain the Columbia River Basin-wide database for PIT-tagged fish and to operate and maintain the established interrogation systems. The data collected by this system is accessible to all entities. This project is an important, prerequisite component of all PIT Tag research conducted for the Fish and Wildlife Program and functions as an objective source of regional scale fisheries data.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

This is not a research and monitoring project per se; however, the PTAGIS database managed by this project is critical to many monitoring and research programs throughout the Columbia River Basin. These data can be used to address many of the Council's management questions and high-level indicators, particularly juvenile and adult salmon survival through the hydrosystem. The data are fully described, including metadata and methodologies, are capable of being aggregated to higher scales, and are made readily available by this project to the public. The ISRP commends the project proponents for including the detailed comprehensive materials (including tables, figures, photos, schematics, etc.) used in illustrating the upgraded elaborate PIT tag systems.

With respect to determining the impact of ocean conditions on Columbia River Basin salmonids, this project could improve coordination of recovery of PIT tag data from BPA-funded ocean research projects, from Chinook salmon bycatch in marine commercial groundfish fisheries (US West Coast, Gulf of Alaska, Bering Sea/Aleutian Islands regions), and from marine commercial, tribal, and sport fisheries. The major accomplishment of this project is their high-quality management of the PTAGIS database. The project scale and resource commitment for objective (Objective 1) are appropriate. However, it is not clear that Objectives 2 and 3, which involve installation, operation, and maintenance of equipment at field locations and the potential major expansion of these objectives in the next 5 years, are necessary objectives for this particular project. For example, to improve innovation and potentially cost effectiveness, the Council and BPA might explore an open, competitive bidding process for contracting PIT tag equipment purchase, installation, and maintenance. The resources devoted to project administration, management and coordination (Objectives 4 and 5) seem high. Why are not many of these activities supported by existing PSMFC infrastructure and project overhead?

In the 2007-2009 review, the ISRP asked to see in the next proposal a more fully transparent history of fish handling. In response the proponents indicated that they developed a workshop process to coordinate different fish handling protocols. Perhaps the workshop forum is a way to resolve this issue, but the workshop proceedings and summaries should be recorded annually. The ISRP did not see any workshop documents referenced.

**199403300 - Fish Passage Center**

**Proponents:** Pacific States Marine Fisheries Commission (PSMFC), Fish Passage Center

**Short description:** The primary goal of the project is to provide technical assistance and information to fish and wildlife agencies and tribes in particular, and the public in general, on matters related to the implementation of water management, spill and fish passage measures in the program's Mainstem Plan.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

Qualification: This project should continue to undergo regular ISAB review.

This project continues to perform its basic functions and produces annual reports and specific products to address a wide range of management questions. The annual report and many of these products are reviewed separately by the ISAB. The overall benefit of the project to the activities of coordinating and mobilizing the data sets for management applications is high. However, although this project undergoes ISAB review, a project as large and significant as this one, needs a more complete proposal for the ISRP to evaluate. Having a fully detailed proposal is important as a public record for the Fish and Wildlife Program. It would be beneficial to provide more details in the proposal including a project history with significant accomplishments, a detailed technical background section, and information on metrics and methods. The proposal contains many typographic errors. Fortunately, most FPC products do not have this deficiency.

### 198712700 - Smolt Monitoring by Non-Federal Entities

**Proponents:** Columbia River Inter-Tribal Fish Commission (CRITFC), Fish Passage Center, Idaho Department of Fish and Game (IDFG), Oregon Department of Fish and Wildlife (ODFW), Pacific States Marine Fisheries Commission (PSMFC), US Fish and Wildlife Service (USFWS), Washington Department of Fish and Wildlife (WDFW)

**Short description:** The primary goal of the Smolt Monitoring Program (SMP) is to develop a consistent, continuous long term data time series of juvenile salmon, steelhead, lamprey passage characteristics through the mainstem Columbia and Snake rivers hydrosystem. Specifically the SMP provides juvenile salmon and steelhead, travel time, passage duration, survival passage distribution by species. Data are valuable for States, Federal and Tribal fishery management agencies' deliberations on fish passage mitigation.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

Qualification 1: The ISRP recommends that the project proponents incorporate the 2011 FPC/FPAC lamprey monitoring plans in their proposal, if they are available, before final contracting with BPA and the Council. Specifically, the fish condition metrics for lamprey should be better described, including any proposed use of lipid content as a metric.

Qualification 2: Justification for adequacy of sample sizes for gas bubble disease and descaling assessment should be provided during contracting.

Overall the response adequately responded to the request for additional information including a description of how this project is coordinated with the FPC and the CSS project, as well as a useful flow diagram illustrating how these projects are linked.

In future proposals, the ISRP suggests that the historical and technical background need to be better described and improvements resulting from adaptive management need to be clearly identified. The proponents are encouraged to develop protocols for evaluating the effectiveness of project deliverables.

**Preliminary comment requesting a response:**

A response is requested on the following two items:

1. The ISRP understands that this project, FPC, and CSS are all working together, but an explanation is requested. The ISRP would like to see a description and a diagram, or flow chart, illustrating how the elements are working together.
2. Lamprey were mentioned as a focal species but were not discussed. A description of the past effort and results, as well as future plans for monitoring lamprey, is requested.

This is a high priority project that is called for in the Fish and Wildlife Program. The importance of this work is clear. However, information in the proposal is lacking on the historical background of the project, including project evolution over time, lessons learned from the past, improvements in the new proposed activity, key relationships and how the project actually functions. The proponents are encouraged to develop a protocol for evaluating the effectiveness of project deliverables.

There are standard protocols for activities, but a historical vision on the work is missing. The proposal does not include adequate information concerning work elements, metrics, or methods. One must go to the Annual Reports to find sufficient information concerning the technical background, results, work elements, and methods.

The ISRP's concern is efficiency of the plan with regard to questions such as where to tag fish, how many to tag, and avoidance of redundant effort, so that the migrating fish are monitored at a level adequate to determine the effects of the hydrosystem. The basic application protocols appear sound, but the ISRP is looking for the overall vision as relates to the MERR (Skamania workshop) and PIT tag work group coordination efforts. The viewpoint may be of a service provider reacting to requests from the region, but it would be useful to hear the proponent's overall vision of how this work fits into ongoing basin programs.

The proponents are encouraged to assess the sampling effort for fish quality and gas bubble disease incidence. Are the levels of sampling for fish quality, descaling, and gas bubble trauma measures appropriate to provide an indication of the health of the run? That is, is the effort enough, too little, or too large for the purpose?

## 200500200 - Lower Granite Dam Adult Trap Operations

**Proponents:** National Oceanic and Atmospheric Administration (NOAA)

**Short description:** This project funds operation of the adult salmonid trap at Lower Granite Dam by NOAA Fisheries. NOAA Fisheries operates the adult trap in cooperation with agencies and tribes for both our own studies and those of other user groups, including IDFG, NPT, WDFW, U of I and USFWS. The goal of the project is to provide access to adult fish for broodstock collection or sampling (i.e., scales, genetic samples, lengths and weights, injuries, etc.)

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

This project has proven its value in the past, and its continuation is certainly justified. The importance of the facility continues to increase, especially with the escalation of the number and scope of upper basin PIT tag studies. The project is thoroughly, logically, and concisely explained.

*1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

This proposal is requesting continued support to run the adult collection trap at Lower Granite Dam. It is straight forward in its goals and objectives and outlines a valuable activity that should continue to provide important information on adults and brood fish for hatcheries in the process. This trapping project serves other programs. It has clear and diverse significance to them.

Project objectives are to provide information (data) and to provide broodstock to groups and agencies. From the proposal: "Collection and sampling of adult salmonids at Lower Granite Dam is an integral part of many studies. Past operation of the adult trap has been conducted primarily by NOAA Fisheries staff, in cooperation with other agencies. The demands on use of the Lower Granite Dam adult trap have increased in recent years, and are expected to increase in future years. Current uses of the adult trap include fall Chinook broodstock collection, run-reconstruction sampling, sampling of PIT-tagged fish from transportation studies to determine life history type (reservoir- or ocean-type migrant) for PIT tagged fish with known passage histories (i.e., transported, bypassed as a subyearling, bypassed as a yearling, or never detected), radio telemetry studies (both tagging and tag removal at the adult trap), PIT tagging of wild adult steelhead and wild adult Chinook to assess the efficacy of using genetic stock identification (GSI) and PIT tags to estimate the population characteristics of naturally produced steelhead and Chinook salmon, and starting in 2010, collection of sockeye salmon broodstock." The background for the project has been clearly stated.

## *2. History: Accomplishments, Results, and Adaptive Management*

The history of the activity and its accomplishments has been clearly described. The data obtained are changing management decisions at several levels. Reviewers commend project staff for their continued involvement with scientific publications. The project is clearly of value.

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

There is a clear and close working relationship between this project and a variety of other entities/projects within the region.

## *4. Deliverables, Work Elements, Metrics, and Methods*

Deliverables and metrics associated with the work plan are clearly delineated.

### **199602000 - Comparative Survival Study (CSS)**

**Proponents:** Columbia River Inter-Tribal Fish Commission (CRITFC), Fish Passage Center, Idaho Department of Fish and Game (IDFG), Oregon Department of Fish and Wildlife (ODFW), Pacific States Marine Fisheries Commission (PSMFC), US Fish and Wildlife Service (USFWS), Washington Department of Fish and Wildlife (WDFW)

**Short description:** The Comparative Survival Study is a long term Columbia River basinwide mainstem lifecycle monitoring program. The CSS reports juvenile survival and smolt to adult return (SAR) by route of passage as well as overall smolt to adult return of major population groups. Overall and route specific SARs are analyzed relative to marine and freshwater conditions.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

#### **Comment:**

Qualification: This project should continue to undergo regular ISAB review.

This project continues to perform its basic functions and produce annual reports and specific products to address a wide range of management questions. The annual report and many of these products are reviewed separately by the ISAB. The CSS estimates survival rates over the smolt-to-adult portion of the life cycle of spring and summer Chinook salmon and steelhead. The resulting data set has become increasingly valuable as data for more years has been added to address passage questions. Although this project undergoes frequent ISAB review, a more complete proposal than the one presented is necessary for a scientific evaluation by the ISRP. Having a more completely documented proposal form with scientific methodologies outlined is also important as a public record for the Fish and Wildlife Program. It would be beneficial to provide more details in the proposal including a project history with significant accomplishments, a detailed technical background section and information on metrics and

methods. The proposal contains many typographic errors. Fortunately, most CSS products do not have this deficiency.

## 199302900 - Survival Estimates for the Passage of Juvenile Salmonids through Snake and Columbia River Dams and Reservoirs

**Proponents:** National Oceanic and Atmospheric Administration (NOAA)

**Short description:** The project estimates reach survival and travel time for juvenile salmonids through Snake and Columbia River dams and reservoirs using PIT tagged fish we tag at Lower Granite Dam and fish tagged by others throughout the basin. We analyze factors that affect survival/travel time and smolt to adult return rates. Data from PIT tag trawling in the estuary enables completion of reach survival estimates to downstream of Bonneville Dam and comparison of those migrants to those released from barges.

**ISRP final recommendation:** Meets Scientific Review Criteria

### **Comment:**

The responses provided to the ISRP's five questions were complete and indicate that the project proponents have fully considered the strengths and limitations of the data generated by the project. The proponents candidly admitted that that this project is not designed to estimate some metrics, such as SARs, and does not have a sufficient number of smolts tagged to make extensive evaluations of adult returns. The precision of travel time and survival estimates is acceptable, and biases in the estimates are acknowledged, but the magnitude of potential bias due to sampling constraints was not fully addressed. The proponents acknowledge that the power of statistical tests may be less than ideal when testing for correlations between reach survivals and environmental conditions, and between reach survivals and improvements in dam bypass structures, but accumulated data from multiple years of the study will still provide insight into these questions.

The responses demonstrated that the proponents had thought in advance about the questions asked and are making a concerted effort to improve the sampling program. The sampling conducted seems adequate for the questions posed in the project.

### **Preliminary comment requesting a response:**

A response is requested to address the following questions:

1. Is the tagging level of 50-60K sufficient to obtain adequate precision for smolt travel time and survival estimates? Is the sample of tagged fish selected to ensure the estimates are accurate? If not, what is the estimated magnitude of the bias?
2. If 2-3% of smolts are detected in the estuary with PIT tag trawl, is this a source of bias? If so, what is the estimated magnitude of the bias?

3. The sampling season covers 85-90% the season when PIT tagged fish pass. Is this a source of bias? If so, what is the estimated magnitude of bias? What is known about the fish that pass earlier and later?
4. When relating annual estimates of smolt travel time and survival to migration conditions is the tagging level sufficient? Is it excessive?
5. When relating annual estimates of smolt travel time and survival with adult returns is the tagging level sufficient? Is it excessive?

This is one of the high priority projects in the Fish and Wildlife Program. It continues to provide critical survival estimates/metrics for tracking recovery and status and trends of listed salmonids. The information provided by this project is central to understanding how survival of migrating juvenile salmonids is affected by operation of the FCRPS. The conditions encountered by migrating fish in the hydropower system change over time: in recent years, new surface bypass structures have been constructed at many mainstem dams, and additional spill is now provided to assist fish passage through the dams. In addition, changing ocean conditions strongly influence smolt-to-adult return rates. Continuation of this project is well justified.

Information from this study has been used by managers in the basin to help guide structural and operational changes at Snake and Columbia River dams in order to improve smolt travel time and survival. The travel time and smolt survival data have also been used for development of NOAA's COMPASS model and continue to be used each year to evaluate COMPASS model performance and to improve the model. The proposal also addresses past concerns about possible overlap with CSS and other studies by stating that some duplication of the critical data and analyses of this and the CSS project is not necessarily bad, but can provide an error check mechanism and instill more confidence if results are consistent. Comparison of information generated by this project with JSATS and POST generated results would be useful.

It is unclear from the proposal how the performance of this project has been monitored and evaluated. Evidence should be presented in future proposals to indicate how well this project has been performing and how adaptations based on monitoring of performance have been implemented.

## 200304100 - Evaluate Delayed (Extra) Mortality Associated with Passage of Yearling Chinook Salmon through Snake River Dams

**Proponents:** National Oceanic and Atmospheric Administration (NOAA)

**Short description:** This project empirically tests the hypothesis that passing through Snake River dams causes delayed or extra mortality of smolts that is not expressed until the smolts have passed through the hydropower system until return as adults. Spring/summer Chinook smolts are collected and PIT tagged at Lower Granite Dam then trucked below Ice Harbor Dam for release (bypassing 3 of 4 Snake River Dams) or released directly into Lower Granite tailrace, with smolt-to-adult returns compared between groups.

**ISRP final recommendation:** Meets Scientific Review Criteria

### **Comment:**

The response was adequate to address ISRP questions and provided additional information. The project proponents understand and are forthcoming about the limitations of their data. The results of this project are limited in space and time, but the results could justify further studies, that together with this project, could provide a more complete understanding of potential delayed mortality. The results could bear on future decisions on dam configuration and operations. This study is responsive to the ISAB's Latent Mortality Report and past ISRP reviews.

Concerning Q5 on ocean conditions, and the number of study years needed to bracket a range of those conditions, the proponents state later on in their response that, "Seven data points should give us a good feel for what is happening to hatchery Chinook." And "If managers in the region would like to see additional years of study, or other species added, we are open to that." The ISRP suggests that the proponents consult with oceanographers to get an impression if, in fact, seven years are enough, given our present knowledge of the time scales of change in the oceans. Some even say there are cycles and, if so, to properly answer the latent mortality questions the peaks and troughs of the cycles might need to be sampled.

The desirability of extending the project to obtain more years of data, or to include additional species, can be better evaluated after three or more years of completed adult returns are available. Although, as the project proponents acknowledge, no experimental design can simulate migration through a free-flowing Snake River, the results of the study will either support the hypothesis that survival is decreased by migration through the three lower dams and reservoirs, or fail to support an effect large enough to be detected, given the power of the tests.

### **Preliminary comment requesting a response:**

A response is requested that provides:

1. evidence that sample sizes are sufficient to detect meaningful differences in SARs between the two Lower Granite release groups;

2. evidence that the assumption of lognormally distributed LG/IH ratio is tenable;
3. an assessment of the extent to which hatchery fish used in this study are representative of wild stocks;
4. more details explaining the method used to estimate the number of juveniles that survived and were detected at McNary Dam;
5. a more complete assessment of the influence of ocean conditions on results to date.

This is a very significant program that has the potential to answer some of the key questions about possible latent mortality due to dam passage. The proposal is well written. The objectives are straightforward and explained well. Accomplishments are reasonable and summarized well for each year of the project. The technical background is generally well done. The history of this project is not well described, and the proposal would benefit from more detailed information on how it developed. There is the issue of the extent to which the LG/IH ratio is analogous to the differential mortality parameter, D. Also, there is a question as to whether or not the length of time for the study will be adequate to obtain meaningful results because there are really only three years of data now rather than five years. These issues should be addressed in a response.

#### 201007600 - Characterizing migration and survival for juvenile Snake River sockeye salmon between the upper Salmon River basin and Lower Granite Dam

**Proponents:** Idaho Department of Fish and Game (IDFG), National Oceanic and Atmospheric Administration (NOAA)

**Short description:** This project estimates survival and characterizes the migration of juvenile sockeye salmon between the upper Salmon River basin in central Idaho and Lower Granite Dam on the Snake River in Washington State using multiple technologies. The approach will use PIT tags, radio telemetry, and otolith microchemistry to determine the magnitude of mortality. In addition, this study will determine where and when mortality occurs, and characterizes the migration for Snake River sockeye salmon.

**ISRP final recommendation:** Meets Scientific Review Criteria - In Part

**Comment:**

The ISRP finds that objectives 1 and 2 meet scientific review criteria, but objective 3 does not meet criteria for the reasons described below.

Smolt travel time and survival estimates from this study will contribute to filling data gaps identified in the Adaptive Management Implementation Plan and could play an important part in recovery of ESA-listed Snake River sockeye salmon by increasing understanding of juvenile sockeye salmon migrations across multiple years. Relationships between the proposed work and the AMIP, 2008 BiOp, MERR, and several specific Fish and Wildlife Program recommendations are described in the proposal.

Objectives for the PIT-tagging and radio-tagging portions of the study (Objectives 1 and 2) are well defined. Monitoring of radio-tagged fish at various locations along the migration route will allow estimation of survival rates over different river reaches. Comparison of release-to-Lower Granite Dam survival rates for radio-tagged and PIT-tagged fish will provide a test for differential tagging effects. This project should be ranked as high priority, because little is known of the migration behavior and survival rates of juvenile sockeye in the basin. A few suggestions for further development of the study plan are:

1) The rationale for desired precision values leading to a target sample size of 400 radio-tagged fish should be presented. Sample size adequacy for investigation of fish size, origin, and release location as covariates in the travel time and survival analyses should be investigated.

2) The sampling plan proposes survival estimates for 25 contiguous river reaches between release points and Lower Granite Dam. This may be overly ambitious, particularly for the first year of the study. Are there important questions that can be answered only at a high level of resolution? Anecdotal observations suggest that predation mortality may be high in the first stage of the migration, soon after the smolts are released. If so, might it be most efficient for the study to initially use fewer and longer reaches, emphasizing study of the effects of alternative smolt release strategies on survival in the uppermost reach?

In contrast to Objectives 1 and 2, Objective 3 – to characterize the migratory behavior of juvenile Snake River sockeye salmon using otolith microchemistry – was not well explained or justified. The intent of this objective is unclear, except for a statement (p. 6) that “we will reconstruct downstream migration by using chemical signatures reconstructed across otoliths...” The proposed sample sizes for this work are very small, and would rely on collection of dead fish (not a representative sample of migrating fish) from dam bypass systems. Otolith microchemistry methods have been shown capable of identifying fish that have reared for some period of time in different watersheds, but juvenile sockeye migrate rapidly downstream from the upper Salmon River basin in large schools through waters of mixed origin. The ability of otolith microchemistry to differentiate between the migration histories of individual fish is, in this situation, problematic. It appears that the radio-tagging study would produce the desired information on travel times through different reaches more directly and with greater precision than the otolith microchemistry work. The ISRP’s recommendation is to not pursue the otolith microchemistry work at this time.

## 199602100 - Gas Bubble Disease Monitoring

**Proponents:** US Geological Survey (USGS)

**Short description:** The USGS Columbia River Research Lab provides training for fish monitors looking for signs of gas bubble disease in juvenile salmonids.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

Examination of migrating salmonid smolts for signs of gas bubble disease continues to be a necessary component of the Smolt Monitoring Program at FCRHS dams. Standardized methods for scoring the severity of gas bubble disease were developed in the early years of this project and described in reports and referred publications. The present activity consists of training Smolt Monitoring Program personnel in the use of these methods. This training has been provided each year since 1999.

The proposal could be improved by providing information on the nature and duration of the training and on the number of personnel trained annually. Is training done at each smolt monitoring program facility, or is a training course held at the USGS laboratory? Is a syllabus provided to trainees? Are trainees tested to ensure competence in using the methods they have been taught? This information should be included in future proposals.

## 199102800 - Pit Tagging Wild Chinook

**Proponents:** National Oceanic and Atmospheric Administration (NOAA)

**Short description:** Monitor migration timing, growth, and estimated parr-to-smolt survival rates of wild Snake River spring-summer Chinook salmon to the lower Snake River. Characterize parr/smolt survival and movement out of natal rearing areas, in selected streams, and relate to environmental and climate conditions.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

**Qualification:** The ISRP recommends that within the next year the project proponents 1) develop a proposed modeling and analysis outline for the data and 2) develop and test several critical hypotheses by integrating data across years.

**Summary:** This long-term project has provided important information regarding the early life history characteristics and survival data for wild Snake River spring Chinook. Key significant findings include parr to smolt survival rates, growth rates, migration timing, and intra- and inter-annual variation in movements between habitats. The information gained continues to be of value to managers and other decision-makers. The ISRP commends the project proponents for the well-prepared summary of accomplishments and major results over the history of the project.

While gathering these long-term data may be worthwhile in itself, the ISRP suggests that to fully utilize these data, the next logical steps are 1) start to develop a modeling and analysis outline for the data and 2) start framing and testing a few critical hypotheses. The ISRP noted that the proponents have started to do this type of analysis for a five year set of data by examining the variation in survival based on size (see Zabel and Achord. 2004. Vol. 85(3) Ecology). The ISRP suggests that the data should be explored more fully and that more such hypotheses can be tested. For example:

- The results of Paulsen and Fisher (2001) were valuable in pointing out the effect of rearing habitat “type” and condition on parr to smolt survival. What is the next step as a logical follow-up?
- Project staff sees a lot of pre-smolt movement during winter. Is this an important pattern? We suspect that mid-winter movement is movement of last resort because the winter habitat utilized at the onset of winter is no longer suitable, and these fish seldom survive.
- The project presents only relative parr densities - how do these compare with actual densities?
- Relevance to climate change is mentioned, but nothing specific formulated for testing.

Other ISRP comments:

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

Proponents describe in reasonable detail how the project relates to the 2008 BiOp, Fish and Wildlife Program, MERR, HLI, etc. The significance of the project to regional programs is clearly laid out and in a general sense it is evident that the information gained is of value to managers and other decision makers. The technical background section is very well done and uses the available literature to support justification for this project. The Objectives are measurable with specifically defined metrics but are mostly about what data will be collected, not hypothesis-driven objectives.

### *2. History: Accomplishments, Results, and Adaptive Management*

An excellent summary is given of accomplishments and major results over the history of the project. This is a long ongoing project that has provided important information regarding the early life history characteristics and survival data for wild Snake River spring Chinook. Several significant findings include parr to smolt survival rates, growth rates, migration timing, and intra and inter annual variation in movements between habitats.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

This project has coordinated well with many other projects, and these are specifically identified in the proposal.

The proponents indicate that they are taking into account significant future changes in limiting factors such as climate change and water quality, but nothing specific is proposed for testing or evaluation.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

There is a good track record of technical reports and publications. Methods seem appropriate, and project staff seems well positioned to continue to incorporate new technology (e.g., smaller tags) as it becomes available. The improvements in detection rates may provide an opportunity to reduce sampling effort if target precision levels can be met with less sampling effort. Indeed, one of the strongest reasons to continue the project is that such new technology is becoming available so rapidly.

The study is well designed with state of art methods. The few null hypotheses listed in the proposal (e.g., there are no significant differences in timing among years, etc.) are okay as far as they go but are not adequate for explaining the observed variation. It is not clear that there are more specific hypotheses that the proponents intend to test.

### 198910700 - Statistical Support for Salmonid Survival Studies

**Proponents:** University of Washington

**Short description:** Ensure that tagging studies in the Columbia Basin are conducted with the best available design and analysis, including sample size guidance, state-of-the-art statistical software, and consultation in order to provide cost-effective and precise research, monitoring, and evaluation studies.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

The statistical services and products provided by this project make a major contribution to fish-tagging studies by state, federal, tribal, and academic entities throughout the region. The project has provided continuity of statistical support for both as-needed and anticipated needs to multiple parties in the region. The statistical software developed by project personnel is used throughout the region. The proposal identifies project support for four management questions posed by the Council in the MERR plan.

The proposal provides good detail on the technical background and objectives. Results are quantifiable through the impressive number of peer-reviewed papers, technical reports, theses completed, and software programs developed. However, some claims are made in the proposal without sufficient information for evaluation, such as, claiming that the approach used has proven to be the best way without providing documentation, or stating that particular software developed through the program is being used by numerous investigators and agencies without providing a real sense of amount of use or user satisfaction. Methods to evaluate client

satisfaction such as summarizing course evaluations, Wiki use levels, timeliness of response to queries and requests for assistance should be identified during contracting.

### 199105100 - Modeling and Evaluation Statistical Support for Life-Cycle Studies

**Proponents:** University of Washington

**Short description:** This project provides statistical analysis and interpretation of life-cycle information for monitoring and evaluation of salmonid stocks. This project has three interrelated objectives: 1) provide real-time forecasts of smolt outmigration timing for use in spill management; 2) analyze historical tagging data to investigate smolt outmigration dynamics and relationships to hydro operations; and 3) provide statistical support for analytical methods and design of monitoring studies.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

The proposal and presentation clearly indicate the overall benefit of this project to the Fish and Wildlife program. This project continues to be valuable in providing statistical support services to many other projects in the region. The proposal effectively relates the project to the 2008 BiOp via many RPAs, the Accords, the Fish and Wildlife Program, and the MERR plan.

The technical background section clearly presents how project output addresses regional monitoring needs and data analysis requirements. Objectives are clearly stated in terms of desired outcomes relative to status and trends of listed salmonid populations. The proposal provides an excellent history with significant accomplishments and with a very good reporting and publication record. Important accomplishments include estimation of SARs for over 350 stocks of hatchery fish and about 20 stocks of wild fish.

In the past, the ISRP has recommended customer surveys for documentation of the value of services. The proponents have somewhat addressed this issue by including unsolicited letters of appreciation that expressed satisfaction. However, summary results of actual customer satisfaction surveys would still be preferred.

## 200851800 - Upstream Migration Timing

**Proponents:** Columbia River Inter-Tribal Fish Commission (CRITFC)

**Short description:** Sockeye and Chinook salmon and steelhead sampled at the Bonneville Dam Adult Fish Facility will be classified using genetics and PIT tagged to assess upstream timing and survival.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

### **Comment:**

This project uses the extensive PIT-tag detection infrastructure now in place at mainstem dams and at many other locations in the Columbia River Basin to track adult salmon and steelhead through (and beyond) the hydropower system. This well-tested tagging technology is used in conjunction with a new technology (genetic typing) to determine the migration behavior (speed of migration, straying, fallback) and survival of adult salmon and steelhead belonging to specific stocks.

On balance, this is a well-justified project. The data obtained could help fill crucial data gaps and be useful in many applications. In addition, PIT tagging is less invasive and stressful than other methods, such as radio tagging, that have been used for tracking of adult salmonids. Information on the upstream movement of PIT-tagged fish can be provided to all interested parties on the PTAGIS web site.

The proposal could be strengthened in several aspects. It describes analytical methods and anticipated applications of the methodology only in general terms. In future years the methodology should be used to address specific hypotheses, with detailed description of study plans, statistical methods, desired levels of precision, and necessary sample sizes.

No information is provided on the specificity and reliability of the genetic typing methodology. How well and on what scale does it differentiate between different stocks within each species? What is the turn-around time for genetic typing; is it potentially possible that stock-specific migration information might be available on a near-real-time basis?

How will PIT-tag recoveries and GSI results be combined to estimate straying rates: what is the quantitative approach?

In the present proposal, Deliverable 1 (Determine stock specific run timing for Chinook and sockeye salmon and steelhead passing Bonneville Dam) and Deliverable 3 (Improvements to the Bonneville Dam Adult Fish Facility) are somewhat broadly but clearly explained. Deliverable 2 (Compare stock composition estimated by GSI with those estimated using PIT tags) should, however, be more fully elaborated: analytical methods have not been adequately explained.

Because the project was recently initiated (2009), few results are available at this time. Future proposals should summarize results to date and also, using experience gained by the first several

years of data collection, outline anticipated future applications of the methodology and the expected benefits.

#### 200890800 - FCRPS Water Studies & Passage of Adult Salmon & Steelhead

**Proponents:** Colville Confederated Tribes

**Short description:** The goal of the project is to assess survival and mortality causes for adult UCR spring Chinook and steelhead through the FCRPS, And assessment of Columbia River storage/flow regimes that benefit UCR spring Chinook and steelhead juveniles. The project will assist in estimating extinction risk and recovery potential associated with the operation of the FCRPS and other management actions in the lower Columbia River that effect survival of UCR ESA-listed

**ISRP final recommendation:** Not Applicable

**Comment:**

This does not appear to be an RME or implementation proposal. Funding is requested for planning and coordination activities, augmented by assistance from subcontractors. No study plans or statistical designs are described, and no methods or metrics are specified. There are no scientific aspects that can be evaluated.

The proponents propose to coordinate with the action agencies in modeling the effects of various hydropower system flow and management scenarios on survival of upper Columbia River adult salmon and steelhead. The objectives are very broad, and assignment of primary responsibility for the various work elements is not specified. It is unclear if the intent is to take on primary responsibility for model development or to play a secondary role by providing input to action agencies on model development. The proposal is not linked to the Chief Joseph Hatchery management plan. If the project budget includes funding for subcontractors, it is not broken out and identified as such.

#### 199900301 - Evaluate Spawning of Fall Chinook and Chum Salmon just Below the Four Lowermost Mainstem Dams

**Proponents:** Pacific Northwest National Laboratory (PNNL), Pacific States Marine Fisheries Commission (PSMFC), Washington Department of Fish and Wildlife (WDFW)

**Short description:** The project monitors spawning and abundance of fall Chinook salmon below Bonneville Dam and collects and builds on previously collected data. Riverbed temperature is continuously monitored in order to estimate chum salmon emergence timing. Redd locations and hourly temperature data are provided to the FPAC and TMT for in-season management of water for the protection of spawning fish at Ives Island.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

Qualification: The following additional requests for information should be addressed in contracting and discussed in future proposals and annual reports. The ISRP is not asking for an immediate response.

1. Information is needed on variance measures of the spawning population estimates. How are they determined, what have they been, and are the end users satisfied with them?
2. Details are needed on specific methods and survey techniques. Over what time periods are the redd surveys conducted, and how many times per week are they carried out? Are any shoreline surveys performed in areas inaccessible to jet sleds? Where are the piezometers located, relative to redd concentrations? How often do temperature loggers record intragravel water temperatures? Is dissolved oxygen ever measured in the egg pocket?
3. A map of the principal spawning areas for Chinook and chum salmon below Bonneville Dam would be helpful, particularly if it highlighted sites where the majority of redds occur. Information on use of the Ives Island area by coho (mentioned in passing in the proposal) and lamprey would also be useful.
4. Information about movement of sediments in the spawning grounds as the river channel migrates would be helpful. Is this metric being monitored?
5. Have other potential limiting factors on chum fry emergence been considered, e.g., predation on eggs or recently emerged fry? Does boat activity in the area affect egg and alevin survival through substrate disturbance?
6. To put this project in context, it would be useful to find out why was the decision made to remove data analysis from this project and place it in two related projects? Was this done for efficiency or for another reason?

*1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The proposal is reasonably clear about the importance of understanding the effect of hydrosystem operations on the reproductive success of mainstem-spawning fall Chinook and chum salmon immediately below Bonneville Dam. This field program is an important element of regional fish population monitoring.

The technical background and objectives were, in general, adequately described. A couple of issues need further explanation. First, why was the decision made to remove data analysis from this project and place it in two related projects? Was this done for efficiency or for another reason? Second, what is being done to track mainstem spawning in the Ives Island complex by species other than Chinook and chum salmon? The proposal mentions coho salmon in passing (in

connection with carcass tagging), and it would be interesting to know if Pacific lamprey use the area too.

## *2. History: Accomplishments, Results, and Adaptive Management*

The proponents have a good track of publications and reports. Results of fall Chinook population estimates for the Ives Island complex are presented for the last decade. A similar set of estimates for chum salmon would be useful, as would a summary of the temperature and water surface elevation monitoring over this period. The water elevation data would be especially helpful in demonstrating how the precursor to this project influenced hydrosystem operations by preventing redd dewatering. The mapping products provide habitat managers with managers to avoid development and damage to critical spawning habitat.

Adaptive management is not really shown by proponents – they describe how end users do modify their needs according to changes in the fish populations.

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

Relationships to two other projects (Project Number 1982-013-01 titled “Coded Wire Tag Recovery Program” and Project Number 2010-036-00 titled “Expansion of Washington’s Tag Recovery Program in the Lower Columbia Region to Improve Fisheries and Viable Salmonid Population Monitoring”) are adequately described. The other projects will assume responsibility for analyses of tag recovery data collected through this project.

Throughout the proposal the implication is that hydrosystem operations causing redd dewatering limit reproductive success of fall Chinook and chum salmon spawning in the Ives Island complex, but have other potential limiting factors been considered, e.g., predation on eggs or recently emerged fry? Does boat activity in the area affect egg and alevin survival through substrate disturbance? Is there any evidence that channel movements (if they have occurred) have influenced hyporheic flow pathways, or that intragravel temperatures have changed over the monitoring period?

R&ME seems reasonable and the proponents have a good track record of data archiving.

## *4. Deliverables, Work Elements, Metrics, and Methods*

Because this project does not include data analysis, deliverables consist of providing field data to the appropriate other projects for analysis and summary.

The work elements, metrics and methods are generally described; however, more details are needed for scientific review. A map of the principal spawning areas for Chinook and chum salmon below Bonneville Dam would be helpful, particularly if it highlighted sites where the

majority of redds occur. Additional information on survey techniques is requested above under response item 2.

### 199102900 - Research, monitoring, and evaluation of emerging issues and measures to recover the Snake River fall Chinook salmon ESU

**Proponents:** US Fish and Wildlife Service (USFWS), US Geological Survey (USGS)

**Short description:** Project 199102900 will collaboratively collect, disseminate, and analyze data to provide real-time information to update status and trend monitoring and assist in the development of data-supported models that inform adaptive management.

**ISRP final recommendation:** Meets Scientific Review Criteria

#### **Comment:**

This ongoing project has collected field data on Snake River fall Chinook salmon spawning activity, juvenile recruitment, survival, and growth for almost two decades, and proposes to continue these studies. The project also manages a very ambitious PIT-tagging program, with almost 400,000 hatchery fall Chinook PIT tagged annually. This project has provided a large portion of the available data on the Snake River fall Chinook Salmon ESU. The data have been used for development of the recovery plan, for planning of the Lyons Ferry hatchery program, and for design of the summer flow augmentation program. The study documented overwintering of juvenile fall Chinook salmon in the hydropower system reservoirs, and contributed to the decision to extend the operation of the juvenile bypass system at Lower Granite Dam later into the fall. This project is a collaborative effort between the USFWS and the USGS, and will provide information essential to NOAA life-cycle modeling efforts. A number of additional Federal and State agencies are involved in data collecting and reporting. The activities funded by this proposal would not duplicate other efforts.

This project is well integrated with other regional RM&E efforts relating to Snake River fall Chinook, as would be expected of a project with a nearly 20-year history. The proposal addresses RPAs in the BiOp, the AMIP, and Council's draft MERR plan. The 2008 BiOp calls for (continuing) investigations of the early life history of Snake River fall Chinook salmon and of the effects of the hatchery program on natural productivity. The NPCC's Fish and Wildlife Program calls for research on the effects of predation in the mainstem on juvenile salmonids, as does the Adaptive Management Implementation Plan (AMIP). The AMIP also calls for the development of improved life-cycle and passage models for ESA-listed salmonid stocks. The proposal has easily identifiable objectives and tasks related to these needs.

This was a well-written proposal for a project with an excellent track record of success and accomplishment (e.g., 32 peer-reviewed journal articles) over its long history. Project proponents have made a number of presentations to the ISAB and ISRP over the years in which major findings have been analyzed and discussed. The project has clearly benefited Snake River fall Chinook salmon over the years and will likely continue to do so. In particular, this proposal seems to be especially good at describing how data collection and data analysis/modeling will

work together. It is more than a monitoring project. It is truly a combination monitoring and research/modeling effort. Their proposal is thus a well-synthesized effort at data collection and high-level analyses with clear applicability to management. The itemized list of management changes that have resulted from the findings of this study constitutes strong evidence of adaptive management. Their general approach could (and should) be applied to other programs in the Basin.

Some limitations on the extent and reliability of data collected by this project have been resolved (differentiating between natural-origin Fall and Spring Chinook subyearlings and between natural-origin Fall Chinook and hatchery-origin subyearlings), while others have not (inability to tag subyearlings <49 mm, uncertainty about effects of flow on beach-seining efficiency, lack of data on passage of juveniles during winter months).

One of the highlights of the project's discoveries has been the recognition of a reservoir overwintering life history attribute in some Snake River fall Chinook, and extension of operation of the juvenile bypass systems at the lower Snake dams reflects this new understanding of year-round movement patterns. The research questions have been refined and focused over the years, and are addressing some of the most critical data gaps concerning this ESU.

The technical background and objectives were clearly organized and explained. For each objective, detailed methods are provided. The project relies on standard field sampling methods. Deliverables, work elements, metrics and methods are well described in the proposal. The discussions of population modeling and the approaches to fitting stock-recruitment curves were especially thorough. Project proponents appear well equipped to carry out the work.

Of particular value in this proposed work are their analyses of abundance and growth data with stock recruitment relationships to address the idea of density dependence in supplementation programs. Post supplementation, there has been a significant decrease in smolt size. Hatchery supplementation has been associated with large increases in redd counts, followed by a leveling off/slight decline of natural fish. There are some indications that density dependent factors might be acting as stock size rebuilds. Whether or not density-dependence or other hatchery-wild interactions are occurring may be a contentious issue, but regardless of the outcome, addressing these questions with their long-term data sets is a highly important use of the data, and an appropriate approach for evaluating and shaping other supplementation projects in the basin as well. Results of the analysis should provide a biological basis for recovery goals. The proponents also have a riverine bass predation element to their project that will provide information related to survival. This project is exemplary in that it is making the attempt to truly assess a supplementation program not just through intermediate steps such as more smolts or more redds, but in terms of its ultimate impact on recovery, the wild stock, density effects, and other higher level population dynamics.

## 200203200 - Snake River Fall Chinook Salmon Life History Investigations

**Proponents:** National Oceanic and Atmospheric Administration (NOAA), Pacific Northwest National Laboratory (PNNL), University of Idaho, US Fish and Wildlife Service (USFWS), US Geological Survey (USGS)

**Short description:** This goal of this project is to understand the mechanisms underlying Snake River juvenile fall Chinook salmon life history diversity and its consequences to management activities such as transportation and flow augmentation. It also seeks to quantify mortality risks that ultimately affect population productivity.

**ISRP final recommendation:** Meets Scientific Review Criteria

### **Comment:**

Overall, this was a well prepared proposal that meets scientific criteria. The goal of this project is to understand the mechanisms underlying Snake River juvenile fall Chinook salmon life history diversity and its consequences to management activities such as transportation and flow augmentation. It also seeks to quantify mortality risks that ultimately affect population productivity. Investigation of losses of juvenile salmonids to non-indigenous predators in the FCRPS is called for by the 2008 BiOp, the NPCC Fish and Wildlife Program, and the Adaptive Management Implementation Plan (AMIP). The significance of this work to the BiOp objectives and regional plans was well supported. The activities funded by this proposal would not duplicate other efforts. The relationship of this project to other research efforts in the upper Snake River mainstem, particularly the other predation study (199007700), was clearly described. Project proponents made a good effort to differentiate the activities outlined from other studies, including the other large Snake River fall Chinook project (199102900). The personnel have experience in the work elements and are well-qualified to conduct the work.

Progress on this project to date has provided important new information on the early life history and life history diversity of Snake River fall Chinook salmon. Subyearlings migrating from spawning areas in the Clearwater River migrate rapidly in the free-flowing portion, but then slow and delay in the area above the confluence with the Snake River (transition zone). Survival through the confluence area is low, but the survivors grow to relatively large sizes and apparently survive well during subsequent migration and marine life. Over-wintering of juvenile Fall Chinook salmon in the hydrosystem reservoirs has thus been shown to be a viable life history strategy.

The net benefit for survival through the entire life cycle has yet to be determined. Much remains to be learned about the implications of the over-wintering life history strategy for management operations, including bypass, transportation, spill, and summer flow augmentation. The questions being asked (role of predation in limiting survival of overwintering reservoir-type Chinook parr, importance of gas bubble disease, and the influence of water temperature) are difficult to answer in such a large aquatic ecosystem, and the project has shown that it can successfully carry out the large-scale studies and reach scientifically supported conclusions. The proponents have a strong record of peer-reviewed publication of past results.

The proponents also hypothesize that predation is higher now than 15 years ago, especially in summer. This project would produce needed information on current losses of juvenile fall Chinook to predators, updating and expanding on studies done over 20 years ago. Understanding how predation, gas-bubble disease, and temperature interact to affect survival of reservoir-type fall Chinook salmon would be useful for management of the ESU.

For the most part, the technical background, deliverables, work elements, metrics, and methods were adequately described. A few shortcomings in the initial proposal were adequately addressed in the response.

The response explanation for why smallmouth bass and channel catfish were the focus of the predation studies clarified that research on these species was specified in the AMIP and the Council's 2009 Amendments to the Fish & Wildlife Program. The ISRP agrees that these species warrant further study in light of the rapid temperature changes that mark the transition from river to reservoir. We also concur with the proponents that preserving pikeminnow stomachs for later analysis and scanning cormorant nesting locations for PIT tags would be worthwhile if the budget permits.

A more complete description of the experimental feeding chamber was provided as requested, and more details were given about the acclimation procedures for test animals and cover characteristics in the apparatus. This information gives us confidence that the experiment will not involve conditions that are greatly dissimilar to what the subyearling Chinook will actually encounter.

In the response, the proponents provided adequate evidence of the probable resolution ability of the otolith microchemistry methodology, i.e., that fish should be able to be assigned to a specific area of origin. The response to the question about using strontium isotopic signatures to differentiate natural and hatchery origin adults provided a good explanation of what is currently known and why this component of the research is needed in this project. The ISRP suggests that it would be very important for the microchemistry portion of the study to show significant measureable progress in their first year in efforts to differentiate stocks (i.e., verifying the very promising 12 known samples analyzed to date and reported in this response) and in the development of other isotope ratios to help distinguish fish from the Clearwater and Salmon rivers.

The response also clarified that project proponents will continue to use scale analysis to differentiate between unmarked hatchery- and natural-origin fish.

Finally, project proponents suggest that the research may shed light on extending the barging season beyond its current termination date, which could provide for late migrants with a high SAR. This was very helpful information for justifying the project.

**Preliminary comment requesting a response:**

Investigation of losses of juvenile salmonids to non-indigenous predators in the FCSRPS is called for by the 2008 BiOp, the NPCC Fish and Wildlife Program, and the Adaptive Management Implementation Plan (AMIP). The significance of this work to the BiOp objectives and regional plans was well supported.

This project has provided important new information on the early life history of Snake River fall Chinook salmon. Over-wintering of juvenile fall Chinook salmon in the hydrosystem reservoirs was shown to be a viable life history strategy. This realization has influenced decisions regarding operation of the juvenile bypass systems at Snake River dams and also the transportation program for juvenile fish. Much remains to be learned about the implications of the over-wintering life history strategy for management operations, including bypass, transportation, spill, and summer flow augmentation.

Results to date have shown that subyearlings migrating from spawning areas in the Clearwater River migrate rapidly in the free-flowing portion, but then slow and delay in the area above the confluence with the Snake River (transition zone). Survival through the confluence area is low, but the survivors grow to relatively large sizes and apparently survive well during subsequent migration and marine life. The net benefit for survival through the entire life cycle has yet to be determined. They also hypothesize that predation is higher now than 15 years ago, especially in summer. This project would produce needed information on current losses of juvenile fall Chinook to predators, updating and expanding on studies done over 20 years ago. Understanding of how predation, gas-bubble disease, and temperature interact to affect survival of reservoir-type fall Chinook salmon would be useful for management of the ESU. This project is a collaborative effort between the USGS, USFWS, NOAA, PNNL, and the University of Idaho. The activities funded by this proposal would not duplicate other efforts. The relationship of this project to other research efforts in the upper Snake River mainstem, particularly the other predation study (199007700), was clearly described. Project proponents made a good effort to differentiate the activities outlined here from other studies.

This was a well-prepared proposal that meets scientific criteria in most respects. The project has contributed to our knowledge of life history diversity in upper Snake River fall Chinook salmon, and its record of publication in peer-reviewed journals is exemplary. The questions being asked (role of predation in limiting survival of overwintering reservoir-type Chinook parr, importance of gas bubble disease, and the influence of water temperature) are difficult to answer in such a large aquatic ecosystem, and the project has shown that it can successfully carry out large-scale studies and reach scientifically supported conclusions.

For the most part the deliverables, work elements, metrics, and methods were adequately described. The technical background was adequately summarized. The objectives, in general, were clear although a little more background on how the results of this project could alter transportation strategies for fall Chinook would have been helpful. Project proponents have done a good job of differentiating this project from the other large Snake River fall Chinook project

(199102900). The personnel have experience in the work elements and are well-qualified to conduct the work.

A response is requested on a few points. A more thorough discussion is needed of why smallmouth bass and channel catfish were selected as the predators of interest out of the suite of potential animals feeding on fall Chinook parr in the lower tributaries and reservoirs of the Snake River. It was not clear how predation from other fish species or birds were to be accounted for in the study.

Second, a more complete description of the predation-trial chamber is needed, as well as the methods used to prepare the fish for the feeding trials. How well does the chamber simulate the lower river-reservoir transitional area habitat (e.g., will there be any cover in the chamber for Chinook parr that might emulate what they could use along the shoreline)? According to the proposal, predators will be habituated to juvenile salmonids as food before each trial. Could this cause them to form an unnatural search image for parr, even if alternative prey were present? A hungry predator used to eating small salmonids will likely concentrate on them in an enclosed environment, so what steps will be taken to ensure that the importance of predation will not be overestimated in this experimental setup?

Third, some clarification of the expected resolution of the otolith microchemistry work is needed. The otolith microchemistry component would provide a tool to differentiate between natural-origin and hatchery-origin adults returning to the Snake River. This is a necessity in order to determine if ESU recovery goals are met. This tool would potentially also allow determination of the overall life-cycle success of hatchery and natural fish and of different life-history types.

In theory, this approach would provide more complete data than available for a smaller number of fish using radio telemetry and would be especially useful for fish too small to radio tag. It is not clear, however, that the methods will produce the desired level of resolution. Hatchery/wild differences may be detectable, but will reservoir versus river or tributary rearing be detectable? Studies in other places have shown that resolution can be an issue, and there is the danger that this technique is being oversold at its present level of resolution and sophistication. Some evidence based on other studies that the desired resolution is obtainable is requested. If the proposed work is highly developmental and evidence of adequate resolution is not available, they should perhaps get a baseline of chemistry in the various habitats before launching into a full-blown investigation. Perhaps a one-year feasibility study should be considered, that if shown to work could be continued and expanded.

A limitation that should be further addressed is the assumption that returning adults that have no fin clips or hatchery-implanted tags are of natural origin. What percentages of hatchery-produced fry in various years have had no fin clips or tags?

Finally, a summary of how the results of the work could specifically affect transportation strategies will make the project's relevance and importance more apparent.

A little more explanation of how the results of the studies will influence transportation strategies would be useful. The importance of understanding migration timing and the apparent effect of a delayed reservoir-type life history on the SAR parameter was clear, but how will this information be used to adjust barging activities?

### ***Coded Wire Tag Program***

#### **198201301 - Coded Wire Tag-Pacific States Marine Fisheries Commission (PSMFC)**

**Proponents:** Pacific States Marine Fisheries Commission (PSMFC)

**Short description:** The Coded Wire Tag (CWT) Recovery Project is an on-going data collection and data distribution program by ODFW, WDFW, and PSMFC that supports a coastwide stock identification system for coded wire tagged salmonid fish. This project samples returning salmon from fisheries, select spawning grounds and fish hatcheries. The tags are read and recorded at the tag labs. The data is reported to the RMIS database operated by the PSMFC. The data is made available to the public on the RMPC web site.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

This proposal is clearly written. It provides good detail and explanation of the structure of the program, its evolution over time, its accomplishments, issues of sampling and coordination, and actions needed or already taken to address those issues. The coded wire tag (CWT) program is very important for evaluating, monitoring and management of fisheries in the Columbia River Basin.

*1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The purpose of the PSMFC CWT project is to collect and manage data in a coast-wide stock identification system, in coordination with ODFW and WDFW. The project provides critical information for monitoring and evaluating population characteristics of Columbia River Basin hatchery and wild salmon and steelhead and for monitoring the status of ESA-listed stocks. These characteristics include stock of origin, hatchery versus wild origin, smolt to adult survival, age, adult size, etc. The project also provides information for evaluating stock-specific contributions to ocean and in-river fisheries, information critical to the management and conservation of Columbia River stocks.

A detailed and informative statement of the significance of this project to regional programs is presented. It notes an increased need to identify fishery (commercial, sport and tribal) impacts on listed stocks, estimate harvest rates, evaluate smolt-to-adult return (SAR) rates of hatchery

stocks, and assess progress of stock rebuilding. Data from this program are provided to researchers and managers within the region.

A detailed description of the various fisheries and associated sampling programs is provided as technical background.

The proposal has four objectives: 1. Sample catch and escapement for CWTs (Chinook, coho and steelhead); 2. Summarize and analyze CWT and catch/sample data; 3. CWT database management and regional coordination; 4. Management and regional coordination. These are briefly but clearly described.

## *2. History: Accomplishments, Results, and Adaptive Management*

The financial history includes a clear explanation of the project's budget structure across participants and performance. It discusses the link between the increasing project scope and intensity of sampling (to maintain a 20% sampling rate) and the associated budget growth.

The project's history of accomplishments is excellent. It has provided valuable data used by managers and scientists to address key questions regarding salmon and steelhead in the Columbia River Basin and elsewhere. The growth of the budget over time reflects the value of this project's contribution to fisheries management. The sampling rate for fisheries is excellent. The project has also responded well to the need for increased sampling in light of the desire to mass-mark most salmon and steelhead released from hatcheries.

The project's long history makes each year of new data even more valuable. These data are made available to the public through the project's online webpage.

Accomplishments in sampling, data validation, database management, and reporting are well described. Tables of sampling rates by fishery over time are presented. The proposal discusses which fisheries have met the 20% sampling rate goal and which have not, providing an explanation for those fisheries that do not meet the goal. Methods of data distribution are well described.

The proposal describes adaptive management actions by the sampling agencies as inter-seasonal or inter-annual changes in sampling focus to high priority fisheries in order to meet management needs. These changes are coordinated among agencies. The Pacific Salmon Commission (PSC) report "An Action Plan in Response to Coded Wire Tag (CWT) Expert Panel Recommendations" recommended changes in data coordination, validation, and reporting that have led to PSMFC changes to improve data validation and data integrity.

A long list of progress reports is presented.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The project is directly linked to ODFW and WDFW and indirectly linked to other regional entities that supply data and access the CWT database. The project appears to be responsive to issues raised by previous ISRP reviews and the PSC CWT action plan report.

Although the proposal mentions additional CWT sampling efforts, it was not clear how the project interacts with these other projects. For example, the project samples natural spawners for CWT below Bonneville Dam and on the Hanford Reach. Are other projects sampling natural fish in other areas and are their data included in the RMIS database?

One well-known deficiency in the RMIS process is that the Canadian coordinator does not report CWT recoveries during Canadian research sampling, e.g., the BPA-funded Canada-USA Shelf Salmon Survival Study (#2003009000) and CDFO research in the Straits of Juan de Fuca and Georgia Straits. Can this deficiency be resolved?

For this project and all other projects involving adipose fin clipping, it is important to document the percentage of poor clips (fish that might be identified as natural origin) and to report these data to RMIS. This annual estimate can be very important for researchers and managers that rely on marks to identify hatchery and wild fish in their samples.

The collected data are critical for evaluating (by others) emerging limiting factors. The proposal notes that since the main function of the project is to collect, manage, and report data, it does not account for emerging factors that could negatively impact fish populations and leaves that for other management entities in the basin. However, in other sections the proposal clearly identifies changes in human populations, sizes and locations of fisheries, and expanding sampling requirements that limit the ability of the program to expand its efforts under present budget levels.

### *4. Deliverables, Work Elements, Metrics, and Methods*

The project provides critical information for managers and scientists on a timely basis. The project has two deliverables: 1. Sample catch and escapement for coded wire tags, analyze the data and report the data to RMIS; 2. Coordinate the collection and reporting of coded wire tag data and maintain the coded wire tag database for public access.

Deliverables are well described, with detailed lists of metrics for objectives 1 and 2. Metrics are not listed for objectives 3 and 4 (regional coordination) although it is not clear why the important coordination activities of the CWT program should not be routinely evaluated for performance effectiveness. Four work elements relate to these deliverables.

Methods of sampling and data collection for each fishery, the division of sampling effort among ODFW and WDFW, and coordination of these state agencies with the PSMFC's Regional Mark Processing Center are well described.

#### 198201302 - Coded Wire Tag-Oregon Department of Fish and Wildlife (ODFW)

**Proponents:** Oregon Department of Fish and Wildlife (ODFW)

**Short description:** This project is part of a comprehensive coastwide program which has the goal of monitoring the performance of anadromous salmonids that are released into the Columbia Basin. Our objective is to ensure that all ODFW hatchery releases of greater than 50,000 fish have a representative CWT group. The release information is reported to the RMIS and is available for all users. Summary information is prepared annually and posted to BPA's website.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

This is a good proposal that was significantly enhanced by additional detail provided during ODFW's September 2010 oral presentation to the ISRP in Portland, which improved the ISRP's understanding of the project. The presentation created a picture of an excellent project that engages in strategic thinking and learning from current performance to improve future performance.

The presentation provided more detail on the project's exercise to assess management priorities for tagging and sampling rates. The project has started a pilot study soliciting tagging proposals from ODFW biologists that will be subjected to review. The proposal review framework may be expanded statewide.

The project has made management changes based on what has been learned, including changing stocks to avoid straying and altering the size and timing of releases. Data are being spatially represented using Google map tools. The project also evaluated determining release group size based on a quadratic model and the possibility of changing the number of tags to increase statistical power. Investigators are considering using indicator stocks and are also developing a GIS interface.

For this project and all other hatchery projects involving adipose fin clipping, it is important to document the percentage of poor clips (fish that might be identified as natural origin) and to report these data to RMIS. This annual estimate can be very important for researchers and managers that rely on marks to identify hatchery and wild fish in their samples.

#### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

This proposal is to fund the ODFW portion of the CWT program. The ODFW project conducts coded wire tagging of representative release groups (groups that exceed 50,000 fish) at each

ODFW-operated hatchery in the Columbia Basin. The project provides critical information for monitoring and evaluating population characteristics of hatchery salmon and steelhead produced in Oregon. The data are used to monitor stock of origin, hatchery versus wild origin, smolt to adult survival, age, adult size, harvest, straying, and returns of hatchery salmonids.

The proposal provides an adequate description of the ODFW portion of the CWT data collection through its standard tagging operations. It identifies the same sorts of sampling issues raised in the PSMFC proposal. In light of the identified problem of a reduction in the numbers of fish samples in response to a constrained budget, it would be helpful to have an explicit description in the proposal of how the reallocation of sampling effort takes place and the expected impact on the statistical precision of the estimates.

Data provided by this project support the evaluation of stock-specific contributions to ocean and in-river fisheries as well as adult returns to specific watersheds and strays from hatchery to spawning grounds. The program is linked to a number of regional programs through the use of data to monitor hatchery operations and evaluate progress toward recovery goals.

The technical background is brief but adequate. The project has three objectives: 1. Evaluate the survival of anadromous hatchery salmonids released into the Columbia Basin; 2. Evaluate the harvest distribution of anadromous hatchery salmonids released into the Columbia basin; and 3. Evaluate the stray rate of each hatchery program. Each objective has several deliverables, most with metrics specified.

For this project and all other projects involving adipose fin clipping, it is important to document the percentage of poor clips (fish that might be identified as natural origin) and to report these data to RMIS. This annual estimate can be very important for researchers and managers that rely on marks to identify hatchery and wild fish in their samples.

## *2. History: Accomplishments, Results, and Adaptive Management*

The project has a long history of producing valuable data and making these data publicly available through the PSMFC website. A budget history and list of cost-share partners is provided. A flat budget for the past few years combined with increases in project costs has led to a decline in the number of fish being tagged.

Since 2004 the project has annually implanted CWTs into 15-25 hatchery groups (Chinook and coho salmon) from ODFW's Columbia Basin hatcheries in the Mid/Lower Columbia and in the Willamette Basin. CWT data are reported to the PSMFC's RMIS. The project prepares an annual summary of recovered CWTs, including an assessment of trends in survival, harvest distribution and hatchery returns. A summary of fish tagged between 2001-2008 shows reduced numbers tagged in 2008.

The proposal describes the use of CWT data in adaptive management of hatchery operations, harvest management, and the evaluation of straying, but does not discuss the adaptive

management of the ODFW CWT project. However, elsewhere the proposal describes work to improve the ODFW data system in response to recommendations of the PSC's "An Action Plan in Response to Coded Wire Tag (CWT) Expert Panel Recommendations," and the presentation provided several examples of adaptive management actions taken by the project to improve performance.

The history of accomplishments of this project is excellent. It has provided valuable data that have been used by managers and scientists to address key questions regarding salmon and steelhead in the Columbia River basin, including Oregon. The proposal notes that data collected by the project will provide information on hatchery fish survival and stray rates which can then be used to evaluate hatchery production.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The proposal provides an adequate description of the relationship of this project with hatchery, harvest and other entities within the Columbia River Basin. The information collected by this project is essential for management and conservation of Columbia River stocks.

The proposal states that it does not explicitly address the effect of limiting factors on fish stocks. However, in other proposal sections the budget is addressed as a limiting factor affecting the numbers of fish tagged. The collected data are critical for evaluating (by others) emerging limiting factors.

The project appears to be responsive to issues raised by previous ISRP reviews and the PSC CWT action plan report. Justification of the tagging and adult sampling rate for CWT is provided.

Although the proposal mentions other CWT sampling efforts, it was not clear how the project interacts with these projects.

### *4. Deliverables, Work Elements, Metrics, and Methods*

The project has seven deliverables and notes that to date all project deliverables have been met on schedule. Metrics are not included, but could be, for two of the seven deliverables. A good description of the tagging methods is provided, with reference to the same statistical sampling issues raised by the PSMFC in its proposal. It discusses the effects of a constrained budget on sampling coverage but does not seem to address how, in 2008, the allocation of sampling effort was made in response to a need to reduce the numbers of fish sampled.

## 198201303 - Coded Wire Tag-US Fish and Wildlife Service (USFWS)

**Proponents:** US Fish and Wildlife Service (USFWS)

**Short description:** The goal of this project is to tag coho and Chinook salmon from each hatchery such that accurate estimates of total survival and major catch area information can be made.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

### **Comment:**

Qualification: The response contains some improvements to the proposal: the relationship to Basinwide goals and other projects is presented in detail, a better technical background is provided, and the accomplishments section is expanded. However, deficiencies still exist in several areas. To address these, the on-line proposal and the 2011 Annual Report should be updated with the information identified below. The 2011 Annual Report should be submitted for ISRP review.

### On-Line Proposal:

- (1) Expand the "Study Design" description with greater detail on sampling and analytical methods.
- (2) Provide greater detail on results.
- (3) Explain how the project uses adaptive management.
- (4) Develop metrics specific to each objective and provide a more detailed explanation.

Metrics were provided for the four project objectives but were the same for each objective and too brief to permit ISRP evaluation of scientific merit. The metrics include several references, i.e., Age at Return (Beasley, C.A., Berejikian, B.A., Carmichael, R.W., Fast, D.E., Galbreath, P.F., Ford, M.J., Hesse, J.A., McDonald, L.L., Murdoch, A.R., Peven, C.M., & Venditti, D.A., 2008); Age Structure (none); SARs (none); Smolt to adult return rate (Beasley, C.A., Berejikian, B.A., Carmichael, R.W., Fast, D.E., Galbreath, P.F., Ford, M.J., Hesse, J.A., McDonald, L.L., Murdoch, A.R., Peven, C.M., & Venditti, D.A., 2008); Smolt to Adult Survival Rate (Yakama Nation Fisheries, 2010). It is not clear what methods from the references provided are used and why some metrics have no methods.

- (5) Provide full citations for all references.

### Annual Report:

- (1) Expand the methods and results section.
- (2) Provide detailed information on methods of tagging, sampling and statistical estimation. What is the right number of groups to tag? What is the statistical basis for the sampling objective of 30 observed off-station recoveries?
- (3) Provide data on fish with poor quality fin clips.

The ISRP noted that a USFWS study (Brignon et al. 2008) could be cited with respect to the issue. This study showed that overall a relatively low percentage (2%) of marks were of poor quality.

Brignon, W.R., R.O. Engle, D.M. Hand, J. Rivera, and D.O. Olson. 2008. Comparative injury, adipose fish mark quality, and tag retention of spring Chinook salmon marked and coded wire tagged by an automated trailer and manual trailer at Carson national Fish hatchery. USFWS. Vancouver, WA.

[www.fws.gov/columbiariver/publications/CNFH\\_trailer\\_eval\\_final\\_report.pdf](http://www.fws.gov/columbiariver/publications/CNFH_trailer_eval_final_report.pdf)

(4) Discuss the following issues raised by the Methods section of the 2010 Annual Report and how they will be addressed with BPA/PSMFC/RMIS:

"Numerous discrepancies have been noted between the original reports of releases, and those in RMIS."

"Fisheries in some tributaries such as the Clackamas River, and its tributary Eagle Creek, are poorly sampled (or not at all) for recovery of coded-wire tags. Whereas, state agencies often rely on harvest estimates based on sport license returns in these tributaries, this information is not available through RMIS and the TS1 format."

"A single Production Expansion Factor (PEF - the total number of fish released divided by the total number of tagged fish released) is calculated for each hatchery, brood year, species, and stage of fish released. This PEF is used to expand estimated recovery information for non coded-wire tagged fish released along with tagged fish, and to determine the overall contribution and survival rate for each facility." Is this a statistically valid approach?

"In order to assess the success of selective fisheries, some hatchery fish are given a coded-wire tag and the adipose fin is not removed. Fish without adipose fins may be harvested at different rates than fish with adipose fins. A new program that expands the recoveries for each coded-wire tag, rather than as an aggregate, was written." No information on the mathematical/statistical calculations in this program were provided. More information on this assessment project is needed, e.g., how many fish are released with CWTs but not fin clipped?

"'Residualized' fish, or 'mini-jacks' from yearling releases, are not included in estimates of survival." Estimates of the numbers of residualized and mini-jacks in each release might help to evaluate estimates of survival, as well as ecosystem effects of hatchery releases on wild fish.

(5) Address the issue of the possible bias of mini-jacks in CWT releases of yearling Chinook salmon.

The proponent states that a key use of the CWT data is for estimating release to recovery survival of salmon. Recent studies show that many male yearling Chinook salmon mature as mini-jacks (up to ~50% of males in some hatcheries), i.e. fish that never go to sea and that are

not captured to any degree in fisheries. The presence of mini-jacks can bias studies that rely upon CWT data to estimate release to recovery survival, and possibly other studies that rely upon CWT data. Studies also show that the proportion of mini-jacks in the release can be estimated through blood sampling from a portion of the yearling release. These data could be used to account for CWT releases of mini-jacks if the data were recorded to RMIS along with other CWT data. How is your agency addressing the issue of mini-jacks among yearling Chinook released from your facilities?

**Preliminary comment requesting a response:**

The CWT program is very important for evaluating, monitoring, and management of fisheries in the Columbia River Basin. As the federal hatchery portion of the CWT program, this proposal clearly fits into the larger regional CWT effort. However, the proposal lacks explanatory detail in a number of important areas that limit the extent to which it can be reviewed.

The ISRP requests a response on several critical components of the project to provide adequate detail to enable a full scientific review. Information is needed on the project's technical background, limiting factors, project accomplishments, study design, tagging and sampling methods, and metrics.

For this project and all other hatchery projects involving adipose fin clipping, it is important to document the percentage of poor clips (fish that might be identified as natural origin) and to report these data to RMIS. This annual estimate can be very important for researchers and managers that rely on marks to identify hatchery and wild fish in their samples.

*1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The purpose of this project is to contribute to the CWT program by tagging coho and Chinook salmon from federal hatcheries such that accurate estimates of total survival and area of catch can be made. These data will allow for more accurate assessments of the proportion of wild and hatchery stocks in the Basin. The expected outcome of this project is to provide a long and consistent time series of survival and distribution data that can be used to measure trends in abundance of hatchery fish. Fish managers, researchers, mitigation agencies and others use the CWT release and recovery data to evaluate a number of management and environmental effects on salmon and steelhead. For example, the harvest management agencies combine CWT data with other data and information to estimate the effects of harvest regulation on populations of salmon and steelhead. Others use CWT data to estimate the rates of hatchery fish escapement into the wild or to determine hatchery fish survival and hence the effectiveness of the hatchery programs. CWT recovery data also provide critical information for evaluating stock rebuilding programs and assessing a wide variety of studies designed to improve survival of hatchery-produced salmonids.

The project is significant to the overall regional CWT effort. The proposal lists a number of other CWT projects to which it is related.

A brief project history is presented as technical background.

The project has four objectives: 1. Tagging; 2. Recovery; 3. Data sharing; 4. Annual report. Each has one deliverable. No metrics are specified.

### *2. History: Accomplishments, Results, and Adaptive Management*

A summary financial history and an explanation of different funding streams over time (different project designations) are provided. The proposal indicates that the project has been successful controlling costs. A list of successfully completed contract deliverables is provided.

Accomplishments are summarized briefly as the number of recent fish tagged and the importance of the CWT program to the region. A brief description of 2009 results (#s of fish tagged) is presented. There is no enumeration of results over time.

By way of adaptive management, the project is currently reviewing tagging levels to determine if adequate numbers are being recovered in fisheries.

The project provides valuable data that have been used by managers and scientists to address key questions regarding salmon and steelhead in the Columbia River Basin. The project recognizes the need to expand its annual reports and to evaluate tagging levels. The history of project accomplishments should also be expanded.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The proposal provides a complete list of relationships of this project with other similar projects, each with a brief explanation of how the project is related. Data provided by this project are used to evaluate a variety of projects, including the Select Area Fisheries, straying from hatcheries to rivers, and survival rates of salmonids released from each USFWS hatchery.

Limiting factors are discussed in terms of changing ocean and stream conditions that may affect productivity, but factors that may limit the success of this CWT project are not identified.

### *4. Deliverables, Work Elements, Metrics, and Methods*

The project specifies four deliverables (one for each objective) and eight work elements. No metrics are provided. Methods are briefly described as numbers of fish tagged in 2009. A very brief description of the study design and the sampling properties of the project's tagging is provided.

The project appears to provide the basic information that can be used by others for monitoring, evaluation, and management of hatcheries and fisheries, but the proposal contains insufficient detail to make this evaluation.

## 198201304 - Coded Wire Tag-Washington Department of Fish and Wildlife (WDFW)

**Proponents:** Washington Department of Fish and Wildlife (WDFW)

**Short description:** This project funds tagging of hatchery coho and Chinook salmon so that at least one production group of each species at each Columbia Basin hatchery is coded-wire tagged to provide a holistic assessment of survival and catch distribution over time and to enable coded wire tag-based evaluations to assess how we meet various measures of the Northwest Power and Conservation Council's Fish and Wildlife Program.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

### **Comment:**

Qualification: The ISRP requested information from the proponents in several areas. Some has been provided in this response, but critical questions about the project remain unaddressed. A point-by-point response to the ISRP request for more information should be included in an updated on-line proposal, during contract negotiations with BPA and in the 2011 Annual Report, which should be submitted to the ISRP for review.

Information should be provided on the following:

- (1) Project relationships: the response includes only a cryptic note "identify relationships to 1982-013-01, 02, 03; 2010-036-00 (LCR exp CWT recovery-Rawding; others (see other CWT proposals)" and does not adequately describe how this project fits in the larger context of CWT projects. Proponents need to expand this note into a complete description of these relationships.
- (2) Deliverables: Instead of addressing the ISRP's request for more detailed information, the proponents argue that the Taurus format is the problem. Nevertheless, the project has only one deliverable that does not seem to directly relate to the objectives, and no metrics were specified.
- (3) Accomplishments: The table provided shows the number of tags recovered only for the years 1994-1998. Does this mean that the project was not involved in tag recovery in other years, and if so how does this comport with Objectives 2 and 3?
- (4) Methods of tagging and sampling: Methods are only very briefly described as "standard methods." The proponents need to describe their standard methods, cite appropriate references, and include these references in a list of citations. The project goal is to "Coded-wire tag at least one group of fish representative of each hatchery's production of a given species that is currently not being tagged through another program for Columbia Basin salmon released in Washington." The table showing the plan for tagging is a good start, but it needs to be expanded to incorporate all hatcheries, including those covered by other programs. How is the representativeness of a particular release group determined? How is this plan coordinated with the other programs? Is CWT tagging of the stocks listed 100% or are some fish released without a CWT or with a CWT but without a fin clip?

The proponents did not document the percentage of poor fin clips (fish that might be identified as natural origin) or indicate whether they report these data to RMIS.

(5) Limiting factors: The proponents state "Because the focus of this project is on tagging and reporting on tag data for hatchery stocks, this project is not expected to be vulnerable to impacts from emerging limiting factors." Nevertheless, there are emerging limiting factors, e.g., changes to mark-selective fisheries or the issue of mini-jacks, that need to be identified and discussed.

Recent studies show that many male yearling Chinook salmon mature as mini-jacks (up to ~50% of males in some hatcheries), i.e., fish that never go to sea and that are not captured to any degree in fisheries. The presence of mini-jacks can bias studies that rely upon CWT data to estimate release to recovery survival, and possibly other studies that rely upon CWT data. Studies also show that the proportion of mini-jacks in the release can be estimated through blood sampling from a portion of the yearling release. These data could be used to account for CWT releases of mini-jacks if the data were recorded to RMIS along with other CWT data. The proponents should describe how they are addressing the issue of mini-jacks among yearling Chinook.

(6) Adaptive management: The proponents do not describe how the project will adapt to changing needs and conditions or how it will test different sampling or tagging methods. As the ISRP indicated in its review, the proposal needs to explain how the collection of data is adjusted to address identified weaknesses and how it is connected to the management use of data.

**Preliminary comment requesting a response:**

The CWT program is very important for evaluating, monitoring, and management of fisheries in the Columbia River Basin. As the WDFW portion of the CWT program, this proposal addresses an important regional need. However, the proposal lacks explanatory detail in a number of important areas that limit the extent to which it can be reviewed.

The ISRP requests a response on several critical components of the project to provide adequate detail adequate to enable a full scientific review. Information is needed on the project's financial history, financial performance, accomplishments, project relationships, deliverables, methods of tagging and sampling, metrics, adaptive management, and limiting factors. The proposal needs to explain how the collection of data is adjusted to address identified weaknesses and how it is connected to the management use of data. These further information needs are described in more detail in the body of the review comments.

The proposal should also provide information on the project's plan for tagging, and the identification of which stocks it will tag, throughout the Washington portion of the Columbia River Basin.

For this project and all other hatchery projects involving adipose fin clipping, it is important to document the percentage of poor clips (fish that might be identified as natural origin) and to report these data to RMIS. This annual estimate can be very important for researchers and managers that rely on marks to identify hatchery and wild fish in their samples.

## *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The purpose of the WDFW project is to implant CWTs into at least one production group of hatchery coho and Chinook at each Columbia Basin hatchery, thereby contributing to the annual assessment of hatchery and wild salmon populations. The project goal is to tag a statistically valid number of coho and Chinook salmon from each hatchery such that accurate estimates of survival and distribution in the ocean, in freshwater fisheries and escapement areas can be made.

The proposal provides an adequate technical background for the need to maintain the CWT collection program. It notes that the CWT database provides the framework for the basic performance measures of hatchery salmon production programs and so is significant to a broad range of regional programs.

The project has three objectives: 1. Tag salmon; 2. Recover and decode CWTs; and 3. Produce annual progress report. Each has the same deliverable: “Effective CWT database and stock assessment opportunities” which does not seem to directly relate to the objectives. No metrics are specified.

The expected outcome of continuing this project is to provide a long and consistent time series of survival and distribution data that can be used to measure trends in abundance of selected hatchery stocks. In addition, the tagged hatchery stocks would be used to provide data relevant to the management of natural stocks, including many that are listed as threatened and endangered under the ESA. This project is an important part of fisheries monitoring, evaluation, and management in Washington.

## *2. History: Accomplishments, Results, and Adaptive Management*

A financial history of the past five years is provided without explanation. Under the explanation of the financial performance, reference is made to “financial missteps” in the past year, without further explanation. A number of cost share partners are listed. Reference is made to past due reports and efforts being taken to address the issue of reporting and deliverable timeliness. No details are provided as to how the problems are being addressed.

The project has successfully provided CWT data, key to the monitoring, evaluation, and management of the fisheries for more than 15 years. However, the “accomplishments” section of the proposal, while referring to the utility of CWT data and to the objectives of the project, does not summarize the project accomplishments to date.

The brief “adaptive management” discussion focuses on the use of CWT data in adaptive management of harvest or hatchery operations, but does not address adaptive management within the project. Given the past operational problems identified in the proposal and within the larger context of the PSC “action plan” recommendations, it would be useful to have an explicit

discussion of how this project will adapt its management to these recommendations and identified problems.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The proposal lists no project relationships, although elsewhere in the proposal a number of links between this project and other regional entities are identified.

The collected data are critical for evaluating (by others) emerging limiting factors. CWTs are a key tool for research, monitoring and evaluation. The proposal states that because its focus is on tagging and reporting it is not vulnerable to impacts of emerging limiting factors. However, it does not discuss the presence of factors that may limit the ability of the project to meet its specified deliverables and achieve its objectives.

### *4. Deliverables, Work Elements, Metrics, and Methods*

The project has one deliverable for all three objectives: “Effective CWT database and stock assessment opportunities” which does not seem to directly relate to the objectives. No metrics are specified.

The project has three work elements.

A very general and overly brief description of tagging is presented. No discussion of sampling methods is presented. A brief description of operational methods (e.g. where samples are taken) is provided under the objectives.

Data are reported to the PSMFC RMIS web page in a timely fashion. Data are used by other projects, as mentioned above.

## *Conservation Enforcement and Harvest Gear Studies*

### 200739000 - Tribal Conservation Enforcement - Confederated Tribe of Umatilla Indian Reservation (CTUIR)

**Proponents:** Umatilla Confederated Tribes (CTUIR)

**Short description:** Provide Conservation Law Enforcement for the Confederated Tribes of Umatilla Indian Reservation for the treaty reserved rights and protect all fish and wildlife species within the aboriginal lands set out in the Treaty of 1855. Provide Conservation Law Enforcement to reduce the illegal taking of Salmon, Steelhead, sturgeon, Basinwide in the Usual and Accustom fishing areas. Provide Law Enforcement to reduce the illegal taking of Wildlife, cultural resources, and destruction of habitat.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

This proposal adequately describes the type of enforcement support needed and the legal-geographic context, but is weak in providing a summary of activities or an assessment of limiting factors. The September 2010 oral presentation to the ISRP in Portland provided more detail about limiting factors challenging enforcement actions: the lack of a boat suitable to night patrol and high-wave conditions, the large size of the enforcement area, and the need for more public education about fish and wildlife conservation.

The proposal would be more informative if it described the enforcement challenges, discussed adaptive changes in approach as a result of operational learning, and included an assessment of the educational needs and the project approach to meet these. Major compliance issues could be described. In common with other enforcement projects, useful lessons could be learned by taking a more analytical approach to evaluate the overall picture of compliance. The ISRP encourages the recording and mapping of information on illegal activities.

The presentation made it clear that the project is working toward a more synthetic approach and is developing a database.

Qualification 1: Address ISRP comments on data development and summary analysis through a progress report as the database is developed.

Qualification 2: Address ISRP comments on the need for a more synthetic approach to the mapping and analysis of enforcement issues through a progress report summarizing actions taken in mapping and data analysis.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The proposal describes CTUIR enforcement and compliance education efforts that are a significant component of regional programs related to treaty rights for fish and wildlife.

The project has a single objective of enforcing tribal, state, and federal fish and wildlife laws. This is a reasonable objective. However, the proposal and presentation make clear that the project has other objectives that contribute to the overall enforcement objective. Public education of tribal and non-tribal members on the various fish and wildlife codes is mentioned in the project statement of purpose but is not listed as an objective. Data collection, management, and analysis, described as a work element, are also not listed as objectives, but could be.

### *2. History: Accomplishments, Results, and Adaptive Management*

The project history focuses on financial expenditures. Previous under-expenditure of funds have provided some reserves which the proponents propose to enhance with additional funds to buy a new boat and motor that is capable of operating at night and in high-wave river conditions.

Although the proposal provides a summary of progress reports and a list of work deliverables completed, the key findings of these reports and work tasks are not summarized, nor are results of previous project compliance monitoring provided. Neither enforcement nor compliance statistics are provided. The proposal indicates that data collected are not electronically available. This data situation was discussed during the presentation, with information presented on current efforts to develop a database.

Monthly and annual progress reports, provided through links, do list numbers of enforcement actions, such as license checks or incidents investigated, as well as the area covered.

The project history indicates a change in personnel and efforts to learn desired content of annual reports and deliverables. “Adaptive management” is described as continuing to work with other agencies, but does not include a description of how operations have been adjusted based on what is learned from project actions. The project has an education program to educate tribal and non-tribal members about state fish and wildlife laws.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

Project personnel have been working on building working relationship with county, inter-tribal and state agencies. Details of how this is being done are not provided in the proposal. However, the annual report does provide more detailed description of joint enforcement efforts between agencies.

Monthly and annual enforcement reports describe activities but do not address any limiting factors that may be in operation, other than to describe the function and scope of the CTUIR

enforcement officer. However, the proposal does note that the project has been working with other agencies to solve enforcement problems. Lack of a suitable boat prevents enforcement activities on the river in adverse water conditions.

The presentation led to a good discussion of challenges and compliance issues facing the enforcement project. The biggest challenges facing the project are the lack of a seaworthy boat and public education on fishing regulations (for tribal members) and restricted access areas (for nontribal members.) The biggest compliance issues are illegal nets and poaching of salmon, steelhead, and sturgeon. During the latest recession there has been an increase in unlicensed fishing by non-tribal fishers.

Since the start of 2010, enforcement officers have had 500 contacts with fishers, with numerous citations and warnings. They will input their information into a database to track these contacts.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

The proposal lists a single deliverable as “Conservation Enforcement officer.”

The proposal lists four work elements, although these are not tied to metrics or methods: 1. Disseminate Raw/Summary Data and Results; 2. Investigate Trespass; 3. Law Enforcement; 4. Outreach and Education

There are no metrics or methods described. However, the presentation did provide some detail on enforcement methods. Patrolling is done using a pickup equipped with police lights, radios, and siren. A laptop is used to record enforcement actions. Patrolling on the river is done using a boat equipped with police lights, radios, and siren. Radar, sonar, and night vision are used for river patrol day and night during fishing seasons, as well as for search and rescue.

The project is requesting a new boat so that greater enforcement efforts can be made on the river. The existing boat is old and not suitable for the river during stormy weather or at night. The frequency of patrols and the amount of area covered each day was not described.

Columbia River Basin enforcement projects coordinate their activities through an annual meeting.

## 200739100 - Tribal Conservation Enforcement-Columbia River Inter-tribal Fish Commission (CRITFC)

**Proponents:** Columbia River Inter-Tribal Fish Commission (CRITFC)

**Short description:** The Columbia River Inter-Tribal Fisheries Enforcement (CRITFE) provides increased protection of fish, wildlife and watersheds within the Columbia Basin. The main focus is to implement an enforcement effort to provide protection against illegal takes of Columbia River salmon species throughout their life cycle with an emphasis on weak stocks passing through the hydro-power corridor into tributary streams, thereby aiding in the rebuilding of native fish populations.

**ISRP final recommendation:** Meets Scientific Review Criteria

### **Comment:**

The proposal provides good detail in describing the approach taken by the Columbia River Inter-Tribal Fisheries Enforcement (CRITFE) to Zone 6 enforcement. It also provides an adequate justification for the approach and places the need for effective enforcement well within the larger context of conservation and recovery efforts. Effective enforcement is of clear benefit to fish and wildlife.

Where the proposal could be stronger is in presenting lessons learned from a synthesis of the many enforcement actions, and an assessment of limiting factors, challenges, and adaptive responses based on what has been learned about enforcement activities to date. All enforcement projects should have an educational component, and the presentation made it clear that this one does, but it could be better described and represented in the proposal.

Among the different enforcement entities there are opportunities to better coordinate, improve data collection, and do spatial representation through GIS. These actions would allow a more analytical, synthetic, and scientific representation of what is occurring in enforcement across the Columbia River Basin.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The purpose of the proposed work is for CRITFE to reduce illegal take of Columbia River Basin salmonids and native resident fish, and to thereby enhance the rebuilding of endemic fish populations. This would be accomplished through harvest law enforcement in Zone 6, promoting cooperation and assistance from non-tribal agencies, and public education about the need to conserve fishes and habitat. The proposal explicitly integrates enforcement for the protection of fish, wildlife and habitats with other fish and wildlife enhancement measures, and makes the case for the significance of enforcement to the success of regional programs. The proposal provides a good problem statement.

The approach has three components: 1. maintain active and visible harvest law enforcement in Zone 6 of the Columbia River at levels that ensure compliance; 2. improve enforcement efficiency by promoting cooperation among federal, state, tribal, regional and local entities; and

3. educate the public about risks to specific fish stocks and their habitats and the need for conservation.

The proposal lists four objectives to achieve these goals: 1. improve juvenile outmigration survival; 2. improve adult outmigration survival; 3. improve resident fish survival; and 4. improve enforcement program effectiveness. Each has coordination, outreach and enforcement activities listed.

#### *2. History: Accomplishments, Results, and Adaptive Management*

The proposal provides a financial history and a link to the annual report. The annual report provides detailed lists of enforcement and outreach issues and actions, but does not provide any synthesis of key issues or assessment of areas of success or failure.

A brief summary lists co-funders and emphasizes a community oriented enforcement strategy for effective deterrence.

“Adaptive management” is described as varying enforcement actions in response to changes in run status and associated behaviors. It describes coordination of enforcement actions with CRITFC biologists.

#### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

CRITFE has primary enforcement authority for all treaty tribal fisheries and shares concurrent jurisdiction on the mainstem Columbia River over enforcement of state law. CRITFE officers are also commissioned with Special Law Enforcement Commissions by the Bureau of Indian Affairs - Law Enforcement Division. Related conservation enforcement projects and/or cooperating entities in Zone 6 of the mainstem Columbia River include many other entities. A list of tribal, state and federal cooperating agencies is provided.

No limiting factors are described.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

Work elements are listed as outreach and education, regional coordination and law enforcement. Deliverables are tracked into these work elements and are described as tasks under each objective. An assessment of factors that may limit success is not provided for any of the deliverables.

Methods of conducting the tasks are generally described. Metrics of deliverable performance are summarized. Four full time enforcement personnel are funded by this project: three officers and one dispatcher.

## 200810600 - Tribal Conservation Enforcement-Colville Tribe

**Proponents:** Colville Confederated Tribes

**Short description:** The enhancement of the Colville Tribes' existing natural resource law enforcement program to increase protection of upper Columbia spring Chinook and steelhead.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

### **Comment:**

Qualification: The proponents should update their online proposal for future reviews to provide information requested by the ISRP on enforcement data, public education, significance of the project to regional program, and deliverables, methods, and metrics for Objectives 2, 4, and 5. Additional new information should be provided, as acquired, in the annual report. The annual report should include an evaluation of the project's efforts to educate people about fish and habitat conservation.

The ISRP appreciates the organized, concise and constructive response by the proponents to review comments. The response is brief but acknowledges the utility of the ISRP comments in helping the project think about how to assess effectiveness.

The ISRP requested further information in four areas: enforcement data, public education, significance of the project to regional program, and deliverables, methods and metrics for Objectives 2, 4 and 5.

The response provides information on the specific type of data the proponents plan to collect, and more detail on the way public education is conducted. Significance to regional programs is indirectly addressed through reference to ESA protections. The discussion of methods and metrics for Objectives 2, 4, and 5 describes an intent to collect data to address performance.

### **Preliminary comment requesting a response:**

The project of the Colville Confederated Tribes (CCT) is clearly relevant and related to regional programs. However, the proposal needs to make a better case as to specifically how it is related. It also needs to develop and describe deliverables associated with Objectives 2, 4 and 5, including performance indicators.

The proposal would be more informative if it described the enforcement challenges, discussed any adaptive changes in approach as a result of operational learning, and assessed the educational needs and success of the project approach to meet these. Major compliance issues could be described. In common with other enforcement projects, useful lessons could be learned by taking a more analytical approach to evaluate the overall picture of compliance. The ISRP encourages the recording and mapping of information on illegal activities.

A response should specifically:

- 1) Address ISRP comments on the need for data development and summary analysis by describing the existing enforcement data and plans for its analysis.
- 2) Address ISRP comments on the need for conservation education by addressing the type of public education that is conducted.
- 3) Provide information on significance of the project to regional programs.
- 4) Address ISRP comments about the need for deliverables and methods by developing and describing deliverables and methods and metrics for Objectives 2 (increase cost-effectiveness of enforcement), 4 (maximize the efficacy of enforcement) and 5 (maximize the accountability of enforcement). These may exist in the newly developed conservation enforcement work plan.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The purpose of this project is to enhance the CCT conservation enforcement program for the protection of ESA-listed species, other anadromous species, and resident fish. Natural resource law enforcement is an integral and essential component of natural resource management. Enforcement of existing fish, wildlife, and habitat regulations is needed to ensure compliance rates and protect fish stocks, wildlife populations and their critical habitats. Coordination of state and tribal government operations, public awareness, and public participation are all benefits of natural resource enforcement.

The CCT Natural Resource Enforcement division will provide two enforcement officers for enforcement activities on the Okanagan River, Columbia mainstem (Wells Pool) and tributaries. It will coordinate among all jurisdictions involved in the enforcement effort and will increase effectiveness and alleviate duplication of efforts. Officers will enforce fisheries and habitat regulations on reservation and ceded lands.

The proposal states that existing enforcement activities will be enhanced through the enforcement of new mark-selective tribal fishing regulations for upper Columbia spring and summer Chinook and summer steelhead within tribal fishing areas covering about 1.5 million acres. The project will also address compliance issues associated with the live-capture selective gear project.

The proposal states that an increased enforcement presence will act as a deterrent to illegal activity and public awareness programs will increase support and understanding of the goals of the program.

The goal of CCT enforcement is to increase survival rates of both juvenile and adult salmonids and to protect critical habitats. In a brief technical background, the proposal ties its enforcement

activities to larger regional conservation and recovery goals, particularly through the protection of ESA listed stocks. Along with assuring compliance of the Live Selective Gear Project, the CCT will release all ESA-listed stocks utilizing the live capture method. In addition, all natural origin Summer/Fall Chinook will be released.

The proposal emphasizes coordination of state and tribal government actions, public awareness and public participation as benefits of enforcement. It is encouraging to see that the tribe supports the mark-selective fishery.

The project has five objectives: 1. provide enhanced enforcement of laws and rules for the protection of anadromous and resident fish; 2. improve cost-effectiveness of fisheries and habitat enforcement; 3. optimize voluntary compliance of laws and rules to protect fish; 4. maximize the annual and long-term efficacy of enforcement efforts; and 5. maximize the accountability of the enhanced law enforcement program.

## *2. History: Accomplishments, Results, and Adaptive Management*

A brief financial history is provided.

A review of conservation enforcement objectives and performance measures relative to those of other conservation enforcement projects (e.g., WDFW, ODFW and lower river tribes) was performed, and on this basis the plan for enforcement and RME was refined. New objectives and performance measures were established for protection of in-stream habitat, riparian zones, fish screening, salmon and steelhead fisheries. These new criteria were then adapted to best meet the tribal conservation enforcement program opportunities, efficiencies and effectiveness. A conservation enforcement work plan has been developed with a schedule of enforcement activities based on priority species, seasons, fishery locations and habitats for conservation enforcement. The first year of focused conservation enforcement has been completed. More than 1000 patrol hours were logged during this initial period in the Chinook and steelhead fisheries, 20 citations issued, and 374 contacts made. No arrests or seizures occurred.

The proposal states that the project has been in place for one year and as yet has not made adaptive management changes. However, the description of project accomplishments describes adaptive changes that have been made to RME methods and design.

The proposal states that an organized evaluation of desired and actual achievement (budget, personnel, equipment, coordination, contacts, warnings, arrests, seizures and critical habitat protected) will analyze the impact of the program.

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

Project relationships are described in general terms; no specific relationships to programs or projects are described, despite the obvious connection to the live-capture selective gear project

(#200810500). Other projects will be supported and enhanced by the role of CCT Natural Resource Law Enforcement. Fisheries habitat enhancement projects, hatchery satellite facilities and restoration programs will be supported by the enforcement of regulations and a reduction in illegal activities such as poaching and vandalism. Wildlife mitigation acquisition projects will be maximized by reducing activities which illegally alter and impact habitats.

Limiting factors for the Subbasin are described but are not related to this project or assessed in terms of how they might affect project success.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

Deliverables are described only for Objectives 1 and 3, and only in general terms. Objectives 2 (increase cost-effectiveness of enforcement), 4 (maximize the efficacy of enforcement), and 5 (maximize the accountability of enforcement) do not have deliverables, despite the description of Objective 5 as tied to performance indicators.

Metrics and methods are not described for any of the five objectives.

### **200206000 - Nez Perce Harvest Monitoring on Snake and Clearwater Rivers**

**Proponents:** Nez Perce Tribe

**Short description:** The Nez Perce Tribe Harvest Monitoring project collects, analyzes, and reports catch data pursuant to pre-planned statistical sampling designs and procedures to assure the conduct of biologically sound harvest strategies for Nez Perce treaty fisheries that may affect ESA listed species.

Primary focal species are Snake River spring/summer Chinook salmon ESA, Snake River fall Chinook salmon ESU, and Snake River steelhead ESU.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

The response improves the proposal in some areas: good descriptions are provided of the live capture study and its educational components, and the metrics section is expanded. However, overall the amount of detail provided in the response is excessive, detracting from the goal of a concise and compelling description of the proposed project and making it difficult to clearly understand the project. The proposal should be a stand-alone document that clearly and concisely justifies the project. It should contain all relevant information sufficient for a complete scientific and technical review without requiring reference to external documents, past proposals, or previous reviews.

Qualification: The proponents are requested to revise and resubmit their proposal for ISRP review. The proposal should be updated incorporating information provided in the response and

in cited reports, to provide a concise stand-alone document with sufficient detail for reviewers to evaluate its scientific and technical merits.

The revised proposal should:

- (1) Synthesize project accomplishments in an evaluative manner rather than listing a number of project reports.
- (2) Evaluate the extent to which specific project objectives are being met.
- (3) Summarize the adaptive management process of making changes to sampling of fish and tribal fishers, rather than simply listing formulas.
- (4) Reconcile the description of the data situation with earlier data statements.
- (5) Justify the choice of selective fishery techniques.

**Preliminary comment requesting a response:**

The proposal is rich in detail about the context and history of the harvest monitoring efforts. It is weaker in detail about statistical sampling and estimation methods used, how these have changed, and why. The proposal needs to be stronger in documenting specific results of past work and the extent to which project objectives are being met.

A response is requested on:

1. Project accomplishments: more information is needed on what the project has accomplished to date and the extent to which project objectives are being met.
2. Adaptive management: more detail is needed, supported by data and examples, on how the project has adaptively managed its approach in response to changing conditions.
3. Methods: clarification is needed on the methods to be used to address each of the three specific problems the proposed work is designed to address. More detail is needed on methods of sampling surveys, estimation and the conduct of the live capture pilot study.
4. Education: a description is needed of the educational component (regarding mark-selective fishing techniques) of the live capture pilot project.
5. Metrics: detail is needed on metrics to be used for testing live capture methods and implementing the harvest management plan.
6. Data: the proposal indicates that the data are not electronically available. A description of the data situation and an explanation of why data are not in electronic format are needed. What problems exist with previously collected harvest data, and what is the plan to solve the problems?

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The stated goal of this project is to develop and implement a biologically sound harvest monitoring program through the collection of credible and accurate catch data to support harvest strategies consistent with treaty reserved fishing rights.

The proposal provides a detailed description of the significance of Nez Perce tribal harvest management to regional programs and agreements, such as U.S. v. Oregon. It describes the large geographic area within which the tribe holds treaty fishing rights and fishing locations. The Tribe is responsible for developing biologically and legally sound harvest plans for both artificial propagation and natural stocks that comport with ESA protections. The project components and objectives form the basis for improved harvest management and therefore are significant to regional programs.

A reasonable technical background is presented. The harvest monitoring project is described as a way to quantitatively evaluate progress toward meeting basin and subbasin harvest objectives and to determine tributary adult abundance. It ties these evaluations to both the U.S. v. Oregon and FCRPS BiOp processes. The U.S. v. Oregon process includes performance measures to monitor progress toward rebuilding and track trends in the status of indicator stocks. This project provides base information for used by the U.S. v. Oregon Technical Advisory Committee to complete annual run reconstruction and forecasting for upriver spring Chinook.

The proposal also ties the project to the Snake Basin Harvest Forum with a long-term goal of developing an integrative management system for tributary fisheries and harvest management in the Snake River Basin. A short-term goal is better coordination and harvest allocation. For some reason the project title does not include the Salmon River, but harvest is monitored there also.

The project is related to specific objectives of subbasin plans.

A good problem statement is provided, accompanied by a list three specific problems the proposed work is designed to address: 1. improving the timing and accuracy of harvest estimates; 2. accounting for harvest impacts on ESA-listed Snake River salmon and steelhead; and 3. increasing the Tribe's capacity to catch its full share of salmon and steelhead. However, clarification is needed on specific methods proposed to address each problem.

The proposal has three objectives each including specific deliverables: 1. plan anadromous harvest strategies and harvest monitoring appropriate for treaty fishing; 2. implement harvest monitoring plan; and 3. design and implement a pilot study to evaluate the feasibility of using "live catch" methods. The project appears to represent the primary source of funding for Nez Perce fisheries management. It is surprising that objective 2 is not already part of the management program.

The project collects, analyzes, and reports catch data pursuant to pre-planned statistical sampling designs and procedures to assure the conduct of biologically sound harvest strategies for Nez Perce treaty fisheries that may affect ESA listed species.

## *2. History: Accomplishments, Results, and Adaptive Management*

The project's financial history is summarized, with a brief statement that funding has been relatively static over time.

Project results in the form of harvest management plans and harvest enumeration are described. The Nez Perce Harvest Division produced one of the first long-term tribal resource management plans in the Snake Basin. The project has developed harvest plans and estimates of hatchery and wild fish in past years.

Various data collection methods are summarized. The proposal states that the project is learning from its experience and improving accuracy and precision of harvest estimates.

“Adaptive management” describes actions taken to improve project efficiency over time, including changing survey methods of harvest, statistical estimates of harvest to address data gaps, the development of sampling techniques that adapt to changing fishing areas (with a long-term goal of standardized Basinwide sampling of harvest and effort) and an assessment over time of the performance of estimators. The material is very briefly described and lacks sufficient data and examples. Further details of project accomplishments are provided in the annual reports but not summarized in the proposal.

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The proposal provides a detailed description of the project's relationship to other projects, subbasin plans and regional agreements. Accurate harvest and escapement estimates of hatchery and wild salmon (especially ESA listed species) are important. The investigators seem to be well qualified to make improvements in harvest estimation, as proposed.

A brief but adequate description of limiting factors and the project's approach to them is presented.

The ISRP is aware of tribal cultural issues regarding tagging and marking fish. It is therefore pleasing that the Nez Perce Tribe managers are willing to evaluate live capture methods that could lead to mark-selective fishing by tribal members. As part of this evaluation, it will be important to include an educational component to explain the benefits of mark-selective fishing techniques in increasing harvest of hatchery fish and reducing straying of hatchery fish.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

Deliverables are described in adequate detail under each project objective. Metrics are limited to harvest metrics such as CPUE and abundance. None are listed for testing live capture methods or implementing the harvest management plan.

Five RM&E work elements are listed, all directed at data collection and management, data dissemination, and data analysis and interpretation. The proposal indicates that the data are not electronically available, although it is not clear why this would be the case.

The project takes a reasonable step-wise approach to harvest management: 1. develop fishery plans and associated harvest monitoring plans for Zone 6 and Snake River tributaries; 2. determine potential run sizes pre-season and update those numbers in-season as fishery managers acquire better information on the actual run; 3. prepare annual and long-term fishery plans using best available information on the target populations; and 4. implement harvest monitoring methodology and disseminate data.

Some detail on methods is provided in the description of each deliverable; the survey methods under “study designs” are listed but not described. Regarding the pilot study on the use of live capture fishing methods, more detail is needed on how the study will be conducted.

#### **200810500 - Selective Gear Deployment**

**Proponents:** Colville Confederated Tribes

**Short description:** To use selective harvest fishing gear as a tool for: reducing the number of hatchery origin fish spawning in the wild with natural origin fish; collecting hatchery broodstock used in area supplementation programs; removing non-native, predatory fish species to increase juvenile salmonid survival; harvesting, distributing and storing fish for Tribal member subsistence and ceremonial uses.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

Qualification: The online proposal should be updated during contracting with BPA to provide the following information:

1. Provide a literature review/summary of hatchery fish effects on wild fish and the ecosystem in the CCT region of the Basin;
2. Explain how relationships among projects will be implemented, and provide a more detailed description of these related projects.
3. Explain methods used to evaluate which gear will be used for selective capture of hatchery fish (e.g., will CPUE, cost, or tradition (or some combination) be the deciding factor(s)?
4. Explain statistical details of monitoring methods;
5. Explain methods for communal distribution of fish caught in experimental gear;

6. Explain how the education and outreach components of objectives 4 and 5 will be performed and evaluated.

The successful implementation of the Chief Joseph Hatchery plan relies to a great extent on the success of this project for deployment of selective gear to catch hatchery fish and release wild fish. This project and further ISRP-requested revisions to the online proposal should draw from and clearly explain linkages to the in-depth monitoring proposed under the Chief Joseph Hatchery research, monitoring, and evaluation plan. The online proposal should be a self-contained document that does not necessitate the reading of additional referenced documents in order to evaluate its scientific and technical merit.

This proposal has been improved, and the proponents' response provided much of the detail requested by ISRP. The ISRP's request for a literature review/summary of hatchery fish effects on wild fish and the ecosystem in the CCT region of the Basin, however, was not provided. The statement of the relationship of the proposed work to other regional efforts remains quite sparse and focuses on outcomes rather than implementation relationships among projects. Other related projects are only briefly described. Much more detail was provided on project results in terms of total harvest and catch per unit effort (CPUE) by species, year, and gear type. Detail was not provided about comparisons among gear types; for example, measurement of mortality differences, etc. Apparently, only immediate mortality is assessed for each gear types, and delayed mortality is not. More detail was provided on methods. However, the response to ISRP's Question #9 concerning details on monitoring methods was weak and required finding details elsewhere. Additional statistical details (for example, power analyses) are required. The statistical basis for gear choice was not explained. Is this information in the referenced documents? The proposal does not clearly explain how the gear used for the selective capture of hatchery fish will ultimately be chosen, for example, will CPUE, cost, or tradition weigh heaviest in the choice? More detail was provided on the adaptive management process. The response did not provide a description of methods for communal distribution of fish caught in the experimental gear and indicated only that methods will not be difficult to develop. There is still insufficient explanation of how the education and outreach components of Objectives 4 and 5 will be performed and evaluated.

**Preliminary comment requesting a response:**

This proposal did not provide the ISRP with sufficient information for scientific review. The project could be significant to regional programs, but, as proposed, weak and equivocal results are likely to be obtained. The critical linkage to the Chief Joe Hatchery Program (CJHP) is not established. The scientific basis for almost all of the work should be improved to build a defensible program. Benefits of the proposed project to fish and wildlife cannot be ascertained as presently described.

The proponents need to revise and update their online proposal, as follows:

1. Finalize Statements in the Proposal Executive Summary which are currently incomplete.

2. Specifically describe the relation of their proposed work to other regional documents in the Project Significance to Regional Programs section. Establish the critical linkage between the proposed implementation of selective fishing and successful operation of the CJHP. Provide information on relationships with projects upriver and downriver from the mouth of the Okanogan. The latter would help the proponents plan their fishing effort and the former would benefit from knowledge of expected escapements after the fish pass through the Colville area.
3. State objectives in terms of desired outcomes. Describe deliverables in sufficient detail to enable scientific evaluation of the proposed approaches.
4. Provide a financial history and reporting (project started in 2008).
5. Describe the background, history, and location of the problem (a map was provided but no other description). The background and history should include a review of the major results of BPA Project #2007-249-00 (Evaluation of Selective/Live Capture Gear), which is the precursor to this project. Describe the relationship between the two projects. Provide a literature review on regional hatchery versus wild salmon issues and predator control programs in place elsewhere in the Columbia River Basin, and technical background specific to CJHP. Discuss hatchery fish impacts and explain why hatchery fish removal is required for the CJHP and the benefits to wild fish.
6. Describe deliverables and past performance (project began in 2008).
7. Describe major accomplishments to date (project began in 2008).
8. Provide specific information on how adaptive management will be implemented.
9. Provide work elements, RM&E Metrics, indicators, and methods for each objective. The project is said to be an RM&E proposal but this aspect needs further explanation. PIT tag data are planned to be archived in regional data bases but no details are provided. Methods to be used for fish capture (purse seine, weir) are straightforward but the statistical and geographic basis for their deployment needs to be described in much greater detail. In particular the statistical aspects of the fishing effort relative to Objectives 1, 2, and 3 should be specified in much greater detail (e.g. power analyses). Objectives 4 and 5 are tending toward socio-economic goals and should be evaluated with relevant criteria. Regarding the educational outreach, socio-economic goals change from individual to collective harvest. This is not just technical, but also educational. How does this work among tribal members? Beach seines and purse seines take a lot of human power.
10. Provide an action-effectiveness study design.
11. Provide project references or citations to relevant reports.

## 199702400 - Avian Predation on Juvenile Salmonids

**Proponents:** Oregon State University, Real Time Research

**Short description:** Evaluate the efficacy of management initiatives implemented to reduce predation on juvenile salmonids by Caspian terns nesting on East Sand Island; collect and compile data needed to complete the NEPA analysis required to manage double-crested cormorants nesting on East Sand Island, and once cormorant management is initiated, evaluate the efficacy of implemented management actions; assist resource managers in the development of plans for long-term management of avian predation, as warranted.

**ISRP final recommendation:** Meets Scientific Review Criteria

### **Comment:**

This is a well developed, well designed and important program for the Fish and Wildlife Program that supports a clear need that will benefit salmonids in the Columbia River Basin. The investigators have demonstrated that avian predation concentrated in certain specific areas has a large effect on salmonid outmigrant survival. They developed the necessary data to show this need and to support the management plans to move nesting birds and reduce the predation. The work proposed will continue these efforts, support efforts to move cormorants to appropriate nesting locations, and continue to determine the importance of predation by other nesting waterbirds (including the relatively recent arrival of pelicans in the estuary). This study is important to understanding the predation rate of fish-eating birds on various salmon stocks. This rate is being evaluated in considerable detail; however, the predator influence on the overall survival rate of the various stocks seems unknown (is it mostly compensated for or is it additive)? For a true cost-benefit analysis, this question needs to be answered. Perhaps avian biologists working with salmon biologists can address this critical issue by working together on salmon life stage models for various stocks, especially since predation rates seem to vary among species and stocks.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

Evaluate efficacy and management initiative implemented to reduce predation on juvenile salmonids by Caspian terns and double-crested cormorants on East Sand Island and develop plans for long-term management of avian predation, as warranted. Data indicates that most significant impacts to smolt survival occur in Columbia River estuary, although populations at other sites may be a concern to local stocks. The two avian species now take 15-20 million smolts annually, i.e., ~15% of all smolts. Stocks affected include every ESA-listed stock from throughout the Basin.

The project's plan is to (1) evaluate efficacy of management initiative implemented to reduce tern predation on East Sand Island, (2) collect compile and analyze data needed for NEPA analyses required to manage cormorants on East Sand Island, and once implemented evaluate efficacy of management actions, and (3) investigate impacts on juvenile salmonids of other piscivorous birds (Brown Pelicans, White Pelicans, Brandt's Cormorants and gull species), including interactions with smolt losses from Caspian Terns and Double-crested Cormorants.

Specifically, assess changes in tern habitat use, colony size, productivity, diet composition, smolt consumption and stock-specific predation rates (associated with reducing the acreage for nesting on East Sand Island from 5 to 1.5 acres. Basically the same approach seems to be followed with cormorants, but it is still in early stages and has not progressed as far.

Nice background information is given, with many detailed publications. Tern population is relatively stable since 1998, but cormorant populations more than doubled. More salmonids are now eaten by cormorants than terns. However, similar to other predator control projects, there is the lingering concern of the importance of predation losses via birds relative to overarching factors such as ocean survival.

## *2. History: Accomplishments, Results, and Adaptive Management*

Systemwide losses of juvenile salmonids to Caspian Terns in estuary amount to 3.6-6.7 million smolts per year, even after management to date. The colony on Rice Island was moved to E. Sand Island (closer to ocean) where diet would hopefully include fewer salmonids. A Caspian Tern dietary change indeed took place (from 90% salmonids to 47% salmonids) with a 62% reduction in consumption of smolts. Further management was needed with the goal in 2006 to redistribute half to two-thirds of E. Sand Island tern colony to alternative sites in Oregon and California, with goal to reduce smolt loss another 50% while still maintaining a viable tern population. Eight artificial islands were constructed in Oregon and California as alternative tern nesting habitat with more nesting islands planned as the size of the nesting area on E. Sand Island is reduced from 5 to 1.5 acres. Double-crested Cormorants on E. Sand Island in 2009 consumed 11.1 million smolts and the colony now represents 41% of the population in western North America. As with the tern, any management of the cormorants will likely require an analysis under NEPA which includes (1) assessment of population status in Pacific states, (2) available suitable alternative nesting habitat outside Columbia Basin, and (3) potential enhancement of salmonid recovery rates in Columbia River should management of cormorants be implemented. The project shows a history of solving problems with fish-eating birds and seems to be planning far ahead to obtain the information needed to assess responses from current or planned management activities. Many results have been published in peer reviewed journals. Raw data have been archived and are available to others. Adaptive Management is clearly demonstrated.

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

Research, monitoring and evaluation of piscivorous waterbird colonies are paramount to success of several regional fish and wildlife recovery plans. Numbers and percentages of smolts consumed by avian predators are needed to assess the success of management activities. Furthermore, the investigators plan to evaluate whether reduction in smolt consumption associated with management of birds in the estuary is compensated by commensurate increases in predation by other avian populations. The diet data will provide information on impacts of avian predation to salmonid and non-salmonid species alike. The study is designed to broaden

knowledge of fish mortality through understanding predator-prey interactions (on a species and stock basis). The study is dependent upon PIT tags applied by many salmon researchers. This indicates that avian biologists are working with salmon biologists.

A big question that does not seem to be fully discussed is, “What influence has the smolt loss from avian predation had on the adult return rate (survival) of various salmon stocks?” Some scenarios were discussed, but from what was presented, these seemed to be “what if” type presentations. The time is now to ask the question, “What type of data are necessary to fully understand what percentage of this avian predation loss is additive vs. compensatory?” It would seem like a real cost-benefit analysis needs the answer to this question. Game bird and waterfowl management has been concerned about compensatory and additive mortality for decades when determining harvest rates by hunting, so perhaps some approaches can be found in that literature. Emerging factors, especially climate change as it affects bird distribution, are acknowledged and factored into study designs. The investigators are apparently working with various management agencies across a broad geographic scope.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

Fourteen deliverables were described and were very specific with respect to types of data being collected and types of reports that will be prepared (usually journal articles). The techniques were described, and most were standard techniques or techniques they developed and described in earlier years of this study. A few methods were slightly modified when changes needed to be made for a different species. The deliverables were listed for both Caspian terns and double-crested cormorants. Certainly the investigators planned far ahead, e.g., collecting pre-management activity data so that it will be available for assessing responses to the management activities. Seems that many organizations and agencies are involved with this large project and cost sharing and expertise sharing is occurring.

## ***Predator and Competitor Control and Research***

### **199007700 - Development of Systemwide Predator Control**

**Proponents:** Oregon Department of Fish and Wildlife (ODFW), Pacific States Marine Fisheries Commission (PSMFC), Washington Department of Fish and Wildlife (WDFW)

**Short description:** The Northern Pikeminnow Sport Reward Fishery is the primary component of this project. The goal is to remove 10-20% of the predatory sized fish each year, which modeling estimated would reduce pikeminnow predation on salmonid smolts up to 50%.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

#### **Comment:**

This proposal describes a successful ongoing program to encourage anglers to exploit a native nuisance predator, the northern pikeminnow (NPM), and to evaluate the effectiveness of this exploitation for reducing predation on outmigrating salmonids. After 20 years of modifications and fine-tuning, the program has achieved 10-20% exploitation rates on large northern pikeminnow, which are the most predaceous, and an estimated 40% reduction in predation on out-migrating smolts.

The overall significance of these northern pikeminnow removals on SARs remains unknown, relative to marine survival in particular, as the proponents note:

“Although it is inherently difficult to relate predator removals to smolt survival benefits, it should in theory be relatively easy to estimate the correlation between SARs and NPMP exploitation rates. The NPMP staff plans to complete this evaluation in the next project cycle.”

Qualification 1: The program would be improved if the evaluation was completed (or at least some detailed plans for evaluation completed) in the present project review cycle.

Statistical designs and analyses have been reviewed about 7-10 years ago, and investigators are using estimators that, although valid, might be improved.

Qualification 2: The ISRP recommends investing in an updated review of these methods (before the next review cycle) by scientists with expertise in current capture-recapture methods, to ensure that the best methods are being used.

Previous ISRP comments still apply, “This program is well justified, technically, and the predator removal program seems to have reached its objectives over the years, although better information might be provided on how this has improved smolt-to-adult return rates (SARs).”

Other ISRP comments:

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

This project primarily responds to the 2008 FCRPS BiOp (a number of RPAs referred to for several objectives). The program is important at the regional level, since it measures northern pikeminnow predation throughout >400 miles of the mainstem Columbia and Snake rivers, and addresses predation at the whole-system scale.

The technical background provides good justification for the program and is supported by a large number of peer-reviewed publications detailing the biological parameters of predation, and the models used to estimate both abundance and consumption, all of which are used to estimate system-wide predation and compare it to pre-program levels. However, there may be some potential for further improvements in design and analysis as the statistical sampling design and statistical estimators used have been reviewed about a decade ago (Hankins and Richards 2000 [not listed in the References]; Styer 2003). Moreover, some references listed (e.g., Everhart and Youngs 1981) are nearly 30 years old. Although unbiased statistical estimators do not become out of date, newer methods are constantly being developed that provide improved estimates. For example, capture-recapture methods used for estimating exploitation of waterfowl are an active area of research and analysis. The ISRP believes that a modest investment in review by analysts with expertise in modern capture-recapture theory would be well worth the investment to continue updating methods and deriving the best estimates (e.g., see White and Burnham 1999; Royle and Garrettson 2005, White 2008, Zimmerman et al. 2009).

Royle, J. A., and P. R. Garrettson. 2005. The effect of reward band value on mid-continent mallard band reporting rates. *Journal of Wildlife Management* 69:800-804.

White, G.C. 2008. Closed population estimation models and their extensions in Program MARK. *Environ. Ecol. Stat.* 15(1): 89-99.

White, G.C. and K. P. Burnham. 1999. Program MARK: Survival estimation from populations of marked animals. *Bird Study* 46 Supplement, 120-138.

Zimmerman, G. S., T. J. Moser, W. L. Kendall, P. F. Doherty, G. C. White, and D. F. Caswell. 2009. Factors influencing reporting and harvest probabilities in North American geese. *Journal of Wildlife Management* 73:710-719.

### *2. History: Accomplishments, Results, and Adaptive Management*

A thorough description of history and accomplishments of the northern pikeminnow program is provided.

Major results are explained in detail in the Problem Statement / Technical Background of the Objectives subsection. Several important ones include:

(1) Fisheries for northern pikeminnow, have resulted in the removal of over 3.3 million northern pikeminnow >250- mm fork length throughout the lower Columbia and Snake rivers, with annual exploitation from 1991-2009 averaging approximately 13%.

(2) Exploitation of northern pikeminnow >250- mm fork length has remained above 10% since 1998, and has increased in recent years. Exploitation rates in 2004 (18.5%), 2005(19.0%), and 2008(19.5%) were the highest observed rates in the history of the program.

(3) Predation index values have generally decreased since the early years of the program (1990-1993), especially above Bonneville Dam. Below Bonneville Dam, predation indices have fluctuated recently (1999, 2004, and 2005), but remain below mean 1990-1996 values.

The project is continuing to meet goals, but (as indicated above) the ISRP would like to see results and data regarding the question of significance of northern pikeminnow removals for benefiting SARs.

The project is continually practicing adaptive management by adjusting program efforts based on annual results as indicated by exploitation rates.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

Although no Project Relationships were listed, it is clear that this effort is a close collaboration among the Pacific States Marine Fisheries Commission, the Oregon Department of Fish and Wildlife, the Washington Department of Fish and Wildlife, and other management agencies.

Northern pikeminnow predation has long been recognized as a limiting factor for salmonid smolt survival. An emerging limiting factor might be the overarching effects of climate change on conditions like temperature, which might foster or reduce populations of northern pikeminnow or non-native predators like walleye and smallmouth bass.

There is scope for value added results from the project such as information on lamprey in northern pikeminnow stomachs. Proponents should collaborate with CRITFC relative to the Columbia River Basin Lamprey plan to see if joint data collection could be conducted.

### *4. Deliverables, Work Elements, Metrics, and Methods*

Deliverables, work elements and metrics are well established and proven to meet their intended purposes (i.e., estimate consumption rate of salmonids by northern pikeminnow). One exception is for Objective 6, which seemed to be a relatively vague statement about using the model and attempts to continually improve it, but with little reference to how these might occur.

Methods were adequately described (with the exception of Objective 6) and references made to peer-reviewed publications where needed.

### 200727500 - Impact of American Shad in the Columbia River

**Proponents:** US Geological Survey (USGS)

**Short description:** The goal of this project is to provide credible lines of argument regarding whether shad provide positive benefits or are detrimental to efforts to restore Columbia River fisheries. This proposal seeks to estimate juvenile shad abundance and consumption of zooplankton in mainstem reservoirs to better understand how they interact with salmon productivity.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

Qualification: Objective 4 currently does not meet scientific review criteria. However, it is an important component of the project, and protocols for the additional work need to be fully described in a study plan and submitted for ISRP review before this objective is implemented.

The proponent has provided adequate responses to most of the Panel's questions with the exception of comments directed to Objective 4. This component, dealing with the question of effects of shad on salmonids, is a key element of the project. An explanation of the experimental design is required – how will this work be conducted? Is this a "natural experiment" that requires years of sampling to cover time periods when shad are abundant and then not? The data collected may allow comparison of age-0 Chinook condition, growth, and survival in locations or years when shad are abundant or zooplankton are scarce, but the analysis of these data was still not entirely clear. The Panel suggests this empirical work could be integrated with proposed bioenergetics modeling and food web analysis.

The ISRP was particularly pleased to see the proponents will broaden their network of biologists involved in the project. Taxonomists and bioenergetics specialists are now involved. The contacts and partnerships with others conducting research on American shad in the region are a positive step. Details of shared tasks and data resulting from these partnerships should be added to the proposal at or prior to contracting with BPA and the Council. The Panel reiterates our suggestion that the proponents contact Dr. Quinn concerning his work on shad in the marine environment as this phase of the life history needs to be integrated into any overall risk assessment for this species in the Columbia River Basin.

The ISRP accepts the proponent's explanation that the original scope of the project was significantly cut due to budget reductions, but it is unfortunate because original food web studies would have provided valuable information regarding shad and juvenile salmonid interactions.

**Preliminary comment requesting a response:**

This project has provided interesting, relevant, and previously unknown information on the role of shad in the Columbia River reservoir food web. Several interesting hypotheses pertaining to food web relationships involving juvenile shad have been proposed. These include: shad as a potential competitor with juvenile subyearling fall Chinook migrants; shad as important prey for both native (pikeminnow) and non-native (smallmouth bass) predator species which could improve their growth and survival; shad as prey for subyearling salmon; and shad as disease vectors.

Instead of pursuing the broad intent of the project, implied by its title “Impact of American Shad in the Columbia River,” the proposed work narrowed its focus to partially address only the competition hypothesis. The proposal focuses on determining abundance of juvenile shad in reservoirs and estimation of zooplankton abundance, production, and consumption by shad. Even with this narrowed focus, it is unclear, given the data that is to be collected, how the proponents will evaluate whether competition for food between juvenile shad and subyearling Chinook is depressing Chinook growth and abundance in lower Columbia River reservoirs. To even demonstrate the feasibility of a competition hypothesis, with the approach implied in this proposal, many years of data on juvenile shad abundance (preferably over periods when shad both increased and decreased), zooplankton abundance, and subyearling salmon growth and survival would be necessary to provide statistical rigor. If the intent of the proponents is not to address the competition question in a rigorous way, they should say so and indicate how their work is relevant to salmon-shad interactions.

The proponents seem to have abandoned their work on food web structure (the encompassing set of hypotheses) in favor of a more narrowly focused project. A great deal is yet to be learned about food web dynamics in Columbia River reservoirs, especially as it relates to its most abundant species, American shad. Competition between shad and salmon does not stand alone, independent of the dynamics of the food web – the complex set of food web interactions that could influence the outcome of competition. In other words, competitive outcomes must be viewed in the context of the entire food web. More fertile ground would be to pursue work on food web dynamics, with competition as a subset of the interactions of importance. Along these lines, it seems that the proponents have enough information on possible species relationships and demographic data on shad, salmon, and pikeminnow to pursue food web modeling, such as the loop analyses done by Hiram Li and Phil Rossignol at Oregon State. We recommend that the proponents work with investigators with food web expertise such as Rossignol and Li to improve the project.

Specific components that need clarification in a response:

1. Methods to determine competition between shad and other fishes need to be expanded upon, because to show competition, food must be shown to be limiting, and that issue is not being investigated. Are the proponents able to facilitate an accompanying program on juvenile salmon? Partnering with biologists working on juvenile salmon ecology is strongly encouraged.

2. The proponents raise the concern that a nonnative copepod could be supporting shad. However, no mention was made of, for example, determining whether these zooplankters make up a high proportion of the zooplankton biomass and production, or assessing diets of juvenile shad from those caught in purse seines, to determine what proportion of shad diets they make up. It is necessary to have information on a) how the datasets will be analyzed to address the main question of whether shad affect zooplankton, or vice versa, b) whether the nonnative invasive copepod is increasing and influencing zooplankton production and shad abundance, and c) whether shad are making use of the invasive copepod, as suspected.
3. How is this project related to the USGS's BiOp proposal #2008-719-00 to study non-native predator impacts on salmon?
4. Shad can be stopped at Bonneville Dam with a fishery and/or fish ladder modification. Would the proponents recommend this action?
5. Shad are declining coastwide. Are the proponents in contact with shad researchers elsewhere on the coast to help look for common factors, perhaps in the ocean, relating to the decline? In particular, Dr. Tom Quinn at the University of Washington has a student working on shad coastwide and the ISRP recommends coordination with the UW project.
6. The nematode *Anisakis simplex* is found in adult American shad in Oregon rivers (see Shields BA, Bird P, Liss WJ. et al. 2002. The nematode *Anisakis simplex* in American shad (*Alosa sapidissima*) in two Oregon rivers. *J Parasitology*. 88(5):1033-1035). Have the proponents looked for this parasite in shad and/or considered the effect of this nematode on shad in the Columbia River?

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

This project responds well to the Council's MERR plan because the plan calls for studies to evaluate positive and negative impacts of American shad on salmon, sturgeon, and other species as well as the feasibility and advisability of shad management measures. The Fish and Wildlife Program and the BiOp also identify the need for understanding the impacts of shad on listed salmonids.

Shad are clearly superabundant in the lower river and an understanding of their role is important. An issue, however, is what can managers do about shad if they are found to be a competitor with juvenile salmon? Shad could be controlled by modification of passage structures in mainstem dams. However, as this non-native has been in the Columbia River for several decades, control could cause cascading effects within the ecosystem (e.g., Zavaleta, E. S., R. J. Hobbs, and H. A. Mooney. 2001. Viewing invasive species removal in a whole ecosystem context. *Trends in Ecology and Evolution* 16:454-459). Research on adapting to their presence by using them as

fish food in hatcheries (assuming the disease problem can be resolved) is an example of what could be done with them.

The technical background is well done, and the proponents have a watching brief on new data from shad projects in the species' native range. However, the proponents have not covered the invasive literature very well. A reference that covers the topic well and includes high fecundity animals such as American shad is Rilov, G. and J.A. Crooks (Eds.) 2009. *Biological Invasions in Marine Ecosystems: Ecological, Management and Geographic Perspectives Ecological Studies Volume 204*. Springer.

The sampling and analysis methods look sound, but the ISRP requests that the investigators present more information on the ultimate analysis. That is, once data on shad abundance in reservoirs, and zooplankton biomass and production, are derived, what will be done with them? Will a bioenergetics model be used to determine whether shad abundance can deplete zooplankton to levels that will stress juvenile salmon? Will investigators attempt to determine whether zooplankton limit juvenile shad during certain periods in certain reservoirs? Likewise, the concern that a nonnative copepod could be supporting shad was not fully explored in the proposal (response item 2 above). These seem like opportunities missed.

### *2. History: Accomplishments, Results, and Adaptive Management*

The proponents have provided documentation of their accomplishments and results. Information gained should allow managers to consider options for near-term management of shad in the system, including prospects for control of this non-native fish. A key finding is the likely influence of disease on shad survival. If the population crash of the species continues, will shad continue to be a problem? Disease and thiamine deficiencies might be key limiting factors but the scope and nature of the problem is still evolving.

The investigators appear to be starting to publish the data they have collected since 2007 in the peer-reviewed literature, which is a good sign of progress, and a key to ensuring a strong basis on which future research and management can be built.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The proposal would be improved by increasing ties with biologists working on juvenile salmonid ecology so that a more comprehensive view of emerging factors affecting food webs can be achieved. It is a daunting task to document competition and an ecosystem approach is required.

The investigators discuss the potential for a nonnative zooplankton to change dynamics, but it would be helpful to present information on how or whether density or biomass of this nonnative will be estimated from plankton samples. Is this also an objective of the work, as an emerging limiting factor?

Climate change may be driving changes in water temperatures or other physical drivers, which in turn may be causing changes in disease or nonnative invasions. Information on plans to assess the importance of factors related to climate change as drivers of American shad would be a useful addition to the proposal.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

Methods to determine competition are not well thought out, because to show competition, food must be shown to be limiting. An accompanying program on juvenile salmon is required. Partnering with biologist working on juvenile salmon ecology is strongly encouraged.

The other work elements, metrics, and sampling methods are well established and scientifically defensible.

Reporting has been done on-time. It was good to see several peer review publications in press or under way, and input to AFS symposium was excellent. Better links are needed to these documents. The basic data described as the one deliverable seems suitable, but it seems incomplete without a more detailed analysis of the relationship between shad and zooplankton, as described above.

It is unclear how management agencies might use this deliverable to make decisions about American shad management to benefit native fishes, without further analysis.

### ***Lamprey***

#### **199402600 - Pacific Lamprey Research and Restoration Project**

**Proponents:** Umatilla Confederated Tribes (CTUIR), National Oceanic and Atmospheric Administration (NOAA)

**Short description:** The purpose of this study is to provide the critical information to restore Pacific lampreys *Lampetra tridentata* in the Umatilla River that is called for in the Draft Umatilla/Willow Subbasin Plan.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

Qualification: The ISRP concurs with the proponents that a synthesis of results to date should be prepared. The ISRP suggests that the synthesis should not be simply a summary of past work but rather should focus on general conclusions that can be drawn from the body of the work since initiation of the project, with supporting evidence, and possible future directions for the work. The proponents should also provide a candid assessment of status and trends in fish and habitat performances including whether trends suggest improvements in these performances related to restoration and enhancement efforts. The synthesis should describe what has been learned that could be applied to a program-wide design for lamprey restoration and research. The ISRP

suggests that the synthesis be completed within one to two years. The ISRP looks forward to reviewing the synthesis.

We appreciate the proponent's willingness to provide a major synthesis of results of the project. This project is one of the longest running and most comprehensive lamprey projects in the Basin and has much interesting and useful information to provide managers and the scientific community.

Most of the ISRP's questions and comments were addressed adequately by the proponents. The proponents referred the ISRP to publications and reports in response to some individual ISRP questions or comments. Due to the time constraints imposed on the ISRP in their initial review of proposals and in review of responses, we were unable to carefully examine the reports and publications.

The proponents indicated that the Columbia Basin Lamprey Technical Workgroup is concerned about the problem of ocean impacts on survival but is in need of direction about how to address it. The proponents have been involved in the Technical Workgroup discussions.

Regarding contaminants, samples of adults and juveniles were provided to CRITFC for their lamprey contaminant study. Commenting on this study, the proponents stated that the ISRP has not provided a "Qualified" review to CRITFC's Project and therefore funding is being withheld to complete this objective." It is not clear what this response means.

The proponents provided an adequate response to the ISRP's second comment concerning the need for a long term strategy for resolving the issue of mainstem dam passage. Serious concern for this issue is evident. The proponents have been cooperating with tribes and the Corps of Engineers in developing a plan of action for improved passage. They described the multiple efforts currently being undertaken to improve lamprey passage at mainstem dams. Considerable information was made available regarding the relatively low passage rates at the various dams.

The ISRP commented concerning mainstem dam passage: "Even if reproduction is successful, however, adult returns could be seriously impaired by passage problems at mainstem dams. The proponents should discuss how long outplanting of adults will continue before success or failure of the program is determined and give their perspective on the time frame for overcoming mainstem dam passage problems." The point was whether mainstem dam problems can be resolved on a timeframe to allow the restoration work on the tributaries to be effective? The proponent's response – "The ISRP should review the Corps 10-year lamprey passage plan to increase their awareness of this plan" – is insufficient to address this important issue.

Based on the information presented in the proposal, the ISRP deemed the work proposed in Objective 4, "Develop structures to improve adult lamprey passage success," not scientifically justified because better understanding of passage under different flow and temperature conditions and prioritization of passage barriers in the Umatilla according to passage efficiency was needed before investment in passage improvement structures throughout the Umatilla was

undertaken. In their response, the proponents provided detailed information to justify that diversion screens pose a serious problem for lamprey passage in the Umatilla and installation of passage improvement structures can be implemented. The ISRP now considers this objective to be scientifically justified.

For Objective 6, "Estimate the numbers of juvenile lampreys migrating out of the Umatilla River," the ISRP commented: "The method for estimating outmigrant production needs to be explained more clearly and in more detail." Although more detail was provided, the proponents did not discuss problems with enumerating lampreys identified in other lamprey projects (screw trap inefficiency/retainment issues).

The ISRP considered Objective 7 in the initial proposal, "Investigate juvenile lamprey screening criteria for use in the Umatilla Subbasin," which proposed a series of laboratory and field experiments to determine the effects of diversion screens on juvenile lamprey scientifically unjustified due to lack of detail about the experimental design and methods. Details of the study design and methods were provided in the response. The proponents documented problems with effects of dewatering on lamprey as well as the ineffectiveness of screens. The ISRP now considers this objective scientifically justifiable. The work could be of great value in reducing lamprey mortality at irrigation diversion screens.

**Preliminary comment requesting a response:**

The ISRP requests a response on following five primary items (some additional questions are asked in the "Other ISRP comments" below):

1. Ocean survival and contaminant aspects. As explained in [ISAB 2009-3](#), there is strong evidence of a coast-wide pattern in lamprey survival, suggesting a marine/estuarine influence on this anadromous species. In addition, as also explained in ISAB 2009-3, lamprey are high in lipids and contaminants that likely bioaccumulate in this species with possible effects on survival. The proponents need to address these issues.
2. An explanation of the long term strategy for resolving the issue of mainstem dam passage problems is needed. Even if translocations work, the translocated animals' progeny may not survive passage over mainstem dams. The proponents' entire program is contingent on either resolving the problem or continuing translocation on a long term basis. If translocation is to be continued then it needs to be justified on a cultural-economic basis that does not use scientific criteria.
3. Objectives 1, 2, 3, 5, and 6 could be scientifically justified if the proponents provide a satisfactory response to ISRP questions. Objectives 4 and 7, in their current form, are not justifiable at this time for reasons described below.
4. The proponents need to provide a synthesis of results directly related to the proposed work – in particular, results related to evaluation of translocation of adults including

larval densities before as well as after outplanting began (by larval size/age class, if possible), outmigrant numbers before and after translocation, and redd densities if available. ISRP questions related to methods and metrics for each objective need to be addressed. In general, more details about the study designs are needed to determine whether the studies, as conceived, will adequately answer the questions being posed.

5. Within a year the proponents should prepare a major synthesis of project accomplishments for review by the ISRP. The synthesis should include objectives, methods, results, data analyses and interpretation, major conclusions that can be drawn from the work to this point, and future directions of the work. The proponents need to present a comprehensive plan for assessing the success of adult translocation. The proponents would be wise to enlist the services of a statistician in analyzing their data.

The proposal presents a comprehensive multidimensional plan for monitoring and evaluating lamprey recovery in the Umatilla Basin. A great deal of useful information concerning lamprey abundance and distribution and factors limiting productivity is being gathered. Adequate response to the questions posed above should reinforce the soundness of the science underlying this worthwhile project.

Other ISRP comments:

*1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The decline of Pacific lamprey in the Columbia River Basin and the need for restoration is largely unquestioned at this point in time. This project is one of several lamprey projects in the Columbia Basin. It was designed to provide critical information to restore Pacific lamprey in the Umatilla River. The project addresses five of the 16 aquatic biological objectives listed in the Umatilla Subbasin Plan, provisions of the 2000 Fish and Wildlife Program, critical uncertainties defined by the Columbia River Basin Lamprey Technical Workgroup, and needs identified in the Tribal Lamprey Restoration Plan developed by CRITFC tribes. The results from this project will be useful in other subbasins.

The objectives are most clearly stated in the Study Design section of the proposal. The Deliverables are essentially the same as these objectives. They include 1) increase larval abundance in the Umatilla River by continuing to outplant adult lamprey, 2) estimate the numbers of adult lampreys entering the Umatilla River, 3) monitor passage success to spawning areas, 4) develop structures to improve adult lamprey passage success, 5) monitor larval population trends in the Umatilla River by conducting electrofishing surveys, 6) estimate the numbers of juvenile lampreys migrating out of the Umatilla River, and 7) investigate juvenile lamprey screening criteria for use in the Umatilla Subbasin. This set of objectives defines a comprehensive plan for monitoring lamprey populations in the Umatilla River. Objectives 1, 2, 3, 5, and 6 could be scientifically justified if an adequate response to ISRP questions is provided by the proponents. Objectives 4 and 7 currently are not justified for the reasons given below.

## *2. History: Accomplishments, Results, and Adaptive Management*

The project appears to have accomplished a great deal, but results were only briefly summarized (in a few sentences) for each year of the project. The proponents instead refer the reviewer to a 20-page paper in an American Fisheries Society symposium (Close et al. 2008) and Moser (2005) for a description of passage improvements. The proponents should have summarized concisely the significant results of the project, especially those directly related to this proposal, with supporting data and analyses, rather than referencing a symposium paper. For example, even a brief explanation of how the low elevation ramp works on the smaller dams would be helpful. Of particular use in reviewing this proposal would have been a more detailed presentation of results related to adult outplanting including larval densities before as well as after outplanting began (by larval size/age class, if possible), outmigrant numbers before and after translocation began, and redd densities if available. The CRITFC lamprey plan is mentioned in passing. It would be helpful to know if it is now finalized.

The proponents say little about adaptive management except to note that they reduced the number of adult lamprey taken at Bonneville Dam for supplementation in the Umatilla due to low adult returns.

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

This project is one of several lamprey restoration projects being conducted in the Columbia Basin. Two salmon monitoring and evaluation projects on the Umatilla River assist in capturing larval lamprey. Project #198902700 (Power Repay Umatilla Basin Project) is seeking to include flow enhancement to aid upstream passage for Pacific lamprey. This project will coordinate with other radio telemetry programs in the region to utilize existing radio telemetry arrays in the area to track lamprey movement. The proponents correctly stated that findings in this study will have application in nearly every subbasin.

The proponents state that they are unaware of emerging limiting factors for lamprey largely because little information is available on effects of emerging factors such as climate change on lamprey, although clearly reduced stream flow and elevated water temperature, both potential impacts of climate change, will affect lamprey.

Chemical contaminants need to be considered as an emerging limiting factor. Lamprey have a high lipid content and so can accumulate many contaminants. It seems that lamprey projects could have an Oregon Department of Environmental Quality or EPA cooperator, and, when samples are collected (the greatest cost often is in collecting the samples), some analyses could be performed to address the contaminant issue. This could be especially important in waters near wastewater treatment plants (personal care products, pharmaceuticals, and flame retardants) or intensive agriculture areas (pesticides). These problems may be especially critical where the rivers/streams are small with low flow (lack of dilution).

As explained in detail in ISAB 2009-3 and several recent ISRP reviews of other lamprey proposals a more holistic approach to lamprey restoration is required, with particular attention to marine/estuarine habitat as a limiting factor. Nevertheless, adult passage at mainstem dams and low level dams in tributaries is acknowledged as a major issue to be resolved.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

Many of the methods seem relatively standard and the concepts seem very logical. The project, however, needs a statistician to assist with data analysis, especially the tagging effort. It seems very late in the project's life to have this need, especially for adequately designing studies. The big question is "Will the project answer some of the critical questions, or is it just collecting data?"

The following are comments on individual objectives:

Objective 1: Increase larval abundance in the Umatilla River by continuing to outplant adult lamprey.

The Umatilla is the test case within the Columbia Basin for translocation of adult lamprey. Adults are collected at Bonneville Dam or Willamette Falls and released into the Umatilla River. Translocation of adults began in 2000. Larval lamprey densities after translocation began are considerably higher than prior to outplanting of adults, suggesting that successful reproduction of translocated adults had occurred. The hope is that translocating adult lamprey will result in a self-sustaining population in the Umatilla Subbasin. Even if reproduction is successful, however, adult returns could be seriously impaired by passage problems at mainstem dams. The proponents should discuss how long outplanting of adults will continue before success or failure of the program is determined and give their perspective on the time frame for overcoming mainstem dam passage problems.

An escapement goal should be provided, and the proponents should discuss how it was determined. The ISRP understands that setting such a goal could be difficult given the lack of information on historical lamprey run sizes but an escapement target, even if it is tentative, would help track success of the program.

Objective 2: Estimate the numbers of adult lampreys entering the Umatilla River.

The proposal could be improved if discussion of the mark-recapture methodology were expanded. More detail about application of the Schaefer method is needed including why it was chosen over other methods. How will the assumptions of the Schaefer method be addressed? How will the fish be marked? Will there be secondary marks? Will tag retention rates be calculated and how? It may be helpful for the proponents to review the discussion of the mark-recapture methodology provided in the proposal for Project 2002-016-00, "Evaluate the Status of Pacific Lamprey in the Lower Deschutes River." Variance estimates for population sizes need to be within acceptable standards.

Objective 3: Monitor passage success to spawning areas.

This is an important objective and needs more detailed explanation. Will groups be tagged and released throughout the summer to determine migration patterns at different water temperatures and stream flows? Will fish be released below each dam within the system or will groups released below downriver dams be followed progressively through upriver dams, or both? If so, how many fish will be tagged? How will passage efficiency be related to water temperature and river flow? Statistical analysis of the data needs to be better explained.

Objective 4: Develop structures to improve adult lamprey passage success.

This objective pertains to designing and installing lamprey adult passage structures at irrigation diversions and is not scientifically justified at this time. Radiotelemetry work performed to date by the proponents, although preliminary, indicates that lamprey adult may have difficulty passing low head dams such as irrigation diversion dams. More work is needed, however, to better understand adult upstream passage under different flow and temperature conditions and to prioritize passage barriers according to passage efficiency before investment in passage improvement structures throughout the basin is warranted (this work is proposed in Objective 3). In the initial radiotelemetry study, sample sizes of adult lamprey were small, few fish passed upstream of Boyd Dam located on the lower river and so passage problems posed by upriver dams are not well understood, and passage seemed to be strongly affected by water temperature and stream flow. Also, more information about the passage structures, their design, and effectiveness needs to be given. Perhaps evaluating the effectiveness of passage structures at a few dams should be undertaken before a large scale installation is begun.

Objective 5: Monitor larval population trends in the Umatilla River by conducting electrofishing surveys.

The proponents indicate that they will “relocate larval density index sites” (Task 5.1). They refer to 33 index sites where larval estimates were obtained prior to adult outplanting. Are these the sites to be relocated and, if so, why are they being relocated and how will new sites be chosen? How will population sizes be estimated “through statistical analysis?” Will habitat variables be measured and related to abundance and distribution? If so, what will be measured and how will the analysis be done? What is the Zippen formula and why was it chosen to calculate larval density?

The proponents state under Background, “Where initial surveys in 1998 provided evidence that larval lamprey were not present in the system, after five years of supplementation efforts, we find that larval lampreys are persisting at all upper index sites (Figure 3), providing evidence that habitat may not be the limiting factor for successful recruitment.” If this is the case can juvenile habitat restoration be justified?

Discussion of the statistical methods for estimating juvenile lamprey densities would improve the proposal. Technical problems associated with lamprey trapping such as lamprey escaping from rotary trap boxes are not mentioned.

Objective 6: Estimate the numbers of juvenile lampreys migrating out of the Umatilla River

The method for estimating outmigrant production needs to be explained more clearly and in more detail.

Objective 7: Investigate juvenile lamprey screening criteria for use in the Umatilla Subbasin

Objective 7 pertains to laboratory and field studies on impacts of irrigation diversion screens on larval lamprey and is not scientifically justified at this time. Before undertaking an extensive laboratory and field study, the proponents should conduct a preliminary study in the field to assess the relative magnitude of entrainment, injury, and mortality of juvenile lampreys and determine how serious a problem diversion screens present. This information could be used to justify a laboratory and more extensive field study. Objectives, research design, and methods for the USGS laboratory and field studies presented in the current proposal are insufficiently detailed to meet scientific criteria.

Deliverable 8: Publish results of Pacific lamprey studies.

This appears to be a worthwhile effort, but no details are given on exactly what would be published.

#### 200201600 - Evaluate the Status of Pacific Lamprey in the Lower Deschutes River

**Proponents:** Confederated Tribes of Warm Springs

**Short description:** The goal of this project is to determine the status of Pacific lamprey (*Lampetra tridentata*) in the Deschutes sub-basin and associated limiting factors to restore lamprey populations to sustainable, harvestable numbers. Decreasing numbers of adult Pacific lamprey returning to traditional collection sites has resulted in reduced harvest opportunities for Confederated Tribes of Warm Springs (CTWSRO) tribal fishers.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

Qualification: The ISRP requests that a synthesis of the work be prepared within one year. The synthesis should not be simply a summary of past work but rather should focus on general conclusions that can be drawn from the body of the work since initiation of the project, with supporting evidence, and possible future directions for the work. The proponents should also provide a candid assessment of status and trends in fish and habitat performances including whether trends suggest improvements in these performances related to restoration and enhancement efforts. The ISRP looks forward to reviewing the synthesis.

In addressing the ISRP comment pertaining to ocean survival, the proponents briefly reviewed the little that is known about lamprey ocean ecology and acknowledged that ocean conditions could affect survival. However, they did not discuss studies that would specifically answer the questions, arguing that ocean survival was beyond the scope of the study. The ISRP is concerned that major commitments to lamprey restoration in tributaries such as the Deschutes will be to no avail if these "out of subbasin" effects are not dealt with. Perhaps they will be under the proposed lamprey master plan. We assume CTWSO is engaged with the development of the lamprey master plan, which at least is a step towards the needed understanding of cumulative effects.

In the response to the ISRP comment pertaining to mainstem passage problems, the proponents acknowledge the severity of lamprey passage mortality. They refer to work being conducted to improve passage for lamprey over mainstem dams. They note that Deschutes River lamprey returns have been relatively stable from 2004-2009 and suggest that Deschutes lamprey is an anchor population. The proponents have a point and need to gain as much understanding of this population as possible. Their major point, however, was that ocean impacts and dam passage problems do not obviate the need for lamprey research and restoration in tributaries. The ISRP agrees. As stated above, our central concern with this project and other lamprey projects is that the effects of poor ocean conditions combined with mainstem passage problems may be so pervasive as to counteract any positive impacts of tributary restoration actions.

Regarding the ISRP question concerning contaminants as a possible limiting factor, the proponents indicated they will assist CRITFC's effort to collect lamprey tissue samples for contaminant analysis. The proponents noted that a contaminant study is beyond the scope of this project and rightfully argued that contaminant studies need to be designed on a larger scale and involve spatial and temporal issues.

In their response to the question concerning specific escapement goals for Deschutes lamprey, they provided a general goal, and believed specific goal setting was premature. However, we note that to develop a specific goal stimulates thinking about all of the types of information that is needed. Some of this type of thinking was noted in their response.

The proponents state their difficulties with some very basic measurements including lack of tagging technology, an inability to capture and retain lamprey in traps, and the imprecise nature of aging lamprey. The proponents are therefore very concerned about lamprey enumeration technique issues, and perhaps this narrow problem should be more of a focus for their work.

The ISRP requested a synthesis of the work. The proponents responded by providing an abbreviated list of accomplishments, in bulleted format, and referring the ISRP to their annual reports. It is unfortunate that the proponents have chosen not to respond in depth to the ISRP's key request for a synthesis of findings to date. Since the project has been going since 2002, this is not an unreasonable request.

**Preliminary comment requesting a response:**

A response is requested on the following items (also see the questions under “Other ISRP comments” below):

1. Ocean survival aspects. As explained in [ISAB 2009-3](#), there is strong evidence of a coast-wide pattern in lamprey survival, suggesting marine/estuarine influence on this anadromous species. The proponents should address this issue in their response.
2. An explanation of the long-term strategy for resolving the issue of mainstem dam passage problems is needed. If this problem is not resolved and research on restoration is to be continued then it needs to be justified on a cultural-economic basis that does not use scientific criteria.
3. The proponents should consider work on contaminants as a limiting factor. As explained in [ISAB 2009-3](#), lamprey are high in lipids and contaminants are likely to bioaccumulate in this species with possible effects on survival.
4. The proponents should discuss how results from several of their studies will further management. Specifically, how is the work relevant to impacts of land use activities? The proponents should provide more detail on some aspects of their work and a synthesis of their work to date entailing general conclusions. It would be helpful if a brief synthesis – the big picture – was provided considering that the project has been ongoing since 2002.
5. The proponents should state an adult escapement goal, explain how the goal was arrived at, and provide a candid assessment of how reasonable the goal is in light of current returns. The ISRP realizes that this may be difficult due to the lack of historical information on lamprey abundance, but a goal, if only tentative, would help track the project’s success.

This is an important project that should contribute knowledge of lamprey ecology that could be useful in management. The project seems to be carefully designed and executed. The proponents’ perspective on how large-scale questions such as ocean survival, mainstem passage, and contaminants will impact their efforts to restore lamprey in the lower Deschutes would be helpful.

Other ISRP comments:

*1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The project is well justified. Lamprey are a native fish species in serious decline in the Columbia River and are of great cultural importance to Native Americans. The project addresses many important questions related to lamprey abundance, distribution, and life history in the Deschutes Basin. The project was undertaken to avoid ESA listing of lamprey and is consistent with needs and objectives specified in NPPC Fish and Wildlife Program and the Deschutes River Subbasin

Plan. The studies may help determine if reestablishment of lamprey above the Pelton-Round Butte (PRB) hydroelectric complex is feasible.

The objectives are straight forward, quantifiable, and address some of the significant questions regarding lamprey distribution, abundance, and life history in the Deschutes River. Importantly, the project will monitor abundance of adult lamprey at Sherars Falls through carefully designed Mark and Recapture and PIT tag monitoring. It will also test a methodology (redd caps) to determine hatch timing of larva, number of larva, and describe water quality variables that influence hatch timing and survival. Other than redd-capping, there are no objectives related to monitoring juvenile abundance and distribution. Will this work continue? Will there be any work conducted above PRB to determine feasibility for reintroduction in this area?

In the Deschutes, lamprey are limited by passage at hydroelectric projects, low summer stream flows, and high water temperatures. A more comprehensive discussion of how these limiting factors relate to land use and other human activities should have been provided.

The proposal would be improved by inclusion of a life cycle diagram for Pacific lamprey and by consideration of the estuarine and marine parts of life history (see ISAB 2009-3). The literature review should be checked as Moore and Mallatt (1980) is not referenced.

The proposal would be improved by more explicit reference to mainstem dam passage problems and ocean survival. All of the objectives for assessing lamprey and their habitat in the Deschutes are, by nature of the system, dependent on successful adult passage through main stem dams.

## *2. History: Accomplishments, Results, and Adaptive Management*

This project has provided information on species composition, larval distribution and habitat, outmigration timing, adult lamprey overwintering and spawning locations, spawning habitat and annual escapement estimates upstream of Sherars Falls. A considerable amount of basic information and methodology has been developed by this project. The escapement and harvest estimation procedure was described in detail, including the assumptions and estimator used. Diagnostic keys have been developed to identify larval lamprey.

The results should be made available in more widely circulated media. The proponents should try and publish their results in the scientific literature, as previously recommended by the ISRP.

The proponents should expand on how their information was used “during the development of a four treaty tribe restoration plan being coordinated at CRITFC.” and also, as CTWSRO is a member of CRITFC, it would be helpful to get an update on the status of the lamprey master plan.

The proponents should have stated an adult escapement goal, explained how the goal was arrived at, and provided a candid assessment of how reasonable the goal is in light of current returns.

Furthermore, some discussion of the historical abundance of lamprey in the Deschutes, in so far as it is known, should have been provided.

Many of the results could have been presented in somewhat more detail so as to better demonstrate what appear to be substantial accomplishments. For example:

A. Determine larval lamprey (ammocoete) distribution and associated habitat within the lower Deschutes River Subbasin (work completed 2003-2006; 2008)

More information on the sampling design for assessing ammocoete presence could have been presented. How were sampling sites selected? Were there temporal changes (seasonal/annual) in ammocoete presence? Was abundance, not just presence of lamprey, quantitatively recorded and related to habitat variables? Maps of distribution would have been helpful. Perhaps “wood” was not selected by the logistic regression as an important habitat variable because it was correlated with other habitat variables such as velocity. Should it have been “forced” based on what appears to have been a simple correlation analysis?

B. Estimate the numbers of lamprey emigrants, by developmental stage, from Warm Springs River and Shitike Creek (2002-2006).

The proponents say they were unable to estimate the number of emigrant lamprey in Shitike or the Warm Springs River yet number of outmigrants was reported for both rivers in Figures 2 and 3. How is the apparent inconsistency explained?

C. Estimate the escapement of adult lamprey in the Deschutes River upstream of Sherars Falls and estimate lamprey harvest at Sherars Falls (2003-2009).

Estimation of adult returns is clearly needed. It would have been helpful, however, if temporal (seasonal) changes in passage were presented. It is unclear how a chi-square test comparing length distributions between dip netting and tribal harvest tests assumptions one and two of the mark-recapture method. The proponents assert that adult lamprey numbers have declined over the course of the project (2004-2009). This assertion is unconvincing because the R<sup>2</sup> is low. One could easily argue that returns are relatively constant. What conclusion could be drawn from the observation that, while lamprey numbers at Bonneville have declined, adult returns to the Deschutes have been relatively constant?

D. Pacific lamprey overwintering and spawning habitats, and spawn timing in the lower Deschutes Basin (2005-2009).

How did the proponents decide when an adult was overwintering? Was habitat of overwintering and spawning fish measured? If not, why not? What were the movement patterns by week or month?

Adaptive management was not specifically discussed. It appears that the project is responding to specific information needs that should improve lamprey management.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The project is one of several in the Columbia Basin that seek to better understand lamprey ecology which should contribute significantly to their recovery. It would be useful if the proponents discussed how this project relates to others in the basin? Is similar data being collected with comparable sampling methods? How is the project cooperating with other lamprey projects? What will the proposed work contribute to understanding of lamprey ecology that other projects do not? How will the information derived from this project benefit other projects?

The proponents state “In cooperation with PGE information gathered through this project (larval habitat data and radio telemetry) were used to model larval lamprey habitat relationships and describe habitat needs for adult lamprey.” The proposal would be improved by a detailed explanation of the model (was it only the logistic regression?).

The proponents are contributing to climate change data bases via their water temperature monitoring program and therefore are cognizant of climate change as an emerging factor. The proponents state, “We are monitoring water temperatures which long term would identify climate change. This information would be shared with a Habitat Section and decisions made on how to make necessary changes to improve habitat for lamprey.” What is the Habitat Section referred to? Do the proponents plan on restoring tributary habitat without first overcoming the major problem, which is adult passage at mainstem dams?

It would be helpful if the proposal also considered the role of the ocean and contaminants as additional emerging factors. It could be very useful to involve Oregon Department of Environmental Quality or EPA with the project. Low flow in small streams (less dilution), and the presence of Waste Water Treatment Plants and agriculture in some areas, increases the likelihood that contaminants could be a problem. Tissues of a few adults and juveniles could be analyzed and provide meaningful information about the possible importance of contaminants.

### *4. Deliverables, Work Elements, Metrics, and Methods*

This project has done some excellent work and, as the ISRP said in the past, it needs to publish the results so that others can benefit from it. It seems like the individual studies are designed correctly, ask the proper questions, and obtain useful information that others need. The complete Deschutes lamprey story needs to be told by someone – if not the researchers on the project, perhaps they could contract with someone to prepare publications. It may be the best money spent.

Each of the objectives with their deliverables and work elements are reasonably well supported. The proposal could be improved if methods and metrics for accomplishing several objectives were more detailed, and each requires further elaboration of statistical methods.

Objective 1: After being marked at Sherars, how long was it before fish were recaptured?

Objective 2: Why was temperature chosen as a variable to monitor when logistic regression did not indicate that it was a significant factor affecting ammocoete presence. How were the sites used for temperature monitoring selected? What are the temperature limits for lamprey in the Deschutes? The ISRP assumes this could have been at least tentatively determined from past sampling. Will temperature be related to abundance and distribution in a quantitative way? Will habitat limiting factors in addition to temperature be considered?

Objective 3: The proponents have worked out a satisfactory method for PIT tagging using HDX tag technology which allows them to proceed without interfering with salmonid work and should be complimented for this effort. Statistical aspects of the tagging such as power analyses should also be considered.

Why was Shitike Creek chosen as a site for half-duplex monitoring? More details should be provided about the array technology and how it be tested for efficiency. How many fish will be PIT-tagged and where? The proposal would be improved by a further explanation of any issues concerning co-monitoring of lamprey and bull trout.

Objective 4: This aspect of the proposal would be improved by an explanation of any difficulties in identifying lamprey redds in order to place the redd caps. In addition, will the lamprey redds be sought systematically, using EMAP or a similar sampling protocol, or found opportunistically? This statistical nuance would be important when calculating the final densities of ammocoetes. The proposal would be improved by a justification of this method relative to others such as downstream trapping of migrants, assuming the goal is population enumeration.

## *Sturgeon*

### 198605000 - White Sturgeon Mitigation and Restoration in the Lower Columbia and Snake Rivers

**Proponents:** Oregon Department of Fish and Wildlife (ODFW)

**Short description:** This project includes a series of closely coordinated and complementary activities that are being implemented in the Columbia River downstream of Lake Roosevelt and in the Snake River downstream of Lower Granite Dam. Activities include stock assessment, population monitoring, and monitoring the biological responses to mitigation actions. Specific goals are to ensure persistence of white sturgeon populations and to restore and maintain population productivity in impounded river reaches.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

Overall, this is a highly worthwhile proposal outlining work badly needed for this species. The vulnerability of the naturally-spawning Columbia Basin white sturgeon is much greater than is widely appreciated. The proposed effort has great promise for providing key information necessary for sustainability of this species in the Basin.

The ISRP appreciates the extensive and thorough responses that the proponents have provided to our review comments, questions, and recommendations. However, we have two qualifications for the proposal.

Qualification 1. The qualification is regarding the ISRP's preliminary comment/recommendation (#3): "Determine periodicity and extent of movements of movements to and from the estuary/nearshore ocean and its importance to population viability." In response to this recommendation, the proponents have proposed two objectives that would require additional funding to implement – Objective (1). Apply micro-chemical techniques to sectioned fin rays of white sturgeon from the Lower Columbia River to reconstruct the movements of individual fish (over the lifetime of the fish) to and from the river, the estuary, and the ocean, and Objective (2). Use acoustic telemetry to examine fine scale spatial movement and seasonal habitat use of white sturgeon in the lower Columbia River, the Columbia River Estuary, and near-shore marine habitats including coastal estuaries both north and south of the Columbia River. The ISRP fully endorses the addition of these two objectives, along with adequate additional funding, and recommends that the proponents pursue addition of these two objectives to the project in negotiations with BPA and the Council. The qualification is that the ISRP wishes to be informed of the outcome of this process.

Qualification 2. It would seem that from the perspective of wild white sturgeon, a vital question is why reproduction and eventual recruitment are occurring below Bonneville Dam and why recruitment is almost non-existent above Bonneville Dam. After all, the fish below Bonneville, while remaining the linchpin of sturgeon in the Basin, are also affected by a dam and altered

flows and habitat. The proponents have done a good job of suggesting some factors that might affect recruitment (e.g. flows, turbidity, etc.). The turbidity proposal seems of interest. One difference below Bonneville from above might be the lack of slack water and lack of standing water below; that might make young fish less susceptible to sight-feeding predation. It is important that effort be expended to identify what specific aspects of habitat lead to these differences below Bonneville versus the areas upriver and what factors may be amenable to operations changes, etc. and which might not. It would have been helpful in this proposal if the proponents had developed a hypothesis or two about what the limitations are in the pools above and outlined work to test hypothesis about recruitment, with the ultimate outcome of providing scientific information on recruitment in the pools above relevant to dam operations and such.

The qualification is that the ISRP recommends that the proponents add one or two hypotheses focused on testing recruitment limiting factors (e.g. flow, habitat, turbidity, etc.) for the below Bonneville population to compare with how those factors may affect populations above Bonneville.

These qualifications should be addressed in contracting with BPA and Council and addressed in future proposals.

#### Other ISRP Comments:

Harvest Management - Information on the fisheries provided in the response to ISRP Recommendation #6 has indicated that harvest management regulations have been quite static for these fish over the past decades (and longer). The harvest slot approach has had many beneficial effects, and despite limiting some data collection, has had a strongly positive effect. However, where harvest exists, collecting creel data on these very valuable fish is difficult and expensive because fishing seasons are long and areas there are open are wide. The proponents provided information that percentages of the commercial catch in the pools above Bonneville Dam creeled are fairly high to high (58-80% of landings). The difficulties with sampling the sport fishery, however, are noted in the response. Although this suggestion is perhaps outside the scope of this proposal, the best way to more effectively and less expensively creel fish to effectively monitor these sport-caught fish and meet program objectives may be to develop some meaningful season area restrictions, as has occurred for sturgeon in some other locations. Such outside the box thinking might be pursued in cooperation with other agencies as part of sturgeon planning in this and other proposals. In that way, harvest could be concentrated spatially and temporally, the creeled fish concentrated in area and time, and creel data vital to maintaining these fish could be more easily obtained. One aspect of adaptive management is that regulations can be set to provide a successful positive feedback loop for data acquisition needed for research, monitoring and evaluation. For high valued individual fish such as sturgeon, such restrictions may be more easily justified and defended than for other species.

Effects of Hatchery Releases - Plans to monitor effects of hatchery releases are still not yet firmed up, and the proponents defer to those working on the Master Plan in Project 198605000. The ISRP believes that the proponents will continue to work in close collaboration with the latter

group, and others, to help ensure a well-coordinated and timely completion of the Master Plan and wishes to be updated regarding these efforts.

**Preliminary comment requesting a response:**

This is a long-term study that has been ongoing since 1986 and has evolved from a research study into almost exclusively a fisheries management and monitoring study as the proponents indicate, “The project has evolved from conducting research on white sturgeon in the Columbia River Basin to implementing mitigation activities based on research results, and monitoring the effects of mitigation activities. The primary objectives of the project are to ensure persistence of white sturgeon populations, restore and maintain population productivity in impounded reaches to levels similar to that in the un-impounded Lower Columbia River Mainstem, and to restore and ensure sustainable white sturgeon fisheries. Objectives are designed to restore white sturgeon populations in impounded areas so that they can sustain annual harvest or use equivalent to 5 kg/ha of surface area.”

During the most recent review for fiscal years 2007-2009, the project received favorable comments from the ISRP, acknowledging the project proponents and their subcontractors as “a group with good record of producing high quality technical reports and peer reviewed publications” and identified the project as “a key component in sturgeon stock assessment and management in the river above Bonneville (Dam)” and “worthy of high priority consideration.” The current proposal continues to propose important monitoring and stock assessment of white sturgeon in the lower Columbia River reservoirs. However, the ISRP notes that there remain a surprisingly large number of unanswered questions about the basic life history of white sturgeon, such as age-specific year class strengths, sex-specific reproductive periodicity, and periodicity of movements to and from the estuary or nearshore ocean and its impacts on estimated total fish present. The harvest management approach of protecting large females has protected many spawners amid these uncertainties but has also contributed to a sketchy understanding of the entire life history. There has evidently been too little sustained effort directed at this species in each reservoir and below Bonneville Dam.

The segment of the population below Bonneville Dam remains the linchpin of wild sustainability (and thus for overall sustainability) for the species in the river. In all other sections of the river basin, recruitment has proven to be poor, and despite the intense interest in sturgeon culture as a remedy, the long-term prospects for the species upriver are not clear. In addition, there is an acute need for truly coordinated research and management of the species in the basin, so that upriver hatchery mitigation efforts do not have a long-term negative effect on lower river efforts to sustain critical wild reproduction.

Detailed sex specific abundance-by-age data is needed to have a chance of learning what environmental factors lead to strong year classes. In addition, it is not clear that the proposed sampling will get at the idea of actual age-specific reproductive periodicity. The sample size of 150 fish may be adequate, but it may also be that such periodicity is not only sex specific (to be expected), but it may also change as the species ages. The linkages whereby the more-or-less traditional sampling proposed (length frequencies, etc.) will lead to actual insights into the status

of sturgeon recruitment could stand to be clarified. Despite this very long-term study, it is not clear that age validation has progressed very far. In addition, there seems to be little in the proposal dealing with the total life history of the fish below Bonneville Dam, the lower river, estuary, and beyond.

The methods of stock assessment used for this long-lived fish species need to differ from those of traditional fisheries management for shorter-lived species. Creel census data adequate for most species may be inadequate for sturgeon. It may be that a much higher fraction of harvested fish needs to be included in a creel-census, not only to get sex specific age and condition information but also to get other internal information (lipid stores in organs, body walls, attached to gonads, etc. by age, sex and reach). The need for more complete information for this species with 50 or more recruited year classes is greater than for a species with 5 recruited year classes. The historical effort in the Columbia River for sturgeon, while better than in most other locations, has not been adequate for a high comfort level about the species' long-term prospects, even in the lower river where they are still reproducing.

In view of these points, it would be beneficial if the proponents clarify in a concise response exactly how the sampling planned in this proposal will differ, be more complete, and be more effective in addressing the above information gaps (and others) than the sampling conducted a decade ago. Is there any new, "outside the box" thinking about these fish in this proposal, in management schemes, or are the changes from past proposals minor and incremental?

As an information point for the reviewers, it would also be useful to know how harvest regulations have evolved in the past decade (especially below Bonneville, but also in harvest areas above) to facilitate the more effective sampling needed for this species in the river. Has harvest been restricted not necessarily to curtail harvest but so that more effective stock assessment data can be collected? In view of the restricted harvest in many locations, it seems reasonable that high priority should be placed on detailed creel sampling of a higher percentage of harvested fish than typical for other species.

The ISRP requests a response, in the form of a revised proposal, to address the following comments and suggestions:

1. Develop a plan and protocols to improve knowledge of age-specific year class strength.
2. Develop a plan and protocols to improve knowledge of sex-specific reproductive periodicity.
3. Determine periodicity and extent of movements of movements to and from estuary/nearshore ocean and its importance to population viability.
4. Develop a plan to monitor and assess impact of hatchery releases on population below Bonneville Dam.

5. Develop a plan to improve inter-reservoir passage through lower mainstem dams.
6. Determine what it will take to creel-census a higher fraction of the harvest from lower reservoir populations.

The ISRP realizes that implementing a number of these items would extend the scope of the project beyond the current level of resources budgeted, but protecting and managing this valuable species requires this information.

Other ISRP comments:

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

This project continues to be responsive to regional programs including the Fish and Wildlife Program, several mainstem Subbasin Plans, the 2008 BiOp, and MERR Plan recommendations.

The technical background is well done with detailed use of available scientific literature. The proponents are clearly experienced sturgeon biologists and researchers.

Objectives:

Objective 1 - The proponents state: “The objective is to ensure the forecasted likelihood of white sturgeon to persist into the foreseeable future in three distinct Columbia River Subbasins: The Columbia River Gorge (Objective 1a), the Lower Middle Columbia River (Objective 1b), and the Lower Snake River (Objective 1c).” The proposal would be improved by a description of what a “forecasted likelihood” is - this is a pretty vague goal. Does “likelihood” have a statistical meaning?

Objective 2 is to “Restore and Maintain Population Productivity in Impounded Subbasins (3) to Levels Similar to that in the Un-impounded Lower Columbia River Mainstem. Is this a realistic approach given the role of amphidromy (or anadromy?) to the fish below Bonneville? It is not clear if the especially high level of productivity below Bonneville results from minimal or substantial use of estuary and nearshore rearing areas. Similarly, it is not clear if historical growth and abundance of fish now restricted in upriver pools is related to feeding conditions there or to conditions farther downriver (e.g. the reach below Bonneville Dam and estuary/nearshore ocean productivity) whereby once fish are reproduced they might have a better chance of recruiting and a larger food supply. The proponents imply the year-one white sturgeon are vulnerable to fishing (“they are within legal harvest size limits”). Data are required to defend this statement.

### *2. History: Accomplishments, Results, and Adaptive Management*

This long-term project has had significant accomplishments over time with many sound refereed papers and technical reports published. The quality of reports has been excellent and results have applied to objectives, although some goals have not been met because factors limiting

recruitment have not been specifically determined. The development of an overall sturgeon conservation plan is still incomplete (although this is not the responsibility of this project) and this is disappointing, considering the ISRP has noted this acute need on numerous occasions.

Results of project findings are nicely summarized in the text and tables from 1986-2009, and adaptive management has been used as a guiding principle over the years.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

Project coordination and information sharing has improved and is now more extensive. Also in response to 2002 recommendations by the ISRP there have been improvements in white sturgeon life history knowledge by using active tags in research studies. However, in the project relationships section the proponents state: “The use of hatchery supplementation in the Lower Middle Columbia River may impact downstream populations through entrainment of stocked fish.” Although they do collaborate with fishery managers downstream of Bonneville Dam, this is an important issue and more focus on it would improve the proposal.

A key objective is to: “Restore and Ensure Sustainable Fisheries in the Columbia River Gorge, The Lower Middle Columbia River, and the Lower Snake River Subbasins.” This may be a laudable goal, but may also be a limiting factor. It is not necessarily clear that without continual stocking, such fisheries will resemble those of past years when today’s below-Bonneville fish had access to much more of the river. Without a planning document outlining the role of hatchery supplementation, it is not necessarily clear that a hatchery-sustained fishery would be more sustainable in the long term than a smaller, naturally reproducing stock (if this is possible).

Limiting factors are listed but understanding of specific factors which may be impeding recruitment still not specifically known – improve efforts here. The proponents mention focus on project monitoring linked to potential effects of climate change but do not include details for testing such effects.

### *4. Deliverables, Work Elements, Metrics, and Methods*

The project has an excellent record for reporting results. Monitoring methods in the proposal, however, are incomplete and not statistically based (i.e., no power analyses, sampling locations are not well described and methods of choosing sampling locations are not given). Comparing trawls to gill nets to set lines is problematic, but the latter two gear types are probably the only practical methods.

The proponents have concluded PIT tags are the marking methods of choice although they do mention scute marks as well. Statistical aspects of the PIT tagging are not well developed or included and should be detailed.

It is not clear how the physiological sampling of small numbers of fish for reproductive periodicity will get at overall stock periodicity. What are the sample sizes here for that work? In other places, this information has been obtained by a conventional tagging operation involving large numbers of caught and released fish. Is this method being used here also?

### ***Basinwide Habitat and Status and Trends***

#### **200301700 - Integrated Status and Effectiveness Monitoring Program (ISEMP)**

**Proponents:** National Oceanic and Atmospheric Administration (NOAA), Eco Logical Research, Environmental Data Services, Quantitative Consultants Inc, Terraqua, Inc., Volk Consulting

**Short description:** The Integrated Status and Effectiveness Monitoring Program is a research and development project to test and develop fish and habitat monitoring methods, data management tools, and data analysis methods for general use by Fish and Wildlife monitoring projects across the interior Columbia River Basin.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

The Columbia Habitat Monitoring Program (CHaMP) monitoring program described in this proposal is very comprehensive and ambitious. The fact that this effort builds on the success of the ISEMP project provides increased confidence that the program can succeed. As the program is implemented, participants should consider developing formal mechanisms for communicating results to managers. The ISEMP project holds a great deal of promise for answering the questions: “What is the current status of fish habitat in the Columbia River Basin?” and “Are restoration actions currently being undertaken in the Columbia River Basin having the desired effects on both habitat condition and biological response?” We were pleased to see that the current proposal includes a number of new watersheds that will expand the geographical scope and completeness of ISEMP. We were also pleased that the strong emphasis in standardized data collection and spatially balanced and randomized sampling is intended to bring more consistency to monitoring efforts in the Columbia River Basin. In general, the proposal meets scientific criteria, with one qualification. The ISRP also offers additional suggestions for project proponents to consider.

Qualification: The ISRP recommends that ISEMP organize a one-day workshop to discuss the CHaMP approach with the ISRP/ISAB and others. A draft of CHaMP should be circulated to the ISRP/ISAB before the workshop. Specific issues at the workshop should include how previously collected data can be or has been incorporated into CHaMP databases. It would also be useful to summarize how ISEMP priorities have evolved over the years, as well as a publication strategy. This qualification was discussed with the ISEMP project lead on September 13 and was determined to be agreeable. The workshop will be tentatively scheduled for late 2010 or early 2011.

## *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

In the Columbia River Basin, there are a wide variety of RM&E projects that often differ in sampling design, methods, metrics, and quality and extent of data analysis, and often do not lead to definitive evaluations of habitat restoration effectiveness. ISEMP is a far reaching project that is based on the reasonable proposition that a standardized set of protocols, procedures, and data collection and analytical methods that can be adopted basinwide is needed to improve data collection precision and accuracy, provide comparability of results within and between subbasins, and so improve the capability of determining the effectiveness of habitat restoration projects. This proposition has been tested in a limited number of watersheds. In this proposal ISEMP is expanding its scope to include several additional watersheds to further evaluate its protocols for study design, data collection, analytical methods, and information dissemination. This effort is worthwhile in that improvements in habitat effectiveness evaluation are badly needed within the Basin.

The technical background is very complete in the proposal. This project is clearly significant to regional restoration programs. A coordinated program for the collection, compilation, and archiving of data on fish populations and habitat condition has been identified in numerous ISRP and ISAB documents as a critical need for the Columbia Basin. Explanation of the significance of CHaMP to regional programs was very thorough. One question had to do with data archiving and database sharing. What will the interface between ISEMP databases and BPA's Taurus project tracking system be? Will CHaMP data be linked to Taurus in such a way that interested parties can access habitat or population status and trend data (e.g., the CHaMP metadata library) directly, or will these databases be housed separately by ISEMP outside Taurus?

It was gratifying to see that CHaMP will be testing novel remote sensing techniques for assessing habitat condition over large areas, e.g., using green LiDAR or multispectral sensing. This project has also demonstrated leadership in tracking population and life history attributes using PIT-tag arrays and other landscape-based methods.

## *2. History: Accomplishments, Results, and Adaptive Management*

The links provided to reports produced through ISEMP, in the aggregate, provide a very complete picture of the results generated by this project and reflects well on the prospects for success of the CHaMP program. The manner in which the CHaMP data will be used adaptively to modify future monitoring efforts is clearly described, and some examples are provided. However, the link with managers and policy decision makers in the basin is less clearly described. The proposal indicates that a process will be established specifically to utilize the data generated through CHaMP to produce new analysis tools, which will be used to generate the type of information required to determine future direction of restoration efforts and to support fisheries management decisions. But there is another step required to make this process maximally effective; a formal process for communicating the output from the data and analytical tools to non-technical audiences. ISEMP has used periodic newsletters as one mechanism for addressing this function. This approach also would be a reasonable option to consider for

CHaMP. But the CHaMP project leaders should devote some effort to developing a consistent process for broadly disseminating program results.

The ISEMP project has expanded in scope perhaps more than any other habitat restoration-related project funded by BPA since its inception. There are now, according to the proposal, ISEMP studies taking place in 26 watersheds in the Columbia River Basin, all of which contain anadromous salmonids. That organizers have succeeded in growing this project in such an impressive fashion reflects well on the willingness of a wide variety of stakeholders (federal and state agencies, tribes, local conservation districts) to enter into cooperative arrangements with the ISEMP project to address large scale restoration status and effectiveness questions. ISEMP has grown to such an extent that many of its component parts could be treated as separate projects.

It was interesting to see how the proposal described past results. There were abundant maps and lists of activities taking place in ISEMP watersheds, but there were relatively few graphs or tables showing how target species have responded to habitat restoration. We were hoping for a little more in the way of biological response findings, since some restoration locations have now been monitored by ISEMP for seven years. The proposal suggests that the results of habitat restoration often require extended monitoring periods (i.e., often decades) in order for their effects to be assessed. We concur, but including a few highlights of some of the most informative results to date would have made the proposal more interesting.

The proposal does an excellent job of describing the formation and evolution of the CHaMP effort, which is in effect an important type of adaptive management, i.e., the development of standardized habitat survey protocols in order to facilitate data analyses and inter-watershed comparisons. Overall, the description of other activities was thorough and informative. One adaptive management question is: have any restoration actions changed as a result of ISEMP findings? In particular, we are interested in knowing if anything is being done differently because evidence is starting to suggest that current approaches are not working as anticipated. Perhaps, as the proposal points out, it is premature to make judgments but if there are any good examples of restoration practitioners learning from past mistakes, they would be worth knowing.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

Generally, the relationships of this program to other habitat and fish monitoring projects in the Columbia Basin are well described in the proposal. The one relationship that could have benefited from a more thorough discussion was the association between CHaMP and PNAMP. Several of the deliverables in the proposal will be co-developed with PNAMP. But the role of each organization in producing these deliverables was not clearly described. A paragraph in the introduction that outlines this relationship and some indication under the shared deliverables of roles and responsibilities would have helped to clarify the division of labor.

The monitoring work includes tagging, other types of fish population assessment, experimental habitat restoration, long-term habitat trend monitoring, habitat protocol standardization, food

web studies, and management of very large datasets. The project does not emphasize identifying limiting factors; rather, it is aimed more toward evaluating the responses of aquatic habitat and fish populations to restoration actions at large spatial scales. Overall, the proposal does a good job of relating ISEMP-sponsored monitoring to other restoration and monitoring projects. The restoration questions being addressed in each of the watersheds are appropriate to the issues believed to be limiting to salmon production. The new CHaMP rotating panel (GRTS) monitoring design appears to hold considerable promise in characterizing habitat status and trends. The project is consistent with the call for expanded RM&E in many subbasin plans and regional programs. This work is relevant to most RM&E efforts basinwide and provides a means by which RM&E programs in diverse subbasins can be unified under a common set of protocols and procedures.

The ISRP suggests that pollutants not be overlooked as potentially limiting factors in certain locations.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

Deliverables, work elements, metrics and methods are adequately described. Some of the details specific to different work elements could be explained more completely (e.g., in what types of habitat will benthic macroinvertebrates be sampled, and why?), but given the very broad scope of the project and the need to cover all the work elements this is understandable.

Journal publications are listed in many of the deliverables for different objectives, but to date there have not been very many papers published from the ISEMP work. Hopefully this will change in the near future.

What was the rationale for including 25 sample sites in each basin for habitat status and trend monitoring? Did the ISEMP data suggest that this number of sites would provide adequate statistical power? Some support for this number of sites should be provided. It would seem that the number of sample sites required to adequately represent the range of channel types within a basin would vary based on watershed size, variation in topography, geology, land use and other factors. If this is the case, a variable sample size might be more appropriate.

The assessment of stable isotope analysis to characterize trophic aspects of habitat condition in the John Day River is a novel element of this habitat monitoring program and could lead to the development of a very valuable tool. Limiting factors have almost exclusively been restricted to physical habitat or water quality attributes, largely because there was no efficient method for assessing food web conditions. One suggestion about the proposed methodology for this work element: the terrestrial invertebrates should not be lumped together for stable isotope analysis. As with the aquatic invertebrates, the terrestrial insects should be grouped on the basis of functional group (detritivores, herbivores, or predators).

The deliverable that addresses status and trend monitoring in the Wenatchee actually discusses this activity in the Entiat. In fact, the information for the Entiat is repeated in the second

deliverable, which actually does address the Entiat. This discrepancy seems like an inadvertent cut-and-paste error, but the Wenatchee information should be added to the first deliverable.

ISEMP suggests, where appropriate, an “experimental approach” where habitat restoration actions in “treatment” streams are compared to reference “untreated” streams. Given the physiographic and biological variability within reaches or tributaries within a subbasin, let alone differences between subbasins, selection of appropriate references and treatments could prove challenging. It probably would be helpful if ISEMP provided guidelines and/or assistance to subbasin investigators for selecting both reference and treatment sites. The same could be said for data analyses. With the large amount of data that will be collected, investigators may need some assistance in data analyses. It is our understanding that ISEMP is planning to provide analytical assistance where needed.

### 201008200 - PNAMP Integrated Status and Trends Monitoring (ISTM) Demonstration Project

**Proponents:** Oregon Department of Fish and Wildlife (ODFW), Oregon State University, US Geological Survey (USGS), Washington Department of Fish and Wildlife (WDFW), BioAnalysts, Inc., Lower Columbia Fish Recovery Board, Washington Department of Ecology

**Short description:** The goal of this project is to develop a coordinated fish and habitat monitoring program to assess the status and trend of salmon and steelhead populations and tributary habitat conditions in the Lower Columbia River. This program will address priority monitoring questions to meet the needs of regional decision-makers and managers. The process deployed to accomplish this coordination and the resulting program will inform and be adaptable in regions outside the Lower Columbia River.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

The proponents’ response to the ISRP’s original review of this proposal addressed most of the ISRP concerns. The questions raised by the ISRP were answered in detail. This project is not solely dependent on data collected through the CHaMP program nor is it dependent upon the funding of CHaMP. Rather, it is intended to assist all RM&E efforts in the Basin with monitoring designs, data management, and analysis. This project also is intended to develop methods for integrating various data sources and apply this information to address multi-scale questions of status and trends of fish and habitat attributes in the basin. Key objectives of the project are to assess the extent and quality of existing data sources, identify key gaps, and develop a region-wide "master sample" framework that can be applied to select sampling locations. The primary activities for FY12-14 supported by this proposal are the maintenance of the master sample web tool (GRTS sampling framework), the support of statistical expertise for monitoring design, and support for data management and analysis. A standardized sampling framework developed using GRTS protocols would be a worthwhile tool and the GRTS methodology is consistent with the direction being applied in the Columbia River Basin and elsewhere in the region. The availability of the framework should be especially helpful for

smaller RM&E projects in the Basin. The entire vision of how this PNAMP effort will be coordinated with efforts supported by CHaMP, ISEMP, and other monitoring programs is not fully developed, but this approach appears to be a reasonable step towards a basinwide monitoring program.

**Preliminary comment requesting a response:**

The data management system, on which this proposal is based, could be extremely valuable to monitoring efforts in the Columbia River Basin and a test of this system is a worthwhile effort. However, the description of the project in this proposal is incomplete and confusing. The lack of correspondence between the stated project objectives and the work elements and deliverables should be rectified. As this project depends upon the successful development of the web-based data management system, a detailed description of progress on this tool to date and the likelihood that it will be available for a test with the CHaMP data by 2012 should be included. Some discussion of whether the CHaMP data sets (assuming CHaMP is funded) will have progressed sufficiently by 2012 to enable a reliable test of the system also should be discussed. A more thorough discussion about the nature of the relationship between ISTM and other projects in the basin also should be added.

*1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

Theoretically, the products generated by this proposal should provide a very real benefit to the monitoring efforts, ongoing and planned, in the Columbia River Basin. A tool that would enable a monitoring practitioner to select sample sites from a master list, identify what activities had already occurred at these sites and provide access to analytical tools and support are all very worthwhile goals. However, this proposal is poorly organized and fails to provide information on several elements key to the success of this project. A link was provided to a draft proposal at the PNAMP website, which provided some additional information. However, the web version of the proposal and the one submitted for RME review had different objectives.

The overarching objective provided for this project was “to develop a coordinated fish and habitat monitoring program to assess the status and trend of salmon and steelhead populations and tributary habitat conditions in the Lower Columbia River (LCR).” However, the work elements and deliverables in the proposal do not address this objective; the website draft proposal did. One objective of the website draft proposal was the development of a web-based data management system. Successful completion of the deliverables in the proposal reviewed by the ISRP is contingent on completion of this data management system by OSU and the conversion of this system into a web-based tool by a private vendor by the end of 2011. No information is provided regarding progress to date on development of the system or the likelihood that it could be ready to test in 2012.

The proposers noted early in their document that this project does not conform to the proposal template. As a result, the ISRP found this proposal difficult to understand. It was unclear from the information provided what this project will actually deliver and when it will arrive.

## *2. History: Accomplishments, Results, and Adaptive Management*

This is a new project that addresses an old problem. Some historical perspective on environmental monitoring in the Columbia Basin would have provided a context for this proposal. How are status and trend monitoring conducted and the data synthesized now? What are the present deficiencies and what exactly are we trying to improve?

The history of this specific project also is not provided in the proposal. It was possible to obtain some of this information from the linked draft proposal at the PNAMP website. But neither of these documents provided any indication of progress on an element of fundamental importance. Because successful execution of this project is entirely dependent upon completion of the data management system, some discussion of progress on this effort to date should have been included in the proposal.

The adaptive management component of this project is implied rather than specified in the proposal. Clearly, the efficient, coordinated compilation, storage and analysis of monitoring data on fish and tributary habitat in the Columbia Basin should greatly improve the delivery of relevant information to managers. But the process by which this exchange of information would occur was not described in the proposal. The logical home for this adaptive management element may be with the CHaMP program, rather than with the ISTM. But if this is the case, this fact should have been discussed in the proposal and a link provided to a description of the adaptive management process in the CHaMP program.

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The activities described in this proposal are closely aligned with the CHaMP program and the relationship between this large monitoring effort and the ISTM is adequately described. Links to documents that describe the CHaMP program and affiliated habitat monitoring projects in detail would have been useful. One concern with the association with CHaMP is that this program has not yet been fully funded or approved at the expanded scale. If CHaMP is not supported, what happens to this project?

The proposal also indicated a relationship between this project and a long list of other activities occurring in the Columbia Basin. Most of these relationships appear to be limited to the ISTM providing review and recommendations on monitoring plans. But the manner in which these reviews would be conducted (part of the official review cycle so the ISTM and ISRP review would be on the same schedule?) and the manner in which ISTM recommendations would be incorporated into these projects (incorporation of input from ISTM considered mandatory before these projects can gain access to the ISTM data management system and tools?) was not specified. The nature of the association of these listed projects with ISTM and CHaMP programs should be provided.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

As noted above, the deliverables for this project do not align well with the objective stated at the beginning of the proposal; “...to develop a coordinated fish and habitat monitoring program to assess the status and trend of salmon and steelhead populations and tributary habitat conditions in the Lower Columbia River (LCR).” The proposal really focuses on a test of this data management and analysis tool with data being collected by the CHaMP program. The fact that CHaMP has not yet been funded raises a concern about this project.

The work elements and deliverables in the proposal are not appropriate for the development of a monitoring program on the LCR. They are appropriate for implementing a test of the data management and support system and providing technical support for use of the ISTM data tools by monitoring practitioners in the basin. This lack of correspondence between the objective of the program and the deliverables and work elements should be corrected.

The purpose of the long list of variables provided under each project deliverable was unclear. Presumably, these are the monitoring variables that will be supported by the data management system. But some explanation of why they are included multiple times in this proposal should be provided.

The section describing deliverables, work elements, and methods lacked specificity for some critical items. Which CHaMP datasets will be used? As most of the CHaMP monitoring efforts will only commence data collection after funding approval following this review cycle, when will a test of the ISTM system be feasible? A time line for the project work elements and deliverables should have been included in the proposal.

#### **199801900 - Wind River Watershed**

**Proponents:** National Oceanic and Atmospheric Administration (NOAA), Underwood Conservation District (UCD), US Forest Service (USFS), US Geological Survey (USGS), Washington Department of Fish and Wildlife (WDFW)

**Short description:** The Wind River Watershed project is a multi-agency approach to RM&E of restoration of a wild steelhead population through habitat actions. Evaluation of habitat restoration actions and steelhead responses will help prioritize future restoration and RME projects in the Columbia Basin. We have incorporated a standardized habitat status and trend monitoring program called Columbia Habitat Monitoring Program (CHaMP) under Integrated Status and Trend Monitoring Program (ISEMP).

**ISRP final recommendation:** Meets Scientific Review Criteria

#### **Comment:**

This was a well-written proposal for work that will increase our understanding of how a naturally spawning steelhead population without hatchery augmentation will respond to habitat restoration in the Columbia Gorge province. Of particular significance is the examination of steelhead

response to the removal of a dam that previously hindered (nearly blocked) access to one of the most potentially productive steelhead spawning tributaries in the Wind River. The ISRP provides some comments to improve the project but does not request a response. We acknowledge that small steelhead populations in Trout and Panther Creeks result in high annual variability that makes it hard to detect fish response to habitat restoration.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The proposal adequately describes the significance of the project to regional programs. It correctly points out that the Wind River steelhead population is worthy of study because it represents one of the few populations in the Columbia Gorge province that is supported almost entirely by natural production, and because it has been declared a “steelhead sanctuary” from in-river harvest in most years.

The description of Objective 4 would benefit from more explanation about the kinds and locations of habitat restoration projects. This is important because this objective commands the largest portion of the project’s budget. We realize that the Hemlock Dam removal effort and subsequent monitoring of the occupation of Trout Creek by steelhead constitute the majority of research attention and rightly so. Still, other habitat restoration actions are taking place in the Wind River and it would be helpful to describe them in greater detail. The details should include location and potential stream area or length affected. It might be useful to present a pie chart or table showing the allocation of funds to different work elements. Again, we realize that the Hemlock Dam removal study will be the largest single item, but expenditures and details on other types of habitat restoration monitoring would be helpful.

Under Objective 6, it was not completely clear what studies will be carried out on juvenile steelhead using the “mainstem rearing” life history strategy, which previous work has shown to be an important adaptation by Wind River steelhead. The PIT tagging effort to monitor juvenile movements was adequately described and worthwhile, but more might be done to establish habitat usage by juveniles in the Wind River mainstem? It appeared that snorkeling surveys were targeting adult steelhead, but locations of steelhead juveniles relative to channel or cover features could be used to determine restoration priorities in the mainstem, if any are needed.

The presence of brook trout in the upper reaches of many Wind River tributaries (including Trout Creek above the Hemlock Dam site) provides an opportunity to study interactions between juvenile steelhead, a native species, and brook trout, a non-native species.

### *2. History: Accomplishments, Results, and Adaptive Management*

This has been one of the more comprehensive habitat restoration projects in the Columbia River Basin. It has benefited from two factors that have reduced potential complexity that tend to confound projects carried out at the scale of a whole tributary system: (1) the naturally spawning species is steelhead (the only anadromous salmonid capable of ascending Shipherd Falls), which is not augmented by hatchery production, and (2) most of the ownership in the subbasin is

federal (US Forest Service). This has led to a generally uniform set of habitat protection and restoration standards. Project proponents have done a good job describing their results and accomplishments, and they appear to have modified and added to some of their sampling methods over the years, especially the PIT-tag studies.

In terms of applying scientific findings to management actions the proposal was a little less clear. In addition to improving fish passage in the Wind River (Shipherd Falls fish ladder, Hemlock Dam removal) there have been numerous wood placement projects on streams in the Gifford Pinchot National Forest. The proposal could have provided more detail about what has been done to monitor the effectiveness of these projects, and any changes that been made as a result of effectiveness monitoring.

The removal of Hemlock Dam on Trout Creek is a centerpiece of this proposal. It would have been helpful to have provided more details about how sediment movement post-dam removal has been monitored and how the Trout Creek channel has been re-engineered in the former reservoir area.

The Wind River effectiveness monitoring effort provides an excellent case study for other restoration projects in the Columbia Gorge, and results from the Wind should be transferrable to other streams in the province where estimates of VSP parameters are not feasible or too costly. A limitation may be the relatively small size of the steelhead population, but that is a trade-off, and so far has not been an issue. A potential complication is the existence of the “mainstem rearing” life-history strategy, which apparently has not been widely documented in steelhead inhabiting other tributaries in the area.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The Wind River habitat restoration and monitoring programs appear to be well coordinated. A solid working relationship has been established between the USGS Western Research Center at Cook, the Underwood Conservation District, WDFW, and the Forest Service. Each of these organizations will play a major role in this project. Due in part to the somewhat simplified land ownership pattern in the Wind River subbasin, coordination among various management entities has been better than average.

Limiting factors have been examined multiple times in the past and have been modeled using EDT, and it is to the project proponent’s credit that they are willing to periodically reassess their limiting factor assumptions. The addition of the Columbia Habitat Monitoring Program (CHaMP) monitoring protocols is a potential benefit, but some caution should be applied when carrying out measurements that are not particularly relevant to the project’s objectives. Over time, it may be worthwhile to drop some habitat parameters that are not yielding usable information.

The RME questions are appropriate and reflect the importance of identifying life cycle needs of wild steelhead in the Wind River and its tributaries, their response to restoration actions, and their overall contribution to steelhead abundance in the Columbia River Gorge.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

This project is well integrated into regional monitoring programs. We were pleased to see that standardized habitat status and trend monitoring protocols of the CHaMP will be incorporated into the habitat status and trends monitoring (but see our cautionary note above on relevancy of measurements to objectives). The list of habitat metrics is quite lengthy – perhaps a bit too lengthy for the scope of the project – and some of the metrics were not accompanied by adequate descriptions of how sampling would be accomplished (e.g., macroinvertebrate studies). We assume that project proponents will be somewhat selective in their choice of appropriate habitat metrics.

The discussions of statistical analysis were thorough and gave us confidence that project staff will be using suitable models and testing procedures. The discussion of the experimental design for evaluation of the removal of Hemlock Dam was particularly well done.

Work elements and methods were, for the most part, sufficiently described. The budget was reasonably detailed and appropriate to the task. A little more information on restoration projects apart from the dam removal project would have been helpful.

Project personnel are very familiar with the area, have worked in the subbasin for years, and are well qualified to address the study elements. Facilities are adequate.

Objective 1: Adult steelhead monitoring via carcass counts seems somewhat unorthodox (steelhead carcasses are difficult to locate and disappear quickly), thus may provide unreliable estimates of spawning population size. Juveniles (parr and smolts) are estimated by RST - see previous reviews and elsewhere. Confidence intervals on adult and parr/smolt estimates must be large (some presentation of these in Rawding et al. 2006, but not in the proposal Figs. 1 and 2).

Objective 2: For Fig. 2 (smolts/adult), show years and separate/explore El Nino/La Nina and regime shift influences. The tagging programs (includes PIT tags) could benefit from some simulation studies to explore sample size requirements and statistical power needed for BACI experimental designs.

Objective 3: Based on the habitat changes, what is the expected (modeled) smolt increase from dam removal and other restoration actions?

Objective 5: CHaMP/ISMEP approach will be applied to a panel of 25 sites – a more thorough justification of this sample size would have been helpful.

Objective 6. Parr life history. This research is valuable and should contribute important data on mainstem rearing.

### 199603501 - Yakama Reservation Watershed Project

**Proponents:** Yakama Confederated Tribes

**Short description:** The Yakama Reservation Watershed Project (YRWP) is a comprehensive project involved in all components of steelhead, salmon, and resident fish recovery including habitat restoration, resource management, and RME (research, monitoring and evaluation).

Although the primary purpose of YRWP is habitat restoration, the project conducts long term monitoring of steelhead populations as well as aquatic habitat status and trends.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

Qualification: Justification for this project depends on a favorable review of the overall project, including the habitat restoration component, in the Geographic Categorical Review.

The response addressed many of the deficiencies raised in the initial ISRP review. The proposal makes a clear statement of the objectives of habitat monitoring: "The primary objective is to correlate population performance and changes in population performance to habitat conditions or specified physical attributes (i.e. flow, temperature, wood densities, and habitat types) by integrating the project's biological data with the habitat data." Therefore, the habitat portion of this project is critical to achieving its primary objective. However, the habitat monitoring portion of the proposal is incompletely described. The proponent states that the habitat protocols will be a part of the Geographic Categorical Review. However, the lack of information on the habitat elements of the proposal makes it difficult for the ISRP to comment on the scientific basis for the RM&E activities.

The response does provide an improved description of relationships with numerous regional projects (although it is occasionally vague with respect to what specific information it will provide to those projects). The description of the importance of the Prosser Dam adult steelhead counts to the thresholds in the AMIP was especially helpful. However, some of these relationships with other projects depend on the habitat portion of the study, which, as noted above, is not sufficiently described in the proposal to enable ISRP review. Although this element of the proposal cannot be reviewed at this time, it is an important component in the regional context. In fact, part of the value of this RM&E project component depends upon the establishment of improved estimates of the effect of habitat restoration at a watershed scale on steelhead productivity (smolt/redd). So the outcome of the Geographic Categorical Review is critical to the ultimate success of this project.

The components of the proposal that deal with the monitoring of status and trends of adult and juvenile steelhead demographics in Toppenish, Satus and Ahtanum creeks were more thoroughly described than the habitat elements of the project. The inclusion of adult steelhead abundance

data in the response was helpful. It showed how variable the numbers of returning adults were, and how difficult it will be to detect a restoration signature in the face of such high variability. The fish population data will be improved by upgrading redd surveys methods and operation of screw traps. The ISRP appreciates that project proponents are keeping records of other species that are caught in the traps. Long-term changes in the abundance of non-target fishes (particularly introduced species) will be helpful in understanding the effects of restoration activities, climate change, and other important influences. The proposal indicates that the Satus and Ahtanum creek population monitoring data will be used to evaluate several spatial structure and diversity VSP metrics. However, the spatial structure and diversity metrics are not identified. It appears that trap efficiencies, trap operations, and redd count accuracy pose continuing challenges that may benefit from regional information exchange with other practitioners of these methods. A workshop sometime over the next year to discuss these topics should be considered.

**Preliminary comment requesting a response:**

The ISRP has strongly supported the collection of the type of data that this study would collect: spawner abundance, smolt output, and smolt survival. Data on spawner abundance and smolt output is the foundation for evaluating any program for restoring salmon and steelhead populations. The information that this project could provide would be of great importance to fisheries and habitat managers in the Yakima basin. But the information provided in the proposal about objectives, methods, and work elements was insufficient to enable a technical review.

The proposal needs to be better integrated with other regional programs, or at least the relationship of the project to other programs should be made clearer. The principal goal of the project should be clarified – are the improvements primarily needed to better establish steelhead status and trends, or to track the biological effectiveness of restoration actions taking place in the three streams? In either case more details are needed on how information from the steelhead monitoring work will be used to inform management plans. The project proponents also should provide a much more detailed description of project work elements, including a thorough description of the sampling and analytical methods that will be used to generate estimates of redd and smolt abundance. Finally, the budget portion of the proposal should be completed.

*1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

There was insufficient information provided in the proposal on objectives and technical background. In fact, the title of the project and its objectives do not clearly match. From the title, the expectation was that objectives would focus on habitat restoration effectiveness monitoring. However, the proposal itself seeks funding to improve data collection on steelhead populations in three tributaries of the Yakima River that are located primarily on Yakama Nation lands. It was also unclear from the proposal whether the goal of improving the steelhead abundance and movement information in these tributaries was primarily to establish long-term trends in the Yakima steelhead MPG or to relate changes in steelhead abundance or movement patterns to habitat restoration actions.

This project has been in place since 1996 and steelhead monitoring on the Yakama Nation Reservation has contributed to knowledge of the species in the Yakima basin as a whole. The proposal was reasonably thorough with regard to the technical background of the steelhead monitoring efforts in Toppenish, Satus, and part of Ahtanum Creeks. It did not give details about habitat restoration actions in these tributaries, nor did it explain how the steelhead monitoring work contributed to knowledge of other fish species of importance in the drainages.

Objective 1 in the proposal was to restore steelhead in the mid-Columbia to harvestable levels, but no additional details were given. In effect, the proposal appeared to be limited to Objective 2, which was to monitor steelhead status and trends. Habitat improvements are not given as an objective; however, 54% of the work was apparently for restoration actions. More information on the restoration component of the project needs to be incorporated into the proposal. In fact, inclusion of this habitat restoration element in the proposal was surprising as the focus of this categorical review is on RME and artificial production rather than habitat restoration.

## *2. History: Accomplishments, Results, and Adaptive Management*

The history of the project is primarily communicated with a series of tables indicating redd counts, smolt counts, and budgets for this project over the last decade. A discussion of previous monitoring problems (including safety concerns) also was presented. A summary of any conclusions that have emerged from the steelhead studies would have been helpful. For example, have adult abundance estimates indicated any long-term trends in this part of the Yakima subbasin? Have there been shifts in age structure or downstream migration patterns in smolts during the monitoring period? Can the effects of habitat restoration projects be seen in any of the steelhead demographic data?

The section on management changes (adaptive management) needed further detail. Little information is provided regarding how the sampling procedures have evolved through time or how the information collected by this study has been used to inform changes in sampling protocols or fisheries and habitat management decisions. The proposal needs to explain how management changes were implemented as a result of the steelhead monitoring studies.

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

There was relatively little discussion of relationships with regional programs or other projects. Aside from explaining how the monitoring studies help in tracking the status and trends of steelhead in the Yakima MPG, the proposal provides relatively few details about how it is linked to habitat restoration projects, supplementation efforts, and work on other anadromous salmonid species in the area. Some mention was made about the application of models and methods for estimating redd abundance being developed by ISEMP in the upper Columbia. However, no description of these models and methods was provided. The Yakima VSP project also was mentioned several times as a potential source of information that could help achieve the

objectives of this study. But the nature of the relationship between these two projects was not described.

A list of the identified limiting factors and their perceived importance would have been helpful, as would a discussion of how an improved steelhead monitoring program would help resolve questions about restoration effectiveness.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

As was the case throughout this proposal, insufficient detail was provided to adequately judge the appropriateness of the work elements, methods, and deliverables. The terms “might be done” or “under consideration” were associated with many of work elements, suggesting the incompleteness of the project design.

The “Types of Work” section of the proposal seemed a little misleading. Only 34% of the work elements are for RM&E; the balance is for habitat or planning and coordination. However, the two project deliverables are concerned with improving the steelhead abundance and outmigration data in the three tributaries, with emphasis on Toppenish and Satus Creeks. The budget section of the proposal was apparently not completed, as there are no budget figures given for each of the deliverables and budget detail is provided for only one year (2011). Therefore, there was no easy way of knowing how resources would be allocated within the project.

In general, the work elements are not adequately described. Problems with access to the upper Toppenish watershed in early spring were to be addressed either by plowing roads or using snowmobiles or ATVs. No analysis of which option is likely to be most effective and least costly was provided. It would seem that a relatively complete analysis of this issue could have been generated using a road system map and data on snow levels during early spring. A preliminary plan of this sort also would enable a more realistic estimate of costs associated with this activity. Similarly, a list of potential smolt trap modifications was provided but there was no indication of which of these modifications was likely to be implemented. The proposal should contain specifics about what will be done, what it will accomplish and the cost.

There also was insufficient detail provided for some of the methodologies to be employed in estimating redd and smolt counts. The redd count estimates apparently will attempt to apply models and methods developed by ISEMP for estimating redd abundance in the upper Columbia. These methods should be described in the proposal and data needs for the application of these tools clearly defined.

The description of the mark-recapture methodology for estimating trap efficiency also was incomplete. Apparently, an attempt will be made to develop a relationship between flow and trap efficiency, but no method details for establishing this relationship were provided. There also are a number of other environmental conditions that can influence trap efficiency. A comparison of day and night efficiencies was mentioned in the proposal but, again, no details on how this comparison would be conducted were provided. Other factors that could influence efficiency

other than flow level and time of day may be fish size and season. Presumably, the trap efficiency data will provide the necessary data to examine the effect of these factors on trap efficiency, but these analyses were not discussed in the proposal. The low smolt trap efficiencies also raise the possibility that alternative methods of enumerating smolts might be considered. For example is a PIT-tag array at the mouth of the study streams a possible option?

Some specific details needed in the proposal include (1) the method for estimating the number of eggs in a steelhead redd, and assumptions about egg-to-fry survival rates, (2) additional information about Satus and Ahtanum Creeks – why trap capture efficiencies and redd count accuracy is low and what can be done to improve the data, (3) an explanation of why the anticipated number of PIT-tagged fish should be sufficient to address the questions being asked and (4) some additional evaluation of some of the logistical aspects of the project such as access for spring spawner surveys and smolt trap modifications.

### 200205300 - Asotin Creek Salmon Population Assessment

**Proponents:** Washington Department of Fish and Wildlife (WDFW)

**Short description:** The Asotin Creek project implements reasonable and prudent alternatives in the Federal 2010-2013 Implementation Plan (FCRPS BiOp RME RPA) and RM&E criteria in the Snake River Salmon Recovery Board and Asotin Subbasin Plans. This project provides comprehensive population status and reference data from the Asotin Creek steelhead - one of two populations in the lower Snake Major Population Group (MPG). The Project is on the Priority List in the Anadromous Salmonid Monitoring Strategy, Skamania RM&E.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

The response is complete and addresses ISRP comments. A better description of M&E procedures and progress to date is provided. The response places Asotin Creek as an IMW within the context of ISEMP and CHaMP. It describes past data collected and the project plan for provision of new data. Data will be used to establish a baseline against which trends in productivity, abundance, distribution, and diversity of Asotin Creek steelhead populations can be assessed.

Methods to monitor adult escapement, redd counts and juvenile outmigration are now described in detail. Methods of genetic sampling are also well described. Data from field sampling are summarized in graphs and tables. An impressive amount of data has been collected considering the relatively short period of time the project has been in operation and it is evident that the proponents are proceeding expeditiously with their analyses.

The proponents are focusing on determining status and trends of VSP criteria, that is, collecting baseline data rather than testing hypotheses. This approach seems appropriate at this stage of the work. They agree that formulating testable hypotheses is desirable and propose to undertake this effort in the future. The ISRP concurs with the proponents that the Asotin would be a good

reference basin for these studies. The project should form an important component of an experimental management network once the complete design among sites is formed. We encourage this approach.

Given the importance and uniqueness of the Asotin population, as the project progresses the ISRP strongly suggests that the proponents consider publishing their results in a peer-reviewed scientific journal.

**Preliminary comment requesting a response:**

The goal of this RM&E project is to develop an index system for status and trends of a wild steelhead population by estimating abundance, distribution, productivity and life-stage survival rates of anadromous adult and juvenile steelhead in Asotin Creek and mainstem. The Asotin summer-run steelhead population has been identified as the primary population for status monitoring within the lower Snake steelhead Major Population Group. The population is somewhat unique in that it is unsupplemented and maintains a relatively large population of naturally spawning steelhead even though it lies above eight mainstem dams. It could serve as a valuable reference stream within the IMW program. For these reasons, continued monitoring of this population should be a high priority. The ISRP seeks a more thorough presentation and interpretation of work and results to date and as planned, toward a comparative experimental approach to recruitment analyses.

The project is consistent with the Asotin Subbasin Plan, MERR, the NPCC Research Plan, NOAA Fisheries “Guidance for Monitoring Recovery of Pacific Northwest Salmon and Steelhead Populations” and the Washington Statewide Steelhead Management Plan. It addresses several RPAs in the 2008 Biological Opinion. This project is closely tied to regional programs. It serves as a supplementation reference stream and collects data for management of ESA-listed steelhead stocks. It collaborates with other projects and is a part of the Integrated Status and Effectiveness Monitoring Program (ISEMP.)

A clear technical background is provided.

The project states five objectives (which are really tasks):

1. Estimate escapement and spawner abundance of wild and hatchery steelhead in Asotin Creek
2. Estimate adults per redd in the Asotin Creek mainstem
3. Document juvenile steelhead and Chinook salmon life history patterns, survival rates, and estimate emigrant production in the Asotin Creek mainstem
4. Collect DNA samples for future genetic characterization
5. Disseminate data

This project seems organized and very worthwhile, with potential value to an array of regional recovery needs. However, more detail needs to be provided on procedures of monitoring and evaluation, as well as more evaluation of progress to date. The proposal should place past activities and accomplishments in the context of the project’s and the subbasin’s objectives,

evaluating strengths and weaknesses and showing how they will strategically affect the conduct and direction of the project. This project received a favorable rating in the last ISRP projects review, and there remain several favorable traits. That is, there is good justification for continued funding. Asotin steelhead are a relatively viable, unsupplemented population occurring above eight mainstem dams and so would have value as a reference stream for IMW work and in maintaining viability of Lower Snake steelhead. The proponents appear to have made progress in evaluating status and trends of Asotin steelhead.

Nonetheless, a more thorough presentation of results is needed. Also, more detail is needed on methods for data collection and analytical methods particularly for objectives 1-3 (Deliverables 2 and 4). In addition, there is a need to briefly summarize their results from annual reports (which were well-written, but separate documents). This is an opportunity to compare with other basins and programs utilizing the CHaMP protocols; however, preliminary characteristics and differences should at least be listed. They also should compare recruitment results to the Tucannon and Walla Walla rivers (and others) and develop testable hypotheses from the recruitment analyses, toward an adaptive management experimental approach.

The goal is to provide data toward understanding the biology and recruitment of wild, unsupplemented summer-run steelhead in this lower Snake River tributary, as an index of status and trends, but little or no information on results is provided. In addition, the proponents suggest the site will provide information on habitat restoration and serve as the wild control for evaluation of supplementation. However, details of these evaluations were lacking. Adult PIT tagging efforts incorporate ISEMP methodology, and there is mention of genetic monitoring (SNPs) but, again, details are needed. No recruitment analyses were attempted, albeit they are working with somewhat preliminary data (trapping commenced in 2004).

The list of accomplishments is substantive, but the proponents need to provide a more thorough presentation of results. Results should be presented in graphs and/or tables, with explanation, interpretation, and general conclusions drawn. Returns of both hatchery (strays) and naturally spawning fish should be provided, and in comparison to elsewhere. The results should be organized according to past project objectives to allow the reviewer to determine if the project is progressing satisfactorily toward accomplishment of its objectives. Given these caveats, this site should form an important contribution to the evolving IMW network.

200206800 - Implementation of the Columbia Habitat Monitoring Program in Lolo Creek, SF Clearwater, Lochsa, and Imnaha Rivers - NPT DFRM Watershed Division

**Proponents:** Nez Perce Tribe

**Short description:** Nez Perce Tribe (NPT) Department of Fisheries Resource Management (DFRM) Watershed Division proposes to collaborate in the development and implementation of a standardized habitat status and trend monitoring program that spans the Columbia Basin within a new Columbia Habitat Monitoring Program (CHaMP) that is being proposed under a related project by the Integrated Status and Trend Monitoring Program (ISEMP). Habitat status and trend is proposed for Lolo Creek, South Fork Clearwater, Lochsa, and Imnaha.

**ISRP final recommendation:** Does Not Meet Scientific Review Criteria

**Comment:**

The purpose of this project is to monitor habitat status and trends in four rivers in the Snake River Basin following CHaMP protocols. However, coordination with the CHaMP and ISEMP program is incompletely described in this proposal. Objective 5 states that data collected by this project will be turned over to ISEMP. Explanation of what ISEMP will do with these data is not provided. The relationship between CHaMP and ISEMP also is not described. The ISRP has proposed that the CHaMP program conduct a workshop for all collaborators in 2011 to ensure full coordination among all of the programs and participants. Although the ISRP believes that this particular project is not currently justified, the project proponents should consider attending this workshop to aid in the development of any future proposals for habitat monitoring.

Several elements of this proposal need significant improvement. A key component of CHaMP status and trends monitoring is modeling to connect habitat condition to fish population response. Successfully accomplishing this goal requires both habitat and fish data. The proposal suggests that fish monitoring will be done by other projects, but it is unclear who will undertake this effort or how it will be done. A complete description of fish monitoring and how habitat data collected by this project will be correlated with fish response should have been included in the proposal.

The response presented objectives that were more specific than those in the initial proposal, as requested by the ISRP, but these objectives are still rather vague. The proponents also provided a more detailed (but still abbreviated) description of methods and analytical techniques than in the initial proposal. Nonetheless, much remains unclear about the analyses. For example, how will "watershed scale effects of current implementation activities" (Objective 2) be assessed and how will habitat information be used to prioritize the "salmonid habitat protection and rehabilitation strategy" (Objective 4)? The analytical methods and adaptive management framework for this project need to be much more fully developed.

Unlike other proposals included under the CHaMP program, this project has not recently collected habitat data. The proposal indicates that no habitat data have been collected since 2002 and the existing project was terminated in 2004 because the NPT and BPA could not reach

agreement on habitat parameters to be measured. The ISRP asked for a history of accomplishments during the past eight years and how this information was used to select restoration projects. This information was not included in the response, indicating that no data have been collected over this time. Testing of the CHaMP program concept will be far more efficient if the initial data sets are obtained from locations where there is a demonstrated capability to collect these types of data.

**Preliminary comment requesting a response:**

The implementation of a coordinated, consistent habitat monitoring program in the Columbia Basin is a laudable goal. However, the part that this project will play in achieving that objective was not fully explained in the proposal. The proposal should be expanded to:

1. clearly describe the relationship with the CHaMP process
2. explain why 25 sample sites per watershed is considered sufficient to characterize habitat trends
3. provide an overview of the results obtained from the monitoring effort that has been conducted since 2002
4. describe who will be responsible for data analysis and the analysis methods
5. include an adaptive management strategy

*1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The purpose of the project is described in the proposal as, “Collaborate in the development and implementation of a standardized habitat status and trend monitoring program that spans the Columbia Basin.” This goal is clearly relevant to restoration efforts in the basin. It also is noteworthy that the largest habitat/survival gaps for Snake River steelhead occur on the Clearwater tributaries proposed for this study. There is a pressing need to fill these data gaps. This fact clearly indicates the potential value of the information that could be generated by this study. However, specific objectives and deliverables are very general and pertain to implementation of a study design that, apparently, has not yet been developed. The objectives simply indicate that a list of habitat parameters will be collected according to sampling protocols developed by ISEMP. The objectives should be more detailed and related specifically to how the habitat monitoring results will be used to modify restoration efforts in the four watersheds where this work will be conducted.

*2. History: Accomplishments, Results, and Adaptive Management*

This project will build off a monitoring effort that has been in place for eight years. However, there is little, if any, discussion about the accomplishments of this existing monitoring effort. Nor is any mention made regarding the impact this existing monitoring effort has had on the selection and execution of restoration efforts in the project region. Some discussion of this past monitoring effort should be included in the proposal. The proposal also should include a clear description of the advantages offered by switching to the CHaMP program.

The proposal does not contain a fully developed description of an adaptive management program. The information that could be generated by this project would be of great value to restoration efforts in the targeted watersheds, representing an opportunity for the development of an adaptive approach for the application of results to a management decisions. A description of how results of this project will be used to modify the process for prioritizing and implementing future restoration projects in the study watersheds should be incorporated into the proposal. Addressing this deficiency would require a more complete characterization of 1) objectives being addressed by this project, 2) the manner in which the data will be analyzed, and 3) the process by which results will be communicated.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The primary objective of this project, the collection of habitat data for tributaries of the Clearwater River, is consistent with the 2008 BiOp, the NPPC Fish and Wildlife Program, MERR, and PNAMP recommendations. However, the relationship between this project and program of which it will be a part (CHaMP) is incompletely described. The proposal provides very little description about the CHaMP program or how the information collected by monitoring in the Lolo Creek, South Fork Clearwater River, Lochsa River, and Imnaha River will be incorporated into this process. The proposal suggests that the success of this project is contingent on funding for the CHaMP program, which has not yet been fully funded or approved at the expanded scale. Is this project viable if the CHaMP proposal is not fully funded? A much more thorough description of the project relationship with the CHaMP program is required to adequately review this proposal.

### *4. Deliverables, Work Elements, Metrics, and Methods*

The GRTS process is generally accepted as a valid method of site selection. Although the process of site selection is appropriate, some description of the rationale for 25 sample sites per watershed should have been provided. Was this number of sites selected based on some analysis of statistical power?

The metrics listed for habitat characterization are appropriate and very complete. Some explanation as to why all these variables are necessary should be included in the proposal. Specifics on the methods that will be employed were not described in the proposal but are included in an ISEMP publication.

In addition to the 25 sample sites, 6 legacy monitoring sites within the Clearwater River and 3 legacy monitoring sites within Lolo Creek will also be monitored. These 9 sites were included in a monitoring project that began 8 years ago. Will some method be employed to make this older data compatible with the new information collected using the CHaMP protocols? Will this be accomplished by monitoring the legacy sites for several years using both old and new sampling methods? If not, will the old data be discarded? Some description of how these older data will be

used and the process by which their compatibility with the new data will be assessed should be incorporated into the proposal.

As noted earlier, there is essentially no information provided on who will be responsible for data analysis and interpretation or the manner in which the habitat data will be analyzed. The analysis methodologies are as important as the methods of data collection. Will the data collected at these project sites be delivered to someone in the CHaMP program for analysis? If this is the case and CHaMP is not funded, how will the analyses be done? How will habitat metrics be related to biological responses? A thorough review of the technical adequacy of this proposal cannot be completed without this information.

### 200302200 - Okanogan Basin Monitoring & Evaluation Program (OBMEP)

**Proponents:** Colville Confederated Tribes

**Short description:** Monitor and evaluate important biological, water quality, and physical habitat indicators for anadromous fish throughout the Okanogan River subbasin; to establish a long-term status and trend data set; and determine population scale responses from habitat restoration efforts.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

Qualification: The proponent should incorporate suggestions generated during the upcoming 2011 CHaMP/ISEMP workshop.

The proponents' response clarifies that the OBMEP Colville Tribes Fish Accord project will continue much as it has since 2005 with some modification for consistency with the CHaMP protocols. A strength of this proposal is the plan to collect data for a period of time using historical protocols and the new CHaMP protocols simultaneously. This procedure will provide a comparison of results using the two protocols and enable modification of the historical data, if required, to make it compatible with data collected using the new methods.

The response made it clear that OBMEP will not be responsible for analyses of the data they collect; their objective is to collect the information and pass it on to the organizations (CHaMP, ISEMP) that will conduct the analyses. Therefore, the ISRP suggestion in the review of the initial proposal that hypotheses to be tested be clearly stated may not be appropriate for the OBMEP project. Rather development of these objectives should be the responsibility of the CHaMP and ISEMP scientists. The ISRP has proposed a workshop be held in 2011 for CHaMP/ISEMP collaborators to clarify objectives and roles. OBMEP should participate in this meeting and adjust their project accordingly.

The response from the proponents clarified the relationship between OBMEP and CHaMP and linkages with other monitoring programs in the basin. The proponents also provided some useful diagrams depicting the complex scheme of the UCR adaptive management program and

OBEMP's role in this scheme. The relationship between OBMEP and CHaMP is still developing, so not all methodological decisions have been made. However, it is clear that OBMEP will serve as one provider of raw data to CHaMP and ISEMP with PNAMP providing data management and analytical tool support. OBMEP data will be linked to CHaMP data through the STEM database (data entry is a two-year process). The OBEMP data also will be used to improve the EDT model. It is envisioned that this consistent, collaborative effort will provide answers to key questions of interest in the region.

**Preliminary comment requesting a response:**

A coordinated monitoring program for habitat and fish has been needed in the Columbia Basin for a long time. The proposal for implementing the Okanogan component of this program is headed in the right direction but some additional information is required to provide a thorough technical review. In particular, the following should be addressed:

1. the relationship between OBEMP and CHaMP
2. linkages with other monitoring programs in the basin
3. data analysis techniques and who will be responsible for this task
4. the process to be used for linking historical data and CHaMP data
5. a better description of the adaptive management program, and
6. use of these data to improve analytical tools, like EDT, also should be a key objective of this project

*1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

A more complete understanding of the current condition of habitat and fish populations and how they respond to restoration measures is critical to the development of an effective salmon recovery program for the Columbia Basin. This project proposes to modify an existing monitoring program in the Okanogan Subbasin to make it compatible with a basinwide effort to coordinate habitat and fish monitoring programs (CHaMP), a very worthwhile goal. More consistency among monitoring programs in the basin should help provide a much more comprehensive picture of the status and trends in habitat and fish populations and accelerate the accumulation of information regarding the effectiveness of various restoration techniques.

The current project in the Okanogan Basin has monitored anadromous fish at the population scale over the last five years. This proposal hopes to link these population data to habitat restoration actions. The enhanced monitoring program envisioned by this proposal (OBMEP) would continue to monitor key components of juvenile fish production, habitat condition, water quality, and adult abundance. However, the habitat parameters being monitored would be considerably expanded and methods would be modified to be consistent with those specified by CHaMP. The modification of the methodologies that have been used previously raises concerns about (1) compatibility of data from previous years and new data, and (2) usefulness of new data when using old models (e.g., EDT). These are proper concerns, but consistency of data collected across the basin is also important.

The technical background for this project was satisfactory. However, objectives for this project were somewhat incomplete. The overarching objective for this project is to continue to collect data to assess progress towards recovery goals – certainly an appropriate objective. But the more specific objectives were often not very informative. For example, rather than simply stating that an objective is to participate in a basinwide monitoring program, specify the hypotheses or questions that the collected data will be used to address and indicate how answers to these questions will influence management decisions. The ultimate goal of any of the monitoring plans in the basin is to develop more effective restoration methods. Thus, project objectives should always clearly link back to this goal.

## *2. History: Accomplishments, Results, and Adaptive Management*

The history, accomplishments and results of the project to date are not presented in the proposal, but links are provided to numerous reports that do detail some aspects of the work that has occurred since 2005. Summaries of some preliminary data also are presented on their web site. In general, the data set is too short at the present time to reach many conclusions, and data analysis has not proceeded very far.

The relevance of this work to management of habitat and fish in the Okanogan Subbasin is less clearly presented. Although there was an outline of an adaptive management program provided, much more detail is required in order to review this aspect of the monitoring program. A detailed discussion about adaptive management associated with this project, both historically (i.e., how have results to date been used to inform management decisions) and in the future, as the project integrates with CHaMP should be included in the proposal. This discussion should specifically focus on how changes in the understanding of habitat effects on fish population dynamics will be incorporated into prioritization of restoration projects or decisions of fisheries management.

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The relationship between this project, ISEMP, and CHaMP is discussed briefly in the proposal, but insufficient detail is provided to judge the degree of coordination among these efforts. The OBEMP program will become a component of the basinwide CHaMP program under this proposal. The role of OBEMP and CHaMP in data analysis, producing reports and communicating results should be clearly defined in the proposal.

It appears as if the primary tool that will be used for linking habitat results to fish population response is a new version of EDT. These EDT runs will then be used to update restoration plans. Use of this model has plenty of precedent in the Columbia Basin, and it is certainly a legitimate method for conducting this sort of analysis. However, this project will collect empirical information on both habitat conditions and fish population performance. These data could be used to evaluate some of the assumptions about fish-habitat relationships that are the foundation of the EDT model. In fact, using field data to test and then modify the EDT relationships represents an important adaptive management linkage, if this model is to be used to inform fish

and habitat management decisions in the subbasin. It may be more appropriate for this type of evaluation to be done with a more integrated data set (the full CHaMP data or some combination of CHaMP and ISEMP data?). Some discussion of this issue should be incorporated into the proposal.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

The Work Elements, Metrics, and Methods were primarily addressed by providing lists of the parameters that will be measured coupled with references to documents that detail the actual sampling protocols (e.g., ISEMP sampling methods). Referencing external documents for methods is certainly an efficient manner of presenting this information and the methods cited are generally very appropriate. There were several items, however, that require some clarification.

The rationale for number and type of sample locations was not clearly presented. The use of GRTS for sample site selection is a widely accepted method. But it was unclear in the proposal whether all 50 sample sites would be selected by this method or if 25 new sites would be selected each year using GRTS to augment 25 sites that were included in the monitoring initiated in 2005. Has any analysis been done to evaluate whether 50 sites are sufficient to adequately capture trends in habitat condition in the Okanogan Subbasin? What is the rationale behind sampling 25 new sites each year and 25 old sites sampled every 5 years in a rotating panel? Some additional explanation of this aspect of the project design should be included in the proposal.

A primary concern with this section of the proposal is a lack of specificity about how past monitoring protocols will be coordinated with the new methods used in CHaMP. The proposal does state that there are three precautions that will be followed in modifying sampling protocols, one of which is “entirely new data or incompatible data is collected in addition to new data being collected.” This statement is unclear but seems to imply that data for certain parameters will be collected using both the new CHaMP protocols and the methods that have been used since 2005. If this interpretation is correct, it implies that data collected using these two protocols will be used to determine how comparable the results are and to develop a method for converting the historical data, if required. The extra effort necessitated by the change in methods is unfortunate, but collecting using both the old and new method is necessary to ensure that data collected under the old sampling regime and that collected under CHaMP are compatible. But no mention is made regarding such a comparison of data collected under the old and new protocols. More detail about the variables that will be impacted by changes in methods and some discussion as to how this issue will be addressed should be included in the proposal.

The proposal also would have benefited from some additional information about the location where fish population data will be collected. It was not clear where the smolt trap is located or where redd surveys will be conducted. Inclusion of a map indicating location would have been helpful.

There was very little information provided regarding the methods that will be used to analyze the data or who will be responsible for this task. Will OBEMP conduct the analyses or will

analytical responsibility fall to CHaMP? Regardless of who conducts the analyses, some description of how this would be accomplished should be in the proposal. Assessing trends in habitat conditions is relatively straightforward. But the methods that will be used to analyze some of the fish data were less clear. For example, it appears as if adult salmon abundance will be assessed using three different methods: redd counts, adult enumeration, and underwater video. How will these three data sources be used in developing an estimate of spawner abundance? Also some discussion of the process by which habitat and fish population data will be related should be included. The proposal does indicate that EDT will be one of the tools used for this purpose, but as indicated above, these data could be used to progressively improve models like EDT. Developing better assessment tools should be one of the key objectives of a program like this.

## 201007500 - Upper Columbia Implementation and Action Effectiveness Monitoring

**Proponents:** Upper Columbia Salmon Recovery Board

**Short description:** This project will support the Upper Columbia Adaptive Management Framework, the action agencies' expert panel process, the Yakama Nation Habitat Projects, and Upper Columbia Habitat Programmatic Project by providing standardized post-implementation/compliance data for all salmon recovery projects implemented in the Upper Columbia, and by increasing the number of sites monitored as part of the Washington State Salmon Recovery Board's Reach-scale Effectiveness Monitoring Program.

**ISRP final recommendation:** Meets Scientific Review Criteria

### **Comment:**

The proponents have a good track record of addressing science review concerns and the ISRP appreciates their responses to our questions. The explanation of the relationship between this project and others in the region is very helpful. Comments below are intended to help the proponents and their partners as the project goes forward.

The project proponents have provided a more detailed explanation of the link between the project and ongoing effectiveness monitoring programs such as ISEMP/CHaMP and OBMEP. The goals of this work in relation to the objectives of Upper Columbia River (UCR) salmon recovery plans have been made clearer. The project is intended to fill information gaps that have been identified by the UCR Technical Team as being critical to calculation of VSP parameters for focal species, and will help determine why at-risk salmon and steelhead populations are continuing to decline in spite of the extensive regional investment in restoration.

The proponents clearly identify the critical gaps addressed in the proposed work as monitoring of all projects in the Upper Columbia for 1) implementation/compliance monitoring, and 2) reach-scale effectiveness monitoring. They propose adding an additional 36 sites in the Upper Columbia to the effectiveness monitoring being conducted, but further information about sampling sites would have made the proposal a little clearer. The ISRP appreciates that

additional detail was provided with respect to treatment-control reaches for evaluating restoration effectiveness. The methods for locating sites (randomly selected, but stratified for restoration category) seem appropriate. One ISRP concern has to do with reach length. Study reaches of 150-500 meters may not be sufficient to detect changes in target species densities or other response metrics (reach lengths of 30 times the average channel width have often been recommended in fisheries work), so project proponents may wish to revisit the size criteria for some locations.

A more complete rationale for the work was presented in the Project Significance and Problem Statement, and the Emerging Limiting Factors sections. Descriptions of the response metrics and their importance were improved over the original proposal. The categories of restoration projects, which form the basis for stratification of study pairs, are also better described, although it was not clear how the 6 site pairs in Panel 2 will address all 7 Salmon Recovery Funding Board project categories.

The response was a little weak in addressing the ISRP's request for information about the status and trends in habitats and fish populations in areas where restoration is taking place. We were hoping for a few examples to illustrate where restoration has had, or has failed to produce, a measurable effect on target species, including some insight into why the monitoring was or was not successful. The history of restoration activity in the Upper Columbia is long enough that there should be some useful case studies.

The response states that data sharing between CHaMP, OBMEP, and this project will occur to "coordinate and share resources related to data management and QA/QC." It was not clear from the revision how this coordination would occur and who would act as the central clearinghouse for shared data. We guess it would be ISEMP, but that may not be the case.

The preliminary list of implementation/compliance metrics given in Table 4 is quite extensive and will need to be winnowed down to the most cost-effective and applicable ones. An attempt to select the most potentially useful compliance metrics should take place prior to initiation of post-project sampling. Likewise, the QA/QC guidelines should be completed prior to initiation of field measurements.

The response correctly points out that time constraints may limit some BACI-design evaluations to a single year of pre-treatment data. While this is not necessarily the most desirable scenario, the ISRP stresses the importance of completing at least one full year of pre-treatment sampling for those treatment/control pairs where a BACI study design will be used.

**Preliminary comment requesting a response:**

The ISRP feels that additional details are needed before it can complete a scientific assessment of this proposal, and for this reason we are asking for a response.

The proposal should provide a clear description of relationships with other monitoring efforts in the Upper Columbia, including ISEMP/CHaMP and the large monitoring program planned for

the Okanogan Subbasin (OBMEP). Monitoring is expensive and resources for conducting these projects are limited. Therefore, close coordination among related projects is critical to the efficient and effective use of monitoring funds. The description should go beyond box-and-arrow diagrams and explain how funding and manpower resources would be shared.

The proposal needs to provide sufficient information about objectives, adaptive management, deliverables and work elements. More explanation could have been presented on the background and rationale for this project, as well as a summary of existing monitoring programs that have pointed to certain factors as being limiting to salmonid productivity. Most importantly, however, the proposal should provide more technical details about both the post-treatment implementation monitoring and the reach scale effectiveness monitoring. A brief list of metrics and citations is not enough; the ISRP needs to see a discussion of why certain metrics have been selected, information about sampling schedules, where monitoring sites will be located in relation to the restoration actions (at least in general terms), what types of sites will serve as controls, who will carry out the monitoring work, and how will the data be managed. Once this information is provided we will be able to assess the merits of the proposal.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

Valuable information could be produced by expanding current implementation and effectiveness monitoring efforts in the Upper Columbia to encompass all restoration projects (according to the presentation on September 13, 2010, many projects are not currently monitored). The proposal should include an expanded discussion of the threats to focal species in the Upper Columbia area and a summary of the major categories of habitat restoration that are taking place which the proposed monitoring would cover. It would also be helpful to summarize the existing implementation and effectiveness monitoring efforts currently in place, where they are located, what types of restoration projects they are monitoring, what the key findings to date have been especially with respect to limiting factors, and where significant knowledge or geographical gaps exist.

More details should be given for the objectives. Most objectives are described in 1-2 sentences followed by an identical list of work elements (some of which are repeated multiple times) for each objective. This made it difficult to understand how the objectives were separated, other than by looking at the title. It was not clear in this section whether the proposal was primarily for post-implementation compliance monitoring or for reach scale effectiveness monitoring, although it became clear later in the proposal that the request was for both.

### *2. History: Accomplishments, Results, and Adaptive Management*

This project proposes to expand an existing set of monitoring sites. However, little information is provided on results that have been generated to date from the existing program. Some indication that the methodologies and design of the program have been effective would provide support for the plan to expand the number of sites monitored using this process.

The project will expand the number of monitored sites to 30 control-impact pairs. A statement was made in the proposal that this number of sites was selected after conducting a power analysis, yet no information about this analysis is provided. As the ultimate value of the information generated by this project will be dependent on the statistical power of the experimental design, a reasonable description of this analysis should be included in the proposal. One must assume that this power analyses was based on monitoring results that have been generated from the existing study sites, further emphasizing the value of including project results in this proposal.

Adaptive management is implied rather than directly addressed in the proposal. The statement is made that adaptive management in the Upper Columbia will be enhanced by the inclusion of more sites in the monitoring program, but no description of this adaptive management process is provided. There are several statements that monitoring data will be used by the Action Agencies' expert panel process. Is this panel considered to be the core of the Upper Columbia adaptive management process? A more thorough explanation of how information generated by this project will be used to inform and change habitat restoration and fish management policies and practices in the Upper Columbia should be incorporated into the proposal.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

A thorough explanation of the relationship between this proposed effort and other monitoring programs in the Upper Columbia should be incorporated into this proposal. The proposal does indicate several other monitoring programs, including ISEMP, but fails to indicate how this program will augment efforts already underway. The proposal also fails to mention a large monitoring effort planned for the area under the CHaMP program. The Colville Tribe has proposed a very large monitoring program for the Okanogan (OBMEP), with many of the same objectives as this proposal. The Colville monitoring program and the one proposed here should be carefully coordinated. Cooperation among these various monitoring efforts is essential to ensure that information is collected efficiently and in a compatible format. The proposal authors make the statement that this project will not interfere with other monitoring programs in the Upper Columbia. Avoiding interference should not be the objective. Rather all these monitoring efforts should be coordinated such that they provide complimentary information. A thorough discussion of the linkages among the various monitoring efforts in the area, one that clearly illustrates the coordination among these programs, should be added to the proposal.

The statement is made that, "Various efforts are underway to resolve some of the confounding issues, including climate change-related projects in the Okanogan and Methow sub-basins to develop better streamflow forecasting tools." This is useful to know because extreme low flows likely constitute a significant environmental limitation to salmonid productivity in many of the watersheds. However, more details are needed on how potentially confounding factors such as climate change will be addressed in this monitoring program. The proposal should be more explicit in this regard.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

Deliverables basically were often described in a single sentence. More description of what these deliverables will include should be added. The work elements were sometimes unclear and duplicative for different objectives. They were presented as a list of variables (e.g., length, width, bankfull height, etc.) with an associated reference, which provided the methods to be used in measuring this variable, but the same reference was often listed multiple times for a given parameter. The description of these elements in the proposal does not provide enough information to conduct a technical review.

Under post-implementation compliance monitoring, the list of metrics should be given, even if it is still preliminary. For each provisional metric, sampling schedules (including years) and sample sizes (if possible) should be stated, as well as who would do the work and where the monitoring data would be housed. An explicit connection between each metric and one or more limiting factors should be given so that the relevance of the metric is clear. How, specifically, will QA/QC issues related to the metrics be addressed?

Under SFRB reach scale effectiveness monitoring, will the 30 treatment-control pairs, plus the 6 pairs already requested, be stratified according to restoration type (e.g., fish passage improvement, increased in-stream flows, physical habitat restoration, nutrient management)? How long will the pre-treatment sampling period be? It would be very helpful to give more details on the SFRB effectiveness monitoring protocols and why post-treatment sampling will occur in years 0, 1, 3, 5, and 10 (as opposed to a different schedule). Fish density is the only biological metric mentioned in the proposal, but some restoration actions could affect other parameters (e.g., fish growth or migration). Will other demographic properties of focal species be estimated?

#### **201005100 - Upper Columbia Water Quality and Water Quantity Gauges**

**Proponents:** Upper Columbia Salmon Recovery Board

**Short description:** This project will fill key gaps in stream flow and water quality monitoring in the Upper Columbia as Identified by the Upper Columbia Watershed Action Teams by 1) restoring key Washington Department of Ecology stream gauges that have been removed or abandoned, 2) installing and operating new gauges in key locations, and 3) deploying and operating water quality sensors at key locations across the Upper Columbia.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

Qualifications: The proponents should either revise the proposal or include in their annual report a description of how they will apply adaptive management within the project and a summary of the data collection methods and protocols as applied by the USGS and WDOE. The proposal needs the relevant information to make it a stand-alone project. Additional ISRP review beyond the standard categorical/geographic review is not needed.

The response adds needed detail to the proposal and significantly improves it. Greater detail on the background, need, and the process used to prioritize needed gauge locations was provided. An expanded description of current gauging efforts and gaps was added. Three of the proposed gauges fill gaps in stream flow coverage in areas monitored by ISEMP and with their input. The proposal was modified to show that no monitoring of toxics/nutrients or "water quality" beyond temperature, conductivity, pH, dissolved gas and turbidity was proposed as part of this project (i.e., the standard dataset for gauging stations). Gaps to be filled by the stream gauges are appropriately identified, and the relationship of the new sites to existing monitoring programs is described. None of the historical WDOE gauges were chosen in the final four to be added, thus, there is no historical data to report in answer to the ISRP's question. The adaptive management process adopted for the Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan is provided in the Technical Background, but the proposal does not develop these general properties into a specific description of how the project will apply adaptive management to learn by doing. The methods section is still weak. Rather than describe the methods of data collection, the proposal simply refers to the fact that processes have been established by the USGS and the WDOE, and that the new gauges will be operated using their methods, i.e., citations provided instead of methods descriptions.

**Preliminary comment requesting a response:**

There is insufficient information in this proposal to conduct an ISRP review, including the lack of describing an established need (identification of critical gaps), description of specific gaps to be filled, methods to be used, and assessment of benefits to be achieved from installing new gauges. For a requested budget of over \$1M, much more detail should be provided. Water quantity and quality monitoring should be fully integrated into the habitat monitoring programs in the project area, not a stand-alone program. If these gauges are truly critical to addressing data gaps in these basins, the Integrated Status and Effectiveness Monitoring Program (ISEMP) and the Okanogan Basin Monitoring and Evaluation Program (OBMEP) and other monitoring programs in the region should incorporate them into their study designs.

More information is also needed on the toxics approach. The Washington Department of Ecology (DoE) has monitored residues in resident fish throughout the state and can provide important background information on toxics in the various rivers, e.g., see Johnson et al. (2006) Washington State Dept. Ecology, Publ. No. 06-03-027, Olympia, 102 pp.

*1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

This new project was designed to fill key gaps in stream flow and water quality monitoring in the Upper Columbia as identified by the Upper Columbia Watershed Action Teams by (1) restoring key DoE stream gauges that have been removed or abandoned, (2) installing and operating new gauges at key locations, and (3) deploying and operating water quality sensors at key locations across the Upper Columbia. Low instream flow has been identified in many streams across the Upper Columbia as a major limiting factor for salmon and steelhead. Reliable stream flow information is required to assess the status of instream flow as a limiting factor, and to evaluate efforts to address the limiting factor. Also, habitat restoration work often requires reliable local flow information as part of the design process. Although stream gauges are present, there are still many gaps in flow monitoring that need to be filled by this project. The project's significance to regional programs is through the provision of data on flow and water quality in support of various Recovery Plan actions, including the IMW actions in the 2009 FCRPS Adaptive Management Implementation Plan. It would support monitoring and evaluation work conducted Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan.

There was very little of the information required to conduct an ISRP review provided in this proposal. The technical background information was very brief and generic, and the objectives were essentially stated as fill critical water quantity and quality data gaps. No specific information was provided about these critical gaps or how these sampling sites will address these gaps. Where will the gauges be located? Why were these sites selected? Where are the sites in relationship to sample locations being used by other monitoring programs? The likely significance of this project to regional programs cannot be judged without a much more complete description of where sites will be established and what will be measured. Clearly, water quantity and quality are important aspects of stream habitat and should be key elements of any stream habitat monitoring program. However, these measures must be incorporated into a complete monitoring program to ensure that the information will be of maximum value. No information was provided in the proposal describing how the information generated by these gauges would enhance the habitat monitoring efforts being conducted through large, regional monitoring programs, like ISEMP and OBEMP. The technical background is quite general and focuses on M&E needs identified in various plans more than establishing specifics about the stream gauge system and critical gaps.

High nutrient levels, low nutrient levels, high temperatures, sediment levels, and potential toxics have all been identified as general issues with respect to water quality, but more specifics need to be documented.

## *2. History: Accomplishments, Results, and Adaptive Management*

One of the major objectives of this proposal was to re-establish a series of DoE stream gauges, prior data from these sites must be available. However, none of this information was presented. DoE flow sampling sites also often collect water quality data, also not included in the proposal. Data from these sites are characterized as meeting critical gaps in the proposal. If so, the data collected at these locations prior to their demise should provide some indication as to why they

are considered critical. There was no discussion of an adaptive management process in the proposal.

The proposal does not include a description of the existing stream gauge system or identify the location and number of gaps in the system or the length of time they have existed. It does provide a map showing existing gauges and priority 1 and 2 gauge sites identified by the watershed action teams, but without explanation of the criteria used or identification of the nature of the gaps that exist and why they are considered “critical.”

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

Other than a mention that the flow and water quality data would be useful to the ISEMP and OBEMP monitoring programs, no indication of coordination with these monitoring efforts was provided. Ideally, water quantity and quality data collection should be a part of a comprehensive habitat monitoring program. The ISEMP and OBEMP programs do collect some information on these habitat attributes. The proposal notes that the new gauges will supplement those of existing programs operated by DoE, USGS and USFS. This proposal implies that the flow and water quality data collected by these large monitoring programs is inadequate. But no discussion is included to support this point of view. Water quality monitoring under this project will be coordinated ISEMP and OBMEP. The proposal does not say how this coordination will work. It is noteworthy that the proposal mentions man-made toxic chemicals and seeks to support current efforts to monitor these potentially limiting factors in the Upper Columbia. Data will be stored in Status, Trends and Effectiveness Monitoring Databank so that it is available to all.

### *4. Deliverables, Work Elements, Metrics, and Methods*

The deliverables are simply characterized as the delivery of water quantity and quality data from the re-established and new sampling locations. There is essentially no discussion of how these data would be collected, analyzed or interpreted. Apparently, data compilation, QA/QC and archiving would become the responsibility of DoE. But as no information was provided regarding these tasks, an evaluation of technical adequacy could not be done.

No information is provided about the location of the water quantity/quality stations that would be installed nor is there any indication of the type of flow monitoring equipment to be used, how the cross-sections will be rated, what types of water quality sensors will be installed or how often water quality samples will be collected. All this information is required to conduct a scientific review of the proposal. A section on study design does show a map of identified “priority 1” and “priority 2” sites, without much explanation as to which gaps they will address or criteria for assigning priority to a site.

Methods are not described beyond providing a list of sites of previously published work on various methods. How will the data be collected, processed and analyzed? Metrics are listed as water quantity and quality variables to be measured, rather than performance metrics for the

project. The metrics and methods are provided in a short table at the end of the proposal. However, this table appears to be inconsistent with the information provided in the text. The text of the proposal states that nutrient levels and toxic compounds are concerns in the study area and that information on these parameters will be provided through this project. This significance of toxics and nutrients to stream productivity is certainly true. However, the list of metrics provided in the table includes only flow, temperature, conductivity, pH, dissolved gas, and turbidity.

There is some indication that nutrients, pesticides, heavy metals or other key water quality characteristics would be measured. More could be mentioned in terms of what specific toxics are anticipated, i.e., agricultural pesticides near agriculture lands, metals in mining areas, and various personal care products, pharmaceuticals, and flame retardants downstream of wastewater treatment plants (especially in low flow rivers). Agencies and personnel to coordinate with would also be important to list so communications can get started, if not started already.

### 200725200 - Multiscale Hyporheic Exchange

**Proponents:** Umatilla Confederated Tribes (CTUIR)

**Short description:** We will develop and implement studies to evaluate the importance of hyporheic exchange, geomorphic diversity and temperature patterns at three scales (tributary watersheds, valley segment classifications and active restoration project sites) in the Umatilla, Walla Walla and Grand Ronde watersheds.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

Qualification: This is an interesting project that has the potential to provide a useful approach and important information beneficial to habitat restoration. More detail could have been provided on how the project will link hyporheic processes and the geomorphic classification to restoration planning and actions, habitat effectiveness evaluation, and salmonid performances, as outlined in the comments below. The ISRP requests that the proponents produce a progress report that provides results to date and outlines a plan or study design that explicitly address these issues identified above. The progress report should be submitted within one year. The ISRP looks forward to reviewing this report.

The response provided a useful description of the method for determining reach scale hyporheic exchange based on LiDAR, geomorphic channel segment classification and Forward Looking Infrared (FLIR). According to the proposal the Hyporheic Potential Index (HPI) assessment for the Umatilla River has been concluded, but the estimation of this index needs to be completed for portions of the Grande Ronde and Walla Walla River subbasins. It was not clear whether HPI determination for the Umatilla would be repeated. Completion of HPI for the additional sites covered in the proposal is a worthwhile goal.

While the proposal describes the importance of floodplain reconnection to maintaining cooler water in channels where summer temperatures exceed the thermal tolerance of salmonids (e.g.,

breaching levees, restoring access to side channels, and removing other constraints to channel complexity to achieve "restoration of normative floodplain morphology") in general terms, it does not present direct evidence that existing restoration actions have facilitated surface-hyporheic water exchange to the extent that there have been reductions in summer stream temperature. For tributaries such as Meacham and Iskuulpa Creeks, in which there have been extensive restoration efforts, demonstrating that restoration of floodplain connectivity promotes hyporheic processes at the site scale is important. This should be a key objective of the project.

The project's goals have been clarified: "1) basin-wide assessments of potential hyporheic exchange (Hyporheic Potential Index; HPI) and stream temperature response in the target watersheds (Walla Walla, Umatilla and Grand Ronde) and 2) reach scale assessments of geomorphic characteristics associated with stream sections where hyporheic response drives variable temperature patterns (a subset of analysis in part 1)." The proposal mentions that temperature measurements of surface and hyporheic water will be monitored in [shallow] wells, but the locations of the well networks are not specified in the response, nor are funds for equipment such as temperature loggers and well building materials requested in the budget. The ISRP is still not certain about the extent and design of the field elements of this project, or other monitoring details. In addition, it was not clear how often FLIR flights would occur, and over what locations. FLIR technology is expensive, but more than one flight may be needed to locate parts of the stream network that experience unusually warm or cool waters. Additional details about temperature characterization, particularly in relation to ongoing restoration projects that affect hyporheic flows, would have been helpful.

The proposal emphasizes restoring natural channel morphological patterns as a key to maintaining habitable rivers in late summer, but we also wonder if shallow wells for irrigation water (if they occur) also might be having a significant impact on exchanges between surface and hyporheic flows.

The value of this project is not only in understanding hyporheic processes but also in using this understanding in evaluation of the effectiveness of habitat enhancement actions and in understanding salmonid use of hyporheic influenced areas. The proponents are well aware of these issues. They define two objectives but a third is evident. In several places in the initial proposal and in their response, they mention determining relationships between hyporheic influenced habitats and salmonid performances. However, in spite of their importance, little detailed information is given about how these studies will be conducted. Salmonid performances should be confined not just to redds and growth (if it has been measured) but should also include adult distribution and juvenile abundance and distribution, as these performances will respond to decreases in water temperature from enhanced hyporheic exchange.

An IMW project is planned for the Umatilla River. It would seem that the proponent's project would be beneficial to the IMW project and should be integrated with it. The proponents did not explicitly discuss their role, if any, in the IMW project.

The proponents should consider evaluation of hyporheic influences on reach scale thermal refugia along stream margins and in side channels. As the proponents are aware, these refugia can provide important habitats for salmonids even if hyporheic processes have little influence on mainstem temperatures.

**Preliminary comment requesting a response:**

This project can provide valuable information for stream habitat restoration programs throughout the Columbia River Basin. The presentation to the ISRP was good and alleviated many of our concerns about the soundness of the science behind the proposed work. The proponent's presentation and response to questions demonstrated a solid grasp of hyporheic and riparian function. However, as the proposal now stands, the information provided was insufficient for scientific review. A response patterned after the presentation would be a good approach in responding to the ISRP's concerns.

The proponents need to provide more detail concerning study design, work elements, methods, and metrics for this proposal to be sufficient for scientific review. Specifically, the proposal needs to state whether the principal focus is on landscape-scale hyporheic identification using remote sensing tools or a more localized objective of assessing the effect of in-stream restoration activities on hyporheic-surface water interactions. We recommend that the project concentrate on one or the other, with additional details provided on where and how the studies would be carried out and the data would be analyzed and reported. We suggest that better integration with other regional habitat programs is needed. A more fully-developed adaptive management process should be provided.

The proponents should explain how altered hyporheic flow was identified as an important limiting factor in the drainages to be studied? They also should discuss how the results of this project would be incorporated into watershed and reach scale restoration strategies.

*1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

A better understanding of hyporheic processes in the Columbia River Basin could make a significant contribution to habitat and salmon restoration efforts. Although many habitat restoration projects have included increased hyporheic exchange as an objective, virtually none of the monitoring efforts associated with these projects have evaluated this process. This proposal contains the elements that would be required to conduct an evaluation of hyporheic exchange and how it is influenced by the application of stream channel reconstruction or other habitat enhancement measures. The development of a floodplain classification system that characterizes the nature and magnitude of hyporheic exchange based on field and remotely-sensed data sets also would be a valuable tool. But the proposal lacked sufficient detail to enable a through technical review.

The technical background was well documented, although text was missing from some paragraphs in the Problem Statement. Even so, it was apparent that the proponents were familiar with the subject. One aspect of the technical background information that would have been

helpful would have been a more complete discussion of the importance of hyporheic flows to salmonid production, and why the issue is so important in this region of the Columbia River Basin (e.g., water withdrawals have disrupted hyporheic-surface water exchanges).

The proponents should explain how altered hyporheic flow identified as an important limiting factor in the drainages to be studied? Was the conclusion based on the lack of thermal refugia in the stream channels and evidence that restoring hyporheic flowpaths would create some cool water locations during the summer low flow period?

The significance of the project to regional programs was inadequately described. The proposal describes how the project is integrated into the CTUIR restoration strategy. To what other restoration projects in these drainage systems is it related?

The objectives were clearly stated and reasonably well supported. The objectives contained the only descriptions of the work elements in the proposal.

## *2. History: Accomplishments, Results, and Adaptive Management*

This proposal builds from a project on hyporheic processes that was completed last year in a reach of the Umatilla River. An annual report from this project was linked to the proposal, clearly indicating that the proponents of this proposal have the necessary experience and expertise to conduct the work.

There was only a very brief paragraph in the proposal dedicated to adaptive management and this text simply stated that previous work in the Umatilla River had persuaded CTUIR habitat project leaders that hyporheic processes are important. More consideration should be given to the process by which the information and tools generated by this project will be delivered to project leaders and managers and the process by which this information could be used in the future restoration planning. The multi-scale aspects of this work, especially the development of a tool that will enable the identification of floodplain locations with high potential for hyporheic exchange, suggest that this project could have a direct effect on management decisions.

As stated in the proposal, the project has been active for less than a year so there are few accomplishments to date. However, results of floodplain hyporheic flow mapping that are apparently in press were displayed. These results suggest that locations in the mainstem Umatilla River where hyporheic-surface water exchanges are significant are patchily distributed, as would be expected. Knowing where these places are is helpful in designing habitat restoration projects.

There was little explicit discussion of how the results of this project would be incorporated into either overall watershed restoration strategies or into different types of restoration actions.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

More information is needed on project relationships, particularly details on how this project would be integrated with other habitat restoration efforts – both CTUIR and other programs. A list of projects was provided with which this effort will “directly coordinate.” But the nature of the interaction was not described. Presumably, some of these projects will provide habitat treatments for before-after assessments of hyporheic processes. If so, these projects should be identified and a brief description of the types of habitat projects provided. One project was listed that did not seem to have any relationship with the proposed effort. Since this project will occur in the Walla Walla, Grande Ronde and Umatilla watersheds, why is the North Fork John Day River Basin Anadromous Fish Habitat Enhancement indicated as an effort with which this project will directly coordinate?

Climate change or other emerging factors are not explicitly addressed in this proposal.

### *4. Deliverables, Work Elements, Metrics, and Methods*

Only a single deliverable is provided in the proposal: “Assess spatial and temporal relationships of hyporheic exchange, changing channel forms, geomorphic setting and altered temperature patterns.” As a generic deliverable, this is fine. But the introductory material in the proposal described a project that included a field effort at the project and reach scale coupled with a remote-sensing component to expand the finer-scale results. Deliverables articulated by spatial scale might have provided a clearer indication of project organization as the work elements associated with each scale are quite different.

Although only a single deliverable was given, the executive summary gives two major objectives: (1) “the Multi-Scale Hyporheic Exchange project seeks to conduct a suite of field tests to document the changes in physical habitats related to surface/groundwater exchange. We anticipate that these activities will include field components for data collection and analysis, including, topographic data collection, dye releases and monitoring, temperature monitoring and tracer tests, as well as, analysis of field and remotely sensed data” and (2) “The second portion of this work seeks to develop a remote sensing-based classification of floodplains in the target watersheds (Umatilla, Walla Walla and Grand Ronde).” These two objectives should generate multiple deliverables.

The work elements, metrics, and methods are only very briefly described in the proposal. These project elements appear to be generally appropriate for the objective and deliverable, but much more detail is required to enable a thorough evaluation of the experimental design and methodologies. Limited information was given on the field techniques and modeling methods, other than to list them without providing details about how they would be implemented at the proposed study sites. It is unclear how this project will be conducted, the locations of study sites, what measurement will be made and how they will be made. A major shortcoming of the

proposal was that a study design was not provided. The lack of detail prevented a scientific assessment of the proposal's merits.

It appears that the evaluation of hyporheic functioning will take place at only one spatial scale (floodplain segments). What are the larger spatial scales and how will floodplain information be "rolled up" to these scales? What "distribution and characteristics of floodplain segments" will be assessed and how? How will floodplain characteristics be related to "salmon diversity and productivity?" The proponent states that they will evaluate how "geomorphically and thermally complex habitats affect growth and survival of juvenile salmon by using existing productivity datasets." How will the relationship between habitat factors (presumably hyporheic influenced, but this is not clear) and fish growth and survival be determined? What data sets will be used?

### ***Water Transactions and Nutrient Mitigation Projects***

#### **200201301 - Water Entity - Water Transaction Program**

**Proponents:** National Fish and Wildlife Foundation

**Short description:** The Columbia Basin Water Transactions Program (CBWTP), a partnership between BPA and the National Fish and Wildlife Foundation, works through qualified local entities to acquire water rights to enhance instream flow for the benefit of threatened and endangered anadromous and resident fish species. Water transactions provide an effective and appropriate response to address inadequate stream flows, often cited as a key factor limiting the productivity of both anadromous and resident fish species.

**ISRP final recommendation:** Yes (Qualified)

**Comment:**

The responses to the ISRP's questions were reasonably thorough. Although we remain concerned that monitoring may not get the attention it deserves, the project proponents have satisfactorily addressed the majority of our questions. We therefore believe that this project meets scientific criteria, with the following qualifications:

Qualification 1: The Water Transaction Program should complete the development of compliance, implementation, and effectiveness monitoring protocols as soon as possible. Given the lead entity is the National Fish and Wildlife Foundation, the proponents should be able to develop their monitoring program fairly quickly.

Qualification 2: Cost monitoring is needed. Thirty six percent of the budget is to support QLEs. This is a big investment, and CBWTP should systematically evaluate how to keep acquisition and administration costs as low as possible. They could provide some analytical evidence of why this amount is needed to implement the project, because NFWF as the lead entity should be able to assess the cost-effectiveness of the various approaches. This could be summarized in the annual meetings so that each QLE can learn from the experiences of other QLEs. The Consultant's evaluation report did not address the question of administrative efficiency or cost

per acre foot of leased or acquired water under different acquisition strategies. This could include a comparison of the annualized costs for a lease (with the accompanying multiple transaction costs) and outright permanent acquisitions (with the one-time accompanying transaction).

Other comments:

The proponents provided a helpful clarification of the budget request, including a \$15M+ cost share that will help lower their request to BPA. The administrative costs still seem a little high, but that may be the result of legal expenses associated with water transactions. Additional clarification is provided in the response to the ISRP's comment about transaction costs being an integral part of the program. The response to the ISRP's question about the cost-effectiveness of individual transactions was illuminating, but it would have been aided by an example how the analysis affected an individual transaction.

The proponents are making some progress toward monitoring. The response states that the flow compliance monitoring protocols have been completed, and development of biological monitoring protocols is planned for FY 2011. Adequate monitoring is essential to ensure that ecological assumptions about the impacts of flow on habitat and population responses are reasonable and sufficient to achieve desired results. The wisdom of limiting the monitoring budget to 5% of total budget should be evaluated regularly to ensure the remaining portion of the budget is invested in the best manner.

Examples of coordination with other restoration programs were given for two streams, as the ISRP requested. The coordination with regional RM&E efforts to achieve implementation and effectiveness monitoring goals was adequately addressed. The ISRP realizes that the 5% monitoring cap is still used, but we remain unsure why project proponents seem unwilling to "up the ante" in situations where the information gained would be worth the effort and expense.

We wish the logic models for priority stream reaches (to be developed by individual QLEs) were further along so we could see how one would be used. The ISRP acknowledges, however, that they have not yet been developed.

The graphs showing trends in water acquisitions through time were helpful. What assumptions are being made about the possibility that temporary acquisitions will be made permanent?

The Big Timber Creek and Teanaway acquisition examples were useful. Additionally, the explanations of how those agreements have become more sophisticated with time help us understand how they address flow-related limiting factors.

The response to the ISRP's question about QA/QC emphasized stream gauging. While this is needed, a little more discussion about quality assurance for the biological monitoring activities would have been useful.

The response clarifies the budget amount as lower than the earlier impression. However the \$23.4 M budget is still large, and the \$8.4 M for administration of the program is high. It is the large budget share (36%) dedicated to the transactions costs that provide the basis for the ISRP recommendation that these transactions costs associated with various approaches to water transactions be analyzed.

The response does a better job establishing the connection between the CBWTP and other regional programs concerned with improving flows. It also provides detail on the types of connections that are required to be established within each QLE transaction proposal and the process of ranking transaction proposals. It establishes contributions made by staff of QLEs to the subbasin plans.

With regard to evaluating the strengths, weaknesses, and cost effectiveness of various processes and methods employed by the QLEs, the response described a process by which the QLEs share information and learn by doing. It also references and provides a link to a biennial report produced by WestWater Research that analyzes the cost-effectiveness of various flow restoration methods and approaches. However it does not summarize the findings of these two processes. Given that program administration is such a large budget component, the proposal should contain some evaluation of lessons learned about the transactions costs and efficacy of various approaches, e.g., by evaluating the performance of program administration. The table on costs by transaction type is an example of the type of data that would be evaluated.

With regard to monitoring outcomes, the response indicates that in response to the 2007 program evaluation recommendations, compliance effectiveness protocols have been developed, to be followed by the development of biological monitoring protocols in 2011. These protocols are being developed in coordination with Council and other regional agency staff. Given the relatively small proportion (5%) of the CBWTP budget dedicated to monitoring and the limited technical monitoring capacity within QLEs, it is not clear how specifically this monitoring will be implemented.

With regard to the degree of permanence of the present acquisitions and the implications of this time horizon for future expenditures, the response states "The CBWTP funds deals of various lengths, from annual leases to permanent acquisitions. We have found that all of these transactions serve a purpose and make the portfolio of the program stronger." This is another example of an area in which an assertion would be strengthened by evaluation. For example, what purpose does the diversity of transactions serve? And how will portfolio strength be measured?

The response does address the question of future availability of water under existing contracts, but does not really answer the issue raised by the ISRP: "the program seems to face a future of declining amount of water acquired, as some existing agreements expire."

The response states, "While the amount of acre feet secured in stream does decrease through time because of the expiration of temporary deals, the program continues to increase the amount

of water that will be protected instream long-term and permanently." So the question is, what is the net effect?

In response to the ISRP comment: "Likely the contribution of the CBWTP varies from subbasin to subbasin, but without knowing how it has impacted rivers during the low flow period it is difficult to judge the program's success. Again, the main difficulty arises when insufficient information is presented to permit an assessment of the impact of the water acquisitions on fish habitat quantity and quality," two specific examples are given. However, this is another area in which ongoing monitoring of the program as a whole would be beneficial in understanding program impact.

The response to the ISRP comment "The proposal asserts that CBWTP results have advanced water transactions as a cost-effective tool for restoring flow to imperiled rivers and streams, but to our knowledge the cost effectiveness of the CBWTP approach has not been fully assessed" does not really address the point, which is the lack of systematic assessment of the cost-effectiveness issue. For example, saying "CBWTP QLEs typically pay at or below market rates when acquiring water rights" is different from documenting this statement and also different from a comparison of CBWTP costs to other BPA and NRCS funded projects.

The bottom line with this response seems to have two pieces: coordination and monitoring. There appear to be many areas with which this program is coordinated with others related to stream flow, and the project proposal just needs to do a more comprehensive job in documenting, summarizing and evaluating these. With regard to monitoring, the project needs to do a better job monitoring and evaluating both cost-effectiveness and biological effectiveness program-wide, not just focus on anecdotal examples. The proponents note examples of the types of information provided in various forms but do not evaluate this information.

**Preliminary comment requesting a response:**

The ISRP is impressed with the Water Transaction Program's goals and objectives but requests a response from the project proponent in order to address some important questions.

Because of the focus on various tools of water acquisition the proposal should also provide some evaluation of various processes and methods employed by the QLEs, identifying strengths and weaknesses. It should also address the question of cost-effectiveness of various acquisition approaches rather than simply assert cost-effectiveness for the program as a whole.

With a budget of almost \$39 million over 4 years, the project is one of the most expensive efforts funded by the Fish and Wildlife Program. To demonstrate that the investments in water rights acquisition are worth it, the proposal should include more details about its record of success. In particular, examples should be presented that demonstrate that increases in fish habitat or various population metrics can be attributable to increased flows resulting from CBWTP acquisitions, and not from other restoration actions taking place in the same watershed. Additionally, more details need to be provided on the potential methods, metrics, and deliverables associated with Objectives 4-6 so that their scientific merits can be assessed.

The project description lacks an evaluative component to justify its large expense. The proposal should contain much more information about accomplishments in terms of outcomes and impacts, rather than its present focus on transactions completed and water acquired. It should discuss the degree of permanence of the present acquisitions and the implications of this time horizon for future expenditures.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The project has six objectives: 1. improve flow rates through identified stream reaches; 2. improve water volumes; 3. improve available habitat; 4. improve egg-to-smolt survival; 5. increase off-channel habitat; and 6. monitor species diversity and abundance. The significance to regional programs is adequately described. There is reason to believe that entry into water conservation programs has the potential to result in large gains in habitat for salmon and resident fishes (as well as some wildlife) in many subbasins, and voluntary incentive-based programs such as CBWTP appear to have had success so far.

The technical background and objectives in the proposal tended to be filled with boilerplate language but without a lot of technical details. Granted, each QLE is using its own approach to monitor the effects of its water acquisitions, but additional details about why certain methods were selected are needed. An example is the use of Instream Flow Incremental Methodology (IFIM) techniques to assess habitat improvements after flow increases. Although IFIM protocols have been in widespread use throughout the west over the last three decades, other methods (including EDT and related habitat models, as well as a variety of channel classification techniques) could be employed to estimate habitat change. Have these been considered in the development of technical approaches to monitoring? It would also be helpful to have more background on need, priorities, water rights transactions and their performance as part of the technical background.

The proposal does a good job of describing its significance to regional and local water conservation programs, but there was little discussion of how the CBWTP is linked to other types of restoration at the subbasin scale. Needed are details of how subbasin analyses and knowledge of limiting factors are incorporated into water acquisition priorities. Are the locations of acquired water rights influenced by other restoration actions in the vicinity so there can be improved coordination (and data sharing)?

The purpose of the CBWTP is to acquire water rights to enhance instream flow to “ecologically significant” Columbia River Basin tributaries, working through various state agencies and NGOs designated as “qualified local entities.” A map and list of tributaries where transactions have taken place is provided. The CBWTP has been operating since 2003. The proposal should put these transactions within the larger context of Columbia River Basin priority needs. What is described is a process of review and evaluation of transactions proposed by individual QLEs, rather than a prioritized strategic framework for how to address the greatest needs.

The program is tied to regional programs involving tributary habitat and flow issues, in particular to RPAs identified in the 2000 and 2008 Biological Opinions. The proposal provides an extensive accounting of programs and plans within the region where in-stream flow is identified as a critical factor, but does this in a general manner rather than tying the CBWTP specifically to these programs. This list establishes the importance of stream flow more than it establishes the significance of the CBWTP to regional programs concerned with improving flows.

## *2. History: Accomplishments, Results, and Adaptive Management*

The history of the Water Transaction Program was adequately described. The proponents did a reasonably thorough job of listing the water transactions that have been implemented in the recent past and describing the relationships that have resulted from the 10 local entities (QLEs) working with interested water users as well as regulatory agencies, tribes, and NGOs.

Although the overall results are presented in terms of acre feet of water conserved through the program (either permanently or temporarily) through water rights agreements, it was difficult to place these water gains in a larger context. In addition to estimating acre feet of water sequestered through the CBWTP, it would be most helpful to estimate what percentages of the river flow during the irrigation season these figures represented. Likely the contribution of the CBWTP varies from subbasin to subbasin, but without knowing how it has impacted rivers during the low flow period it is difficult to judge the program's success. Again, the main difficulty arises when insufficient information is presented to permit an assessment of the impact of the water acquisitions on fish habitat quantity and quality (e.g., x% increase in base flow, approximate increases in the area of key habitats, effect of the water acquisitions on in-stream temperatures, etc.). Limited results were presented in the proposal, but we hope there are more examples that could be included. We suspect that delays in implementing effectiveness monitoring – both habitat and biological response – have restricted the amount of available data, but the proposal really needed to include a more thorough summary of results to date.

We were pleased to see that the QLEs have adopted the ISRP's recommendations for prioritizing water transactions (ISRP 2003-1). That was a good example of adaptive management. It would also be useful to know if adoption of the prioritization criteria has resulted in any shifts in QLE approaches to working with landowners.

We note that the CBWTP is holding a workshop among the QLEs to discuss monitoring methods and arrive at general monitoring recommendations, and we strongly recommend carefully examining other basinwide aquatic habitat monitoring programs (e.g., CHaMP/ISEMP, AREMP, EMAP) to determine what elements of those programs can contribute to the water acquisition monitoring efforts undertaken by the QLEs.

The proposal provides a financial history and a list of cost share partners over time. The description of financial history and performance is adequate. The explanation of factors influencing the timing of deliverables is adequate. A summary of the numbers of transactions

and amount of water acquired over the life of the program is presented, along with a good description of coordinated efforts with cost-share partners.

One graph shows acre-feet of water acquired during each year of the program. Is the interpretation that the out years of the graph show the time horizon over which these acquisitions will be in effect? If so, the program seems to face a future of declining amount of water acquired, as some existing agreements expire.

A graph indicating the total cost of water over the program's history is presented. It would be useful to see a calculation of the cost per acre foot of water acquired.

The accomplishments section also describes implementation of conservation easements, work within the regulatory frameworks of the four states, and programmatic changes. The programmatic changes include the expansion of the application of market-based mechanisms to water conservation. The proposal asserts that CBWTP results have "advanced water transactions as a cost-effective tool for restoring flow to imperiled rivers and streams," but to our knowledge the cost effectiveness of the CBWTP approach has not been fully assessed.

An adequate description is provided of the changes in the program over time to adapt to changing circumstances: mergers of QLEs, QLE prioritization of acquisitions, experimentation with new acquisition tools, implementing related programs, and the development of monitoring protocols in response to recommendations of a 2007 external program review and ISRP reviews that the biological impacts of the acquired water be evaluated. The program has a pretty good history of learning from past experience and adapting approaches on the basis of what has been learned and in response to changing conditions.

The proposal describes responses to several ISRP recommendations. In response to a Council recommendation to lower overhead costs of the projects, the CBWTP refers to a conclusion of the 2007 review that observes the nature of individual transactions between rights-holders and a QLE, and states that transactions costs will always be a part of the program. Also part of that review was a Council-sponsored review of the consultant's report, in which this perspective is challenged somewhat and a recommendation made to systematically assess the QLE actions and processes to learn general properties of successful and unsuccessful processes.

Since 2002, the program has completed over 240 water right transactions and noted that they have restored over 819 cfs of flow to tributary streams using various water acquisition methods. It is impossible from the data presented to know how much of the flow improvement occurred at the key low flow time of the year (perhaps flow improvement should be summarized differently). In terms of priority localities for this activity, it was noted that stream flow was mentioned in the subbasin plans or other key documents. But, it also mentioned willing landowners and the presence of other activities in the area play an important part in the decision making process. There seems to be an approval process that would tend to eliminate less important activities. The program was independently evaluated in 2007, with a report indicating that in addition to monitoring compliance and flow, that standards be established for habitat monitoring.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

It was apparent that the CBWTP targets both resident and anadromous salmonids, depending on location. A little more discussion of the life history stages that would likely benefit from water rights acquisitions would have been helpful (e.g., would the projects be more likely to benefit fall or spring spawners?).

Although discussed under a topic above, the issue of using water acquisitions to address perceived limiting factors in areas where other types of restoration actions are simultaneously taking place suggests that close coordination will be beneficial. What is being done to promote the coordination of water acquisitions with other habitat improvement projects? The proposal addresses this question in general, but some specific examples would help.

The proposal includes a good description of how climate change will affect limiting flows, with specifics of how these anticipated changes will affect the timing and quantity of water in different parts of the Columbia River Basin. It also summarizes QLE approaches to account for these anticipated changes.

### *4. Deliverables, Work Elements, Metrics, and Methods*

More details are needed on the monitoring protocols. The proposal states that the biological effectiveness monitoring methods will be developed by the QLEs, but there should be a statement of the types of methods that project proponents would consider reasonable. Additionally, the QLEs may have to rely on cooperation from ongoing effectiveness monitoring efforts in the area (e.g., the CHaMP/ISEMP project), and how the Water Transactions Program would contribute to the implementation and funding of effectiveness monitoring should be explained in greater detail. Despite having developed protocols for biological monitoring and compliance monitoring in the past year, details of these protocols or how they will be applied to monitoring or data collection are not provided.

The descriptions of methods and deliverables for objectives 4-6 were not sufficiently explanatory, and the language for each objective was virtually identical (and sometimes unrelated to the specific objective itself) suggesting that methods for these three objectives had yet to be selected. More details are needed with respect to the potential methods that could be used to achieve Objective 4, Objective 5, and Objective 6, or, if not currently available, how they would be established (we assume the workshop will do this, but a few more details are needed). Although the QLEs will determine the exact procedures to be used, the proposal should present a suite of potential methods from which the QLEs can pick the most appropriate approach and metrics. This proposal, as it is currently worded, contains insufficient detail for scientific review of these three objectives.

Flow monitoring will be a key component of assessing the habitat effects of water acquisition, and the proposal is reasonably detailed concerning where flow monitoring would be carried out. It would be helpful, however, for the proposal to describe how QA-QC will be accomplished on the flow determinations. This is important because some of the water acquisitions will comprise a relatively small percentage of the river's discharge and accurate flow measurements will be needed to verify that flow objectives are achieved.

It would also be helpful to describe in more detail where data related to water acquisitions and post-acquisition monitoring would be archived and made publicly available.

### 200733200 - Mitigation of Marine-Derived Nutrient Loss in Central Idaho

**Proponents:** Idaho Department of Fish and Game (IDFG), Idaho State University, University of Idaho, Washington State University

**Short description:** The project mitigates marine-derived nutrient loss resulting from salmon extinction due to hydro development in Idaho. In an applied context, we are quantifying differences in nutrient replacement strategies at the reach and basin scale using an ecosystem-based, mechanistic, long-term monitoring approach to both aquatic and terrestrial habitats and organisms. The project will determine relative efficacy of widely used nutrient mitigation tools and facilitate adaptive management decisions.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

This proposal is generally very complete and addresses a question of considerable importance to salmon recovery efforts in the Columbia River Basin. The development of a regional synthesis of the results of nutrient addition projects (with the aid of a 2011 conference) is badly needed and should be given priority. Project proponents should consider the questions and suggestions in the comments below as they move forward with this important effort.

*1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The proposal provides a persuasive rationale for investigating nutrient supplementation to mitigate for the loss of anadromous salmonids in Snake River tributaries located in central Idaho. The significance of this project to regional restoration programs was adequately described. The project is significant to the region in that it aims to experimentally determine if restoration of marine-derived nutrients (MDN) inputs to watersheds from which anadromous fishes have been excluded by dams benefits the ecosystem, and its fish and wildlife.

This proposal will build off an existing nutrient addition study that has been very successful. The project proponents plan to expand nutrient treatments to an entire watershed. This expanded treatment will enable assessment of responses at a spatial scale more appropriate for mobile organisms (i.e., fish and bears). There is a great deal of interest across the Columbia Basin in using nutrient addition as a mechanism to enhance aquatic and riparian productivity. Therefore,

the results from this project would have considerable significance for regional efforts to restore salmon and steelhead populations.

The technical background and objectives were well explained and generally clear. The description in the proposal of the problem being addressed by this project is very complete and a thorough review of what we know (and do not know) about the response of aquatic and riparian ecosystems to nutrient enhancement was provided. The proposal also provides some thoughtful speculation about potential temporal changes in response with the long-term application of nutrients. The length of the study should enable some of these hypotheses to be evaluated. The proposed use of models also will help to explore possible responses to treatments at larger spatial temporal scales.

There were a few items related to the background of the project that could have been more completely addressed. Comparing the response of aquatic communities and wildlife (especially bears) to carcass and carcass analog supplementation received the most attention in the proposal, but it was somewhat less clear why inorganic nutrients were also chosen as a third treatment (other than their widespread use in oligotrophic lakes) and whether inorganic nutrient additions were really viewed as a viable alternative to carcasses or carcass analogs in streams. No supporting evidence was provided for the assumption that MDN contributed by adult anadromous fish was greater than the nutrient loss caused by the emigration of smolts prior to dam blockage. Also, it would have been helpful to know more about efforts to restore instream habitat and riparian vegetation at the proposed study sites (if, in fact, such efforts exist).

Knowledge of other restoration actions, in addition to nutrient additions, will be critical to interpreting experimental results. An issue that has arisen with the implementation of nutrient addition studies in the past is permitting. Even when applying treatments at a reach scale, permits to add nutrients are often controversial and can be difficult to obtain. A recent proposal to add fertilizer to Dworshak Reservoir was postponed because some members of the public raised concerns over the project, which led to a reassessment of the permitting procedure required for such projects. Some discussion of this issue should have been included in the proposal. Despite these minor deficiencies in the background material, the potential value of this project was well justified.

The objectives for this study are clearly articulated and very appropriate. They are scientifically based and specific. They are as complete a set of objectives as has been proposed for any nutrient study in the Columbia River Basin, evaluating everything from the activity of soil microbes to bear productivity.

## *2. History: Accomplishments, Results, and Adaptive Management*

The history of this project is concisely summarized in the proposal and links to various annual reports are provided. The project staff is to be complimented for examining a wide variety of potential responses to nutrient amendments in the streams, in riparian foliage, and in a number of wildlife groups. Many projects of this type have not been as comprehensive in studying

ecological effectiveness, and we are pleased that the team has considered so many response metrics.

The past accomplishments discussion in the proposal clearly indicates why the response variables chosen for the expanded treatments were selected. It appears that many of the short-term wildlife responses to carcasses or carcass analogs (as introduced over 500m reaches) have been minimal or undetectable. Isotopic analyses of several taxonomic groups, including small mammals, songbirds and bats, failed to detect the presence of MDN. Studies of these animals have been abandoned in the current proposal in favor of a more intensive examination of bear response. This focus on bears seems appropriate, given their linkage to salmon and aquatic systems. The large spatial and temporal scale of the treatments in this study makes the experimental design compatible with the examination of bear response. We assume that the project proponents will refine the bear research as a better understanding of the response of these animals to nutrient enhancement is derived from the preliminary results.

The proposal does not provide a detailed description of an adaptive management element. The information generated by this study will be of great value to managers given the interest in this enhancement technique. However, the manner in which this information will be communicated to managers and policy people was not clearly described. Peer-reviewed journal articles are the gold standard for scientific communication but are often a less than ideal method for conveying information to decision makers. The project leaders should give some additional consideration to incorporating an outreach and education component into the study as the project proceeds.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

In general, the relationships of this project with ongoing and planned nutrient addition studies in Idaho were adequately described. Coordination among the projects appears to be mostly informal, including sharing annual reports and collecting some parameters using comparable protocols. These projects may benefit from a more formal collaboration, possibly including regularly scheduled workshops to ensure timely information exchange. Some specific information in the proposal about the parameters that are being collected using similar methods also would have helped to illustrate the degree of coordination among the projects.

The map in the proposal shows the general area of study, but it does not identify the locations of the nutrient addition experiments already underway nor does it show where the proposed new sites would be located. Additionally, it would be helpful to display the locations of other restoration projects in this area (e.g., habitat improvement, hatchery-based native fish supplementation programs, exotic species control, and riparian restoration). This information would help to place this project in a broader context of fish and wildlife programs in the area. Because this proposal outlines work that addresses a presumed limiting factor – nutrient limitation resulting from the loss of salmon carcasses – it is important that the specific effects of nutrient additions not be confounded by other restoration efforts affecting the study sites.

The rationale for using PIT tags was provided. The willingness of the project staff to look for opportunities to share the PIT-tag data with other projects and effectiveness monitoring programs in the area is commendable.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

The description of the deliverables, work elements and methods would have benefited from some additional detail. For example, the description of the project in the Problem Statement focused on the application of carcass analogs at a watershed scale. As a result, Objective 2 caused a bit of confusion with the mention of treatment with inorganic nutrients and carcasses. It was not clear if only the riparian plot-scale treatments would look at various nutrient-source types or if a range of treatment types would also be used for the large-scale, aquatic treatments. An introductory paragraph or two describing the project's experimental design would have eliminated this problem.

The description of work elements was generally adequate, but there were several items that would have benefited from additional discussion. It seems likely that conditions that may influence plant growth, other than nutrient availability, may vary among the randomly selected riparian plots. Differences in light level, soil moisture, or soil structure can impact plant growth and mediate the response to nutrient enrichment. No indication of how variation in these non-treatment factors will be addressed (or even if they will be measured) was provided. Given the general technical rigor of most of the proposal, reviewers assume these issues have been considered but were not included in the proposal.

The inclusion of the bear work in this proposal is an unusual element; there are few (if any) experimental nutrient enrichment studies that have attempted to examine bear response. The methods that will be employed to evaluate bear response appear to be very complete. However, it was not clear whether or not there would be sufficient pre-treatment data on bear population dynamics to be able to detect a response. Certain attributes, like fecundity and growth rate, can be influenced by factors like temperature and precipitation level. If so, there may be considerable interannual variation in these parameters, suggesting that a relatively long record of pre-treatment data might be required. It was not clear in the proposal how variable these population parameters are likely to be, how much data is currently available and what level of a response following nutrient addition would be required to detect a response.

Some additional discussion of the use of stable isotopes to determine if bears are incorporating analog N and C also would have been useful. The apparent assumption in using this technique is that the analogs possess an isotopic signature distinct from any other food source available to the bears. Is there sufficient data on the isotopic ratios of the things bears may eat (which is probably a pretty long list) to support his assumption? If not, you might consider including the isotopic analysis of potential food sources in the study.

The methods were not fully described, but they are based primarily on existing protocols and references are provided. However, several items would have benefited from additional discussion:

1. No rationale was provided for the application of at least 50,000 kg of analog material annually. Was this figure based on information generated through the reach-scale studies? Was it derived from some published source? Was it based on the current nutrient status of the treatment watersheds and some desired post-treatment nutrient level? Some reason for this level of nutrient application should be provided.
2. A more complete explanation of why 500 m was selected for the length of the treatment reaches for nutrient supplementation would have been helpful. The proposal presents data showing measurable food web effects from previous experiments, but so far there does not appear to be convincing evidence that focal species (trout) populations have responded. Perhaps the study reach is too small for an effect to be shown at the population level. Analogs will be added to multiple 500-m reaches within the treated watershed under this proposal. The apparent assumption underlying this approach is that these multiple reach-scale treatments cumulatively will constitute a watershed-scale treatment. Is there any supporting evidence that the length of the treated reaches, the number of treated reaches and the amount of analog material to be added will increase nutrient availability significantly through the entire watershed?
3. It was not clear why salmon carcasses (analogs) would be distributed 75% in the stream and 25% on the banks. Is there rationale from the literature that suggests this is a reasonable distribution?
4. In addition to the comparison of trout density and growth between the treated and untreated watersheds, the project proponents might consider collecting data on recruitment, if possible.
5. The ISRP generally encourages the application, verification, and modification of simulation models to generate testable hypotheses and extend the applicability of project results. Project staff is on the right track to use the Biome BGC model for this purpose. More details about the model would have helped explain why certain response metrics were selected for evaluation. And knowing a bit more about the model's structure and outputs would have been helpful for review purposes. We appreciate that power analyses have been carried out to determine sample sizes for many of the response metrics. Has the Biome BGC model influenced sampling frequency, location, or timing?

## *Genetics*

### 198909600 - Genetic Monitoring and Evaluation (M&E) Program for Salmon and Steelhead

**Proponents:** National Oceanic and Atmospheric Administration (NOAA)

**Short description:** This genetic monitoring program evaluates the effects of hatchery reared fish on natural and wild populations of spring/summer Chinook salmon (*Oncorhynchus tshawytscha*) and steelhead (*O. mykiss*) in the Snake River Basin. The study has two components: gene frequency monitoring over time, and reproductive success in hatchery and wild fish. Results should aid in addressing critical uncertainty and genetic risk associated with the use of artificial propagation in recovery.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

This project began in 1989 with the goal of assessing evidence of hatchery spawning and introgression with wild Snake River spring/summer Chinook and steelhead using allozyme (protein) technology. The project transitioned to employing DNA microsatellites as the genetic marker prior to the 2007-2009 proposal cycle and is starting to explore using DNA single nucleotide polymorphisms (SNPs). In addition to the original approach of evaluating allele frequencies in hatchery stocks and looking for “signatures” of these alleles in natural populations with different levels of hatchery presences in the spawning mixture, relative reproductive success investigations are underway in the Grande Ronde River subbasin.

Field sampling to obtain fin clips from fish in hatcheries and natural locations takes place annually, but samples are not analyzed unless requested from local managers. Based on information provided during the proposal presentation, about 10% of the effort is dedicated to sample collection, about 25% on analysis of samples for allele frequency comparisons, and 65% on relative reproductive studies. The ISRP concludes that the annual sampling and archiving of fin tissue is important and needs to continue, that refinements are needed in the development and execution of the comparative allele frequency effort, and that the relative reproductive studies are needed.

There are several qualifications that the proponent should address during this project cycle:

Qualification 1: Formal plans for performing the comparative allele frequency analyses needs to be developed. The work should clearly be linked and integrated with the Columbia River hatchery effects team and the LSRCF. The current approach is to wait for co-managers to ask them questions, and then initiate analysis. The efficacy of the approach should be examined.

Qualification 2: They should increase coordination of QA/QC of the relative reproductive studies sample collections to ensure field practice is consistent with the assumptions of their

investigations. It is disappointing that the Chinook relative reproductive success work in the Lostine lost 8 years of effort because of fish handling mistakes at a weir.

Qualification 3: They need a better described plan for the examination and potential transition from microsatellites to SNPs.

*1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The general purpose of this ongoing and long-term project is reasonably stated. The problem statement provides the rationale for the project, including the general need for genetic monitoring. The explanation of hatchery uncertainties, genetic risk, and hatchery reform, however, is very general. The link of this proposal to the uncertainties is not well developed. The statement regarding using the multivariate breeders equation, “These methods can be used with the molecular studies proposed here to elucidate the fundamental selective pressures that determine successful supplementation” seems an overstatement without many more details on what selective pressures are to be assessed.

The proposal would be improved with more detailed explanation of how SNPs would be used and interfaced with the existing data sets built using other methodologies.

There were three clearly stated objectives, with deliverables listed for each.

Project Objectives:

Objective 1. Monitor population genetic relationships within and among populations of Chinook salmon and steelhead in the Snake River Basin.

The objective is okay, especially monitoring the genetic relationships through time. No indication is made anywhere in the proposal how often the data needs to be collected. Every year? Every five? In how many populations? These topics are developed in the Anadromous Salmon Monitoring Strategy (ASMS), but not discussed in the proposal. No table has been provided of how much genotyping has actually been completed.

Objective 2. Determine the degree to which supplemented populations affect non-supplemented populations of Chinook and steelhead.

This was the original objective and approach to evaluate hatchery influences on natural populations. The analytical methods do not seem to have been updated to reflect recent development – for example using STRUCTURE to dissect the relationships among individuals in a spawning population. The text reads almost identical to Objective 1. The framework for the analysis and its application to management decisions needs to be developed in more detail.

Objective 3. Monitor relative reproductive success of hatchery and wild Chinook and steelhead in the Snake River basin.

These are important analyses, but the explanation of the range of contrasts possible and how these investigations fit into the AHSWG framework for evaluating supplementation are absent.

## *2. History: Accomplishments, Results, and Adaptive Management*

The explanation of the financial performance and history and contract deliverables history and performance is adequate.

The project has been ongoing since 1989 and has modified its methods of genotyping fish in tandem with development of PCR and expanded DNA methodologies. Initially the project used allozymes (proteins) in a very simple analysis of allele frequency comparisons among hatchery populations and natural populations with and without hatchery-origin adults. Currently the project genotypes fish using microsatellite loci and is exploring the utility of Single Nucleotide Polymorphisms (SNPs). The project has also expanded the analysis to estimates of effective population size ( $N_e$ ), and estimates the effective number of breeders ( $N_b$ ), although the presentation does not provided details on the scope of these analyses. The project has also expanded to include relative reproductive success (RRS) investigations of hatchery steelhead in the Imnaha River and Chinook salmon in tributaries of the Grande Ronde River.

Allozyme data from this project was used in the original status reviews of steelhead (Busby 1996) and Chinook (Myers 1998). The proposal states, although explanation is inadequate, that data from this project was used by the Interior Columbia Basin TRT to establish the population structure for recovery program development. It is not clear whether the data used was allozyme or microsatellite genotypes. There are many peer-reviewed publications, but many are on topics with peripheral management application.

The major results achieved is a list, some duplicates, and many do not clearly relate to the application of the primary objectives – stock structure of Snake River steelhead and Chinook salmon, and the effects of hatchery interactions with natural spawning populations. There is a long list of major results listed (many quite interesting) and of publications, but how these results and publications combine to influence change is unclear.

The adaptive management section reports that this project informed ICTRT population boundaries (see above) that have been used in the FCRPS BiOp and recovery planning. The proposal reports that boundaries have not changed much from initial work. There was an early management decision (1993) to discontinue using Rapid River spring Chinook in the Grande Ronde hatchery programs. Finally, based on the relative reproductive success of hatchery steelhead in the Imnaha River, new management rules have been developed regarding the total number (HOR, NOR) and hatchery fraction passed above the weir for natural spawning in Little Sheep Creek, Imnaha River subbasin.

No actual data are presented. A statement is provided regarding a decreasing trend in effective population size, and there is limited reporting of reduced RRS in steelhead and equivalent RRS

in Chinook. The ISRP would need more extensive presentation of the data to judge its adequacy. No definitive future application of the stock structure, Ne, and Nb data is presented.

In response to the questions about prior ISRP reviews, the answers seemed accurate, but the same principal question(s) remain. Some data has been used, but not a huge use. The ISRP asks again, how much more data on stock structure are needed to manage Snake River steelhead and Chinook?

The RRS studies are not presented in sufficient depth to arrive at a conclusion at whether they will substantially contribute to the management decisions regarding hatchery production. An RRS study by itself (contrast of hatchery versus natural fish) is not particularly informative to answer the question of supplementation effectiveness. These studies do make important contributions to analysis of the demography of the supplemented population, but they do not identify whether supplementation is adding natural-origin adults in the following generation and they do not inform the long-term fitness effects of interbreeding between hatchery and natural fish. For both of these important management questions contrasts to non-supplemented reference locations or among pedigree groups beyond just hatchery and wild are needed. The proposal does not provide a connection to the Anadromous Salmonid Monitoring Strategy, the Ad Hoc Supplementation Work Group recommendations, or the up-coming NOAA review of hatchery program HGMPs.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

Project relationships are listed as “None”, but then there is a good section explaining additional relationships, including quite a number of other BPA-funded projects.

The lab also seems to have ongoing working relationship with other genetics entities in the region – likely due to the high quality of researchers on the project.

For geographic region a number of hatchery and field collection and tagging projects are identified. The Idaho Department of Fish and Game and CRITFC work with parental based tagging (PBT) and genetic analysis of individuals at Lower Granite Dam are not mentioned. Although this project is sampling fish from throughout the Snake Basin, it is not clear this work is coordinated with the more recent SNP investigations to collect VSP information for Snake Basin anadromous salmon.

Regarding similar work, a number of RRS investigations are identified, and other SNP work is mentioned. Differences and similarities as well as consistency with other investigations are not provided. Particularly, the RRS work in the Hood River and planned in the Methow involve more than just contrasts of hatchery and natural fish. In this proposal, the types of contrasts, their interpretation, and management implication are not well developed. Coordination with other SNP efforts in the Snake Basin is not provided. In particular, the CRITFC stock identification project seems to duplicate the stock structure activities in this proposal.

Regarding Emerging Limiting Factors, this does not really apply here and the proposal covers it adequately. The question is posed for restoration actions where emergent factors might compromise the outcome.

RME issues are not addressed. No response to tagging report issues is given with regard to genetic methodologies.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

The linkage of the deliverables, especially the methods and results, to the BiOp and Fish and Wildlife Program monitoring strategies is not well developed. It is not clear how much of the data collected by this project will be used in management, and in what time frame. For example, they report the observation that effective population size is decreasing, but no options for management are identified, and no explicit connection to recovery planning or management is developed.

Tracking population relationships through time is worthwhile, but how many populations need to be surveyed, and how often, is not considered.

Sampling methods could be described in more detail. Also, details on how the results might be analyzed, as well as the metrics used for determining project success is unclear.

#### **200203000 - Salmonid Progeny Markers**

**Proponents:** Umatilla Confederated Tribes (CTUIR)

**Short description:** We propose to assess the relative reproduction success of Umatilla summer steelhead using a pedigree analysis and a laboratory tested strontium progeny marker injection

**ISRP final recommendation:** Meets Scientific Review Criteria

#### **Comment:**

The answers to the ISRP questions were adequate. Completing the feasibility investigations with the field trials in Iskuulpa Creek is justified to bring the effort to a reasonable conclusion and to serve as the basis for any future management application. When this project began, otolith chemical marking was an alternative to genetically based parentage assignment. The genetic methods have since proven successful, and employing chemical marking alternative may or may not be cost effective.

#### **Preliminary comment requesting a response:**

A response is requested on the following issues:

1. Describe in more detail the laboratory methods of strontium analysis and of parentage analysis that will be used. In the presentation Q&A the project leader said the Strontium

analyses would be carried out at an OSU laboratory by project staff. The laboratory should be identified, and if OSU staff is to assist in the analyses and quality control they should be identified. The protocols for analysis should be identified. The project staff's qualifications to perform the analysis should be given in the response.

2. The Parentage Analysis methods should be indicated. These analyses apparently will be done under contract by a genetics lab. The laboratory should be identified and some evidence of its qualifications should be given in the response. The protocols for the genetic analysis should be identified and some indication of the feasibility should be given.
3. What is the likely cost of strontium mark and recovery? What is the likely accuracy of detection of the strontium mark? The presentation provided some information not given in the proposal; it should be given in the response. How do these costs compare to those of genetic parentage analysis? What is known about the accuracy of genetic parentage analysis? How would the results of this research be applied to estimation of "Relative Reproductive Success" (of HOR and NOR steelhead) as used in the AHA model?
4. Extending the feasibility investigation from the laboratory to field is reasonable if adequate samples can be collected. Please indicate in the response how many adult steelhead can reliably be expected to be injected with strontium chloride at the project weir? Can tissues be collected from all adult steelhead?
5. The proposal suggests that 15 offspring otoliths/parent will be required. Will such large samples be required at the new dose rate of 20,000 and will such large samples be feasible given egg-to-fry survival rates in Iskuulpa Creek?

The purpose of the project is to investigate feasibility of strontium markers to assess relative reproductive success (RRS) in summer-run steelhead of the Umatilla (Iskuulpa Creek). The need for measurement of RRS was identified by ISRP in previous reviews as necessary for evaluation of supplementation. Demonstration of a technique in the laboratory has formed part of an MSc thesis of one of the project staff and is in review for peer-reviewed publication (TAFS). A comparison of accuracy and cost with another candidate technique, genetic parentage analysis, is part of the proposed project. Gravid steelhead are to be injected with strontium intraperitoneally, and elevated strontium is to be detected in natural origin offspring from Iskuulpa Creek in otolith primordia.

This proposal is to extend the feasibility investigation to a natural stream. Female hatchery steelhead will be injected with strontium chloride, and natural female steelhead will be sham injected. Otoliths from a sample of natural-origin progeny in the natural stream will be evaluated for strontium and assigned to either a hatchery or natural-origin female parent. The assignments will be cross-validated with genetic progeny assignments. The rationale for this project is a need for a more effective and efficient technique than genetic parentage analysis. The presentation was helpful. It clarified that the field dose would be 20,000 ppm rather than 5,000 ppm, a change

resulting from analysis of lab experiments at OSU. There is a complete census possible at Iskuulpa Creek at the weir.

Other researchers pursuing similar research (Washington Department of Fisheries and Wildlife) have found it necessary to get permission from the U.S. Food and Drug Administration to administer strontium to fish that are potentially harvested and eaten. While it's not the ISRP purpose to review project permits, we recommend that the project leader communicate with them. The ISRP understands that Steve Schroder (WDFW) had an INAD for injecting gravid females with strontium. The CTUIR should be in touch with him. The INAD may still be in force and maybe CTUIR could readily get listed on it. Word is that USFWS may take on custody of the INAD. Having FDA permission might blunt any criticism about strontium as an artificial taggant.

The ISRP has questions on the project's ability to collect sufficient numbers of marked offspring. The proposal suggests that 15 otoliths/parent will be required. Will such large samples be required at the new dose rate of 20,000 ppm and will such large samples be feasible given egg-to-fry survival rates in Iskuulpa Creek?

As conceived now, the method applies to a single generation, but if the method could be extended to measure RRS in subsequent generations it would have more power.

### 200303900 - Monitoring the reproductive success of naturally spawning hatchery and natural spring Chinook salmon in the Wenatchee River

**Proponents:** Washington Department of Fish and Wildlife (WDFW), National Oceanic and Atmospheric Administration (NOAA)

**Short description:** We propose to continue our quantitative evaluation of the relative reproductive success and survival of naturally spawning hatchery and natural origin spring Chinook salmon in the Wenatchee River. The next phase of the project focuses on i) evaluating the relative reproductive success of naturally produced spring Chinook with different levels of hatchery ancestry (first versus second generation), and ii) refining our understanding of the mechanisms causing differences in fitness.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

This project is a study of the relative reproductive success of naturally spawning hatchery and natural spring Chinook salmon in the Wenatchee River above Tumwater Dam. The study was initiated in 2003 in response to the 2000 BiOp RPA 182.

The project is called for in the 2008 BiOp, is consistent to the Fish and Wildlife Program research and monitoring plans, and the Wenatchee subbasin plan. The reporting of results and adaptive management implications was succinct and thorough in a much-needed ongoing project of significance to the Columbia Basin on issues of supplementation and hatchery straying. The

study design is appropriate and appears to be logistically feasible (that is, they can catch the adults and juveniles to obtain genotypic data for executing the parentage analysis).

This investigation concludes that hatchery spring Chinook salmon in this watershed have substantially reduced reproductive success relative to natural-origin individuals. Reproductive success increases as fish move upstream in the watershed. Most hatchery fish spawn lower in the watershed, near where they are released. It is not entirely clear whether the reduced success of hatchery-origin adults is a consequence of their hatchery background or their choice of spawning location.

The proponents have answered the fundamental question that they originally set out to address. The initial findings raise mechanistic questions, which are amendable to further exploration. The proponents plan to run this investigation for two complete generations, through 2018 with last brood in 2013, to expand on the initial findings and gain insight into mechanistic explanations of the observations.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The significance to regional programs, technical background and problem description, and objectives are all well described and appropriate for the investigation.

### *2. History: Accomplishments, Results, and Adaptive Management*

Financial Performance and History - adequate response

Deliverable Performance - Based on Pisces reports, the project has delivered fine responses.

Major Accomplishments - The project has achieved the objective of evaluating the RRS of hatchery versus natural spring Chinook in the Wenatchee River subbasin. The hatchery fish have about 50% of the fitness of natural fish. Initial investigation of potential explanatory variables suggest spawning location, age, size, and spawning date influence the difference in performance between hatchery and natural parents.

Adaptive Management - The findings have contributed to the development of hatchery fish exclusion at Tumwater Dam, a revised HGMP reflecting limits on the genotype of fish passed upstream to spawn, and ongoing efforts to develop Parental Based Tagging (PBT) to reduce or eliminate the need for broodstock collection weirs in tributaries.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

Adequate responses are given for project relationships, emerging limiting factors, and tailored tagging questions.

There are no emerging limiting factors that would reduce the likelihood of success of the investigation.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

The objectives of the investigation are appropriate for the topic – RRS of hatchery salmon and evaluation of supplementation. The deliverables, work elements, metrics, and methods are all acceptable. The proponents have a commendable track record of publication in peer-reviewed literature and have solved logistic and technical issues that have arisen during the course of the project.

## 200305000 - Evaluate the Reproductive Success of Wild and Hatchery Steelhead in Natural and Hatchery Environments

**Proponents:** University of Washington

**Short description:** We have assessed the efficacy of a segregated hatchery program of wild steelhead since the start of the hatchery program in winter 1995. Early results found lower survival of hatchery fish. We are now examining the long-term effects ongoing releases of hatchery fish over four generations. We propose an additional year of funding to complete ongoing data analysis and manuscript publication, and to archive samples and data in publicly available forms.

**ISRP final recommendation:** Meets Scientific Review Criteria

### **Comment:**

This research project to investigate fine-scale genetic attributes of a segregated winter steelhead program outside of the Columbia River basin was initiated in 2003 in a suite of projects to address RPA 182 in the 2000 FCRPS Biological Opinion.

The project was designed to evaluate relative reproductive success of natural and segregated-hatchery steelhead in both hatchery and natural environments. The project was especially of interest because during two years early in the program (late 1990s) hatchery-origin adults were permitted to escape to spawn naturally, but a policy decision was subsequently made to intercept hatchery-origin adults. This provided a natural experiment to evaluate the fate of a pulse of hatchery contribution to natural production through time.

The project had several primary objectives: evaluate variation in reproductive success of families in the hatchery environment; evaluate effective population size and inbreeding accumulation in the hatchery environment; estimate selection on life-history traits in the hatchery and natural environment; and evaluate relative reproductive success of natural fish with different levels of segregated hatchery parents in their pedigree.

The scientists responsible for the project have completed a portion of the original project and published in peer-reviewed literature on the completed portions. Objectives to evaluate the breeding pattern, reproductive success, and effective population size in a segregated production hatchery were completed. Even with a policy and an attempt to randomize breeding in the hatchery, empirical data demonstrated that larger and earlier spawning fish were selected for breeding, there was high variance in reproductive success (demonstrating selection among hatchery families), and a low number of effective breeders.

Investigation of the loss of genetic diversity in the hatchery population, heritability of key traits of hatchery-origin individuals, and relative reproductive success in the natural environment of adults with varying levels of segregated-hatchery steelhead ancestry is partially complete.

The proposal requests support for one year to archive samples, complete a reference database, finish analysis, and report findings. The ISRP concludes that this request meets scientific review criteria. It appears to the ISRP, based on the proposal and presentation, that the hoped for analysis on relative reproductive success in a population that was re-adapting to the natural environment following a pulse of hatchery introgression is unlikely to be realized because the weir used to exclude hatchery adults has not been effective. Hatchery-origin adults, in unaccounted proportions and numbers, have been escaping to spawn naturally. This coupled with inefficient smolt and adult sampling diminishes the likelihood of addressing that objective. The project should be able to evaluate the genetic consequences for a natural population when segregation is not complete.

### 200305400 - Evaluate the Relative Reproductive Success of Hatchery-Origin and Wild-Origin Steelhead Spawning Naturally in the Hood River

**Proponents:** Oregon State University

**Short description:** The project has two main objectives: 1) estimate the fitness effects of raising steelhead in a hatchery, and the effects of those fish on wild populations of steelhead in the Hood River; and 2) identify mechanisms causing hatchery fish to become different from wild fish. Suggest ways to alleviate the problem. The importance of the project is that accurate estimates of fitness are necessary for modeling demographic effects of hatcheries on wild populations and understanding mechanisms causing decline may identify solutions.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

This project was initiated in 2003 as one of a suite of projects to evaluate relative reproductive success of hatchery-origin steelhead compared to natural steelhead when spawning naturally, to address critical uncertainties identified in the 2000 FCRPS BiOp RPA 182.

This project benefited from the foresight of ODFW biologists and the necessity that all steelhead spawning in the upper portions of the Hood River pass Powerdale Dam and could therefore have tissue taken (fin clips) to provide DNA for parentage and pedigree analysis. Beginning in the 1990s tissue was collected for all parents used in both hatchery mating and those released for natural spawning. In the hatchery all mating was recorded so it is known whether a hatchery smolt had natural or hatchery-origin parents. Consequently this project had a head start in 2003; several generations of tissue were archived and available for immediate genotyping and analysis.

The OSU research team leading the genetic analysis has made commendable use of this resource. They have largely achieved the original goal, having evaluated relative reproductive success (RRS) of long-standing hatchery stocks of winter and summer steelhead, and of recently developed local winter steelhead stock. They reported substantial reduction in RRS in the long-standing production stocks, and less reduction in a local winter stock in the early generations. The pedigree information maintained in the hatchery has provided an opportunity to investigate

carryover effects, demonstrating rapid deterioration in natural spawning fitness of fish born in the wild that had hatchery-origin parents.

During the period covered by this proposal the research team plans to complete analysis of a nearly 20 year reconstruction of the breeding history of winter and summer steelhead in the Hood River. Part of this analysis should yield information useful in evaluating the short-term demographic and long-term fitness consequences of “sliding scale broodstock management” employed in many supplementation projects in the Columbia River Basin.

This project is also transitioning from the original study looking at RRS of steelhead in the Hood River to looking at the causal mechanisms for the reduction in performance. This may lead to modified hatchery practices that would reduce the effects. They have experiments designed to evaluate the potential for domestication selection and for relaxed selection as contributors to reduced performance of hatchery-origin adults.

When these results are compared to similar RRS work in the Imnaha, Wenatchee, and elsewhere it should be clear how applicable and representative the results are. It should be replicated, although the Hood River situation was a unique opportunity.

Completing the RRS will benefit fish and wildlife by substantially reducing the uncertainty about hatchery genetic risks. Initiating the causation experiments has the potential to benefit harvest and recovery if modifications can be made to fish culture operations.

New work proposed should be ground-breaking and prove highly applicable (within four years), given the samples on hand and well-planned approach.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

This section is well done.

### *2. History: Accomplishments, Results, and Adaptive Management*

This project has an impressive record of developing analyses, reporting, and publishing findings. This is the first project to scientifically document a decline in fitness (RRS) of hatchery fish and effects on wild RRS in subsequent generations. These results have led the field and fostered ongoing discussion of management changes to hatchery operations.

The effects of residualism of hatchery steelhead were addressed (little or no contribution to spawning) and the work unveiled the important role of resident fish in stabilizing wild genetic structure as well as lowering the effect of hatchery fish on the wild component. Evidence of the fitness advantage of repeat spawning females suggested twice the RRS, with other useful observations on males. New epigenetic work proposed is innovative and developmental, well justified by the technical discussion, and deserving of support. Good justification for the MHC approach was provided, in search of a disease-related cause for reduction in fitness.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

This project is directly significant to regional programs. Adding summer-run analyses to the near-complete work on winter-run RRS serves as a replicate, but with less introgression. The new work may also assist in estimating the “rebound” in RRS once a domestic broodstock has been removed. Modified hatchery practices might also emerge from the proposed work in Objective 2, in search of mechanisms that underlay lower RRS in hatchery fish.

### *4. Deliverables, Work Elements, Metrics, and Methods*

The continuation of the RRS estimates to complete the winter steelhead and develop further the summer steelhead analysis is necessary to bring this exemplary effort to a point where the results can establish whether the theoretical and conceptual risks of interbreeding between hatchery and natural fish are irrefutably observed.

The proposed work to evaluate the genes and genetic mechanisms that might cause the difference in fitness is worth pursuing. This activity is justified to answer uncertainties raised in the Council research plan, and could help address the question of whether modification of hatchery practices might reduce the deleterious effects on natural spawning fitness from interbreeding between hatchery and natural fish.

## 200306300 - Natural Reproductive Success and Demographic Effects of Hatchery-Origin Steelhead in Abernathy Creek, Washington

**Proponents:** US Fish and Wildlife Service (USFWS)

**Short description:** The USFWS’s goal is to determine the natural reproductive success and mean relative fitness of hatchery-origin and natural-origin steelhead and assess the demographic effects of hatchery fish supplementation in Abernathy Creek relative to two control streams. This work is important because the ability of hatchery-origin steelhead to reproduce successfully and contribute genetically to the recovery of naturally spawning populations while minimizing genetic and ecological risks is unknown.

**ISRP final recommendation:** Meets Scientific Review Criteria

### **Comment:**

The proponents provided much more detailed data to address the ISRP’s questions, and these data were very useful. In particular proponents have responded favorably to our suggestion to develop methods to include adult steelhead abundance estimates in Abernathy and extrapolated to Germany and Mill Creek for an evaluation of supplementation.

One question that was not addressed, and perhaps we failed to emphasize it, was the actual number of individuals that were assigned to single or parent pairs in the parentage analysis, and how many individuals that were genotyped were not assigned to a parent. The numbers (and

proportion) of fish not assigned needs to be presented and adequately discussed in any future proposal for completion of this project.

The challenge with this project is not executing the lab work but the logistics of the field work, namely, to meet the sample sizes required to have sufficient data. From the ISRP perspective, the question posed circa 2000, about establishing a broodstock using wild parr and producing smolts and subsequent anadromous adults from them has been answered. The questions for which support is currently being provided are the relative reproductive success of hatchery versus natural origin steelhead and the demographic consequences of supplementation. Since Germany, Mill, and Abernathy Creeks are intended to serve as reference and treatment locations respectively, the near genetic equilibrium among them, with the conclusion they have large amounts of gene flow, complicates any analysis. The challenge is twofold: First, for a demographic analysis you need a reasonable estimate of the adult progeny produced from natural spawning. If the three streams are functionally panmictic, adults attributed to one stream based on redd counts may have originated in one of the other streams. Second, if the implied large proportion of unassigned adults or juveniles is owing to adults that avoided capture at the electric weir, effort is being expended on genotyping individuals for which no useful conclusion can be reached.

Unless all of these logistical challenges can be resolved in future proposals, this project should be designed to complete the RRS and supplementation evaluation tasks over the next few years, and then be concluded. The project should be included in the Columbia River Hatchery Effects Evaluation project as part of consideration of basinwide evaluation. If the data are not suitable for meaningful evaluation the project should be brought to a reasonable conclusion.

If the logistic challenges can be resolved this study will provide an important replicate of the relative reproductive success of hatchery steelhead developed from a local broodstock, adding to the range of locations to help meet BiOp needs.

**Preliminary comment requesting a response:**

The ISRP requests a response that provides two primary items.

1. The response should provide a succinct, yet complete, presentation of the accomplishments of all facets of the project.

This includes:

- the number of parr collected each year to establish broodstocks the smolts released from these initial broodstocks
- the estimates of smolts leaving the system from these releases and those residualized in the stream
- natural smolt yield before beginning supplementation
- adult returns to the stream from natural and hatchery production (by release year)
- estimates of steelhead spawning below the hatchery weir site

- numbers of hatchery and natural steelhead passed above the weir for natural spawning
- estimates of juvenile (parr or smolt) production from natural spawning by natural and hatchery-origin adults, and
- estimates of RRS of hatchery and natural-origin adults.

The presentation should include the primary data (actual counts of fish), analysis of the primary data, interpretation of the analysis, and use of this interpretation to justify the approach to completing the study design in the 2003 proposal.

The submitted proposal and presentation to the ISRP often provide conclusions without transparent supporting data. Portions of the proposal and presentation are contradictory. And within the proposal, conclusions in various places are often contradictory or cannot be easily associated with specific data.

As an example, in the proposal in the accomplishments section there is a statement: steelhead smolt production has declined in the last few years in Abernathy Creek, whereas Germany and Mill creeks (control streams) have been more variable (figure 1). These results suggest that this supplementation strategy may have negative consequences from either HOR smolt release or HOR adults spawning in the wild. Slide 9 in the presentation has bullet points stating that smolt production is equivalent between pre- and post-hatchery production years and that HOR emigration rates, timing, and patterns are similar to NOR fish. The text accompanying the presentation states: “These results suggest that smolt production within Abernathy Creek has not been negatively affected by hatchery production thus far.”

A second example: the proposal accomplishments section states that, “Improper synchrony of HOR physiological processes associated with smolt transformation may increase the percent of HOR fish that elect to remain in fresh water or reduce survival. The consistent differences we have observed in HOR and NOR steelhead physiology and morphology may be positively related to the proportion of HOR fish that remain in Abernathy Creek (residualize) annually.”

But in the next paragraph: “we evaluated spatial and seasonal overlap in habitat use and behavior between yearling HOR steelhead released from the AFTC and NOR salmonids. During spring, the majority of HOR smolts migrated downstream and left the system soon after each of three releases, whereas NOR smolt migration was more protracted following a normal distribution with one central peak. This suggests that the highest potential for ecological interaction between NOR and HOR at the smolt life states occurs downstream of the release location and within the first few days after each release.” Later in the same paragraph: “Our results suggest that there is a potential for hatchery fish to affect wild steelhead populations due to dietary overlap and salmonid fry predation.”

In the adaptive management section the proposal states: “Our results suggest that a small portion (1% - 7%) of HOR released smolts did not emigrate.”

For most of the essential production, demographic, and genetic objectives there is similar inconsistency within the proposal.

2. The response should also address the qualifications identified by the ISRP in the 2007 review. The 2007 ISRP review summary stated:

“The sponsors made a diligent effort to rapidly respond to the ISRP’s questions. For the most part, however, their answers are only partially satisfactory. One major difficulty with this project lies with the comparison of adult abundance estimates in the reference streams (Germany and Mill creeks) and the treatment stream (Abernathy Creek). The sponsor’s are apparently unable to verify (with presently collected data) assumptions involved with redd counts, which will be used to assess adult abundance in the reference streams. The response lacks a description of how the error associated with the abundance estimates will be assessed, and there is difficulty in accurately assessing other demographic characteristics such as sex ratio, age structure, and redds per female. The sponsors fail to plainly explain how they will account for confounding effects, such as habitat restoration actions, planned sometime in the future for Germany and Mill Creeks.”

The recently submitted proposal continues to emphasize the opportunity to contrast production, demography, and genetic evaluations in reference and treatment streams. The proposal executive summary states: “We have started to compare the reproductive success and demographic changes (to both juvenile steelhead production and adult returns) occurring within Abernathy Creek to two control streams (i.e. Germany and Mill creeks) to determine whether supplementation was successful...”

However, the accomplishment section provides no data on adults in Germany and Mill creeks. None of the objectives identify a demographic comparison of adults in reference streams to a treatment stream, and there are no objectives to obtain data on adult steelhead in Germany and Mill creeks.

The ISRP raised concerns in the 2007 review about the sufficiency of data to assess and interpret relative reproductive success (for a variety of reasons), and demographic consequences of supplementation (for a variety of reasons) (see 2007 review). These concerns need to be resolved during this response loop.

## 200729900 - Investigation of Relative Reproductive Success of Stray Hatchery & Wild Steelhead & Influence of Hatchery Strays on Productivity in the Deschutes

**Proponents:** Oregon Department of Fish and Wildlife (ODFW)

**Short description:** The purpose is to provide a better understanding of the impacts of stray hatchery steelhead on viability of Deschutes steelhead by assessing: relative reproductive success of natural spawning stray hatchery and wild fish, number and origin of strays in Bakeoven and Buck Hollow creeks, and 3) changes in survival, productivity and life history resulting from removal of stray hatchery spawners. This work is important because strays are a key threat to recovery of Deschutes steelhead populations.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

### **Comment:**

Qualification: In two years, the project proponents should provide a report on genotyping, success with the identification of stray hatchery fish, capture of adults and smolts in the target streams, and exclusion of hatchery adults in the target stream. At that time there needs to be a thorough presentation of the BACI experimental design to ensure it will be sufficient to evaluate genetic and demographic effects of straying.

The goal of this project is to measure the effects of stray hatchery steelhead, released from hatcheries in other subbasins with the Columbia River using a BACI manipulative experiment. These stray hatchery steelhead enter the Deschutes River, apparently to seek refuge in the cool water, and unknown numbers remain and spawn with wild Deschutes River steelhead. These data are critical because these hatchery steelhead routinely make up between 50% and 10 times the abundance of wild spawning steelhead, and the effects of this swamping are unknown.

The work is well planned, using proven methods, and has been refined several times through the proposal process. The results stand to help managers understand whether supplementation of steelhead in other parts of the Columbia River Basin can aid in sustaining and recovering wild stocks, or whether supplementation is another factor contributing to their demise through unanticipated effects that play out at long distances in other basins.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The investigators propose to evaluate the relative reproductive success (RRS) of stray hatchery and wild steelhead in two eastside tributaries of the Deschutes River, and to remove hatchery strays from a treatment stream and compare the RRS of these wild steelhead to those in a control stream (see comments on the experimental design in number 4 below).

The proposal is of great significance to regional programs. The effects of these strays could threaten the wild stocks of mid-Columbia steelhead, which are a threatened DPS, with extinction, when added to other stressors like climate change. Moreover, no comprehensive evaluation has yet been made of the effects of stray hatchery steelhead on wild fish.

The investigators have carefully planned a decade-long project, tested the adult traps, and include a conservation geneticist who is skilled in parentage analysis from another project (on Abernathy Creek, WA).

The objectives and methods are reasonable, the general design simple and elegant, and the data collection and analysis well planned (including power analysis). If anything, it would be ideal (if funding were available) to add another set of treatment and control tributaries, perhaps west-side tributaries. This would make another statistical “block” which could be compared with the eastside block to determine whether any effects are stronger or weaker between these two environments.

## *2. History: Accomplishments, Results, and Adaptive Management*

This is a new project, so there are no accomplishments or results to report, except the pilot testing of adult traps, which was successful. This project has the potential to be important information for managers, to assess how supplementation and removal of strays could be better managed.

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

This project links to others that seek to understand the effects of hatchery fish on wild fish reproductive success. As such, the set of projects stand to provide managers with much useful data to understand whether supplementation is a useful practice, with minimal impact, or whether it is another factor contributing to the demise of wild fish populations.

Climate change is identified as an emerging limiting factor, which may be exacerbated by stray hatchery fish, if the latter reduce reproductive success of wild fish.

## *4. Deliverables, Work Elements, Metrics, and Methods*

Two points on methods and deliverables, first is the genotyping. The proposal indicates that SNP markers using Parental Based Tagging will be used to identify the source of stray hatchery fish and also to determine the RRS of hatchery and natural steelhead adults. This is reasonable, but those methods are under development and may not be sufficient. They need to be evaluated before a full commitment is made to use this genetic marker and identify stray hatchery individuals.

Second, it is not entirely clear to the ISRP how the treatment and control (reference) streams will be managed. The proposal states:

“The study design is a Before After Control Impact with the treatment of removing hatchery strays from Bakeoven and allowing strays to continue to enter and spawn at the normal rate in Buck Hollow Creek for the first phase of the study and then removing

strays from Buck Hollow after the initial treatment in Bakeoven. This design allows for assessment of changes in productivity and survival between the treatment and control streams as well as a pre and post comparison in the control stream, Buck Hollow. For five years we will remove all hatchery fish from Bakeoven Creek and allow only wild fish to pass and spawn naturally. In Buck Hollow Creek, we will allow all wild and stray hatchery fish to pass upstream to spawn naturally for the first five years and then remove all hatchery strays thereafter.”

The proposal appears ambiguous to the ISRP on the subject of whether stray hatchery steelhead will be permitted access to Bakeoven Creek after the initial five year period. The ISRP believes the experimental design likely requires continued removal of hatchery fish from both locations throughout the duration of the breeding portion of the investigation. During phase two, strays probably need to be removed from both streams.

The ISRP’s rationale is that at the beginning of this experiment the assumption is that both natural populations of steelhead are genetically equivalent and have had many years of hatchery fish introgression. There is a genetic and environmental (density dependence) cost to having these hatchery fish present. If during the experiment you have two streams, one with hatchery fish present, and another where they are removed, you have two contrasts during those years. One contrast is the hatchery and natural fish in the mixed population, a second contrast is between the natural fish in the two locations. The first contrast measures both the genetic (non-native and hatchery) and environmental (hatchery) costs to the hatchery fish when they spawn. The second contrast (natural with hatchery versus natural without hatchery) measures the environmental effects (density and other ecological) of hatchery fish on natural spawning fitness of natural fish.

Once the treatment period ends (removal of hatchery fish), there is the opportunity to evaluate whether there has been a genetic improvement (genetic effect) in the population where hatchery fish were removed – a contrast of natural fish spawning naturally that are now genetically different. During the breeding period for this contrast the ISRP believes there should be an absence of hatchery-origin steelhead in both environments.

The ISRP believes that a full evaluation of the experimental design, with an explanation of all the RRS comparisons and their biological interpretation is required before full implementation.

## 201008500 - Columbia River Hatchery Effects Evaluation Team (CRHEET)

**Proponents:** Bonneville Power Administration, National Oceanic and Atmospheric Administration (NOAA)

**Short description:** A technical workgroup will be formed to coordinate hatchery programs in the Columbia basin to address critical uncertainties in the areas of demographic benefits, short- and long-term fitness effects, and ecological effects of hatchery programs. Specific products of the workgroup will be recommendations for basin-wide study designs, analytical methods, and monitoring measures to facilitate this research. This workgroup is called for in Amendment 6 of the supplemental FCRPS BiOp.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

An ISRP/ISAB 2005 report critical of the monitoring of supplementation projects resulted in the formation of a Tribal, Federal, and State led Ad Hoc Supplementation Work Group (AHSWG) that made substantive recommendations for improving supplementation monitoring and evaluation. The final AHSWG report recommendations have not been comprehensively implemented. The FCRPS supplemental BiOp calls to extend the work of the AHSWG.

CRHEET's deliverable will be a report in 2011 that will include detailed recommendations for:

- 1) Experimental designs coordinating multiple hatchery evaluation programs to provide critical data on the demographic benefits, fitness impacts, and ecological impacts of hatchery programs.
- 2) Standardized monitoring metrics and data collection and management protocols to provide the information needed for experimental designs for demographic benefits, fitness impacts, and ecological impacts of hatchery programs.
- 3) Analytical approaches for research into demographic benefits, fitness impacts, and ecological impacts of hatchery programs.
- 4) Formation and operation of a basinwide process to implement CRHEET recommendations.

In developing this material, CRHEET will work with the Action Agency/NOAA/NPCC RM&E workgroup and/or another basinwide workgroup to integrate the elements above with existing basin RM&E efforts in a programmatic approach.

This is a long needed project that should help provide higher-level views and analysis of hatchery effectiveness at a landscape scale.

## 199703800 - Listed Stock Chinook Salmon Gamete Preservation

**Proponents:** Nez Perce Tribe

**Short description:** This project uses cryotechnology to preserve male gametes from ongoing artificial propagation programs and natural populations of ESA-listed Snake River Chinook salmon and steelhead. The primary goal of this proposal is to manage and maintain a secure, long-term repository for the 4,393 gamete samples collected from ESA-listed Snake River Chinook salmon and steelhead.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

Qualification 1: Because saving salmon sperm for 50 years has not been done before, and because individual variation among researchers and storage facilities may affect long-term survival rates of preserved sperm, this project needs to develop a formal protocol to periodically and regularly test the sperm viability. Although testing every five years should be sufficient, because more than five years have already elapsed since collection of many of these samples, this plan should be developed and presented in the next proposal.

Qualification 2: The program also needs to initiate development of a plan with co-managers *soon* on when and how the region would use these preserved gametes. Such a plan should include innovative approaches to conserving/maximizing usage of these valuable and historical sperm samples (rather than using up an entire sperm sample in one production event). For example, if cryopreserved sperm cells represent a life-history legacy, to conserve those genes, sperm may need to be amplified before being used to produce smolts. Eggs could be fertilized with a subsample of the preserved milt, some of the resulting smolts released, and precocious parr and smolts could be used to collect additional sperm for storage, as well as to produce a cohort of smolts for release.

**Preliminary comment requesting a response:**

This is a proposal for a modest amount of money (\$50,000) to maintain the sperm cell collection from Snake River Chinook and steelhead. The project is generally sound and justified. That said, the ISRP requests information on testing the viability of the cryopreserved gametes and a discussion of a plan to employ the gametes if needed. Would they use the sperm to produce smolts that would be released for ocean migration? The Forks Hatchery relative reproductive success work (and possibly Hood River as well) demonstrate a very high variance in production of adult progeny from hatchery fish. Most do not return any progeny. While captive rearing raises serious issues, it may actually be better to maintain smolts produced with cryopreserved milt until they are precocious parr or jacks and then use them to fertilize eggs to be released for anadromous migration. In such a scheme there is an amplification generation (and the possibility of replacing the used sperm with that of direct progeny). Using doubled-haploid technology it might be possible to maintain the original germplasm without recombination with a contributing female genome.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The primary goal of this proposal is “to provide funding for the management and secure maintenance of gamete samples from 4,393 Snake River spring/summer Chinook salmon and steelhead collected and being kept cryogenically frozen. Collections occurred from 1992 through 2008 resulting in a collection of gamete samples from 2,990 Chinook salmon and 1,403 steelhead. Chinook salmon and steelhead collections occurred from 15 and 13 genetically and geographically distinct populations, respectively (Young, 2009), representing a significant portion of the existing diversity in the Snake River basin for each species.”

Technical background is fairly straightforward.

The two original objectives/and newly developed ones are:

1. Maintain secure storage facilities for cryopreserved gametes from 2990 Snake River spring/summer Chinook salmon and 1403 Snake River steelhead. An additional objective has been added “to split collections and to store half of each fish’s gamete supply at a federal facility in Colorado.”
2. Assist hatcheries with the use of cryopreserved gametes for broodstock management or population recovery. This will include travel to a hatchery with all equipment required to successfully spawn eggs using cryopreserved milt. An additional objective has been added “to make additional gamete collections from populations that are critically imperiled or underrepresented in the genebank.”

### *2. History: Accomplishments, Results, and Adaptive Management*

There is good information given on the past success of gamete collection and cryopreservation activities, as well as the genetic information of the stocks of focus. The following summarizes the project’s objective:

“Collections and cryopreservation of gametes from Snake River spring/summer Chinook salmon and steelhead have not occurred since 2008. This proposal requests funding for operations and maintenance of the genebank storage facilities that house the samples. This collection represents one of the largest collections of cryogenically preserved fish gametes in the world.”

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

It is clear that one of the goals of this project is to work with hatcheries within the region to provide cryopreserved gametes if and when they are needed. As such, the opportunity is present for interacting with many other projects.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

Although actual deliverables are few for both objectives, especially now that additional collections have been terminated, most support is to keep the samples frozen in good shape in two local universities and now to also include the federal cryopreservation facility in Colorado.

There were, however, no data showing the long-term viability of these samples to fertilize ripe eggs nor a plan to test that. This omission was deemed important to be fixed.

#### **200203100 - Growth Modulation in Salmon Supplementation**

**Proponents:** National Oceanic and Atmospheric Administration (NOAA), University of Washington

**Short description:** This project assesses the proportion of precociously maturing males produced in supplementation and conservation hatcheries for Chinook salmon in the Columbia River Basin. We conduct both basic and applied research to help devise rearing protocols for hatchery programs to reduce the production of these life history types, enhance smolt development, reduce domestication selection and ultimately produce fish with similar physiological, morphological and behavioral attributes as their wild cohorts.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

The project is providing a major benefit to fish and wildlife simply by bringing the high frequency of minijack age 2 maturing males to light. It is a result of fish culture practice that not only biases SAR estimation but also is probably a source of domestication selection. The project scientists are well positioned to understand the problem physiologically and to evaluate fish-culture practices.

#### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

There are very compelling ties to regional programs and to the Council's Fish and Wildlife Program – the proponents have identified a major problem with Chinook supplementation and offer the prospect of adaptive change of practices:

Objective 1) Improve survival and reduce fitness loss in Columbia River URB Fall Chinook salmon.

Objective 2) Refine rearing protocols to reduce minijack rates and optimize smolt development in URB Fall Chinook salmon.

Objective 3) Continue long-term minijack monitoring in Spring Chinook salmon from the Yakima River Supplementation Program.

## *2. History: Accomplishments, Results, and Adaptive Management*

The project scientists are an experienced team with a strong record of publishing results. They have demonstrated an insidious problem and clearly describe past and future adaptive changes to fish culture practices that have occurred or will occur as a result of this research.

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The proposal explains how the research will affect other activities in the region, as well as serve as a model for other regions. The proponents also broach the subject of climate change and how that may contribute to the minijack problem in this and other systems.

## *4. Deliverables, Work Elements, Metrics, and Methods*

The proposal does a great job of describing deliverables (as well as reviewing their past progress and difficulties in meeting past deliverable due dates). That candor is refreshing! The level of detail explaining methodology (both experimental and analytical) was outstanding.

## ***Artificial Production Programs and Associated Production and Habitat Monitoring***

### **Sockeye**

#### **200740200 - Snake River Sockeye Captive Propagation**

**Proponents:** Idaho Department of Fish and Game (IDFG), National Oceanic and Atmospheric Administration (NOAA), Shoshone-Bannock Tribes

**Short description:** Project # 2007-402-00 is a consolidation of five previous Projects related to the Snake River sockeye salmon captive broodstock program. Previous Project #'s are listed in parenthesis for reference. Recovery efforts are collaborative in nature and directly involve the Idaho Department of Fish and Game (IDFG), the National Marine Fisheries Service (NOAA Fisheries), the Shoshone-Bannock Tribes (SBT), the Oregon Department of Fish and Wildlife (ODFW), and the University of Idaho (U of I).

**ISRP final recommendation:** Meets Scientific Review Criteria

#### **Comment:**

The response contains a good deal of helpful information and gives a more comprehensive view of project accomplishments than was provided in the initial proposal. This is valuable in enabling a continuing dialogue regarding this ground-breaking endeavor. Reviewers now better appreciate that the project was conceived and funded as a gene maintenance program to prevent extinction and that the rather minimal adult returns over project years 1994-2006 were very much

anticipated. Reviewers look forward to the time when the shift can be made to more conventional efforts scaled for adult returns. The response to the ISRP provides some critical data related to the performance of the sockeye salmon in the natural environment. This information is appreciated.

The Snake River sockeye captive culture program has been successful in rearing sockeye salmon in closed culture. This in and of itself is an achievement, and is consistent with success of the closed culture of a number of related salmonid species – rainbow trout, brown trout, Atlantic salmon, and brook trout. For this achievement the project participants are congratulated.

Under the Fish and Wildlife Program, producing products in a fish culture facility – whether those are eggs, parr, smolts, or adults – are not a sufficient endpoint. The appropriate performance of cultured individuals following release are a required performance standard established by the 1999 Artificial Production review and reflected in the current Fish and Wildlife Program.

The information provided, especially the adult return data from the most recent years, is encouraging. The current SARs appear to be sufficient to transition from a captive to a "conventional" anadromous culture program. The current SARs appear to still be too small to plan for development of an integrated program, which requires a natural population at or above replacement.

The data presented on juvenile growth and production, and limnology, from the Stanley basin lakes is useful. The role of the three lakes in sockeye rearing is discussed in better detail and reviewers more fully appreciate the complexity of inter-lake comparisons and difficulty in assessing dominant trends in natural sockeye rearing and survival in the hydrosystem. The use of genetic parentage analysis on the returning adults beginning in 2010 will facilitate fish identification and analysis of the success of release strategies.

The response also provided draft summaries of data examining the relationships between sockeye/kokanee abundance, growth rates, and zooplankton in the three lakes, although it does not discuss if and how such information will be used to enhance lake management. Significant, important results to date are also provided regarding parr size, parr growth rates and smolt survival. Those results enable project staff to hypothesize that the inverse relationship between smolt size and survival that was observed is because size at migration reflects previous growth, without regard to seasonal growth patterns, and that smolt survival might be strongly influenced by growth rates directly preceding migration. This is nicely done, and testing those hypotheses should significantly assist in designing future actions.

An explanation of how limnological monitoring and kokanee population sampling guides lake fertilization and stocking rates is not adequate. It is not clear to the ISRP how the limnological component is integrated into the development of fertilization and fish release plans.

Given the apparent success of the captive broodstock program, there is anticipation of a Three-Step master plan to expand production to 500,000 to 1,000,000 smolts. It is important to document the performance of the fish in the wild. As a component of the Three-Step review, it would be very useful if the program produced a comprehensive synthesis of available information, including comparisons with characteristics of viable sockeye populations in other regions. The synthesis should evaluate factors affecting survival during each life stage in order to identify key bottlenecks where additional focus may be needed to enhance population viability. Additionally, the SARs outlook for Snake River sockeye salmon should be explored while considering reasonable survival scenarios during smolt migration and ocean rearing. This analysis should evaluate what is needed in order to produce a viable, self-sustained populations of Snake River sockeye salmon.

Significant gains can be made through comparison of Snake River sockeye with sockeye populations in other regions. For example, in the Kvichak watershed, Alaska, (formerly the largest producer of sockeye in North Pacific), smolts produced per female spawner was approximately 58 smolts when productivity was high (broods 1974-1990) and 30 smolts when productivity was low and overall R/S was near replacement (broods 1991-1998; ~50% of decline was due to low survival at sea). Redfish lake smolts per female spawner seemed to be somewhat high prior to 2006 (46-133 smolts) but a bit low thereafter (22-32 smolts).

Mean length of age-1 smolts (reviewers assumed the data were for age-1 fish) was typically greater than 100 mm, which is reasonable. Many populations in Alaska and coastal BC produce age 1 smolts that are smaller than 100 mm. But this somewhat large size may reflect low densities. However, it was odd to see many age-0 sockeye in Redfish Lake during September reaching only 50 mm (research report). When reporting length or weight, it is important to clarify age of the fish.

The proponents should continue to test the hypotheses mentioned in the proposal response. Importantly, the findings should be documented in published literature.

**Preliminary comment requesting a response:**

The ISRP requests a response on the following three items.

1. A succinct summary of the propagation and reintroduction efforts (yield of smolts and adult returns, egg-to-smolt survival rates, SARs, etc) for each year by lake and reintroduction strategy. The current proposal provides a chronology of releases and returns, but the yield from each strategy and location is not entirely clear.
2. A clearer explanation of the integration of the limnological monitoring, lake fertilization, and the success of reintroduction efforts. How does the limnological monitoring and juvenile *O. nerka* assessments inform lake fertilization and reintroduction decisions? How is the lake monitoring evaluated? What are the length of the smolts and the length at age? Is there evidence of depensation – is there evidence of safety in numbers? Results should be considered for each year releases.

3. A statement of the life-stage survivals (spawner to smolt, smolt to adult) and production levels needed to transition from captive propagation to a traditional anadromous hatchery propagation program to a self-sustaining natural population with abundance, productivity, spatial structure, and diversity sufficient for delisting. How do these requirements compare to what has been observed in the 2000-2007 and the 2008-2009 time periods?

Summary: In the 2007-2009 Fish and Wildlife Program solicitation review, the ISRP gave the Snake River sockeye captive propagation projects a does not meet criteria recommendation based on empirical results from the program that indicated the smolt-to-adult return (SAR) rates were so poor that the program would never be able to transition from a captive propagation program to an anadromous hatchery program at or above replacement.

In the last three years, there has been an encouraging increase in the number of hatchery-origin and natural adults returning from the ocean. In 2010 more than 100 naturally produced anadromous adults returned to the Redfish Lake weir.

Nonetheless, background information indicates SARs for naturally produced sockeye in Redfish Lake is typically less than 1 percent. SAR increased slightly above 1 percent only in 2008 and 2009 when sockeye survival throughout the Columbia River Basin increased. The exceptionally low survival rate for these sockeye is much lower than survival of sustainable sockeye populations throughout the Pacific Rim. The low survival and the low fecundity of sockeye (especially ocean age 2 fish) suggests that the captive brood stock and supplementation program will be necessary until the low survival can be significantly improved. The stock appears to be consistently well below replacement. The project should estimate egg-to-smolt survival or smolt per spawner and compare these values with those for other sockeye populations. These data and the SARs data would help identify the key bottleneck for Redfish Lake sockeye.

The program indicates the need to fertilize the lake. It would have been worthwhile for the proponents to provide length at age of sockeye smolts that have reared in the lake so that growth could be compared with many other populations. Are these fish smaller than expected based on density, temperature, and lake productivity? Size at age data can be very informative. If the freshwater portion of the adult sockeye scale is still intact, one could compare mean smolt scale radius with that of return adults to examine the extent to which size-selective mortality is occurring after smolts leave the system.

While cautious optimism is warranted, the ISRP concludes that the empirical evidence suggests substantial gains in survival are required to put the sockeye population on a trajectory toward delisting and recovery.

## **Kelt**

### **200740100 - Kelt Reconditioning and Reproductive Success Evaluation Research**

**Proponents:** Columbia River Inter-Tribal Fish Commission (CRITFC)

**Short description:** This is an evaluation of kelt steelhead reconditioning and the feasibility of reestablishing this life history strategy that has been suppressed by the hydrosystem. The program utilizes wild fish that would otherwise become mortalities. Our study evaluates kelt steelhead management scenarios as well as reproductive success of artificially reconditioned kelt steelhead in natural streams. This study could yield low risk restoration strategies for steelhead populations.

**ISRP final recommendation:** Does Not Meet Scientific Review Criteria

#### **Comment:**

Before proceeding with additional kelt reconditioning feasibility and physiology research the Basin co-managers need to establish a well defined kelt management master plan. This master plan needs to use modeling to estimate the benefit of kelt reconditioning to VSP status of steelhead at the independent population, MPG, ESU, and Basin levels at various rates of survival for each of the kelt management alternatives – passage improvements, transport, short-term reconditioning, and long-term reconditioning. With this guidance on the expected benefit from kelt management strategies the co-managers can first determine whether even under the best of outcomes kelt management yields a meaningful improvement in steelhead status. If the conclusion is affirmative, an effective adaptive management experiment is needed to determine whether the benchmark survival thresholds can be achieved. And a decision framework should be developed to outline (1) the success required to justify expanding feasibility experiments to the pilot stage or (2) when levels of performance indicate the program should be discontinued.

A recommendation from the ISRP is that a thorough quantitative analysis of anticipated benefits to steelhead VSP parameters is needed as a foundation for pursuing steelhead kelt reconditioning as part of a kelt management effort. The ISRP appreciates that this modeling effort is a basinwide requirement probably beyond the scope of this project. But it is required as a foundation to expand and implement kelt reconditioning as an element of steelhead conservation and recovery. The project proponents direct the ISRP to the accomplishments section as a source of information on benefits of kelt reconditioning.

The accomplishments section provides survival benefits for individual steelhead kelts. This is not the type of analysis that the ISRP believes needs to be conducted. The ISRP believes it is necessary to provide an analysis of improvement in the risk status of steelhead under reasonable conditions of "success" for steelhead kelt reconditioning. If kelt reconditioning is successful how much will the time period to recovery be shortened? How much will extirpation (extinction?) risk in specific time periods be reduced? It is not clear to the ISRP that even under a robust definition of success for kelt reconditioning that the status of steelhead will be meaningfully improved. In the supplemental BiOp assessment, NOAA Fisheries estimated a 6% increase in B-run steelhead may be realized in the Snake River basin. No estimates have been developed for

other steelhead ESUs (MPGs). How does a 6% increase in abundance translate into improved natural productivity and abundance following the spawning of these fish? That is, spawner abundance has been increased by 6%, but after the progeny from these fish emerge from the gravel how much additional benefit is anticipated? Will density dependence in tributaries, the estuary and ocean, and hydrosystem losses essentially eliminate any benefit?

Page 7 of the 2009-2010 Kelt Management Plan states: "The perspective kelt reconditioning program is likely to increase the number of spawning MCR steelhead, but it is not possible to estimate a survival change at this time because of uncertainty regarding the percentage of the run that can be collected." Page 13 of the 2009-2010 Kelt Management Plan states: "However, total capacity constraints for the short- and long-term reconditioning scenarios are highly probable. Given that up to 30,000 to 40,000 kelt steelhead could potentially return to Lower Granite Dam in 2010 as a result of high steelhead escapement in 2009; there is a high likelihood that there will be too many kelts to place them all in a single or multiple reconditioning facilities. Even with the grandest plans in place for kelt reconditioning, the capacity will realistically be capped around a few thousand individuals.

It is not clear to the ISRP that the region has fully grasped the facility and logistical infrastructure needed to implement kelt reconditioning on a scale required to improve steelhead status.

The ISRP requested a description of "success" for the kelt reconditioning efforts. This was not provided. Along with a modeling effort that will help the region understand the potential benefits of kelt reconditioning and the costs, a definition of success is needed, perhaps as one of the conclusions of the modeling exercise. Certainly this should be established ahead of expanding the geographic replication of reconditioning experiments. A decision framework is needed to guide expansion of geographic replication and justification for construction of additional facilities. The results presented in the Kelt Management Plan suggest to the ISRP that there is little indication of immediate or long-term benefit from the transportation only or short-term reconditioning efforts. Replicating this management strategy in other areas should be phased and use existing facilities, based on the success so far. Success for long-term conditioning needs to be defined and used to justify expanded geographic replication.

The proponents state that this study is needed to evaluate the "feasibility of reestablishing this life history strategy that has been suppressed by the hydrosystem." It was not immediately clear what evidence was present to indicate what the upriver rates of kelt survival were historically.

**Preliminary comment requesting a response:**

The ISRP requests a response providing a revised description of the objectives, experiments, and deliverables. There is not an adequate presentation of methods used to complete an evaluation of each proposal objective. A thorough presentation is needed for each of the components of the research.

There are methodologies to be employed in this project for which the details are not yet established, including nutritional and physiological aspects. These facets of the research are not presented in sufficient detail for reviewers to evaluate the sufficiency of the experimental design, methods, and hypotheses to be evaluated.

Summary: This project is an experimental approach to potentially enhancing steelhead abundance in the entire mid and upper Columbia River Basin, including the Snake River. However, the proposed large magnitude and duration of this project (it is a large and rather costly undertaking) calls for a preliminary, well articulated quantitative evaluation of the potential and projected benefits of the project.

None of the narrative of this proposal is as clear as is the discussion put forth in the 2009-2010 Kelt Plan Final Draft developed by the action agencies. The 2009-2010 kelt plan from the action agencies provides sufficient justification for the basic trials, but not the reproductive physiology. The essential need now is to produce a proposal that provides a clear statement of what “success” is, an adequate description of the experiments, so there is reasonable likelihood they will provide interpretable results, and a time table for execution, analysis, and interpretation. Studies of endocrinology and physiology were not well justified and lacked sufficient detail. Likewise, the evaluation of possible management scenarios requires further development, as does the evaluation of reproductive success, to allow a more useful and thorough science review.

There is a real need to develop and adequately present the likely benefits to steelhead abundance from kelt reconditioning. For example, some basic model of how improvement in kelt survival of some percentage would result in this many more spawners of this age, etc. Kelt reconditioning is mushrooming into a very large effort with little quantitative justification for anticipated benefits to steelhead status. The potential research seems endless. It seems that some numerical and life history benefit and cost analysis should have been done by now.

## Lower Columbia Select Area Fisheries Enhancement

### 199306000 - Select Area Fisheries Enhancement

**Proponents:** Oregon Department of Fish and Wildlife (ODFW), Clatsop County Fisheries, Washington Department of Fish and Wildlife (WDFW)

**Short description:** The Select Area Fisheries Enhancement (SAFE) project is a well-established cooperative program that strives to deliver quality commercial and recreational salmon fishing opportunities in a setting which maximizes the return of hatchery production into fisheries through successful net-pen and hatchery rearing strategies and minimizes impacts on ESA listed and non-local stocks of fish through extensive in-season monitoring/evaluation and management of the fisheries.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

The proponents have provided a thorough and detailed response to each of the ISRP information requests.

Methodology is described in good detail, including a differentiation of the collection of data by other agencies (e.g., WDFW and ODFW) from the synthesis and summarization of those data by SAFE personnel. They also discuss how internal resources will be allocated away from field staff to project biologists to support coordination and data compilation and to assist with analysis and reporting. This approach reduces the potential for duplication of effort. Fishery sampling is described in detail by fishery, with citations provided for further information. Stream escapement sampling, which is largely conducted by other agencies, is sufficiently described, including issues related to the identification of hatchery fish.

A good description of how the project uses adaptive management is provided. Since project constraints (based on allowable impacts to ESA-listed stocks) change by year and within year, decisions are made on how the season will be structured and how harvest will be monitored. A flowchart is provided to show how project decision processes take account of and adapt to information within-season and between seasons. The process of monitoring impact rates on upriver spring Chinook is well described. The spring fisheries are differentiated from the fall fisheries in terms of difficulty and urgency of monitoring impact rates on non-local stocks.

The explanation regarding "efficient harvest" as a project deliverable states that the term "efficient" is relative and then describes how the term is used. However "efficient" is a term with technical meaning which is different from what the proponents describe. To avoid confusion it would be better to avoid "efficiency" altogether and use instead "harvest effectiveness" which is what they are describing.

To address the four questions regarding the effects of the SAFE program on harvests of local (natural origin) and non-local stocks, detailed tables are provided. These tables show some data gaps, which are recognized by the proponents.

The response adequately identifies problems with identifying local natural origin fish in harvest, acknowledges the importance of being able to do this, and states the intent to apply greater effort in determining these harvest rates. The response is similarly detailed in identifying problems with differentiating SAFE hatchery fish from other hatchery fish in order to estimate the proportion of SAFE fish on local spawning grounds. This problem arises because only a portion of the recovered hatchery strays (fin clip) have coded-wire tags. Exceptionally high levels of stray fall Chinook and coho salmon are observed in some watersheds, and this observation is recognized by the management agencies.

The response describes the Oregon and Washington recovery plans for salmon and SAFE's role in them. It notes the compromise between harvest opportunities and persistence of local populations, while identifying wild fish only areas upstream of hatchery weirs.

The response related to deliverables suggests that, as with other proposals, some confusion exists and therefore clarification is needed before the next round of proposals on how projects should list deliverables on the proposal form. There appear to be some difficulties with how Taurus structures objectives and deliverables leading to a hierarchy in the proposal that is confusing to reviewers. The explanation of the project's deliverables is adequate. The proponent notes that a project report will be prepared every three years and the latest report was uploaded to the web page one week ago.

**Preliminary comment requesting a response:**

The SAFE project provides an important approach for providing fishing opportunities in the lower Columbia River while attempting to minimize impacts on non-local stocks, including protected wild stocks. Nevertheless, the project should provide additional evidence that the fishery is not adversely affecting non-local and local natural-origin stocks.

The ISRP recommends that the project prepare a comprehensive analysis of the project and a report at least every five years. The report should include a detailed project description, methods used to evaluate the project, project benefits, project costs, and project effects on natural-origin local and non-local stocks. Some key questions are listed below:

1. How many and what percentage of non-local stock populations are harvested and what is the stock composition of the non-local harvest?
2. How many local, natural-origin salmon are harvested?
3. What percentage of the local spawning escapement is represented by SAFE fish that escaped the fishery?
4. How will the SAFE project coexist with attempts to rebuild local natural origin fish?

The proposal did not provide information on the methodology and the key monitoring questions noted above. The ISRP requests that the proponent provide a response with the following information:

1. Please describe the methodology that will be used to achieve each objective.
  - When monitoring the fishery, the methods should describe frequency of sampling, numbers of fish sampled, methods for stock identification, and methods for estimating catch of each stock.
  - Methodology used to sample streams for stray SAFE salmon should be documented. How many streams will be sampled, what area, and how frequent? How are stray stocks identified?
  - How does the program adaptively manage SAFE production and fisheries? How are adjustments made during the course of the season? Does the program have specific goals that it strives to achieve?
2. Please identify specific deliverables that are linked to each objective in the proposal (see comment below).
3. Please provide available information on the four key questions listed above for natural-origin local and non-local stocks associated with the SAFE fisheries.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The proposal provides an adequate statement of purpose for the project, placing it well within the context of regional efforts to maintain commercial and recreational fisheries in the lower Columbia River while minimizing incidental impacts on listed ESUs. The significance of the project to regional programs is adequately described. The proposal lists four project goals: 1) mitigation of harvest opportunities lost through actions taken to recover listed ESUs, 2) protection of endangered species, 3) minimizing negative environmental impacts of SAFE hatcheries and rearing pens, and 4) minimizing the straying of hatchery fish to wild spawning grounds by maximizing harvest rates.

The project has five objectives that are consistent with the specified goals: 1) adaptively manage select area production and fisheries, 2) monitor impact of select area fisheries, 3) monitor impact of select area production, 4) provide supplemental production for regional fisheries, and 5) provide outlet for basin-wide reprogramming of hatchery production.

## *2. History: Accomplishments, Results, and Adaptive Management*

A summary list of accomplishments and charts is provided. This information provided evidence that the project was addressing most of the goals and objectives. However, the ISRP identified additional information that should have been provided or discussed more thoroughly. For example, the proposal states that the SAFE fishery comprises 91% local stock for the winter, spring, and summer fisheries, and 87% Chinook and 80% coho local stock for the fall fishery. The project should attempt to identify non-local stocks that comprise the remaining 9%, 13%, and 20% in these fisheries and whether those percentages have a harmful impact on protected wild stocks. Did the local stocks harvested in the fishery include some natural-origin fish?

Habitat restoration projects are underway in watersheds adjacent to SAFE fisheries (e.g., Young's Bay) in order to recover depleted or extirpated local stocks; therefore, the project should evaluate how it might coexist with rebuilding of local natural-origin stocks. Migration timing might be one factor to consider. The proposal mentioned that some data on straying of SAFE fish to local spawning grounds have been collected, but the findings were not described. The ISRP encourages the SAFE project to collaborate with local ODFW and WDFW biologists in order to more accurately estimate numbers of SAFE fish straying to the local spawning areas. This is important to local stock rebuilding efforts because stocks used in the SAFE project are produced by using segregated hatchery practices and because the SAFE stocks may not be derived from nearby stocks.

One performance element noted is the ex-vessel value of SAFE production. The proposal notes that ex-vessel value is a minimum indicator of economic value since it does not capture any multiplier effect. This is not fully correct. It is true that noting the value at point of first sale (ex-vessel value) does not account for local multiplier effects within the economy, but it is also the case that ex-vessel value represents gross revenues rather than net revenues (accounting for costs) and so overstate first-round benefits. An estimate of costs was given in the 2006 economic analysis, as was an analysis (based on predicted return rates, revenues and estimated costs) of economic impacts. Economic impacts were found to be positive for the two counties of the Astoria/Ilwaco area but less clear for the larger Oregon/Washington region.

Earlier ISRP recommendations for employing a statistician for data analysis appear to still be relevant; a detailed statistical analysis of project outcomes or impacts was not included. A comprehensive analysis of the benefits, costs, and effects on natural-origin local and non-local stocks should be performed and reported at least every five years.

The proposal presented some evidence of adaptive management, such as eliminating the use of stocks that had high stray rates. The proposal indicates the potential for increasing SAFE releases and harvest opportunities. If this occurs, will production from other hatcheries decrease to the same extent?

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

A long list of related projects is provided. An important emerging factor is the effort to recover locals stocks through habitat restoration projects in watersheds adjacent to SAFE fisheries. The SAFE project should more accurately estimate strays to spawning grounds (as proposed through new collaborations with ODFW and WDFW field crews), estimate harvest rates on local natural-origin salmon, and evaluate approaches to minimize harvests of these stocks.

### *4. Deliverables, Work Elements, Metrics, and Methods*

The same deliverable is listed for each of the five objectives. The deliverable is “efficient harvest of hatchery salmon while contributing to the recovery of listed stocks.” “Efficient” is not defined. This deliverable is not specific to any of the objectives, and its details are a brief history and justification for the project, not a description of deliverables and how they will be accomplished. Methods of the project are not described.

## **Rock Creek and John Day Dam Mainstem**

### **200715600 - Rock Creek Fish and Habitat Assessment**

**Proponents:** Yakama Confederated Tribes

**Short description:** Information will be collected on the abundance, growth, genetics, diseases, habitat condition, and movement of salmonids in Rock Creek, a unique watershed of the middle Columbia River.

**ISRP final recommendation:** Does Not Meet Scientific Review Criteria

#### **Comment:**

There are not enough details in the project to conduct a scientific evaluation. This project likely needs more time than is available in the response loop to adequately develop this project for a meaningful ISRP review. The ISRP looks forward to reviewing a proposal when it is fully developed. As mentioned below, a few parts of this might be supportable if better justified.

A labeled map and a description of land ownership in project areas are both badly needed.

#### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The issue/problem statement is not well developed, and as a result, there is no clear overall goal. How the entire project relates to the region as a whole is unclear.

A few Chinook have been noted to spawn in the lower end. Steelhead are the only species of interest (The presentation reported 143 Steelhead redds). Again, the background and goals are described as though the completed work was never done.

The merits of the seven specific objectives are in question as well their status and the need for the work to be done. One objective (#4 to assess juvenile abundance and distribution) appears warranted if clearly defined. The other six are either already completed, at least to an adequate extent, or inappropriate.

Obj. 1 steelhead genetics - see completed report in Annual Report. Several more years of 50 fish samples are “needed.”

Obj. 2 assess habitat conditions and limiting factors - Proponents need to justify and clarify the need for additional data based on what has already analyzed. The discussion in the Annual Report was insufficient.

Obj. 3 assess lamprey use - never justified or explained to reviewers.

Obj. 5 survey fish pathogens - completed, see page 15 in Annual Report. “The Rock Creek fish health report indicates the mainstem Rock Creek fish samples were in good health and no pathogens were detected.”

Obj. 6 kelt movement - not explained or justified.

Obj. 7 identify project sites (probably okay if adequately justified) and also plant trees (also okay if not just feeding beavers).

## *2. History: Accomplishments, Results, and Adaptive Management*

For some reason this is identified as a new project as it indicates there are no past accomplishments. Yet the financial summary indicates \$330K has already been spent, much of that Accord funds. Some of the funding went to “install two PIT-tag multiplex units in Rock Creek and subcontracted to USGS. Not all of the funding was spent to the end of the contract because there was limited time. The remainder of the FY2008 budget was carried over to the FY2011 budget. Then in FY2009 the Rock Creek Project started a two-year contract which is planned to end on May 31, 2011. We have a large subcontract with USGS to assist with the population surveys in Rock Creek as well as analyze the PIT-tag data.” This tangled web was confusing to reviewers.

An annual report has been filed for the period Dec 2007 through May 2009. However, for some reason that is quite disconcerting, those results are totally ignored in the current proposal. So, regardless, there have been lots of data gathered. And there are PIT tag units and a USGS population survey subcontract apparently in place.

The project development, history, and most importantly its current status is in question.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

There is little information regarding how this project relates to other projects in the region.

The fact that there are substantial numbers of channel catfish, smallmouth bass, walleyes, perch and other non-natives is a clear problem, and to the reviewers, puts the value of the entire project in question.

### *4. Deliverables, Work Elements, Metrics, and Methods*

All of these are inadequately detailed.

## **200852700 - John Day Reprogramming & Construction**

**Proponents:** Columbia River Inter-Tribal Fish Commission (CRITFC)

**Short description:** In 2008, as part of the development of a new fish management plan, state, federal and tribal entity parties to U.S. v. Oregon engaged the USACE in reexamining the implementation of The Dalles/John Day mitigation. The goal of this project is to provide the tribes with technical assistance in developing near-term reprogramming goals for losses in production due to construction of The Dalles and John Day Dams and implementing those production reprogramming measures.

**ISRP final recommendation:** Not Applicable

#### **Comment:**

Not applicable. This current proposal is not scientifically reviewable. If a plan or loss assessment design is developed that is scientifically reviewable the ISRP will review it, if requested.

As stated, “The goal of the proposed project is to provide the tribes with technical assistance in developing near-term reprogramming goals for the losses in production due to the construction of The Dalles and John Day dams and in implementing those reprogramming measures.” An associated objective is to implement in-place, in-kind mitigation that is consistent with the fulfillment of treaty fishing rights. The project will have three phases. The first phase is review and planning. The second phase is developing mitigation options. The third phase is implementing the preferred option. This project is now in the first phase – planning. The level of information in the proposal, however, is quite slim. For example, although the history of the issue is well explained, there is little structure to the proposal after that explanation.

Although support to the tribes to re-evaluate the losses and mitigation options for the Dalles and John Day dams is reasonable and justified, the background of the individual chosen by CRITFC to execute the re-evaluation is not clearly presented. The proponent appears to have substantial administrative experience, but evidence of developing analysis of losses and analyzing mitigation options is not evident.

A second concern is the integration of the mitigation solutions with the Council's Columbia River Basin Fish and Wildlife Program. The Council, Fish and Wildlife Program, and ISRP are not mentioned in the proposal as being included in those to be participants or topics in the discussions and negotiations, since the discussions are conducted under the auspices of US v Oregon. Many proposals for hatcheries are brought before Council, and reviews are requested from the ISRP. However, scientific and ecosystem based skepticism of the efficacy of the proposal or systemwide limits to production is often countered with an argument that the decision is policy based within the US v Oregon settlement. There should be language that any production initiatives should be consistent with the Council and APR, address the HSRG recommendations, and be subject to ISRP review if conducted under the Fish and Wildlife Program or receiving BPA funding, e.g., Lower Snake River Compensation Plan.

## **Umatilla, Walla Walla and miscellaneous Columbia Plateau South**

### **198343500 - Umatilla Hatchery Satellite Facilities Operations and Maintenance (O&M)**

**Proponents:** Umatilla Confederated Tribes (CTUIR)

**Short description:** Acclimate juvenile summer steelhead, coho, and spring and fall Chinook salmon prior to release in the Umatilla River basin. Collect, hold, and spawn adult summer steelhead, coho and spring and fall Chinook salmon and provide eggs to Umatilla and other hatcheries for incubation, rearing, and later release in the Umatilla River basin. Transport and hold adult spring Chinook salmon for outplanting into natural production areas in the Walla Walla River basin for natural spawning.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

The proponents answered the ISRP's questions satisfactorily. Mostly the questions were more appropriate for other projects, not the Facilities Operations project. However, the proponents answered that (1) the program is taking a stepping stone approach toward developing segregated harvest and conservation stocks, (2) acclimation is widely accepted as effective, (3) a self sustaining natural population is a goal of the subbasin plan even though progress toward it is problematic, and (4) even if adequate harvest cannot be provided by a self sustaining natural population, harvest is a goal of artificial production.

**Preliminary comment requesting a response:**

This project is a large effort to produce, acclimate, and hold juvenile and adult Chinook, coho, and steelhead to support both conservation goals and harvest in the Umatilla River basin. The focus of the proposal is on the numbers of fish produced or held and outplanted, whereas the overall goal is to develop self-sustaining runs of anadromous salmonids which can sustain

harvest. Verified tests were not apparent, such as whether holding juveniles increases survival and homing, or whether the overall goal of self-sustaining populations has been met, or will be in the future. Moreover, production of Harvest fish often far exceeds production of those for Conservation (e.g., of spring Chinook), which raises the question of whether these efforts are creating demand by fishers that cannot be met by self-sustaining runs in the future.

A response is requested on the following four items:

1. Have there been tests of acclimation? Does holding juveniles at satellite sites actually increase survival and homing?
2. Will the goal of self-sustaining populations be met in the future? Have the project's efforts in acclimation and outplanting resulted in successful supplementation, i.e. naturalized spawning?
3. Will the demand for harvestable fish ever be met by self-sustaining runs?
4. In "Response to Past ISRP and Council Comments and Recommendations" the proposal states that new information has been derived, and the program has been tuned to support goals of the co-managers through BMPs. The information has been presented by the Umatilla Hatchery M&E project. Has this information been presented in written reports?

The ISRP review of the entire Umatilla program in 2006 ([ISRP 2007-15](#)) noted that the program had not achieved its salmon or steelhead goals for either escapement or harvest and raised the concern "whether the long-term fitness of the (steelhead) population that has been supplemented has deteriorated from interbreeding with fish that have had parents (or grandparents) reared in a hatchery." The ISRP recommended that the hatchery production components of the program "consider modifying the spring Chinook and steelhead program goals and eliminating the fall Chinook program."

In response to this recommendation and in response to an HSRG review, the Umatilla program changed production methods in 2009 to create two groups of smolts, a "Conservation" group derived from natural origin returns and a "Harvest" group of smolts derived from hatchery origin returns. The two groups are to be reared and released at separate locations, the "Harvest" group low in the watershed where returning adults are expected to be vulnerable to fisheries and the "Conservation" group high in the watershed where returning adults are expected to be less vulnerable to fisheries and in better spawning habitat. The assumption is that the "Conservation" group, relatively relieved of harvest pressure and sustained primarily by natural origin returns, will over generations adapt to the habitat high in the watershed and ultimately naturalize as a self-sustaining population in the river.

## 198903500 - Umatilla Hatchery Operations and Maintenance (O&M)

**Proponents:** Oregon Department of Fish and Wildlife (ODFW)

**Short description:** This proposal funds operation and maintenance of Umatilla Hatchery and fish transfers from the Umatilla, Cascade, Oxbow, Bonneville hatcheries to acclimation facilities on the Umatilla River. Northwest Power Planning Council (Council) adopted the Umatilla Hatchery Master Plan in 1990 as part of its Fish and Wildlife Program. (ODFW), (CTUIR), and others federal partners designed the Umatilla Hatchery as an experimental tool to achieve adult returns to the Umatilla Basin.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

The proponents answered the ISRP's questions satisfactorily. Mostly the questions were more appropriate for other projects, not the Operations and Maintenance project, but the proponents answered that acclimation is widely accepted as effective, that there is a plan for management of Conservation and Harvest groups, and that even if adequate harvest cannot be provided by a self sustaining natural population, harvest is a goal of artificial production.

**Qualifications:**

The management plan for Conservation and Harvest groups should be more fully developed and tested and presented at the next ISRP review. The fate of Spring Chinook Natural Origin Returns (NOR), released upstream or taken upstream, should be described, as well as the fate of NOR Fall Chinook. The use of NOR in the Conservation broodstock might be limited such that it does not inhibit natural development of a self sustaining population, if this is the goal, by establishing a minimum required escapement. A decision tree on the use of NOR returns for hatchery broodstock and natural spawning is needed in the management plan.

**Preliminary comment requesting a response:**

This proposal is to fund production of salmon and steelhead for a hatchery program in the Umatilla River basin in support of subbasin plans. A recent innovation in 2009 is to create two groups of smolts, a "Conservation" group derived from natural origin returns and a "Harvest" group of smolts derived from hatchery origin returns. The two groups are to be reared and released at separate locations, the "Harvest" group low in the watershed where returning adults are expected to be vulnerable to fisheries and the "Conservation" group high in the watershed where returning adults are expected to be less vulnerable to fisheries and in better spawning habitat. The assumptions are that the "Conservation" group, relatively relieved of harvest pressure and sustained primarily by natural origin returns (i.e. an Integrated program in the sense of HSRG), will over generations adapt to the habitat high in the watershed and ultimately naturalize as a self sustaining population in the river and that the "Harvest" group (i.e. a Segregated program in the sense of HSRG) will be highly vulnerable to harvest in the lower river and will remain isolated from the "Conservation" group.

A response is requested on the following three items:

1. What has been the effect of supplementation on summer steelhead, fall Chinook, and spring Chinook in the basin? Is the project impeding or advancing recovery as part of RPA 39?
2. Explain how the new “Conservation” and “Harvest” broodstocks will be managed separately for their different goals.
3. Will the harvest needs in the basin (now to be met by the four-times larger “Harvest” broodstock) ever be satisfied by a future self-sustaining population? Are harvest needs in the basin being met now? If not, why not?

*1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The purpose of the program is stated as artificial production with an emphasis on supplementation of summer steelhead, fall Chinook, and spring Chinook. The proposal numerically summarizes production of smolts and indicates that the program has produced fewer adults than the program goals (without giving actual numbers) and states for each of the three programs that “Elimination of the hatchery program would mostly likely result in closing of fishing opportunity” apparently a response to the ISRP 2007 review recommendation to eliminate or modify these failing programs.

Despite its centrality in the purpose of the program no information about the effect of supplementation by any of the three programs is given. No information is given about whether the project is impeding recovery as required by RPA 39

The ISRP review of the entire Umatilla program in 2006 (ISRP2007-15) noted that the program had not achieved its salmon or steelhead goals for either escapement or harvest and raised the concern “whether the long-term fitness of the (steelhead) population that has been supplemented has deteriorated from interbreeding with fish that have had parents (or grandparents) reared in a hatchery.” The ISRP recommended that the hatchery production components of the program “consider modifying the spring Chinook and steelhead program goals and eliminating the fall Chinook program.”

In response to this recommendation and in response to an HSRG review the Umatilla program changed production methods in 2009 to create two groups of smolts, a “conservation” group derived from natural origin returns and a “harvest” group of smolts derived from hatchery origin returns. The two groups are to be reared and released at separate locations, the “harvest” group low in the watershed where returning adults are expected to be vulnerable to fisheries and the “conservation” group high in the watershed where returning adults are expected to be less vulnerable to fisheries and in better spawning habitat. The critical assumption is that the “conservation” group, relatively relieved of harvest pressure and sustained primarily by natural

origin returns, will over generations adapt to the habitat high in the watershed and ultimately naturalize as a sustaining population to the river.

## *2. History: Accomplishments, Results, and Adaptive Management*

All accomplishments are described as numbers of juveniles reared and transferred. No indication is given of the resulting harvest or the resulting supplementation with respect to program goals. The proponents should provide information about progress toward program goals i.e. artificial production emphasizing supplementation.

Will the program's management adapt to successful supplementation, i.e. re establishment of a sustainable natural population, by restraining harvest within the productivity of the natural population or will there be perpetual artificial production of harvest fish.

If releases of hatchery fish are not meeting goals for adult returns, is there information to suggest the causes for this?

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

This project links closely with the four others in the Umatilla Restoration Program.

## *4. Deliverables, Work Elements, Metrics, and Methods*

The deliverables are restricted to fish production, and no methods are described. How do the fish production deliverables relate to the Umatilla Program goals? How will the deliverables relate to the production of Conservation and Harvest subpopulations?

## **199000500 - Umatilla Hatchery Monitoring and Evaluation (M&E)**

**Proponents:** Oregon Department of Fish and Wildlife (ODFW)

**Short description:** This proposal is for ongoing research, monitoring and evaluation of the Umatilla Hatchery program. The Umatilla Hatchery M&E Project evaluates hatchery practices for steelhead supplementation and spring and fall Chinook salmon reintroduction.

**ISRP final recommendation:** Meets Scientific Review Criteria

### **Comment:**

The project proponents provided detailed responses that adequately addressed the two ISRP questions posed. The program is developing separate Conservation and Harvest stocks of Chinook and steelhead to be evaluated with PIT tags, genomic analysis, and monitoring of life history traits. The proponents would improve the project if they accounted for (1) variability of survival at sea and (2) current habitat conditions and progress in habitat improvement.

**Preliminary comment requesting a response:**

A response is requested on the following two items:

1. What has been the effect of supplementation on summer steelhead, fall Chinook, and spring Chinook in the basin?
2. How will the performance of the new “Conservation” and “Harvest” groups of fish be evaluated?

Overall, the presentation described a comprehensive program to evaluate and monitor the production of Conservation and Harvest groups of summer steelhead and spring and fall Chinook in the Umatilla River basin. Ongoing monitoring and evaluation has shown that many of the groups of fish released from the hatchery and satellite facilities have low survival rates, and that the program has not yet been successful in establishing a locally-adapted wild stock of any of the three.

The meeting presentation reports a preliminary analysis which suggests that supplementation has not increased natural steelhead production or abundance, but also has not depressed those metrics. However, the presentation showed some promising recent trends. Supplementation has resulted in more fish spawning in nature. Natural spawner abundance seems to have increased. The preliminary conclusion is that supplementation has benefited natural production, but the observation is based on only four years of high numbers of spawners. The number of natural recruits per spawner has not increased and SAS rates have been low. One problem may be that high density/high oxygen fish culture, although appropriate for Chinook, may not be for steelhead, a question which ought to be addressed experimentally. A response should provide updated information.

Effects of artificial production on maturation of both species are evident. Steelhead have a higher percentage of returning females than males. Subjack Chinooks are frequent and threaten a demographic or genetic impact on the program. Program managers are working with NOAA on design of a growth modulation study of Chinooks.

A positive effect of supplementation has been inferred from a comparison between the Umatilla and John Day, a basin which has not experienced direct supplementation. The contrast with the John Day is a good example of testing the effectiveness of supplementation, but it is not evident whether straying has affected the John Day populations enough to affect the comparison.

In the future, more work could be done within the basin (rather than based on tag returns) to evaluate how these two groups use habitat (spawning and rearing), their juvenile survival, and timing of smolt outmigration and adult spawning migration. These direct measures of population divergence and performance, though perhaps more difficult and costly to measure, are likely to be more applicable to management, and to dovetail well with ongoing work based on tag returns and genetics.

## *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The stated goal of the project is to inform hatchery practice decisions for the Umatilla Restoration Program, i.e. steelhead supplementation and spring and fall Chinook reintroduction by the “evaluation of release sizes and acclimation and release locations, timing and strategies on juvenile survival and adult production.”

The proposal lists 16 objectives in six categories (status, natural production, hatchery program, flow and passage, fisheries, and communications). The list is a mix of objectives (2, 3, 13), strategies (1, 5, 7, 8, 9), and tactics (4, 6, 10, 11, 12, 14, 15, 16).

Key objectives include “Minimize any negative impacts of the Umatilla Basin hatchery program on natural steelhead and Chinook, and non-target populations” and “Maintain and enhance tribal and non-tribal steelhead, Chinook, coho and lamprey fisheries compatible with production, population, and conservation objectives.” The proposal addresses the objectives well and they are well justified in relation to BiOp and MERR

The ISRP review of the entire Umatilla program in 2006 (ISRP2007-15) noted that the program had not achieved its salmon or steelhead goals for either escapement or harvest and raised the concern “whether the long-term fitness of the (steelhead) population that has been supplemented has deteriorated from interbreeding with fish that have had parents (or grandparents) reared in a hatchery” but the ISRP found that this project, as a component of the program, has been successful in its basic goal of providing information. The ISRP recommended continued support of this project while recommending that the hatchery production components of the program “consider modifying the spring Chinook and steelhead program goals and eliminating the fall Chinook program”

In response to this recommendation and in response to an HSRG review the Umatilla program changed production methods in 2009 to create two groups of smolts, a “Conservation” group derived from natural origin returns and a “harvest” group of smolts derived from hatchery origin returns. The two groups are to be reared and released at separate locations, the “harvest” group low in the watershed where returning adults are expected to be vulnerable to fisheries and the “Conservation” group high in the watershed where returning adults are expected to be less vulnerable to fisheries and in better spawning habitat. The expectation is that the “Conservation” group, relatively relieved of harvest pressure and sustained by natural origin returns, will over generations adapt to the habitat high in the watershed and ultimately restore a sustaining population to the river.

The Hatchery M&E project therefore undertook a new responsibility, i.e. “to evaluate changes to the spring and fall Chinook salmon hatchery program that began in 2009 with the rearing of separate Conservation and Harvest Groups.” A genetic analysis is proposed to determine whether the “Conservation” and “harvest” groups of the two life history types of Chinook, and of summer steelhead [will] each show divergence between the two.” There is little in the proposal about

measuring adaptive characteristics or performance of these fish. For example adult run timing, locations of spawning throughout the watershed, egg and juvenile survival, and timing of smolt outmigration. Data already planned for collection on timing and survival of smolts passing downstream dams, and of adults returning, and SAS based on CWT returns, could be supplemented by ecological data from within the basin itself. However, the latter would require more intensive work, and different approaches.

## *2. History: Accomplishments, Results, and Adaptive Management*

The project's history of results since 1992 was recently favorably reviewed in ISRP 2007-15. This long history of data could profitably be used in an analysis of such relationships as recruits/spawner or smolt recruits/spawner vs. spawners which might provide a test of density dependent recruitment and other insights into the performance of the program with respect to its objectives.

The proponents report that adaptive management has focused largely on alterations within the artificial production facilities. Given that SAS rates have been very low for many groups produced by the hatcheries (e.g., <0.01 - 0.06%), considerably lower than the original goals of 0.30%, and given that the program has not been successful in creating locally adapted self sustaining naturally spawning stocks, an original goal of the program, an adaptive approach to management of the entire program would probably shift more effort toward evaluation of these key issues, rather than toward producing more hatchery smolts. However, it is also clear that ongoing work may yet help determine how to increase rates of return of both "harvest" and "Conservation" fish. Incorporation of AHA modeling has begun in the program which may lead to more adaptation of the program to its goal of creating a locally adapted naturally spawning stock.

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

This project links closely with the four others in the Umatilla Restoration Program.

During their presentation the proponents raised the emerging issue that climate warming will likely diminish survival of wild steelhead and Chinook in the basin. Consideration should be given to adapting propagation strategies and monitoring to the changing climate.

## *4. Deliverables, Work Elements, Metrics, and Methods*

The long section of the proposal on objectives was difficult to understand because the many deliverables overlapped substantially among objectives and were repeated listed among the various objectives. Information needs are being met, evidence that the study design is adequate. As mentioned above more should be done by analysis of results in understanding progress toward program objectives.

## 199000501 - Umatilla Basin Natural Production Monitoring and Evaluation (M&E)

**Proponents:** Umatilla Confederated Tribes (CTUIR)

**Short description:** Salmonid Monitoring and Evaluation: Provide ecological information and technical services to decision makers in support of adaptive management for sustainable restoration, conservation, and preservation of salmonid and aquatic resources.

**ISRP final recommendation:** Meets Scientific Review Criteria - In Part

**Comment:**

In Part: Deliverable 7 and Objective 3 do not meet scientific criteria due to lack of information that was requested by the ISRP. It does not appear that the proponents will actually be conducting work related to Deliverable 7 and Objective 3, even though they were included in the proposal. Rather, this work will be conducted by project 1984-024-01 (Umatilla Outmigration).

The proponents clarified their role in the Umatilla IMW project. They will coordinate with the major proponents of the IWM work, Projects 1984-024-01 (Umatilla Outmigration) and 2009-014-00 (Biomonitoring) and provide them status and trend data in support of the IMW project. The proponents of this project did not clearly indicate that they will be performing the habitat work called for in Deliverable 7 which states "Conduct habitat and related biological surveys to evaluate the effectiveness of habitat restoration activities." Therefore, Deliverable 7 is not scientifically justified for this project.

The ISRP requested more detail on Objective 3, "Assess salmonid diversity." This objective, which apparently is a part of the IMW study, reported no deliverables in the initial proposal and none were forthcoming in the response. With this lack of detail the ISRP is unable to evaluate the objective and so must deem it not to be justifiable for this project. The proponents referred the ISRP to the major proponents of the IMW project for the details of objectives 3 and 4. The details of these objectives and deliverable 7 were presented satisfactorily in the response of the proponents of project 1984-024-01 (Umatilla Outmigration).

The ISRP requested a more detailed summary of results. The proponent did not provide a summary but instead referred the ISRP to annual reports. Unfortunately, due to the time constraints imposed on the ISRP in their initial review of projects and in review of responses, we were unable to carefully examine the annual reports.

**Preliminary comment requesting a response:**

A number of issues need to be addressed by the proponents. The most important are: 1) a more detailed summary of results, especially since the last project review, needs to be provided, 2) the proponents should clearly explain this project's role in the Integrated Model Watershed (IMW) work in the Umatilla Basin, 3) more detail on Objective 3 needs to be provided, and 4) study design, background, methods, metrics, and data analysis for accomplishing Objective 4 and

Deliverable 7 need elaboration and clarification. The proposal would benefit from separation of status and trend monitoring objectives and IMW objectives.

This project provides critical information about the natural production of steelhead and Chinook salmon in the Umatilla River basin. The data generated can be used to assess the effects of habitat restoration, flow restoration, and hatchery supplementation on populations of wild fish. In addition, it should provide important data by which to judge the new integrated hatchery supplementation strategies, whereby two different groups (Conservation and Harvest) of smolts are produced from natural vs. hatchery parents, respectively. This supplementation strategy may interact with flow and habitat restoration to create different benefits depending on these other two driving variables.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The project is consistent with the NPPC Fish and Wildlife Program and priority RM&E Objectives in the Umatilla Subbasin Plan, and addresses the natural production component of the Umatilla Hatchery Master Plan which was developed collaboratively with ODFW. A Comprehensive RM&E plan was developed by CTUIR and its regional collaborators. The proponents propose to co-operate in the IMW project to evaluate effectiveness of habitat restoration actions in Umatilla basin tributaries, although their role is not entirely clear.

Monitoring and evaluation of salmon status and trends in the Umatilla Basin certainly is well justified and the proponents have outlined a comprehensive approach for this effort. The objectives address important elements that should be entailed in an M&E program, including returns of hatchery and naturally spawning adult, outmigrant abundance and survival, tribal harvest, and passage upriver. The objectives and technical background information are comprehensive, and appear sound. Missing from the proposal, however, is monitoring trends in juvenile abundance. The proponents should explain why parr abundance won't be measured.

A confusing aspect of this proposal is that it apparently has components pertaining to routine, on-going status and trend monitoring, evaluation of habitat effectiveness under the IMW program, and other habitat effectiveness assessments (Deliverable 7). The ongoing status and trends monitoring is encompassed by Objectives 1 and 2, and meet scientific criteria.

The IMW work apparently is divided among at least two projects, this one and Umatilla Juvenile Salmonid Outmigration and Survival (1989-024-01). The Outmigration project appears to have the greatest responsibility for conduct of the IMW work. The proponents of this proposal should clearly explain this project's role in the IMW work. What data will it collect? What analyses will it perform? Which of the deliverables in this proposal pertain to the IMW project? Is it just Deliverable 3? Why wasn't the IMW work consolidated into one proposal?

One challenging aspect of the IMW work is comparison of results from the various subbasins (reference and treatment), each of which has a suite of different flow, habitat, and supplementation treatments. As such, there is not a simple treatment-control structure to the

IMW study design. Formal model selection might be used with the various response variables (e.g., smolt output) to separate the effects of these three main treatment factors among subbasins. The proponents should address this issue.

Objective 3, “Assess salmonid diversity,” requires more detail. What are the Deliverables for Objective 3? What life histories will be assessed, and how will the assessment be done?

The description of Objective 4 is “Quantify the benefits of habitat actions, flow augmentation, hatchery releases, and mainstem facility operations on adults returns, natural production and juvenile rearing,” with an accompanying Deliverable 7 which pertains to habitat effectiveness evaluations. This is an exceedingly broad and complex objective. Do the proponents intend on doing all of the work entailed in this objective by themselves and if so how will it be done? As the proposal now stands, it is unclear how Objective 4 will be accomplished. Deliverable 7, a component of Objective 4, is equally perplexing. It states “Conduct habitat and related biological surveys to evaluate the effectiveness of habitat restoration activities. The study design will be similar to that outlined in the Comprehensive M&E Plan but is currently being refined through BPA project 2009-014-00 and will be coordinated with the Umatilla Intensively Monitored Watershed Project 1989-024-01.” The proponents provide no further explanation of how this deliverable will be achieved. If a study design exists, even in preliminary form, it should have been presented in the proposal (not simply referenced as the Comprehensive M&E plan) along with background, methods, metrics, and data analysis approaches. Objective 4 and Deliverable 7 are not scientifically justifiable because they lack these important elements.

## *2. History: Accomplishments, Results, and Adaptive Management*

Based on its scale and duration, this project is likely to have produced significant results documenting status and trends of salmon in the Umatilla basin. The project has been ongoing since 1992, providing long-term data, but there was no mention of the main results from these data (only accomplishments were briefly listed), or whether these data had been published in peer-reviewed form. These results apparently are presented in other reports which the ISRP had no time to review. Analysis of the data for publication, and feedback from outside reviewers (i.e., outside of the region), can help refine ideas and analyses that feed back to improve monitoring and management.

The results presented in the proposal pertain primarily to products of EDT analyses and trends in adult returns of hatchery and naturally produced steelhead, and naturally produced spring Chinook, but only through 2004. It would have been useful if the proponents had summarized, in a similar way, data and interpretation pertaining to each of the project objectives. What have the main results shown, and how are they being used in management?

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

This project links to many others – both the four projects within the Umatilla River subbasin, and others outside the Umatilla Basin. The project is an important link to others in the basin, since it provides information on natural production of salmon and steelhead, and data generated can be used to assess the current integrated hatchery strategy (although this was not presented as an objective).

The proponents indirectly address emerging factors by continuing to monitor the status and trends of salmon and steelhead in the Umatilla Basin and thus provide information to assist managers in their assessments of emerging threats. A recent report has suggested that climate change will be an important emerging limiting factor for steelhead. This project will provide data to inform some of those ongoing changes, and how supplementation and habitat restoration may interact with it to affect steelhead and salmon.

### *4. Deliverables, Work Elements, Metrics, and Methods*

The deliverables, methods, and metrics pertaining to status and trend monitoring were described very succinctly, are scientifically sound, and should yield suitable data for analysis.

As commented on above, Objective 4 and Deliverable 7 lack sufficient detail to permit a scientific review. Their breadth and complexity require a more thorough explanation of study design, background, methods, metrics, and data analysis. This projects role in the IMW work should be clarified.

## **198902401 - Umatilla Juvenile Salmonid Outmigration and Survival**

**Proponents:** Oregon Department of Fish and Wildlife (ODFW)

**Short description:** This project proposes to continue ongoing smolt monitoring activities of the ESA-listed Umatilla River steelhead population, to intensively monitor steelhead population responses to habitat restoration activities, and to expand the scope of smolt monitoring activities to include Chinook salmon. We also propose to collaborate in the development and implementation of a standardized habitat status and trend monitoring program that spans the Columbia Basin that is being proposed by ISEMP.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

The ISRP's comments were addressed in a thoughtful, comprehensive manner. The response was thorough and gave frank consideration of issues raised by ISRP. The proponents provided detailed answers to ISRP questions and comments that clarified issues concerning the M&E program, especially the IMW project.

The proponents provided a reasonable justification for the design of the IMW project, which involves comparison between two treatment streams and a reference stream to assess effectiveness of habitat restoration in the treatment streams. Although the proponents argued that the treatment and reference streams were physiographically and biologically similar enough to provide valid results when compared, they were forthright and objective in discussing the limitations of the design, limitations that likely will be common to many future IMW projects.

Given the differences among the treatment and reference tributaries in many biological and physical habitat features, and past management actions, the strongest comparisons may be Before-After comparisons within tributaries in response to habitat restoration. Additional comparisons among tributaries that depend on similar "background" effects of supplementation can be made, but regression analysis using key covariates may be a more useful approach, as the proponents suggest.

One of the limitations of concern to the ISRP is the uncertainty of the degree of hatchery influence which could affect comparability of the treatment and reference streams. Another potential problem is that habitat restoration actions in the treatment streams have been ongoing for some time. The effects of these actions will continue beyond the initiation of the IMW project making it difficult to separate biological and habitat responses resulting from pre-treatment habitat enhancement actions from those occurring post-treatment, after project initiation. This residual effect of pre-treatment actions may complicate before-after comparisons. Finally, given the extent of habitat degradation in the treatment streams, will the proposed restoration actions in these streams, especially Meacham Creek, be great enough to produce a significant, detectable biological response? The proponents should consider how they will deal with these problems analytically or through modification of their design.

**Preliminary comment requesting a response:**

This project proposes status and trend monitoring of ESA-listed Umatilla River steelhead and Chinook salmon, and collaboration in an Intensively Monitored Watershed (IMW) project intended to evaluate the effectiveness of habitat restoration actions in two tributaries of the Umatilla. Work related to status and trends monitoring in Objectives 1-4 meets scientific criteria. A response is needed that expands, clarifies, and provides more detail concerning the IMW project and Objective 5. The study design needs more thorough explanation, and more background information on the reference and treatment streams needs to be provided. Comparative metrics and data analyses need further explanation.

Overall, this is a thorough proposal for continuation of a centrally important project in the Umatilla Basin. The investigators describe a highly integrated project to collect critical data on production and survival of wild steelhead and spring and fall Chinook salmon. This project could provide critical data to assess whether the habitat restoration projects in the Umatilla River basin are effective in increasing abundance, survival, and productivity of naturally-spawning steelhead and salmon. In addition, it provides key data to determine the success of the new integrated hatchery supplementation program, whereby separate groups of Conservation and Harvest smolts are produced. These data are necessary to determine if the integrated hatchery program is

contributing to the recovery of steelhead and salmon, or just another factor leading to their demise (or no change is detected).

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The project is consistent with many regional programs and projects including the NPPC Fish and Wildlife Program and the Umatilla/Willow Subbasin Plan. It addresses several RPAs in the BiOp. This work is of great significance to regional programs, because it provides critical data to assess how natural populations of steelhead and two life history types of Chinook are responding to a variety of conditions, including in-river habitat, flow, migration corridors, and ocean conditions. Without it, little will be known about the performance of the newly created Conservation groups of salmon and steelhead.

The proposal includes status and trends monitoring and a new Intensively Monitored Watershed project. The main goal of the Umatilla IMW project is to determine whether habitat enhancement results in higher abundance, survival, and productivity of natural spawned steelhead and salmon. A confusing aspect of the proposal is that several of the objectives and deliverables include work related to both status and trends monitoring as well as to the IMW habitat effectiveness evaluation. The objectives and deliverables for the status and trends work and those for the IMW work should be separated so that these two aspects of the project are clearly distinguishable. Several projects are addressing components of the IMW work, although this project seems to have the bulk of the responsibility for its conduct. Dividing the work among projects makes scientific evaluation of the IMW effort difficult. Why was the IMW work not consolidated in a single proposal?

### *2. History: Accomplishments, Results, and Adaptive Management*

This project has been ongoing in various forms since 1994, but underwent an extensive review in 2006 by the ISRP. It was restarted in 2009, after reformulating goals. This proposal is characterized by carefully planned sampling designs for the redd surveys and juvenile abundance in tributaries, and for habitat monitoring.

The project can point to various results that have allowed managers to make important decisions based on the data that was collected. Based upon the results presented, the project appears to have been productive and has accomplished its objectives since its inception in 1994. Data collected through this project are critical for monitoring salmon and steelhead populations in the basin.

A notable conclusion drawn from data analysis was that “habitat enhancement has not resulted in a significant improvement for summer steelhead and that the system may be at capacity for production of the species.” The negative relationship between smolts/female and number of females supports this conclusion and suggests that density-dependence may be affecting smolt survival. This conclusion is tentative but it argues for a more rigorous evaluation of the

effectiveness of habitat restoration actions in the Umatilla Basin, which the proponents propose to undertake.

In addressing adaptive management, the proponents indicate that the information they obtained has assisted with management decisions and provide some examples. They did not specifically address how their project has changed based on previous results. However, their decision to participate in CHaMP is indicative of their willingness to shift the direction of the project.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The proposed project is one of four collaborative BPA funded projects aimed at monitoring the status and trends of Chinook salmon and summer steelhead in the Umatilla River. The project is tied to several other BPA funded projects in the Umatilla Basin. It also relates to several other IMW projects in the Columbia Basin that are collaborating in the development and implementation of CHaMP. In particular, this project and another in-basin project (1990-050-01; Umatilla Basin Natural Production M&E) are cooperating in conducting the IMW habitat evaluation in the Umatilla. Some discussion of the new C & H / Integrated Segregated hatchery production scheme would have been helpful, but it seems that the proposed project, without explicitly discussing it, will deal with it effectively.

In addressing emerging factors the proponents make the general statement that the data collected by this project could assist in determination of fish population response to emerging threats but do not offer anything more specific. Climate change and predation by birds and native and non-native fish predators are key emerging limiting factors which are dealt with in other proposals. It will be important to determine how this project can link with those data, such as estimating loss of this DPS of steelhead from Caspian tern and cormorant predation at the mouth of the Columbia River.

### *4. Deliverables, Work Elements, Metrics, and Methods*

This proposal has components pertaining to both routine status and trend monitoring and evaluation of habitat effectiveness under the IMW program. Methods and metrics for assessing status and trends in Objectives 1-4 are fairly standard and are appropriate for this type of work.

The ISRP views positively the proponent's willingness to engage in rigorous habitat effectiveness evaluation under the auspices of CHaMP and according to ISEMP protocols. Properly conducted, this evaluation could yield the most valuable information to date on effectiveness of habitat enhancement in the Umatilla Basin. Several issues, however, need clarification.

Several objectives and deliverables (e.g., deliverables 4, 6, 9, and 10) in the proposal apparently include work related to both status and trends monitoring and to the IMW habitat effectiveness evaluation, complicating scientific review of the proposal. It would be helpful if the objectives

and deliverables for the status and trends work and those for the IMW work could be separated so that these two aspects of the project are clearly distinguishable.

The study design for the IMW project needs more thorough explanation, and more background information on the reference and treatment streams should be provided. The proposed approach for evaluation of the effectiveness of habitat enhancement actions is to compare a control or reference stream with each of two treatment streams that have undergone habitat enhancement. A main difficulty is that appropriate treatment and control streams are difficult to find. The Upper Umatilla, a reference stream, receives supplementation, whereas Meacham Creek, a treatment stream, has been subject to habitat restoration and also is supplemented. Steelhead use both tributaries for spawning and rearing. Therefore, a comparison between these tributaries should yield information on the effectiveness of the habitat projects in Meacham Creek, assuming there is no interaction between the habitat work and supplementation, and other physical and biological differences between the tributaries are negligible. In contrast, Birch Creek, another treatment stream, receives no supplementation but connectivity and fish passage has been restored. Since the Upper Umatilla is supplemented, it is not an adequate control stream to compare with Birch Creek, although trend monitoring (i.e., before-after) can be conducted to assess changes. How will this apparent problem be resolved?

The proponents need to deal with several other questions pertaining to the IMW project. How do the reference and treatment basins compare physiographically and biologically? The history of land use, habitat loss, and hatchery influence in reference and treatment tributaries should be summarized. What habitat restoration actions have been and will be implemented, and on what time frame? What is the fish distribution and abundance in these streams?

Comparative metrics and data analyses need further explanation. What metrics (fish and habitat) will be compared between treatment and reference basins to evaluate the effectiveness of habitat restoration actions? Will the proponents be responsible for collection of habitat and fish data, data integration, and data analysis? What data will be collected by other projects? An extremely large amount of data will be collected. How will it be analyzed? It should be possible to use model selection to assess how, for example, smolt production relates to habitat restoration, by fitting models with and without this covariate. ISEMP proposes a long list of habitat variables that can be measured. How will the decision be made as to which of these variables are most important for this work?

## 200820300 - Assess Reintroduction of Steelhead in Butter, McKay & Willow Creeks

**Proponents:** Umatilla Confederated Tribes (CTUIR)

**Short description:** This project seeks to develop a more integrated understanding of the aquatic habitats in the Butter, McKay, and Willow Creek through interdisciplinary habitat assessments. These assessments will combine information encompassing the historical abundance, distribution, and health of

**ISRP final recommendation:** Meets Scientific Review Criteria - In Part (Qualified)

**Comment:**

The proponents simplified their approach, as requested by the ISRP, but did not fully address the ISRP concerns in their very brief response. This was especially true for Objective 3, relating to developing a plan for habitat restoration and steelhead reintroduction. Thus, Objective 3 does not meet scientific criteria.

The ISRP agrees that the proponents should undertake Objectives 1 and 2, specifically:

- a. Summarize historical habitat and anadromous fish distributions in these streams, and carefully and completely summarize what information has already been collected, as well as Traditional Ecological Knowledge based on oral histories.
- b. Determine what new information is critical to collect, that is not already included in previous reports and plans.
- c. Collect this new information about current conditions that is critical for developing a reintroduction plan.

Once these tasks have been completed, the ISRP asks that the proponents outline the tasks needed to develop a restoration plan based on these data, and submit a proposal to ISRP for this work. The timing of this proposal might coincide with the anticipated geographic review of Umatilla habitat projects in about 18 months.

A few specific comments about the proposal and the work remain, which include:

1. Forward Looking Infrared (FLIR) is proposed as a central tool for the research, but there is no mention in the original budget of funding for this work. Is this because other funds are used for these flights, not shown in this proposal?
2. The original budget calls for \$28K per year of "model analysis," but no modeling is discussed in the revised plan. Should this amount be shifted to other needs, like FLIR?
3. As indicated earlier, the role of the changing climate in any reintroduction plan was not addressed, but needs to be in any new proposal, even if in a preliminary way.

### **Preliminary comment requesting a response:**

The project proponents propose to evaluate the possibility of reintroducing steelhead and developing self-sustaining populations in two tributaries of the Umatilla River and one direct tributary of the Columbia River that is adjacent (Willow Creek). These plans assume that fish passage barriers could be removed or surmounted (e.g., using fish ladders or by trapping and hauling fish). The main focus is on developing a comprehensive landscape/watershed scale evaluation of habitat features that are needed to sustain steelhead populations in these streams.

#### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The overall objective of assessing the reintroduction/recolonization potential of steelhead into Butter, McKay, and Willow Creeks within the Umatilla subbasin is consistent with the habitat focus of both the Columbia River Basin Fish and Wildlife Program and the recovery objectives of the ESA. Likewise, focusing the work at the landscape/watershed scale is ideal for assessing whether freshwater habitat is suitable for anadromous fish reintroduction.

However, the objectives for this work are unclear, and it seems like they could be simpler and more straightforward than presented in this proposal. Three issues are important:

A. A basic hierarchy of limiting factors - If steelhead are to develop successfully reproducing populations, they must (in order of their life history) a) be provided access to habitat as adults, b) have access to suitable stream temperatures throughout summer, c) find suitable spawning and rearing habitat, and d) smolts must gain passage downstream for outmigration. Therefore, even if adults are trapped and hauled above certain barriers, if temperatures prevent their summer survival, then degraded spawning or rearing habitat is a moot point. On the other hand, if (as in McKay Creek), resident salmonid populations already occur above the reservoir, then it is already known that temperatures are suitable, and the amount of habitat becomes important.

Given this, it seems like the proposal could be organized to assess this hierarchy of limiting habitat factors:

- 1) Identify fish passage barriers for adults and methods to surmount them (barrier removal, fish ladder, trap and haul)
- 2) Use Forward Looking Infrared (FLIR) videography to assess summer temperatures during critical periods, throughout the segments where adult steelhead oversummer, and steelhead parr rear during summer
- 3) If temperatures are suitable, use a combination of GIS, regular color videography (done at the same time as FLIR), and on-the-ground surveys to make a continuous assessment of spawning and rearing habitat throughout the tributaries. If temperatures are suitable, then more focus can occur on habitat, but also with a simpler logic than in the proposal, such as:

- a. Determine through literature and expert opinion what large-scale features of habitat steelhead use at critical life stages (adults, age-0, age-1 and older) during key seasons (summer, winter)
  - b. Determine which geomorphic or mesohabitat features (e.g., pools) provide this habitat
  - c. Determine how to measure surrogates of these features using GIS, or simply measure them using low-elevation flights (color videography) or on the ground (see below)
- 4) Identify fish passage barriers for outmigrating smolts, and methods to surmount them.

A main point is that if any steps in this logic chain are not met (e.g., temperatures are unsuitable), then it may make little sense to proceed further in an expensive or complicated analysis and modeling effort to predict suitable spawning and rearing habitat.

B. Is existing information being adequately used? It is unclear whether data already available from previous fish and habitat assessments are being used for this new work, such as from the 1986 anadromous fish restoration master plan, the Umatilla subbasin plan, and TRT mid-Columbia steelhead ESU assessments. Likewise, will information learned from EDT analysis, conducting the assessments and executing habitat restoration and reintroduction of other salmonids, and supplementation of steelhead in other portions of the Umatilla subbasin, be used here? The ISRP felt that much is probably already known about the four limiting factors above, which could quickly be summarized and used in this project.

C. Statistical modeling will likely be less useful than proposed – the proposal calls for statistical modeling, but the objectives were vague and seemed driven more by the techniques rather than objectives. That is, if the main objective is to assess whether these three basins (and three others in a companion proposal) have suitable habitat for steelhead reintroductions, then there seems little point to developing a complex statistical model. The reason is that the variance on the predictions from this small sample of basins (N=6) would be great, rendering the models of relatively little usefulness for management decisions.

Instead, direct assessments of habitat using GIS, FLIR, color videography, and on the ground measurements, may be much more useful. For example, even if walking each basin takes 3-4 weeks of work, this would be far less time than the work required to develop, fit, and interpret a statistical model that has limited usefulness because the predictions are highly variable.

If the more direct assessment of habitat suggested here is adopted, then only much simpler statistical analysis would be needed. For example, see the logistic regression conducted by Torgersen et al. (1999. Ecological Applications) for FLIR and direct habitat data (pool volume by reach).

## *2. History: Accomplishments, Results, and Adaptive Management*

While this is a new project, habitat assessments, reintroduction, and supplementation are not new to the Umatilla subbasin. Either this section, or the problem statement, should review what has been accomplished in the Umatilla subbasin relative to the original assessments for the subbasin Master Plan in 1986. What has worked, and what has not? How will a new assessment provide different recommendations for restoration potential and strategies?

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

Because these are low-elevation semi-arid basins, the emerging limiting factor of climate change is important to assess. If climate change is projected to either push temperatures beyond lethal thresholds, or further reduce flow and prevent passage, then habitat restoration will be pointless. At least some “first-cut” analysis of potential changes in temperature and flow is needed to prevent putting effort and funding into projects that have a high likelihood of eventually failing.

## *4. Deliverables, Work Elements, Metrics, and Methods*

Overall, the deliverables (e.g., develop a GIS database, predict the potential for redds) are vague and disconnected. The ISRP had difficulty determining how the work proposed will use the information already available, and how it would meet the objective identified of predicting the success of steelhead reintroduction into these watersheds, or predicting where habitat should be restored.

## 200820400 - Assess Reintroduction of Anadromous Fish in Burnt, Powder & Malheur Rivers

**Proponents:** Umatilla Confederated Tribes (CTUIR)

**Short description:** This project seeks to develop a more integrated understanding of the aquatic habitats in the Burnt, Malheur, and Powder rivers through interdisciplinary habitat assessments. These assessments will combine information encompassing the historical abundance, distribution and health of anadromous salmonids.

**ISRP final recommendation:** Meets Scientific Review Criteria - In Part (Qualified)

### **Comment:**

The responses for this proposal were nearly identical to those for a companion and nearly identical proposal on Butter, McKay, and Willow creeks (2008-203-00). Hence, the ISRP comments are also very similar.

The proponents simplified their approach, as requested by the ISRP, but did not fully address the ISRP concerns in their very brief response. This was especially true for Objective 3, relating to

developing a plan for habitat restoration and anadromous fish reintroduction. Thus, Objective 3 does not meet scientific criteria.

The ISRP agrees that the proponents should undertake Objectives 1 and 2, specifically:

- a. Summarize historical habitat and anadromous fish distributions in these streams, and carefully and completely summarize what information has already been collected, as well as Traditional Ecological Knowledge based on oral histories.
- b. Determine what new information is critical to collect, that is not already included in previous reports and plans.
- c. Collect this new information about current conditions that is critical for developing a reintroduction plan.

Once these tasks have been completed, the ISRP asks that the proponents outline the tasks needed to develop a restoration plan based on these data, and submit a proposal to ISRP for this work. The timing of this proposal might coincide with the anticipated geographic review of habitat projects in about 18 months.

Several specific comments about the proposal are important to consider while undertaking this work on Objectives 1 and 2, including:

1. The proponents feel that RIPPLE-GEO is a powerful tool for analyzing stream geomorphology and habitat, and the budget includes \$43K for Stillwater Sciences to conduct this work. However, there is no justification for why this takes precedence over determining whether temperatures are suitable, using FLIR or another technique carried out at the whole-basin scale. As a result, the original ISRP question remains, about whether such sophisticated modeling is warranted if temperatures are too warm, especially under projected climate change, or if habitat is simply too poor to consider any reintroduction. This potential conflict was not addressed. For example, it was unclear to the ISRP how median grain size of substrate in channel units would actually be used to assess suitable habitat for anadromous fish reintroduction.
2. In the end, any reintroduction would require a significant program of trapping, trucking, and hauling adult spawners into habitat that is in very poor condition. Likewise, downstream migrating smolts would encounter large populations of non-native fishes like smallmouth bass in the receiving reservoirs. The ISRP anticipates that an assessment will find that the feasibility of this reintroduction effort is minimal, and thus the benefits to fish and wildlife minimal as well.
3. As indicated earlier, the role of the changing climate in any reintroduction plan was not addressed, but needs to be in any new proposal, even if in a preliminary way.

**Preliminary comment requesting a response:**

Questions raised by the ISRP that require responses include:

1. The objectives for this work are unclear, and it seems like they could be simpler and more straightforward than presented in this proposal. Please rephrase more clearly.
2. Develop a simpler logic path to be used to lay out a hierarchy of limiting factors, and develop straightforward methods for sampling them. For example, if temperatures are limiting (as determined by FLIR), then there may be little point in measuring habitat in great detail until the problems with temperature are corrected.
3. Provide a summary of fish species status and trends (they might be surrogate species in these blocked subbasins), habitat, and limiting factor analysis that has already been assembled from previous efforts in these subbasins. Explain the deficiencies in the data and analysis and identify how the proposed work will rectify the deficiencies for planning reintroduction.
4. Will statistical modeling be useful for this small sample of basins, given the high variance in predictions? Would it be more effective to simply measure habitat directly on the ground or from low altitude flights, rather than attempting to predict it from models?
5. The deliverables (e.g., develop a GIS database, predict the potential for redds) are vague and disconnected. The ISRP had difficulty determining how the work proposed will use the information already available, and how it would meet the objective identified of predicting the success of anadromous salmonid reintroduction into these watersheds, or predicting where habitat should be restored. Please clarify the deliverables?

Overview: The project proponents propose to evaluate the possibility of reintroducing anadromous salmon and steelhead and developing self-sustaining populations in three tributaries of the Snake River above Hell's Canyon and several other dams. These plans assume that adult fish could be trapped and hauled above the dams, and smolts could be trapped and passed downstream. The main focus is on developing a comprehensive landscape/watershed scale evaluation of habitat features that are needed to sustain anadromous salmonid populations in these streams.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The overall objective of assessing the reintroduction and recolonization potential of salmon and steelhead into Burnt, Powder, and the Malheur rivers is consistent with the habitat focus of both the Columbia River Basin Fish and Wildlife Program and the recovery objectives of the ESA. Likewise, focusing the work at the landscape and watershed scale is ideal for assessing whether freshwater habitat is suitable for anadromous fish reintroduction.

However, the objectives for this work are unclear, and it seems like they could be simpler and more straightforward than presented in this proposal. Three issues are important:

A. A basic hierarchy of limiting factors - If salmon and steelhead are to develop successfully reproducing populations, they must (in order of their life history) (1) be provided access to habitat as adults, (2) have access to suitable stream temperatures throughout summer, (3) find suitable spawning and rearing habitat, and (4) smolts must gain passage downstream for outmigration. Therefore, even if adults are trapped and hauled above certain barriers, if temperatures prevent their summer survival, then degraded spawning or rearing habitat is a moot point.

Given this, it seems like the proposal could be organized to assess this hierarchy of limiting habitat factors:

- 1) Identify fish passage barriers for adults and methods to surmount them (barrier removal, fish ladder, trap and haul)
- 2) Use Forward Looking Infrared (FLIR) videography to assess summer temperatures during critical periods, throughout the segments where adult salmon and steelhead oversummer, and juvenile salmon and steelhead parr rear during summer
- 3) If temperatures are suitable, use a combination of GIS, regular color videography (done at the same time as FLIR), and on-the-ground surveys to make a continuous assessment of spawning and rearing habitat throughout the tributaries. If temperatures are suitable, then more focus can occur on habitat, but also with a simpler logic than in the proposal, such as:
  - a. Determine through literature and expert opinion what large-scale features of habitat salmon and steelhead use at critical life stages (adults, age-0, age-1 and older) during key seasons (summer, winter)
  - b. Determine which geomorphic or mesohabitat features (e.g., pools) provide this habitat
  - c. Determine how to measure surrogates of these features using GIS, or simply measure them using low-elevation flights (color videography) or on the ground (see below)
- 4) Identify fish passage barriers for outmigrating smolts, and methods to surmount them

A main point is that if any steps in this logic chain are not met (e.g., temperatures are unsuitable), then it may make little sense to proceed further in an expensive or complicated analysis and modeling effort to predict suitable spawning and rearing habitat.

B. Is existing information being adequately used? It is unclear whether data already available from previous fish and habitat assessments are being used for this new work, such as from the 1986 Umatilla anadromous fish restoration master plan, the relevant subbasin plans, and TRT

mid-Columbia steelhead ESU assessments. The ISRP felt that much is probably already known about the four limiting factors above, which could quickly be summarized and used in this project.

C. Statistical modeling will likely be less useful than proposed. The proposal calls for statistical modeling, but the objectives were vague and seemed driven more by the techniques rather than objectives. That is, if the main objective is to assess whether these three basins (and three others in a companion proposal) have suitable habitat for steelhead and/salmon reintroductions, then there seems little point to developing a complex statistical model. The reason is that the variance on the predictions from this small sample of basins (N=6 for both proposals) would be great, rendering the models of relatively little usefulness for management decisions.

Instead, direct assessments of habitat using GIS, FLIR, color videography, and on the ground measurements, would be much more useful. For example, even if walking each basin takes 3-4 weeks of work, this would be far less time than the work required to develop, fit, and interpret a statistical model that has limited usefulness because the predictions are highly variable.

If the more direct assessment of habitat suggested here is adopted, then only much simpler statistical analysis would be needed. For example, see the logistic regression conducted by Torgersen et al. (1999. Ecological Applications) for FLIR and direct habitat data (pool volume by reach).

## *2. History: Accomplishments, Results, and Adaptive Management*

While this is a new project, habitat assessments, reintroduction, and supplementation are not new to these subbasins. Either this section, or the problem statement, should review what has been accomplished in these subbasins and address what has worked and what has not. How will a new assessment provide different recommendations for restoration potential and strategies?

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

Because these are low-elevation, semi-arid basins, the emerging limiting factor of climate change is important to assess. If climate change is projected to either push temperatures beyond lethal thresholds or further reduce flow and prevent passage, then habitat restoration will be pointless. At least some “first-cut” analysis of potential changes in temperature and flow is needed to prevent putting effort and funding into projects that have a high likelihood of eventually failing.

## *4. Deliverables, Work Elements, Metrics, and Methods*

Overall, the deliverables (e.g., develop a GIS database, predict the potential for redds) are vague and disconnected. The ISRP had difficulty determining (1) how the work proposed will use the information already available and (2) how it would meet the objective identified of predicting the

success of steelhead reintroduction into these watersheds or predicting where habitat should be restored.

## 200901400 - Biomonitoring of Fish Habitat Enhancement

**Proponents:** Umatilla Confederated Tribes (CTUIR)

**Short description:** This project will provide a detailed design for a reliable and relevant monitoring program that evaluates the biotic outcomes from restoration actions throughout the five subbasins; John Day, Grande Ronde, Umatilla, Tucannon, and Walla Walla. The project is divided into three phases, or tasks: (1) the conceptual design, (2) a summary of current biological monitoring efforts, and (3) the biomonitoring design for the five CTUIR subbasins.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

### **Comment:**

**Qualification:** Currently, the proposal does not provide enough information to allow a complete scientific evaluation. Overall, this proposal is to provide funding to work with a consulting firm (Stillwater Sciences) to develop an experimental design for evaluation of the effectiveness of habitat restoration activities in five subbasins. Given the importance of this work, the ISRP recommends that it review the proposed experimental design when it is completed.

The proponents of this work propose to develop and publish in the peer-reviewed literature a detailed design for evaluating habitat enhancement across five basins managed by the CTUIR. Evaluating the effectiveness of habitat enhancement, especially for anadromous steelhead and Chinook, but also migratory fish like bull trout, is very challenging because: a) effects of factors outside of the basins (like ocean conditions) interact with any effects of habitat enhancement, and b) fish use habitat across multiple scales, even in freshwater, so response variables must be measured across multiple scales as well.

Overlaid on this is a third challenge, which is that habitat enhancement is combined with flow augmentation and hatchery supplementation in various tributaries, making simple treatment-control comparisons difficult. In many cases, these three main actions are combined, so that simple comparisons are often confounded. For example, effects of habitat enhancement measured in a treatment vs. control stream could be caused by another factor that is also different between the two streams (e.g., one has received supplementation whereas the other has not).

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The CTUIR is proposing to develop and publish an experimental design and sampling protocol to measure biological results of habitat enhancement actions in a scientifically defensible way. The project is well justified and badly needed in the Umatilla Basin. This project is related to regional intensively monitored watershed (IMW) programs and to MERR, PNAMP, CSMEP, and ISEMP (although it is unclear how it will be integrated with these other programs). It addresses the ISRP's recommendation for habitat effectiveness monitoring in the Umatilla Basin.

Discussion of the technical background could have been improved if the proponents had presented the conceptual experimental design that they say was completed in 2009. The proponents also say they have summarized RM&E actions in each of the five subbasins on ceded land. It would have been useful, even necessary, to include the summary in the proposal in abbreviated form.

The technical challenge, as described above, will be to develop an experimental design which can:

a) Address the interaction between freshwater habitat (and changes to it by habitat enhancement) and mainstem survival, ocean conditions, and climate change.

b) Address how effects of habitat enhancement can be teased apart from effects of supplementation, flow augmentation, or other factors that affect freshwater survival and growth. It seems that statistical models could be developed across this larger number of basins and tributaries to partition out the effects of these factors, as well as the effects of different basins, and changes through time, perhaps using a “model selection” approach (Burnham and Anderson 2002. Springer).

c) Address what response variables about fish and habitat will be measured at what scale, to test specific hypotheses. For example, hypotheses may range from some at the local scale such as “Growth of juvenile Chinook will be greater in off channel than mainstem habitats” to very broad-scale hypotheses such as “Relative reproductive success of steelhead is greater in tributaries where habitat has been enhanced versus control watersheds without habitat enhancement, after accounting for the effects of density-dependence, ocean conditions, and changes in supplementation.”

## *2. History: Accomplishments, Results, and Adaptive Management*

The proponents have completed a conceptual experimental design but did not include it in the proposal.

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The project appears to be closely related to other projects on ceded lands and to ODFW’s Umatilla Intensively Monitored Watershed program, but these linkages were not entirely clear.

Emerging limiting factors include overarching effects of climate change, lag times from other projects or disturbances, and effects of supplementation on biological responses. How the experimental design will tease apart these effects from those of habitat enhancement will need to be clearly laid out.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

Metrics and methods will need to be made clear in the design. At a finer level than the interacting effects described above, rarely is a habitat response (e.g., side channel development) independent of other habitat changes (e.g., flood plain reconnection). Separating a single response from all other habitat responses, say in a reach, could be difficult. The design will also need to clearly lay out how this will be addressed.

#### **200003900 - Walla Walla River Basin Monitoring and Evaluation (M&E)**

**Proponents:** Umatilla Confederated Tribes (CTUIR), Washington Department of Fish and Wildlife (WDFW)

**Short description:** To provide ecological information and technical services to decision makers in support of adaptive management for restoration, conservation, and preservation of cultural, social, and economic salmonid resources.

**ISRP final recommendation:** Meets Scientific Review Criteria

#### **Comment:**

The proposed work is important and is well justified. The project will provide important information on status and trends of steelhead and reintroduced spring Chinook in the Walla Walla River and its tributaries. Major results of the project were presented comprehensively in the proposal and progress to date is in line with project objectives. The presentation to the ISRP was well done and addressed many of our questions.

#### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The project directly addresses objectives of the Walla Walla Subbasin Plan and is consistent with its RM&E needs and recommendations. It emphasizes meeting NOAA-Fisheries VSP monitoring needs and guidelines. It is also consistent with the Lower Snake River Salmon Recovery Plan, the mid-Columbia River Steelhead DPS Recovery Plan (2009), and the Council's MERR.

The objectives presented in the Objectives and Project Deliverables section provide a general idea of what the project is about. Specific objectives can be inferred from the study design and methods, but it would have been helpful if they had been clearly stated.

#### *2. History: Accomplishments, Results, and Adaptive Management*

The project has made significant progress in evaluating adult and juvenile salmonid abundance, distribution, and productivity and is continuing to find ways to improve reliability of data. For example, it has been hampered to a degree by several problems that have complicated adult enumeration including different enumeration methods (video cameras, weirs) at different locations within the subbasin with dissimilar detection or capture, and adult spawning below

detection facilities. Due to these factors the reliability and comparability between tributaries of adult estimates is somewhat uncertain. The proponents are exploring ways to improve accuracy of adult counts and establish additional counting sites. It would have been helpful if they had discussed these potential improvements and indicated how (or how much) they would improve estimates of returns.

Results presented were rather extensive and included redd count data, genetic analyses, movement patterns of radiotagged fish, returns of hatchery and naturally spawning adults, and estimates of recruits per spawner, in-basin smolt survival, and SARs. The presentation of results could have been made more concise if extraneous information pertaining primarily to operations and activities were omitted.

In relation to adaptive management, the proponents did not specifically indicate changes made in the project based on previous results. They did indicate how information from the project is used by managers. It is apparent, though, that adaptive changes are being made to improve accuracy and precision of data such as adult returns. These changes are a good indication that the project will continue to operate in an adaptive mode and seek ways to improve data collection.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The project cooperates and coordinates with watershed councils, irrigation districts, state and federal agencies, and numerous other organizations. It is closely associated with two other fish monitoring and evaluation projects in the Walla Walla Subbasin. It is also related to a number of other BPA funded projects.

### *4. Deliverables, Work Elements, Metrics, and Methods*

Methods and metrics are reasonably detailed, are standard for assessing salmonid abundance and survival, and appear appropriate for addressing the objectives. The proposal could be better organized, extraneous material eliminated, and redundancy reduced. At least in part these problems could be attributed to the proposal format.

The proposal would have been easier to follow if specific objectives were first stated (e.g., enumerate adults), then the methods and metrics for accomplishing each objective for each species were provided. For example, for each species:

- How will number of returning adults be enumerated (facility location, method of enumeration, measurements, time frame, relative precision and accuracy of enumeration methods, problems encountered that reduce precision and accuracy, how these problems will be dealt with, etc.)?
- How will hatchery and naturally spawning fish be differentiated?
- How many fish will be marked and where, what information will be gained from the marked fish?
- How will the data be analyzed?

Most of this information is provided in the proposal, but it is difficult to associate it with individual species and tributaries. There certainly are elements of the study design, methods, metrics, and estimation of parameters such as SARs that are common to all species and these could have been pointed out and consolidated, but there appear to be some important differences between species, for example in the way adults are enumerated, and special problems presented due to the differing life histories. It appears that all of the necessary elements are present in the proposal. The proponents just need to present it in a more concise, logical, and understandable way. Maps of the basin, river channels and names, and locations of facilities are not clear, perhaps due to the Taurus format. It would be helpful if a map showing major spawning distributions of each species with an explanation would have been provided.

## **Yakima**

### **199506325 - Yakima River Monitoring and Evaluation-Yakima/Klickitat Fisheries Project (YKFP)**

**Proponents:** Washington Department of Fish and Wildlife (WDFW), Yakama Confederated Tribes, Oncorh Consulting

**Short description:** Umbrella proposal for monitoring and evaluation of natural production, harvest, ecological and genetic impacts for spring Chinook, fall Chinook, and coho fisheries enhancement projects in the Yakima Basin. M&E results guide adaptive management decisions.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

#### **Comment:**

We judge the overall implementation of the project to be adequate, but the Yes (Qualified) rating does not represent ISRP endorsement of the interpretations of data and results.

Qualification 1: Specifically, we recommend that in the future the project use standardized calculations/metrics for determining impacts of supplementation, as presented in the Ad Hoc Supplementation Work Group reports and ISRP supplementation reports (e.g., incorrectly using total number of redds before and after supplementation efforts, rather than number of redds from wild spawned returning adults before and after treatment). The project needs to really assess response to supplementation of the *wild* population...and to do that, the calculations will need to include a method of estimating proportions of wild to hatchery fish in reference versus treatment streams.

Qualification 2: We also acknowledge that because of the sheer size and complexity of this project, it is not possible for any single reviewer to get his/her arms around it. As a group we wholeheartedly support the idea that future ISRP review efforts should be conducted in conjunction with the annual Yakama Nations' Fisheries Program Review, thereby taking advantage of that meeting's presentations and discussions.

The project team's response does, however, provide additional information and clarification when available for some ISRP concerns and further justification of constraints and future plans for other ISRP concerns when a current resolution is not available. As such, it helps move along the dialogue regarding the role of supplementation efforts in the subbasin.

The response includes good discussion of the specific items raised in the review. It is clear that much improved understanding is needed regarding factors that impact pre-smolt survival of natural- and (post-release) hatchery-origin. As seen in other watersheds as well, there appears to be a pattern emerging of poor natural-origin fish survival in the months prior to smolting that contrasts with better survival of hatchery-origin fish. More study is needed.

**Preliminary comment requesting a response:**

The comments on this proposal, 199506325, apply to all three YKFP projects.

This is an immense proposal that covers a lot of territory, with varying levels of detail. Most of the real RM&E activity is housed under this project, with more WDFW administration under 199506425, and more hatchery Operations under 199701325.

The proposal and especially the presentation were both well-organized and very informative. We agree with Dave Fast's suggestion at the presentation, that the next review of this project would be best coordinated with their annual coordination meeting. This strategy would help the better understand coordination efforts and how all of the pieces fit together.

Some general questions exist, and a response is requested:

As presented in more detail below, results reported the total number of redds per year, what are the results when returns are adjusted for presence of hatchery fish?

It is recognized that because of hatchery limitations, out-of-basin coho smolts are still being brought into the basin. Why can't they collect the broodstock and rear them offsite?

If NO fish start out-performing HO fish, will there be a transition to NOs and local brood?

*1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

This project is characterized as an "Umbrella proposal for monitoring and evaluation of natural production, harvest, ecological and genetic impacts for spring Chinook, fall Chinook, and coho fisheries enhancement projects in the Yakima Basin." As such it is quite complex in its nature.

The overall purpose is summarized as follows: "To restore sustainable and harvestable populations of salmon, steelhead and other at-risk species, the YKFP is evaluating all stocks historically present in the Yakima subbasin and, using principles of adaptive management, is

applying a combination of habitat protection and restoration, as well as hatchery supplementation or reintroduction strategies to address limiting factors....”

There are four very broad research focal topics listed as objectives: Ecological Interactions, Genetics, Harvest, Natural Production, with little real objectives type statements; instead these objectives are accompanied by a list of metrics/methods – but these are very terse descriptors.

The authors do, however, provide the following set of four research questions that the project is addressing:

1. Can integrated hatchery programs be used to increase long-term natural production?
2. Can integrated hatchery programs limit genetic impacts to non-target Chinook populations?
3. Can integrated hatchery programs limit ecological impacts to non-target populations?
4. Does supplementation increase harvest opportunities?

## *2. History: Accomplishments, Results, and Adaptive Management*

There is a brief set-up as a problem statement. The scope of the proposal, however, is so vast, that no introduction of a reasonable length could cover it all. That said, a nice review of YKFP history and background is provided. The project’s lengthy list of accomplishments, including a commendable number of scientific publications, is highlighted. There is a strong discussion of adaptive management. Work to date on ecological interactions has been extremely strong, extensive in scope, and well published.

Certain results, however, continue to portray results in a way that does not reflect the true goals of a supplementation project. Specifically, results presented in the proposal and in the presentation to the review group reported the total number of redds per year, a number that was not adjusted for presence of hatchery fish. Results need to be reformatted to provide sufficient data to determine the project’s status on demonstrating the efficacy of its experimental design as well as how well it is really accomplishing its supplementation objectives. We want a paragraph or two and tables containing the correct analyses. Authors should coordinate with WDFW on this response, specifically including results that Todd Pearsons presented at the AHSWG.

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

As an umbrella project, this proposal does a good job of tying the myriad aspects together in a reasonable description of the vast network of inter-relationships of this project with other groups.

#### 4. Deliverables, Work Elements, Metrics, and Methods

Deliverables were less than specifically identified, although the work elements were laid out in great detail in the boxes with tasks etc, along with methods and metrics.

Bottom Line – this is such a huge project, providing the level of detail given by other proposals would be impossible.

#### 199506425 - Policy, Plan and Technical Support of Washington Department of Fish and Wildlife (WDFW)-Yakima/Klickitat Fisheries Project (YKFP)

**Proponents:** Washington Department of Fish and Wildlife (WDFW)

**Short description:** We propose to continue involvement of the Washington Department of Fish and Wildlife (WDFW) in the policy and technical oversight of the YKFP. The co-managers of the resource (WDFW and Yakama Nation (YN)) will meet regularly and make collaborative decisions using adaptive management and risk management. This proposal funds WDFW participation in YKFP technical management and administration, technical review, environmental compliance documentation, and report and publication writing.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

The ISRP reviewed the three YKFP projects as a set. The response for 199506325 is sufficient. See the ISRP comments under that proposal.

**Preliminary comment requesting a response:**

The ISRP reviewed the three YKFP projects as a set. As a result, see the ISRP's review of 199506325 for details on the request for a response. That project should be able to address the request in a coordinated response representing all three YKFP proposals.

#### 199701325 - Yakima River Operations and Maintenance (O&M) for Hatcheries and Acclimation Sites-Yakima/Klickitat Fisheries Project (YKFP)

**Proponents:** Yakama Confederated Tribes

**Short description:** The O & M sub-proposal currently covers the following YKFP fish production and research facilities: the Cle Elum Supplementation and Research Facility (CESRF), the Prosser Fish Facility, and the Marion Drain Fish Facility

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

The ISRP reviewed the three YKFP projects as a set. The response for 199506325 is sufficient. See the ISRP comments under that proposal.

**Preliminary comment requesting a response:**

The ISRP reviewed the three YKFP projects as a set. As a result, see the ISRP's review of 199506325 for details on the request for a response. That project should be able to address the request in a coordinated response representing all three YKFP proposals.

**Tucannon****201005000 - Evaluation of the Tucannon River Summer Steelhead Endemic Stock Hatchery Program**

**Proponents:** Washington Department of Fish and Wildlife (WDFW)

**Short description:** This project will evaluate the summer steelhead supplementation program in the Tucannon River. This is a new supplementation program that will be expanded in the future to fulfill harvest mitigation responsibilities under the LSRCP Program. It is unknown if the supplementation program will be successful in restoring the ESA listed natural steelhead production in the Tucannon River, hence monitoring and evaluations need to occur to track the success/failure of the program

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

Qualification: This project should be included in the CRHEET supplementation evaluation umbrella.

This is a proposal for tagging and data collection for evaluation of a steelhead supplementation program in the Tucannon River that is implemented under the Lower Snake River Compensation Plan.

The monitoring is essential to evaluate the conversion of hatchery steelhead production in the Tucannon River from the release of out-of-subbasin Lyons Ferry production stock to an endemic (local) stock primarily reared and released in the Tucannon River subbasin. The transition is an effort to maintain mitigation fisheries under the Lower Snake River Compensation Plan and US v. Oregon while protecting the native population in the Tucannon River. There are complicated circumstances (i.e., apparently half the returning hatchery and natural-origin steelhead bypass the Tucannon and enter other Snake River tributaries, and others spawn below a hatchery weir) that may compromise this effort to obtain data that will provide meaningful analysis. The proponents, however, have a good track record of evaluating hatchery programs.

If there is expansion of LSRCP hatchery facilities, it would be reasonable to have those reviewed through the Three-Step Process used in the Fish and Wildlife Program, since the LSRCP is BPA funded, and reviewed as part of the "reimbursable" program.

Although the proposed data collection is essential for the supplementation to be evaluated, the description of the actual field data collection methodology, vital statistic estimation, and supplementation evaluation is not yet detailed enough for scientific review.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

As stated, “The primary goal of this project is to monitor and evaluate the status and trends of both natural and hatchery origin summer steelhead in the Tucannon River.”

In addition, there are four main objectives for this proposal:

1. Document change in productivity of steelhead above the Tucannon Weir
2. Estimate total adult steelhead returns to the Tucannon River
3. Estimate distribution of hatchery and wild spawners in Tucannon River
4. Document in-hatchery survival performance of supplementation steelhead.

Although these were all clearly laid out in a logical progression, it is not clear how a system can be designed for supplementation in the Tucannon that is restricted to the area above the hatchery, when the population above and below the weir are not clearly independent. The objectives for monitoring, to evaluate adult and juvenile abundance, and ultimately estimate adult-to-adult productivity, are the correct essential data to collect. It is not clear from the proposal how well this can be accomplished. The evaluation of supplementation requires using these essential data in statistical comparisons of before/after and control/reference or perhaps some other design. These evaluations need to be carefully assessed. It is not clear from the presentation how the comparisons will be made.

Significance to regional programs is amply described; the relationship to LSRC, the BiOp, US v. Oregon, etc. is succinct.

Technical background: The current status of steelhead in the Tucannon River is not described, and the anticipated system capacity, goals of the hatchery program, and performance of the hatchery fish in the system are not clearly described. A discussion of supplementation of other steelhead in the Columbia River Basin is not presented. There is or has been supplementation of steelhead in the Hood River, Umatilla, and Imnaha rivers, and the performance of those programs was not included in the technical background.

### *2. History: Accomplishments, Results, and Adaptive Management*

There is a general discussion of past history of using Lyons Ferry steelhead in the Tucannon to develop a harvest program for steelhead. The results of using local fish beginning in 2000 is only briefly presented, and not in a fashion that is interpretable in terms of whether the feasibility stage yielded performance justifying the proposed project’s moving to an expanded pilot stage.

Throughout the proposal there are some troubling statements, e.g., that the BiOp expects supplementation to improve productivity of steelhead. Supplementation may increase abundance,

but there is not a conceptual foundation for supplementation that it will increase productivity. Under supplementation, productivity is likely to decrease owing to both density dependence and fitness effects. The ISRP is under the impression that preliminary analyses from a number of systems demonstrate that natural productivity is reduced in the presence of hatchery fish. There is a lack of attention to the need for objectives for natural-origin steelhead abundance (although mention is made of 285 fish). Supplementation has as its primary objective the goal of maintaining or increasing the abundance of natural-origin adults. This increase in generation 0+1 is to be achieved by increasing total abundance in generation 0 by permitting hatchery-origin adults to spawn naturally. This phenomenon has not yet been demonstrated (see CRHEET proposal).

So, the project needs a better description and basis for adaptive management in the Tucannon itself, and adaptive management systemwide for steelhead supplementation. The ISRP does appreciate and acknowledge the discussion of transitioning from using the Lyons Ferry hatchery steelhead to provide harvest mitigation to conservation. Discussion in various areas of the proposal to suggest that harvest of a significant portion of the “endemic” production is anticipated. That “other” hatchery programs could be implemented (including supplementation) following the cessation of supplementation above the hatchery weir appears to conflict with guidance in the Fish and Wildlife Program.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The relationships with other projects are explained adequately.

### *4. Deliverables, Work Elements, Metrics, and Methods*

The set of expected deliverables is reasonable. The workplan was laid out clearly, but a better description is needed of the subbasin layout, where the new PIT tag array will be, and how various data will be collected and then evaluated.

## Grande Ronde and Imnaha

### 198805301 - Northeast Oregon Hatchery Master Plan

**Proponents:** Nez Perce Tribe

**Short description:** The Northeast Oregon Hatchery Master Plan's primary goal is development of new and modified artificial production facilities in Northeast Oregon. Facilities include: new Lostine River Hatchery, new Lostine River weir and modified Imnaha satellite facility. Important tasks include facility construction oversight, environmental compliance, operation, maintenance, and evaluation of Chinook and Steelhead artificial production facilities. Project responds to 2008 FCRPS BiOp RPAs 46.2 and 64.2.

**ISRP final recommendation:** Not Applicable

**Comment:**

Not applicable. This proposal relates only to the construction of the hatchery facilities. There is no component of the proposal that clearly indicates a study design or lays out the monitoring and evaluation program. This proposal did not provide sufficient details for an in depth review. However, the ISRP's previous Step Review applies here ([ISRP 2004-10](#)). The project has not been implemented since the ISRP's and Council's recommendation under the Step Review Process.

### 200713200 - NEOH Monitoring & Evaluation Implementation (Formerly a component of 198805301)

**Proponents:** Nez Perce Tribe, Oregon Department of Fish and Wildlife (ODFW), Umatilla Confederated Tribes (CTUIR)

**Short description:** This project will monitor the effectiveness of hatchery (supplementation) in four populations of spring/summer Chinook in Northeast Oregon (NEOH). It will guide evaluation of the NEOH production program, give empirical evidence of effects, fill knowledge gaps regarding supplementation and its uncertainty as an enhancement tool and provide status and trend information on important Snake River Chinook salmon populations.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

This was a well-written and complete proposal. The technical background was complete and understandable, with appropriate methodology. The details included in the Study Designs section listed under NEOH M&E Plan were very helpful in getting a picture of what was to be done. This proposal also included a very well-written and helpful section describing the NEOH Management Questions. The problem was well stated, and included an historical perspective on the issues at hand for the NEOH system.

There have not been adaptive management opportunities to date for this group on this work, but their explanation of how it would work makes it clear that a reasonable plan is in place: “The NEOH Management Plan will provide co-managers the information necessary for the adaptive management process. The Nez Perce Tribe (NPT), Oregon Department of Fish and Wildlife (ODFW) and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) insist on coupling their supplementation efforts with appropriate monitoring and evaluation. It is the NEOH Monitoring and Evaluation Plan that will allow co-managers to determine whether they are successful in meeting management goals and objectives associated with the Northeast Oregon Hatchery program. It is, therefore, intended to guide evaluation of the NEOH production program, give empirical evidence of effects and fill knowledge gaps regarding supplementation and its uncertainty as an enhancement tool.”

This is a re-submittal from a previous proposal to the ISRP, which received favorable review ([ISRP 2004-10](#)).

#### 198805305 - Northeast Oregon Outplanting Facilities

**Proponents:** Oregon Department of Fish and Wildlife (ODFW)

**Short description:** The Oregon Department of Fish and Wildlife (ODFW) is collaborating on preliminary design of new hatchery facilities and modifications to Lookingglass Hatchery with the Nez Perce and Umatilla Tribes and federal partners.

**ISRP final recommendation:** Not Applicable

**Comment:**

Not applicable. The status of the project is unclear, and not enough information is provided to enable a scientific review.

## 199800704 - Grande Ronde Spring Chinook on Lostine/Catherine Creek/ Upper Grande Ronde Rivers

**Proponents:** Oregon Department of Fish and Wildlife (ODFW)

**Short description:** The purpose of this contract is to integrate Bonneville Power Administration (BPA) efforts with the Lower Snake River Compensation Plan (LSRCP) in the Grande Ronde subbasin program utilizing Lookingglass Hatchery as the primary rearing facility. These integrated efforts focus on holding and spawning adults, rearing juveniles, fish health, and monitoring natural production (Redd counts) for Catherine Creek, Lostine River, and Upper Grande Ronde stocks.

**ISRP final recommendation:** Response requested

**Comment:**

The integration of this project with LSRCP (the set of projects) should be better described. The project needs to be integrated with CRHEET (Columbia River Hatchery Effect Evaluation Team and the Ad Hoc Supplementation Work Group).

The major part of this project is straight-forward artificial propagation. The current production levels have been agreed to and incorporated into the U.S. v. Oregon Interim Management Agreement.

In the response, the project's purpose should be restated in terms of the population restoration or enhancement goal, not as merely production and rearing of fish. (In a forthcoming report, the HSRG advocates that the purpose of hatchery programs be described in terms of the effects that the released fish are intended to have on conservation goals.)

From what was presented, the recovery goals and progress toward meeting those goals were not clear; the response should discuss those subjects. The present text contains the following: "Table 1. (revised 12/23/05) Minimum abundance thresholds by species and historical population size (spawning area) for Interior Columbia Basin stream type Chinook and steelhead populations (Table 3). Median weighted area and corresponding spawners per km (calculated as ratio with corresponding threshold) provided for populations in each size category (see attachment B)." This seems to be where the information is supposed to be located, but the information does not seem to be there. No attachment B was found in the proposal.

Objective 4 should be restated to explain the purpose of the redd counts (when questioned during the oral presentation, the presenter said the purpose is to assess adult returns), rather than as simply performance of an operation (to summarize data). As the project is a long-term continuation of past operation, the proponents should in their response present a clear table or two outlining, based on redd counts, where the hatchery effort is in terms of progress toward rebuilding each stream's population and its trajectory, and then they should present interpretations and conclusions from those tables in a discussion. This would better justify inclusion of the redd count objective in the proposal.

How the redd counts translate into estimated number of total spawners should be explained.

The proposal's Problem Statement lists the 10 specific LSRCP Chinook Salmon Program objectives. The ISRP requests that the proponents describe the methods by which the project will meet each specific objective or else omit from the list those specific objectives that do not apply to the project.

The Proposal Short Description and the Executive Summary indicate objectives pertaining to Catherine Creek, Lostine River, and Upper Grande Ronde River. The Problem Statement, however, states that program's goal is "restoration of spring/summer Chinook salmon in Catherine Creek" without mentioning the other rivers. Operations for the other rivers are then described further on in the Problem Statement, together with the implication that the project will carry out 10 specific objectives of the LSRCP Chinook Salmon Program which involve all three rivers: Catherine Creek, Lostine River, and Upper Grande Ronde River. Why then, is only Catherine Creek mentioned in the project goal?

The response should discuss emerging limiting factors.

The proposal mentions captive broodstock phase-out. The response should indicate the time frame for phase-out and the rationale for that time frame.

#### 199800703 - Grande Ronde Supplementation O&M on Catherine Creek/Upper Grande Ronde River

**Proponents:** Umatilla Confederated Tribes (CTUIR)

**Short description:** This project conducts O and M for a supplementation program in the upper Grande Ronde River and Catherine Creek. CTUIR operates an acclimation facility and an adult broodstock capture facility on each tributary.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

Qualification 1: The proponents should better describe their overall objectives for the fishery, not just operational, in-facility objectives.

Qualification 2: They should coordinate and integrate with CRHEET and show that they are implementing consistent protocols and metrics.

These qualifications can be addressed in contracting and discussed in progress reports and future proposals.

This project is intended to support a supplementation and captive broodstock program for spring Chinook in the Grande Ronde basin, in particular, the upper Grande Ronde River and Catherine

Creek. It is related to several other projects in the Grande Ronde system and is consistent with the Lower Snake River Compensation Plan.

Included are an acclimation facility (for smolts prior to release) and an adult broodstock capture facility on each tributary. Broodstock are to be collected from local stocks in the Upper Grande Ronde and Catherine Creek. The project's captive brood component is intended to minimize demographic risk of extinction, and its conventional hatchery production component is intended to balance the captive component and increase production while reducing the genetic risk of artificial selection. The stated objectives pertain straight-forwardly to fish production, but they should be accompanied by objectives that encompass the desired outcomes for the river system's fish population abundance.

The sliding scale used for dealing with wild and hatchery adults in the operation is a particularly beneficial feature. In future review cycles, it would be helpful to show and discuss statistics indicating the degree of conformance to and progress in that scheme.

No specific methods or metrics were given. The ISRP assumes that standard hatchery practices will be employed. The proposal would have been improved, however, if more information were presented about the acclimation facility and procedures.

ISRP overall comments on the present proposal are similar to those of the previous ISRP 2007-2009 review. In that review it was stated that this project's future proposals should summarize the quantitative results in tables or graphs, and should devote the project history narrative mainly to interpreting the biological significance of those results to date. The ISRP cannot see that this recommendation was followed.

Although this sizeable project has continued for over a decade, there does not seem to be a clear table or section of the report showing progress on the goals. The proponents do not show whether the supplemented stock is progressing toward the stage at which the program can be ended, as is the goal in supplementation. There also do not seem to be many meaningful reports resulting from this work. The project is summarized as routine fisheries work, but its fishery objectives should be stated and the results toward fulfilling them should be discussed. As the ISRP commented previously, "the desired outcome(s) should form the project's biological objectives." Once again, the proponents did not write this year's proposal to remedy the problems with biological objectives.

The ISRP previously pointed out that the proposal should include the objective of terminating the project when M&E determines that supplementation either is not working or has been successful enough that the wild stock is recovered to the point that supplementation is no longer needed. The project is designed to provide emergency risk management of spring/summer Chinook in the subbasin and ultimately to recover self-sustaining populations if out-of-subbasin stressors are remedied. If those stressors are not remedied, the long-term viability of the spring/summer Chinook is uncertain. The ISRP commented in the previous review that a response was needed,

in coordination with the other GRESCSP proposals, showing a decision tree detailing criteria for termination based on results, whether positive or negative.

The proposal lists annual fish production since 1997, but no quantitative results regarding the stock were reported and no management changes were shown. Therefore, meaningful accomplishments to date cannot be assessed on the basis of this proposal.

The Proponents state that: “The captive brood component was implemented to minimize the imminent demographic risk of extinction. The conventional component exists as a long-term strategy to balance the captive component and increase production while reducing the genetic risk of artificial selection. The GRESCSP has produced substantial adult spring Chinook returns to the target tributaries beginning in 2002. As returns increase, reliance on the captive component will diminish and as the demographic risk of extinction decreases, we will increase the conventional component until the captive brood component is expected to be phased out.” This paragraph would have much more meaning if data were presented to show how substantial those returns have been, how far along toward objectives those returns are, and, at the current rate of progress, when the existing captive brood program would be phased out. These data and projections do not seem to exist in the proposal. To include and discuss them could provide a useful description of success and status related to objectives. The ISRP requests that this be done in the next proposal.

#### 200708300 - Grande Ronde Spring Chinook Salmon Supplementation Monitoring and Evaluation (M&E) on Catherine Creek/Upper Grande Ronde River

**Proponents:** Umatilla Confederated Tribes (CTUIR)

**Short description:** This is a continuation of an ongoing RM&E program and separate from its O&M component with which it was joined in previous proposals. Monitor status and detect changes in spring Chinook salmon abundance, productivity, and life history diversity for two supplemented streams, Catherine Creek (CC) and the upper Grande Ronde River (UGR) in the Grande Ronde Subbasin. Describe life history of native summer steelhead for three streams in the Grande Ronde Basin (CC, UGR and Lookingglass Creek (LKG)).

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

Qualification: A full explanation of the monitoring program for the Grande Ronde/Imnaha should be developed by co-managers and made available to the ISRP. This should be completed no later than the geographic review of habitat projects in this subbasin/subregion.

This proposal can only be judged as part of a larger scheme to evaluate salmon and steelhead VSP parameters, hatchery effectiveness, and habitat restoration response in the Snake Basin ESU. The proponent indicates the work complies with the ASMS but does not link the work to specific objectives and goals of the ASMS. That makes it difficult to figure out what this project does in relation to other Fish and Wildlife Program and Lower Snake River Compensation Plan

(LSRCP) monitoring by ODFW, WDFW, and the Nez Perce Tribe. The proponent (and those of other projects) should not assume that ISRP reviewers know how the project fits in with the overall program; instead, the proponent should summarize this in clear narrative form. In other words, the ISRP should not have to investigate outside the proposal (see below) to determine whether the project is meeting program objectives.

The ISRP could only assume that the projects are essential to the LSRCP, for the proposal did not tell why this may be so, nor did it give information by which to judge whether the data are being properly collected and analyzed. The ISRP is concerned about quality control within the project and the broader program. The overly fragmentary array of projects—and the confusing interagency responsibilities within this particular project—severely hamper overview with respect to scientific merit and raises concern about overall program design and supervision. A system for more easily understood integration of proposals is needed, and the ISRP encourages the project proponent to more clearly explain in future proposals the project purposes in terms of the overall program and what the results signify.

In subsequent investigation, we learned that the CTUIR weir monitoring on Catherine Creek and the upper Grande Ronde River is an essential component of implementation of the LSRCP in the Grande Ronde subbasin, and is essential for adult return data collections. The data analysis for artificial and natural production is performed by ODFW, funded by the LSRCP program. Juvenile tagging, juvenile trapping, and returning adult monitoring is funded through the Fish and Wildlife Program. The Nez Perce Tribe and ODFW are involved in smolt monitoring, and the CTUIR takes the lead on adult trapping and monitoring. The monitoring is done according to the NEOH monitoring plan, which the ISRP has reviewed.

The response to ISRP questions and comments was inadequate in many respects. For example, to address the comparisons of hatchery versus natural survival of smolts to Lower Granite Dam, the response only stated that the comparisons are complicated. Similarly, for volitional versus force-out release strategy comparisons for the upper Grande Ronde River, the response did not offer information other than they are of limited utility due to limited sample sizes. Some justification for terminating these comparisons or increasing sample sizes would be useful.

The answers to questions about specific Objectives 2, 3, and 5 contain piecemeal fact statements, which, taken together within each objective and lacking program-related interpretations, result in vagueness. For example, in the response on Objective 2 (evaluate performance of hatchery-origin juveniles), there is no discussion of implications for success of the supplementation program that may lie in data on the differences in body size and condition factor or on the differences in survival and in arrival time to Lower Granite Dam.

The response on Objective 3 (describe life history and productivity) has, again, no comment on meaning of the results for the supplementation program. Also, there is apparent inconsistency between the last sentence of response paragraph 1, which says that upper Grand Ronde River “natural-origin returns are frequently low compared to hatchery-origin” and the second sentence

of next paragraph: “Mean SARs of upper Grand Ronde BY 1999-2004 hatchery origin [fish] ... was 0.5% (range 0.3-0.9) compared to 1.4% (range 0.6-2.9) for natural-origin.”

The response on Objective 5 (life history of summer steelhead) is a fact-string that comes to no point with regard to program success or lack of it.

The response was vague in overall effect on the ISRP questions as to (1) whether carrying capacity of freshwater habitat can be determined, (2) how such information could be used to establish goals and limitations for supplementation in subbasins, (3) how the project is helping to answer that, and (4) what the results indicate thus far. Related to that was the later ISRP suggestion that data from the project should be examined for signs of density-dependent compensation; this received no explicit response from the proponent.

Concerning the fact (from oral presentation by proponent) that natural-origin SARs in Catherine Creek from 1994 through 2004 exceeded those of hatchery by about three times on average, and that the proponents said results in upper Grand Ronde were about the same, the ISRP asked what this disparity may mean for the future of those populations. The response dealt with some operational changes that might be made but did not say what the disparity may mean for the future of the populations.

In response to the query about how far the program has progressed toward the goal of recovering depleted populations, the proponents present data on the populations and conclude that “it appears as though for most populations, replacement of natural spawners is not occurring ...” This would seem to demand an extensive response justifying why the project should continue.

**Preliminary comment requesting a response:**

The response should present the interpretations and conclusions that can be drawn from the data that the project has accumulated for 10 years or more. This requirement is consistent with the project objective: “Communicate results to the scientific community.” In addition, the proponents should explain more thoroughly in narrative how this project is essential and how it is integrated within the overall monitoring conducted by other co-managers for Grande Ronde projects.

The proponents point out that there is no hypothesis or standard of evaluation for survival to Lower Granite Dam. In the response, they should rectify those deficiencies.

They also state that for spring Chinook, most of the data are LSRCP project data, and that the weirs are staffed by other projects. Therefore, the ISRP requests that the proponents clarify what this project actually did. They should explain the sources of all the monitoring data for anadromous salmon. They should also explain the need for the data as identified in the basin Anadromous Salmonid Monitoring Strategy. The role this project plays in the monitoring and evaluation of BPA and LSRCP supplementation is not at all clear. There needs to be a full explanation of the relationships of the M&E projects in the Grande Ronde subbasin, including those implemented under non-Fish and Wildlife Program projects.

Project proponents for research and M&E projects that have existed for a significant period (in this case, apparently 12 years or more, formerly within another project) should, besides showing the accumulated data, also present narrative analyses of those data – or explain why the data are not yet sufficient to permit meaningful analysis.

Based on the project's data thus far (and data from coordinated projects that this project uses), what do the proponents conclude with respect to the following project objectives:

- Objective 2) evaluate performance of hatchery-origin juvenile spring Chinook salmon released from acclimation facilities on Catherine Creek and the upper Grande Ronde River,
- Objective 3) describe life history and productivity of hatchery- and natural-origin spring Chinook salmon in Catherine Creek and the upper Grande Ronde River, and
- Objective 5) describe life history of summer steelhead from Catherine Creek, the upper Grande Ronde River and Lookingglass Creek?

One of the stated critical uncertainties that the project addresses for hatcheries/artificial production, harvest, and population structure and diversity (NWPC 2006) is: "Can the carrying capacity of freshwater habitat be accurately determined and, if so, how should this information be used to establish the goals and limitations of supplementation within subbasins?" How is the project helping to answer this question, and what do the results thus far indicate in this respect?

Further, the proponents' goal statement in oral presentation was "to recover depleted populations in the Grande Ronde Subbasin of northeastern Oregon." On the basis of this project's results (and possibly those of coordinated projects), what can the proponents say about how far the program has progressed toward meeting that goal?

The proponents' oral presentation included two graphs representing some helpful data analyses beyond those in the proposal. One graph showed recruits per spawner (R/S) for brood years 1999-2004 in Catherine Creek and Upper Grand Ronde River (no results for control streams Wenaha and Minam). The other graph compared smolt-to-adult return rates (SAR) of hatchery-origin and natural-origin fish in Catherine Creek from 1998 through 2004. Natural-origin SARs consistently exceeded those for hatchery fish by about 3 times on average. The proponents commented that results for Upper Grand Ronde were about the same (no data shown). In the response, they should show the results and discuss what the disparity between origin types may mean for the future of the populations.

This project's data, combined with those from other projects in the Grand Ronde system, should be examined for signs of density-dependent compensation in populations (stock-recruitment analysis). Hints of it existed in presentations for several projects. Evidence of such compensation would bode against benefit from supplementation and would be consistent with the strategy of working to restore habitat. In other words, releasing smolts into a stream cannot benefit natural spawning results beyond a certain habitat-limited level, and that level already may have been reached in some streams that have less than favorable habitat. The numbers of adults in the

streams look very low considering what one might assume “pristine” (or even more recent historical) abundance was. This may make it difficult to test for density-dependence.

Fieldwork duplication does not seem to be a problem, but this project needs to coordinate closely with other M&E projects in data analysis and interpretation.

In oral presentation, the project representative revealed that reduced landowner willingness to grant access limits suitable monitoring (the ISRP assumes this must also limit restoration and management). The ISRP urges that the Grand Ronde Model Watershed Program’s liaison be reinvigorated to encourage better relations and more success in salmon recovery.

The ISRP requests clarification about whether the project’s primary effort goes into assisting other co-managers or into trapping. A large component of the project is program assistance. Please justify this. There are three 0.5 PTEs working on this project.

### 199202604 - Life History of Grande Ronde River Spring Chinook Salmon and Steelhead

**Proponents:** Oregon Department of Fish and Wildlife (ODFW)

**Short description:** This project will investigate the critical habitat, abundance, distribution, migration patterns, survival, productivity, and life history strategies of spring Chinook salmon and steelhead from distinct populations in the Grande Ronde and Imnaha River subbasins. This study provides long term status and trend monitoring of salmonids and their habitats in the Grande Ronde River subbasin essential for assessing the success of recovery efforts including hatchery supplementation and habitat restoration.

**ISRP final recommendation:** Meets Scientific Review Criteria - In Part (Qualified)

**Comment:**

The project’s status and trend monitoring objectives (1-4) and the tasks involved meet scientific review criteria. In future proposals, however, the proponents need to provide a more thorough presentation of results for each project objective, adding interpretive discussion of data. This is especially true for the supplementation part of the project.

Qualification: Project objectives 5 and 6, concerning the Intensively Monitored Watershed (IMW) procedure and habitat monitoring do not meet scientific review criteria. The proponents should prepare a comprehensive plan for the IMW project including its objectives, study design, metrics, and the project’s role in the IMW project. The ISRP should review the plan before its implementation.

Objectives 5 and 6 are not scientifically justifiable at this time due to the lack of specific detail concerning the Grand Ronde IMW program and this project’s role in that program.

In the proposal, broad objectives of the IMW program and ISEMP procedures and protocols are given, but little detail is provided about on-the-ground studies in the Grande Ronde basin. What are the specific objectives of the Grande Ronde? What is the study design? What hypotheses will be tested? What are the treatment and reference streams, why were they selected, and what are the restoration activities that are ongoing and planned in them? At what spatial scales will comparisons be made? What metrics will be chosen? What is this project's role? Will the proponents integrate and analyze the data (as implied by the objectives), and how will the data be analyzed? If other projects are involved, what is their role? In short, a great deal more information about the IMW specific to the Grande Ronde and this project needs to be provided before scientific criteria are met. In connection with this, the ISRP recommends that the project obtain the services of a qualified biometrician to help with statistical design of the monitoring and of the subsequent data analyses. All of these questions should be addressed in a comprehensive plan for the IMW which should be reviewed by the ISRP before implementation.

The proponents revealed in oral presentation that they plan to add staff - a project leader for the EMAP (status and trend) and for the IMW. Their IMW will focus on the Grande Ronde above the Wallowa River. The project's control stream for adult escapement, the Minam River is in wilderness area and is hard to access. The Lower Grande Ronde is also difficult to access in springtime. How will these factors affect accomplishment of the project objectives?

This major project, ongoing since 1994, seems to have substantial accomplishments, but this was not evident from the results presented in the proposal. There were tables and graphs on timing of movements of juvenile steelhead and Chinook and on smolts per redd for spring Chinook, but the proponents presented little explanation and interpretation of the data. They often stated what they did, and then referred the reviewer to a table or graph with little interpretation of what those results mean, no general conclusions being drawn. Also, it would have been helpful for the proponents to present tables in more concise and understandable form. The oral presentation provided interpretation that alleviated some of the interpretive deficiency. The ISRP requests that future proposals contain narrative interpretation and discussion of the project's data.

The results need to be summarized by project objective to clearly illustrate that the project is progressing toward accomplishing the objectives. For each of the project's four streams, information on spawner abundance and distribution, smolt abundance, smolts-per-spawner, smolt survival, life history characteristics (age, size, timing of migration), and juvenile abundance and distribution for both steelhead and salmon should have been provided, and then the meaning of this information should have been discussed.

Most importantly, the proponents should have discussed far more fully the supplementation evaluation, including study design, metrics, data analysis including statistical analyses, and results to date. Then, based on the results, the proponents should offer their assessment of the success of the supplementation program thus far.

## 200740400 - Spring Chinook Captive Propagation-Oregon

**Proponents:** National Oceanic and Atmospheric Administration (NOAA), Oregon Department of Fish and Wildlife (ODFW), Umatilla Confederated Tribes (CTUIR)

**Short description:** The Captive Broodstock Program was designed to prevent extinction of the Chinook salmon populations in three Grande Ronde Basin streams. The Catherine Creek and the Lostine River populations have increased to a level where they can be phased out and will end with the 2010 spawn. The program in the upper Grande Ronde River is being transitioned to a Safety Net Program, which will rear salmon to be used in years when insufficient numbers of adults return for the conventional hatchery programs.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

### **Comment:**

Qualification: A collaborative synthesis report with Idaho Department of Fish and Game (IDFG) and NOAA evaluating and comparing the captive rearing strategies should be prepared and jointly reviewed by the ISAB and ISRP.

The comparison of captive rearing methods (strategies) – Salmon River rearing and releasing adults, Grande Ronde rearing to adults/spawning and producing smolts for release – is one of the few adaptive management experiments in the basin. A report comparing the methods and evaluating the efficacy of the strategy and methods is needed. The report should be evaluated by the ISAB and ISRP as a report to the Council on an independent conclusion on the scope of the benefit (and cost) of using this approach to rescue populations that have extremely small numbers of spawning adults.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The Captive Broodstock Program was designed to prevent extinction of the Chinook salmon populations in three Grande Ronde Basin streams. The Catherine Creek and the Lostine River populations have increased to a level where they can be phased out and will end with the 2010 spawning season. The program in the upper Grande Ronde River is being transitioned to a Safety Net Program, which will rear salmon to be used in years when insufficient numbers of adults return for the conventional hatchery programs.

Captive broodstock projects for Snake River spring/summer Chinook salmon are supported by recommendations in the Snake River Salmon Recovery Team, NMFS draft recovery plan, and the Council's Fish and Wildlife Program. This project addresses some objectives identified in the 1994 Fish and Wildlife Program.

### *2. History: Accomplishments, Results, and Adaptive Management*

The primary accomplishment for the Captive Broodstock Program was the successful rearing and spawning of natural parr (and later eggs) to produce smolts for release in select Oregon watersheds. The Catherine Creek and Lostine River populations have increased and have reached

the Program's goal of a consistent return of >150 adults spawning in nature. As a result, the Captive Broodstock Program for these two populations has come to an end. Data to assess any contribution the captive broodstock program had to this increase in abundance awaits future analysis. The last of the fish from these two populations will be spawned in 2010. Details on accomplishments and significant findings about the program were not provided in the proposal but some findings were described in the presentation. It was not clear whether the adult spawning goal of 150 fish was hatchery fish, hatchery/wild crosses, or natural origin fish. The ISRP has emphasized the need to provide performance expectations for the abundance of both hatchery- and natural-origin adults in supplementation programs.

The Upper Grande Ronde River population has not quite reached the Program's goal for abundance. Some years it has had an extremely high abundance of salmon spawning in nature (>500), while in other years the abundance has been well under 100 adults. Therefore, ODFW and the Umatilla Tribe have begun a Safety Net Program for the Upper Grande Ronde River Chinook salmon population. This program will take 300 eyed eggs from the Upper Grande Ronde River Conventional Hatchery Program (equal numbers of eggs from all females) and rear them in captivity to maturation. If they are unable to collect a sufficient number of returning adults for the Conventional Hatchery Program for a given spawn year, they will spawn the Safety Net adults and use their offspring to supplement the Conventional Program production. If the Safety Net Program adults are not needed, they will be released and allowed to spawn naturally in Upper Grande Ronde River tributaries that do not currently contain Chinook salmon.

The program has adapted to emerging problems that have arisen, such as BKD.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The project is reportedly integrated with other hatchery, habitat, and research projects in the Grande Ronde Basin. The project has followed previous recommendations to phase out the program when natural production goals were achieved. The proposal noted that excess fish from the Captive Broodstock Program may be released into suitable under-seeded streams (Wallowa River (9 RK 64-76), Hurricane Creek (RK 0-8), Bear Creek (RK 0-14) and Prairie Creek (RK 0-8) in the Wallowa River drainage; Sheep Creek (RK 0-8) in the Upper Grande Ronde River drainage). These supplementation activities should be evaluated in the final report. The project should demonstrate collaboration with other groups working in the watershed.

### *4. Deliverables, Work Elements, Metrics, and Methods*

Portions of the deliverables were attributed to captive rearing and others to safety net. It was not clear to the ISRP how Accord safety net tasks are being separated from ongoing captive rearing tasks.

The final report should provide a comprehensive review of the Captive Broodstock Program, including but not limited to numbers of parr/eggs collected, their survival to smolt stage, and

subsequent return as adults. The report should evaluate whether increased abundance in Catherine Creek and the Lostine River can be attributed to the captive brood stock program and what fraction was related to natural production. Density-dependent effects should be evaluated and discussed in light of supplementation activities and the potential for ongoing habitat restoration to increase the capacity of streams to support salmon. Comparisons with reference streams (Minam and Wenaha) should be made if possible. Efforts by other projects in the watershed should be incorporated into the final report as necessary to provide a comprehensive review of Chinook salmon population dynamics, supplementation effects, and habitat restoration.

### 199701501 - Imnaha River Smolt Monitoring

**Proponents:** Nez Perce Tribe

**Short description:** The Imnaha Smolt Monitoring Project provides estimation of juvenile abundance, survival, arrival timing, and SARs for hatchery and natural origin Chinook salmon and steelhead in the Imnaha River. This information is critical for implementing a monitoring and evaluation component of the NEOH M&E Plan (Hesse et al. 2004), objectives laid out in the LSRCP Hatchery Evaluations Project, and real time reporting to Fish Passage Center for recommendations concerning operations of the Snake River dams.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

Qualification: Analyses using data collected under this proposal – whether conducted by the NPT, FPC, or others – should be increased and documented in future project progress reports and proposals.

Summary: The project provides valuable data for several other projects and management applications in the basin. The project rationale is clearly presented, adequately showing how the data collected and supplied by this project are applied to management issues and decisions. The history of project activities and the time series assembled are outlined in a general sense, at least insofar as what was done (rather than what was discovered).

In a previous ISRP review of this project, the ISRP wrote that 199701501 is not a research investigation but essentially a data collection project. That assessment remains accurate. The objectives are more accurately called sampling and data summary tasks designed to provide the data in a form suitable for a database. The objectives are adequate as far as they go, i.e., as strictly a monitoring project. The project itself is well conducted using appropriate sampling and population estimation methods. The methodologies for this sort of smolt trapping work are identified and referenced, and are adequately standardized.

Although the historical data generated in this project are presented in the proposal, the proponents indicate that interpretation of the data is probably someone else's primary responsibility, or is at least outside of the scope of the proposal. It is unclear, however, whose responsibility is it to analyze this valuable data.

There remain several opportunities for making more effective use of this 13-year data set. First, in a general sense, it would be helpful for the proponents to discuss the meaning of their results. The tables present the collected data very well. There appear to be some trends, and it would be helpful for the proponents to discuss those possible trends. Besides showing the accumulated data, presenting basic analyses (with narrative) of those data would be required to fulfill the criterion that the project “benefit fish and wildlife” as would interpreting the data and drawing conclusions about effects on the focal fish population and management implications. These data do not need to be dealt with in a routine manner. The results need not just be reported but can also be evaluated and interpreted.

For example, how might accuracy, precision, and bias be evaluated? Would short-term operation of a second trap (if cost-effective), or another approach, provide accuracy and precision estimates? It is not clear what biases may exist in this sampling regime. None of these issues are indicated as being addressed.

As for interpretation of the data collected, there is no research component, no hypotheses are listed, no indications are given of any research analysis designs. There are meaningful hypotheses that can be tested. For example, Roper and Scarnecchia (1999: CJFAS 56:939-946) develop and test several hypotheses around a 3-4 year data nearly identical in form but of much shorter duration than the impressive data set described in this proposal. There are also many other papers cited in that paper where hypotheses are tested with screw trap data on salmonid migrations. Such hypotheses might include an analysis of factors affecting run timing and duration, such as discharges, water temperatures, lunar phase, etc. It might also compare survival rates of early and late migrants. Such hypotheses testing and analyses would provide meaningful information for the Imnaha and be potentially applicable to other areas of the basin. A thorough analysis of this data would not only make full use of this valuable data set, it would show the limitations of the data and improve the sampling design for the future. This appears to be a missed opportunity; there are no refereed publications listed as having emanated from this project by the proponents.

The data are thus not being fully utilized beyond the good use by the FPC and by the LSRCF. The next proposal or project report should preferably describe the analyses conducted or proposed with this data whether through the NPT, FPC, or others.

## 199801004 - Monitor and Evaluate (M&E) Performance of Juvenile Snake River Fall Chinook Salmon from Fall Chinook Acclimation Project

**Proponents:** Nez Perce Tribe

**Short description:** This project provides implementation and compliance monitoring of Fall Chinook Acclimation Project released fish. Reporting of the number, characteristics, and basic performance of hatchery fish released relative to program goals is recommended for every hatchery program (AHSWG 2008). This project will facilitate collaboratively generated annual run-reconstruction estimates of fall Chinook escapement to the Snake River Basin that enables status and trend and hatchery effectiveness assessments.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

Monitoring, evaluation, and research of the Snake River fall Chinook population and hatchery programs is a cooperative effort among the proponents and the Washington Department of Fish and Wildlife (WDFW), U.S. Fish and Wildlife Service (USFWS), Idaho Department of Fish and Game (IDFG), Idaho Power Company (IPC), Oregon Department of Fish and Wildlife (ODFW), and U.S. Army Corps of Engineers (Corps).

This project provides important implementation and compliance monitoring of released fish under the Fall Chinook Acclimation Project (FCAP). It will also facilitate collaboratively generated annual run-reconstruction estimates of fall Chinook escapement to the Snake River Basin that enables status and trend and hatchery effectiveness assessments. It is a broad proposal involving administrative, coordination, and participation activities in addition to collection of data for monitoring the FCAP. They help evaluate the performance of the FCAP program in contributing to natural spawning, progress towards meeting ESA delisting criteria and management goals.

Proponents indicate that their activities include:

1. PIT tagging 2-3 thousand fish per release group for juvenile survival and emigration timing.
2. Prerelease sampling for size, condition, and mark retention (CWT) and tag loss (PIT).
3. Redd surveys in the Grande Ronde, Imnaha and Salmon Rivers.
4. Facilitate and lead annual run reconstruction estimates and reporting.
5. Assist with adult sampling at LGD, Lyons Ferry Hatchery and Nez Perce Tribal Hatchery to recover FCAP CWT data.
6. Assist project 198335003 with juvenile seining and tagging in the Clearwater River to assess post release behavior and growth of FCAP fish.
7. Collaborate with project 199102900 on analyses associated with population performance and behavior.

The proposal clearly identifies the value of these activities. The significance of these activities to the regional production activities is explained well.

Methods for the objectives, which are mostly long-term efforts (except for portions of Objectives 4 and 7), are presented sketchily, in general sufficiently to indicate their appropriateness, but not in great detail. There is not a great deal of scientific content (hypotheses, details of methods, etc.) that make it especially amenable to scientific review. One issue of the adequacy of condition factor as a performance indicator (from the past ISRP review) still does not seem to have been addressed.

In addition to their identified long-term activities, the proponents intend in this proposal period to take a more active role in leading run reconstruction activities (Objective 4), which to this point appear not to have proceeded along a regular and well-defined process each year. In their words, “Currently, run-reconstruction (RR) is done in an ad hoc manner by the WDFW, NPT, USFWS, and CRITFC staff. This ad hoc effort is laudable but hampered by a lack of funding to support statistical consultation, individual participant workloads and priorities, and insufficient staffing. This has led to delayed generation of estimates, inadequate reporting of methods, and no centralized posting of data. In the past this project has assisted with the ad hoc RR effort. In this proposal, we are expanding our RR involvement to: 1) lead the RR collaboration (facilitation), 2) subcontract for statistical consultation, and 3) fund staff participation by key entities.” They also intend to collaborate on analyses with Project 199102900 on analysis assessing the status of the Snake River fall Chinook in relation to the FCAP (Objective 7). Proposed activities under Objective 7 are closely linked with activities under proposal 199102900 (but do not duplicate them) such that the proponents will be much more involved participants in the run reconstruction and analysis of data for the FCAP.

Although the proponents acknowledged the need for statistical consultation in this added effort, they did not present any specific scientific analysis that they were planning to lead or conduct, or any hypothesis they might test, in an analysis of population performance under the FCAP. In contrast, the reconstruction activities under 199102900 included a presentation of models to be used (e.g., stock recruitment models) and some specific hypotheses about carrying capacity and the possibility (at least) of closeness to full seeding (density dependence associated with carrying capacity), an important consideration in fall Chinook recovery. None of these ideas, nor any other topics to be evaluated, were mentioned in this proposal. They only note that quantitative people will be hired or recruited and oversight will occur. Nevertheless, the additional activities listed under Objectives 4 and 7 are welcome additions. In a previous ISRP review, it was noted that a more active role in biological interpretation/information synthesis was needed for this project. This proposal responds to that need.

## Clearwater (and Lower Snake)

### 199801005 - Fall Chinook Acclimation Facilities on Snake/Clearwater Rivers

**Proponents:** Nez Perce Tribe

**Short description:** The Snake River Fall Chinook Acclimation Project is part of a larger comprehensive program to supplement and sustain the natural spawning population of Snake River fall Chinook population in the Snake River while providing tribal and non-tribal harvest opportunities. Fall Chinook yearling and sub-yearling juveniles reared at Lyons Ferry Hatchery are transported and acclimated and released at two sites on the Snake River and one site on the Clearwater River adjacent to prime spawning habitat.

**ISRP final recommendation:** Meets Scientific Review Criteria

#### **Comment:**

This proposal requests funds for operations and maintenance of the acclimation facilities for fall Chinook salmon on the Snake/Clearwater Rivers (FCAP). Monitoring and evaluation of fish acclimated and released through this project occurs under companion the project 199801004 (Monitor and Evaluate Performance of Juvenile Snake River fall Chinook). The linkage between these projects is clearly presented. As a result, this project is primarily task-oriented and does not really have a research or M&E component. Like most other O&M plans, it does not really fit the format for detailed scientific review with the minimal level of methodological detail provided. The proposal meets criteria, however, when reviewed in conjunction with the companion project 199801004. ISRP comments under that project (199801004) apply toward this recommendation of meets criteria for this project.

The significance of the project to regional programs is clear and adequately presented. The proposal adequately explains the importance and role of the acclimation project to the region, and provides three distinct objectives: fish acclimation and final rearing, data management and communication of findings to resource managers, and project coordination. There are deliverables listed for each of the three objectives, with a list of tasks described that serve to lay out the work elements, which are fairly simplistic because this O&M is mostly production activity.

Future proposals would be improved by addressing a few issues. First, the proposal does not do a thorough job of explaining how the work has improved and evolved in recent years. That is, evidence for adaptive management presented is fairly weak – really only sharing of culture techniques with seemingly no real changes in big management plans/strategies. For example, there is a table that shows numbers of fish produced and returns by year from these facilities, but there is no evaluation of the overall results of the project, i.e., how well it is working. Metrics to assess success or failure (of the production/acclimation operation) are not explicitly stated.

As a second example, problems with transport and husbandry of fish (by the COE mostly) is a stated limiting factor. How these problems will be remedied is unclear. As a third example, the HSRG recommends that managers implement a bacterial kidney disease (BKD) control strategy

for their spring and summer/fall Chinook hatchery programs where BKD has proved a recurring problem.

Further, the suggestion of trapping fish at NPTH or Oxbow hatcheries (concrete to concrete) seems directly contrary to the goal of encouraging local adaptation as proposed for other salmon populations in the Columbia. It is unclear how the project is dealing with the main recommendations from the HSRG.

These examples suggest that this proposal and future proposals for this long-term project would be greatly strengthened by providing updates on key adaptive management responses to problems and limiting factors, methodological improvements that have been implemented, and how well the adaptive changes are working.

### 198335000 - Nez Perce Tribal Hatchery Operations and Maintenance (O&M)

**Proponents:** Nez Perce Tribe

**Short description:** The Nez Perce Tribal Hatchery Complex (NPTHC) mitigates for the effects of the Federal Columbia River Hydropower System on naturally-reproducing salmon in the Clearwater River Subbasin. The goal is to release fish that survive to adulthood, contribute to natural production and provide long term harvest opportunities. NPTHC utilizes best management practices (BMP) and Natural Rearing Enhancement Systems (NATURES) techniques to produce 1.4M fall and 825K spring Chinook salmon annually.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

This meets criteria but also see comments on the M&E proposal 198335003.

Now that the program has shown that it can produce fall and spring Chinook that return to the Clearwater River as adults, perhaps it is time to begin to consider whether (and to what extent) the effort will yield self-sustaining runs of natural origin. The next iteration of the project needs to begin to address whether and how self-sustaining Clearwater River salmon runs will be achieved. Thus, while the NPT has done a good job in guiding the NPTH to this point, the ISRP's longstanding concerns about the viability of the supplementation approach to rebuild self-sustaining natural reproduction in Idaho rivers and streams remains unanswered.

*1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The proponents do a good job of describing the history of the project and how it fits into regional Fish and Wildlife Program and AP planning. Technical background, along with the growth and evolution of the NPTH program is well described.

## *2. History: Accomplishments, Results, and Adaptive Management*

Past ISRP concerns that project results were not being adequately described have been effectively dealt with by the very commendable January 2009 Orofino symposium. The current proposal summarizes material presented at the symposium but often provides inadequate narrative for those who did not have the opportunity to attend the symposium.

The proponents do a very good job of describing the project's history and evolution, as well as to a lesser degree, how they went about solving unforeseen problems, mostly associated with low return of adults or with limited water supply. It is evident that the hatchery was built at a site having unsuitable water supply. The hatchery is reported to be operating better than in its first few years, however. Within the last year or so, production has increased to the point that objectives are being met or nearly so in terms of numbers of released fish.

One of the four or so apparent current "issues" with the project is whether the basic requirements for fish production are adequate at the NPTH facility. From the proposal it appears that ongoing improvements (of a wide variety) are adequate for the near future and that issue no longer exists.

Another issue is survival of juveniles immediately after release. It was mentioned at the symposium that results from tagging juveniles at Newsome Creek showed very high mortality by Lower Granite dam. It is important to understand relationships among fish size at release, time of movement from acclimation site, whether release is volitional or forced, and the habitat used by those fish as they overwinter. Granted, such monitoring should be (is?) done by another project (NPT M&E) but results need to be closely linked to this project so the best release strategies can be developed. Currently it does not appear that is receiving adequate attention.

Production goals for both spring and fall Chinook, in terms of numbers of juveniles leaving the various acclimation facilities, now seem close to being met. The obvious question now is whether those are the most appropriate production goals. Because the ultimate goal must be natural production, and the project duration is "until natural production in target streams can support exclusively the fishery management principles, goals and objectives listed above," the key issue is whether the project is indeed moving toward that goal.

Objectives are not being met in terms of proportion of natural influence (PNI). The proportions of natural-origin adults in hatchery broodstocks (pNOB) are too low, and the proportions of hatchery-origin adults among naturally spawning fish (pHOS) are too high, therefore the PNI values are too low. For the ISRP to evaluate progress toward meeting PNI objectives, it would help for the proponents to provide the pNOB, pHOS, and PNI results for each year of hatchery operation.

SARs for the FCS and SCS components are roughly 0.1% and 0.3%, respectively. For natural production to be self-sustaining, SARs will have to increase by an order of magnitude. How can this be achieved? The next iteration of the project should start to address these issues and

describe a plan for achieving them, otherwise, there will never be a termination date for the artificial production efforts on this project and the ultimate goals will never be achieved.

*3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

Adequately described.

*4. Deliverables, Work Elements, Metrics, and Methods*

Adequately described.

**198335003 - Nez Perce Tribal Hatchery Monitoring and Evaluation (M&E)**

**Proponents:** Nez Perce Tribe

**Short description:** The Nez Perce Tribal Hatchery - Monitoring and Evaluation project examines the performance and status of hatchery spring and fall Chinook salmon produced at the Nez Perce Tribal Hatchery (NPTH), natural fish, effects to non-targeted fish populations, sustainability of harvest, supplementation success that leads to an increase in natural production and aids in the recovery of the ESA listed Snake River fall Chinook salmon, and communicates its findings to enable adaptive management of NPTH.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

The proponents' responses were adequate. The minijack query was nicely addressed. Reviewers view the project favorably, but are very concerned about the low SARs observed to date. These are not values that will lead to recovery or sustainability. The ISRP's request for additional clarity on this issue was perhaps misunderstood. This observation is not a policy issue. Understanding what bottlenecks exist and are contributing to low SARs and how they can be minimized is the job of proponents and reviewers alike. This is in everyone's best interests. If actions to address the low SARs are being taken within basin, the ISRP was interested in knowing more about the actions. If the low SARs are thought to be entirely due to downstream mortality factors, this calls into question the likelihood of reaching SARs and returning adult numbers identified in the NPT Hatchery Plan or the Clearwater Subbasin Plan.

It is also worth noting as a programmatic concern, that the NPT spring Chinook SAR goals do not match those of the Fish and Wildlife Program and Subbasin Plans; thus, the SAR goals need further examination. SAR goals for the NPT Hatchery are less than the subbasin goals and won't result in rebuilding or the creation of a self-sustaining population. A SAR of 0.4 may result in some harvestable fish, but it will not result in naturally sustainable runs. If the proponents are interesting in rebuilding fish, these SAR goals are not compatible.

**Preliminary comment requesting a response:**

A response is requested on the following points (also, see additional discussion in comments below):

1. How will SARs increase (nearly an order of magnitude) under the present program to achieve program goals?
2. How are harvest goals (and present harvest actions in tributaries) to be reconciled with the rebuilding targets and schedules?
3. Need a discussion of minijacks.
4. Need additional interpretation of results for Spring Chinook.

Summary: This is an excellent proposal. It is clear that this continues to be a quality program. The proponents deserve a good deal of credit for the recent 5-year review Symposium and for the establishment of a new DFRM website on which selected information will be available.

The NPTH Goal is to increase the number of naturally spawning adults to achieve goals within 24 years (this timeline is consistent with the Council's Fish and Wildlife Program). This should result in 4-6% SARs for spring-summer Chinook, 3% SARs for fall Chinook, and 4% SARs for steelhead as measured at Lower Granite Dam, within the next 24 years. However, presently SARs are about 1/10th this amount. Consequently, the proposal should describe how the 3-6% SAR goals for the various species are to be reached, when they are so much lower than that at present.

In a similar vein, how are the Subbasin Plan's harvest goals to be accounted for (i.e., justified) when SARs are not indicative of rebuilding to target levels. What is the scientific basis for believing that a fishery for fall Chinook could be soon warranted on a substantial scale that would not be in conflict with the stated goal of the hatchery project that is to establish a natural spawning run of salmon? Allowing harvest impacts before reaching the project's target rebuilding goals will reduce the number of fish in the system or require increasing overall hatchery production for the project. Either step will likely slow the local adaptation process of the naturally spawning salmon population and therefore will delay achievement of the project's rebuilding goals.

Also relevant and needed is a discussion regarding minijacks, the abundance of which is being seen (i.e., by proposal 200203100) to be problematic in several ways in supplemented Chinook populations. The proposal includes no discussion of minijacking, its consequences, or potential management solutions.

The second concern deals with the reporting of project results. Proponents are to be commended for the detailed presentation. Results are fairly clearly presented for fall Chinook; however for spring Chinook, reviewers are inundated with fine detail without adequate interpretation.

## *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

This proposal seeks funding to continue monitoring and evaluation (M&E) of NPTH activities to:

1. Mark NPTH hatchery production with adipose fin clips, Coded-Wire Tags, and/or PIT tags;
2. Monitor the status and trends and life history diversity of Clearwater subbasin spring Chinook salmon and fall Chinook salmon including typical subyearling emigration versus yearling or holdover emigration strategy and associated adult returns;
3. Evaluate the effectiveness of the NPTH program at meeting production goals, stimulating Chinook salmon natural production, minimizing deleterious impacts to target and non-target populations, aiding in the recovery of ESA listed Snake River fall Chinook and maintaining genetic integrity;
4. Facilitate adaptive management of operational processes including innovative rearing strategies, variable stocking rates, and release locations; and
5. Report (electronically post) data and results. The primary regional data systems (PTAGIS, RMIS) will be provided tag data. Additional annual reports, metadata, and performance measure data will be available on the new DFRM website.

## *2. History: Accomplishments, Results, and Adaptive Management*

The study's results are shown in clear and thorough detail. While it has been an ongoing issue for ISRP reviewers to get proponents to adequately describe a project's history, accomplishments, and the use of adaptive management, the NPT does a very good job of describing the project's history and evolution, including how they went about solving unforeseen problems, mostly associated with low return of adults or with limited water supply. These are good and well described examples of adaptive management.

The project has gone through several phases. First was an initial building and troubleshooting phase where facilities and protocols were tested against the project's goals. Next was a phase of refining the project's objectives and refining the artificial production protocols, while attempting to reach the project's production goals. The most recent stage has been one where the protocols are refined and the production goals are increasingly being reached. Thus, the project was implemented, refined, and now regularly approaches its production goals. Because the ultimate goal for the project is one of reaching sustainable natural production consistent with the subbasin and fishery management goals, the next phase of the project will need to focus much more on post-release survival, mortality factors, and performance of returning adults. The NPTH M&E project describes much of how this will be done.

The proponents' minimal discussion of meanings and conclusions (which would constitute the study's accomplishments) is appropriate, given the few years of data that are available thus far. Also, the rather new hatchery's supplementation project being evaluated has only recently begun

reaching production goals. The ISRP expects that in future cycles of review (and in other reports) the study will be providing conclusions about effects of the supplementation.

For example, SARs for the FCS and SCS components are roughly 0.1% and 0.3%, respectively. For natural production to be self-sustaining, SARs will have to increase by an order of magnitude. How can this be achieved? The next iteration of the project should start to address these issues and describe a plan for achieving them, otherwise, there will never be a termination date for the artificial production efforts on this project and the ultimate goals will never be achieved. Other issues in the new phase of the project include the high number of minijacks, the low SAR rate, and how tribal harvest goals are consistent with natural production goals, given the low SAR rate.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

Adequately covered.

### *4. Deliverables, Work Elements, Metrics, and Methods*

Adequately covered.

## 200723300 - Distribution and Abundance Monitoring of *Oncorhynchus mykiss* within the Lower Clearwater Subbasin

**Proponents:** Nez Perce Tribe

**Short description:** Proposed project will facilitate entry, analysis and reporting of data collected through FY2011; the final survey year scheduled for existing project #2007-233-00.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

### **Comment:**

Qualification: The current proposal is too brief for evaluation and not scientifically adequate. A thorough presentation of what has been accomplished is required. This proposal should have objectives consistent with the original proposal, and a full explanation of the methods and sampling designs used to obtain data and evaluate the status of steelhead. The project states it will serve as the baseline for developing restoration actions. How the data will be analyzed and evaluated and serve that purpose needs explanation.

However, data gathering will continue only through 2011. Rather than requesting detailed information in a response loop the ISRP qualifies the review with the recommendation that the proponents prepare a report in 2011 that describes the fieldwork design and methods used to gather the project's data and the methods that will be used to analyze the data and what will be

necessary to complete the project in 2012. The ISRP should review this interim report before proponents complete the project and prepare a final report.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The purpose is to continue data gathering, with 2011 being the final survey year, and complete the project. The general need for data on the distribution, abundance, and habitats of *O. mykiss* is adequately presented. The proposal does not establish a clear linkage to the Columbia River anadromous M&E strategy. The technical background and problem statement is incomplete. Reference is made to randomized sampling as preferred over index sites, but a summary of the problems this generates for status and trend assessments and how this work remedies the deficiencies is not adequately discussed.

The sole objective is to “Assess distribution, relative abundance and aquatic habitat quality of anadromous and resident fish species within the Snake River Basin steelhead CRMLA subpopulation spawning and rearing range.” The objective only includes scale reading and data entry because the project will have completed field collections when this funding (2011) begins. The ISRP needs a more thorough presentation of the project, and the objectives should clearly support restoration actions for the focal species.

### *2. History: Accomplishments, Results, and Adaptive Management*

The proposal does not present a project history. The accomplishments section is just a single paragraph identifying the number of sites visited for status and trends. There is some discussion of how many sites were selected by the sampling design, how many were inhabited by various species, what was learned about the value of this sampling approach, etc. Reviewers can link to the Annual Report, where the sampling sites are summarized but no fish or stream habitat data are given.

The proposal focuses on what has been learned about how to implement their project, not how the region and Council can experimentally manage the execution of the Council Fish and Wildlife Program. This narrow view of adaptive management has been reported to the Council by the ISRP before, but most of the examples in the proposals give direct evidence of the broad failure to actually implement adaptive management in the Council program.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The intended relationships are adequately described.

### *4. Deliverables, Work Elements, Metrics, and Methods*

There is an inadequate description of sampling design and methods of analysis. The method of data collection for the many fish population and habitat metrics listed within Deliverables 2, 3,

and 4 were not described. With respect to the various Metrics/Methods listed, literature sources are referenced, but these are not shown (spelled out) in a References section for the proposal.

Under the Project Significance heading, it says “assessment of salmonid spatial structures through genetic profiling is beyond the scope and biological objectives of the proposed project and has not been included as a work element [but] non-lethal genetic samples of all salmonid species will be collected from each probabilistic site at which salmonids are present.” Is there a design for this sampling in order to avoid unnecessary work on this project and on the project that receives the samples?

### 201005700 - B-run Steelhead Supplementation Monitoring Project

**Proponents:** Idaho Department of Fish and Game (IDFG), Nez Perce Tribe

**Short description:** This project will monitor the effectiveness of B-run steelhead hatchery (supplementation) in the Clearwater River subbasin. Short term productivity will be assessed through Relative Reproductive Success (RRS) in Lolo Creek. Comparative performance of conventional and supplemental production strategies will be evaluated in the South Fork Clearwater River. This project will also validate PIT tag array-based status and trend estimates and facilitate a run-reconstruction of Snake Basin steelhead.

**ISRP final recommendation:** Meets Scientific Review Criteria

**Comment:**

Reviewers point out that their support of this project should not be construed as an indication of blanket support of supplementation (see programmatic comments). The LSRCP artificial production activities are being initiated with the M&E funded through the Fish and Wildlife Program, and much of the production is under the "supplementation" category. Reviewers note that goals that are required under a supplementation strategy are unlikely to be realized and are difficult to justify. There is little evidence that supplementation has made a positive contribution to the abundance of natural-origin adults, particularly in settings where the natural population is not replacing itself. Projects established for harvest mitigation, rather than natural population rebuilding, conducted under an experimental framework are perhaps more consistent with the environmental conditions faced by the fish and the program objectives of the managers.

The project would gain some important new information on Clearwater B-run steelhead. The response addressed most of the items requested and worked toward clarifying the few major issues. The most important issue, the need for a reference-control design, is addressed by discussing two options, neither of which is ideal. The second option, using "in and out" data from A- and B-run fish from a mixture of streams within and without the Clearwater, appears preferable but far from strong.

The proponents advocate the need for a three generation-long study. Because they will likely continue supplementation past a single generation, they will likely need to continue the M&E to monitor those hatchery release returns. However, if the results become clear that the strategy is

not meeting its goals, reviewers maintain that three full generations of monitoring would not be needed.

A trend analysis in parr abundance should be informative and is suggested. If it is consistent, it may suggest the habitat is adequately seeded by fry to meet parr requirements, and that the steelhead population may be limited by available parr habitat (capacity). However, here, as elsewhere and throughout streams entering the Pacific coast, the major limitation to abundance appears to occur in the ocean.

There continues to be a need for consistency among supplementation efforts. The proponents should integrate this monitoring with the Columbia River hatchery evaluation team and collect metrics consistent with the Ad Hoc Supplementation Work Group.

**Preliminary comment requesting a response:**

This is a very nicely crafted proposal. The current situation is clearly described and problems laid out, followed by a clear and logical development of the proposed work. Testable hypotheses are presented.

The tasks to monitor B-run steelhead supplementation in Lolo Creek and the South Fork Clearwater River are needed, actually a requirement, for assessment of the restoration strategy. One piece that is missing is a contrast between the abundance trend in the treatment streams and reference sites. This needs to be clarified in a response, and the proposal is not justified without the contrast.

A response is requested to explain the basis for increasing the smolt releases at these sites. It appears that the releases are conducted under the auspices of the Lower Snake River Compensation Plan (LSRCP). The ISRP anticipates a sequential review of Lower Snake River Compensation Plan spring Chinook, fall Chinook, and steelhead production programs over three years (one species annually) beginning in December 2010. This LSRCP review will provide an opportunity to revisit the scientific basis of the release numbers, empirical data on the programs results, and assess the adequacy of the experimental designs.

*1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

This project will monitor the effectiveness of B-run steelhead hatchery (supplementation) in the Clearwater River subbasin. Short term productivity will be assessed through Relative Reproductive Success (RRS) in Lolo Creek. Comparative performance of conventional and supplemental production strategies will be evaluated in the South Fork Clearwater River. This project will also endeavor to validate PIT tag array-based status and trend estimates and facilitate a run-reconstruction of Snake Basin steelhead.

According to the proposal, “The 2008-2017 U.S. vs. Oregon Management Agreement designated 200,000 unclipped (supplementation) steelhead reared at Dworshak National Fish Hatchery (DNFH) released into Lolo Creek and 330,000 unclipped steelhead reared at the Clearwater

Anadromous Fish Hatchery (CAFH) released into tributaries of the South Fork Clearwater River (SFCR). These releases are in addition to the 840,000 conventionally reared, AD-clipped, steelhead smolts released into the SFCR each year. The motivation behind the unclipped fish releases is escapement from down-river fisheries and increased contribution to natural production to bolster natural steelhead population abundances. The brood stock composition of the supplementation releases (e.g., integration of natural adults into the brood stock) and the increase of these releases from the current level of 60,000 into Lolo Creek to full production (200,000) will be decided by tribal, state, and federal co-managers. Therefore, this project is structured as an observational study of management actions, as per the recommendation of ISRP/ISAB.”

Also to be evaluated is the possibility of a velocity barrier existing below the stocked tributaries of the SFCR, in the vicinity of Golden, Idaho. This seems an important item.

## *2. History: Accomplishments, Results, and Adaptive Management*

Very little history and results of work accomplished thus far were presented. No data were presented despite releases since 2006 and earlier. Unclipped smolt releases (50,000, to increase to 200,000) into Lolo Creek are to bolster natural production. What evidence that this is working? Are there associated issues with unclipped hatchery fish that confound other studies?

The presentation of preliminary data analyzing abundance, behavior, performance and survival of natural, conventional and supplementation returns to date is needed. The population monitoring appears needed, but there remain questions of its benefit.

Fifteen years for supplementation results, or three generations seems lengthy – would not the returns from one generation (>five years) be sufficient, particularly given other, better studies?

## *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

Relationships with other studies on supplementation appear to be lacking. Questions may be best addressed in more detailed studies elsewhere.

## *4. Deliverables, Work Elements, Metrics, and Methods*

Methods and metrics are clearly delineated and seem generally appropriate. The proposal uses existing facilities plus new facilities being Fast Track funded.

There is insufficient detail on results to date, parentage analyses, sample size availability, and sample size requirements. The section (Objective 8) on steelhead run construction was confusing. There is also need for development of a decision framework and time scale for several elements of the work, particular the supplementation evaluation, with indication of key indices or reference points for management action.

## Salmon River

### 199604300 - Johnson Creek Artificial Propagation Enhancement

**Proponents:** Nez Perce Tribe

**Short description:** The primary goal of the Johnson Creek Artificial Propagation Enhancement (JCAPE) program is to use indigenous stock to provide for the restoration of summer Chinook salmon in Johnson Creek and to mitigate for fish losses occurring as a result of the construction and operation of the four Lower Snake River Dams.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

We judge the overall implementation of the project to be adequate, but the Yes (Qualified) rating does not represent ISRP endorsement of the interpretations of data and results.

Qualification 1: The ISRP believes that natural-origin abundance trends in Johnson Creek as a response to a supplementation treatment must be interpreted by reference to an unsupplemented reference location. The Sesech River is proposed by the proponent. These analyses need to be included in future proposals and any Three-Step review for expanded production.

Qualification 2: The proposed expansion of the Johnson Creek project and facilities needs to be reviewed through the Council's Three-Step process. Additionally, the expansion of the fish releases will require review and consultation with NOAA Fisheries for the Hatchery and Genetic Management Plan (HGMP).

Summary: The ISRP appreciated the proponent's constructive approach to the response. The proponents gave a clear and articulate response that continues to advance a positive dialog regarding the Johnson Creek project. Probably the most important issue, the proposed expansion, was deferred to the Three-Step process, and that seems most appropriate. Other ISRP concerns that were well addressed include the egg-to-smolt differential survival for wild versus hatchery fish and possible mini-jacking.

With respect to the pending Three-Step review, the ISRP believes that consideration of expansion needs to explicitly treat both demographic and genetic elements of conservation. The proponent is principally arguing for expansion based on retention of genetic diversity. Any formal plan needs to demonstrate how expansion can achieve the intended goals for genetic diversity, and for abundance and productivity. Expansion has the potential to decrease natural adult abundance by removing adults for hatchery production, and the potential to increase density dependent effects on juvenile survival and life-history/behavior by addition of juveniles beyond the stream's carrying capacity.

The explanation of the updated replacement rates for natural and hatchery adults is not entirely satisfactory. It is clear that the updated numbers reflect an expanded geographic scale. It is less clear how the current numbers are estimated. It appears to the ISRP that this must be due to

hatchery-origin adults returning in larger numbers than reported previously, and spawning below the capture weir. The types of data (weir, redd counts, carcass surveys) that are used to arrive at the updated evaluation and the actual numbers, expansion, and derivation are not transparent.

**Preliminary comment requesting a response:**

The proponents need to provide additional clarification on the following points. The points are further elaborated in the Summary and specific comments below.

1. The proponents need to demonstrate that the expansion is needed to address the perceived problem. The increase is discussed indirectly in the Problem Statement but needs to be more clearly and directly justified. The proponents need to convincingly describe the problem and what they believe are the potential causes. There appears to have been a boost in returning adult numbers in recent years associated with the Johnson Creek supplementation effort. Recent increases in adult returns beg the question of why an expansion of the program is justified.
2. A response is needed to clarify how abundance and productivity of spring/summer Chinook is to be assessed in the Johnson Creek supplementation program, and discuss the potential for coordination with the hatchery effects proposal to bring this project into full compliance with the AHSWG recommendations. The ISRP understands that the Sesech River will serve as a reference site to evaluate JCAPE, but the methodology is not presented, and results to date are not presented.
3. There appears to be a change in numbers reported that requires clarification. There is a very important difference in the data reported here, and that reported in the 2007-2009 proposal and the ISRP requests a clarification. In the 2007-2009 proposal the replacement rate for supplementation fish was lower than for natural-origin adults for 1998 and 2000 (6.99 versus 6.95 for 1998 and 4.46 v. 2.88 for 2000). In Table 4 these replacement rates are now 6.78 versus 7.06 for natural and supplementation in 1998 and 2.81 versus 3.5 for natural and supplementation females in 2000. How did these estimates change in the interval since the earlier reporting?
4. Another issue involves the (poor) survival of wild juveniles in the Upper Salmon and their habitat use. The proposal indicates eyed egg to smolt survival for the JCAPE has averaged 97.4%, which they contrast with high mortality (74.8%) from the egg to smolt stage within the Salmon River (Kiefer and Lockhart 1997). It would seem that evaluation of the causes of those patterns would perhaps pinpoint the causes of poor wild juvenile survival. The proposal's DELV-14 is to "Determine status and trends of Chinook salmon habitat in the South Fork Salmon River Subbasin" by implementing the Environmental Monitoring and Assessment Program (EMAP) sampling framework, a statistically based and spatially explicit sampling design to quantify status and trends in stream and riparian habitats. Such monitoring is well designed but could be more valuable if in addition it was designed to test specific hypotheses regarding juvenile habitat use and survival, and contrasting patterns for wild vs. JCAPE fish.

5. Another issue pertains to possible minijacks, the abundance of which is being seen (i.e., by proposal 200203100) to be problematic in several ways in supplemented Chinook populations. Granted, calculation of female:female ratios somewhat obviates some concern, but the proposal includes no discussion of minijacking.

Summary Comments: The proposal was in general well written, and the Executive Summary does a good job giving basic history, accomplishments, and logic.

This proposal is for an expansion of both facilities and scale of the Johnson Creek Artificial Propagation Enhancement. Consequently, a more thorough review of the proposal is likely warranted through the Three-Step Process. In the meantime, the proponents need to respond to several items.

The main thrust of the proposal is to increase smolt production of JCAPE from the current 100,000 smolts (produced by 80 NOR adults) to 300,000 smolts, which would require 240 NOR adults for broodstock. Given the preliminary result presented in the proposal it is hard to see why the increase is justified. The increase is discussed indirectly in the Problem Statement, but needs to be more clearly and directly justified. The increased production objective also drives the hatchery facility expansion. Without a more clearly justified explanation for the proposed increase in production, it isn't possible to support the proposed expansion of the facilities.

During the presentation, the ISRP asked for additional information on the justification for tripling the smolt releases and the hatchery facility expansion? Jason Vogel said the tripling is to diminish the genetic risk – that a broodstock sampling of 80 NOR fish was not adequate to represent the entire run. If this is true and modeling could help identify whether it is adequate or what sample size might be more representative, additional NOR fish could be brought into the broodstock sample without the necessity of increasing the number of smolts released (and therefore having to increase the facility size). The proponents note that the justification for the increases (broodstock, smolts, and facilities) come from M&E findings that are detailed in the JCAPE HGMP to be submitted to NOAA Fisheries. This information needs to be in the proposal and in the response to the ISRP.

Other concerns include:

1. There does not appear to be a restriction on supplementation fish on the spawning grounds. At the present time the returns of hatchery-origin salmon are not so large as to create a population largely influenced by hatchery production, especially since all brood fish are natural-origin. If hatchery returns should increase substantially this balance could shift, and there does not appear to be a decision framework or experimental design to evaluate the consequences.
2. How does abundance of natural-origin adult Chinook salmon in Johnson Creek compare with Secesh River, the designated reference location? The essential measure of supplementation is the abundance of natural-origin adults (females) in a supplemented

stream in comparison with a reference location, and the productivity in the supplemented population in contrast with an unsupplemented reference site. How these evaluations are going to be conducted and preliminary analyses need to be incorporated into the proposal.

Full comments:

Some of the comments below are highlighted above.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

The principal linkage for this project to regional programs, based on the proposal, is to Wy-Kan-Ush-Mi Wa-Kish-Wit; the Columbia River Anadromous Fish Restoration Plan developed by the Nez Perce, Umatilla, Warm Springs, and Yakama Tribes. The proposal identifies elements of the 2008 BiOp that recognizes the actions in Johnson Creek, and considers Johnson Creek to be an important component of the South Fork Salmon spring Chinook Major Population Group. No specific reference is provided to the Council Research Plan or to the recent Anadromous Salmon Monitoring Strategy.

Problem Statement/Technical Background: The explanation of where the project is taking place and the status of the spring/summer Chinook population is adequate. The technical background is incomplete. The stated purpose of the supplementation in Johnson Creek is to reduce the extinction risk (extirpation risk) for this spawning aggregate. The discussion of this topic does not quantify either the extinction (extirpation) risk, the anticipated reduction in risk owing to the project, or provide a sufficient method for evaluating any benefit.

As elaborated on elsewhere in the review, and emphasized in the ISAB supplementation report ([ISAB 2003-3](#)) and ISAB and ISRP memo on supplementation monitoring ([ISRP/ISAB 2005-15](#)), the essential metrics of interest are the abundance of natural-origin adults returning to Johnson Creek and the productivity (female to female replacement rate) of natural-origin adults resulting from supplementation. While there are many interesting metrics being collected, there is not an analytical framework presented in the proposal to address these essential uncertainties.

The project should have clear objectives for performance of the fish in the hatchery, performance of both hatchery and natural fish in the wild, and measures of benefit (abundance of NORs) and deleterious risk (productivity of NORs spawning in the wild).

The monitoring that takes place (weir counts, redd counts, juvenile (parr, smolt)) provides valuable information on an important population of spring/summer Chinook.

Objectives:

Obj-1. Maintain and enhance natural production in the Johnson Creek summer Chinook population: The ISRP does not believe that productivity of the Johnson Creek spawning aggregate can be increased by hatchery smolt releases. The proponent states that they assume

this objective will be attained by having supplementation and natural productivity equal. This may increase abundance, but is unlikely to increase productivity. The concern with supplementation is that the increased abundance owing to supplementation will be at the cost of natural spawning productivity.

Obj-2 Maintain life-history characteristics in Johnson Creek summer Chinook salmon. The comparison needs to be between natural-origin juvenile and adults in Johnson Creek with an unsupplemented reference location, not a comparison of supplementation and natural fish within Johnson Creek. As the accomplishments demonstrate, there are a variety of life-history difference between natural and hatchery fish in Johnson Creek, and these have been demonstrated in a number of spring/summer Chinook supplementation programs (Grande Ronde, Tucannon, and Imnaha). The important uncertainty is the extent to which natural fish life-histories are being altered by interbreeding with the supplementation fish, and whether there is a productivity decline as a consequence.

Obj-5 Operate the hatchery program to achieve optimal production effectiveness while meeting priority management objectives for natural production. Description: The desired outcome...if hatchery smolt-to-adult return rate is equal to JCAPE criteria (0.65 and 0.87).

It is not clear to the ISRP what the JCAPE criteria are. What do the 0.65 and 0.87 refer to? It would be useful to include the JCAPE criteria in the problem statement.

## *2. History: Accomplishments, Results, and Adaptive Management*

The history, accomplishments, and results are generally adequate. The proponents include a substantial summary of data collected from the project. One element that is missing is a summary of the numbers of hatchery-origin and natural-origin adults (by sex) that were passed above the weir for spawning. It may be possible to summarize this from Table 8, but a simple table would be useful.

There is a very important difference in the data reported here, and that reported in the 2007-09 proposal and the ISRP requests a clarification. In the 2007-09 proposal the replacement rate for supplementation fish was lower than for natural-origin adults for 1998 and 2000 (6.99 versus 6.95 for 1998 and 4.46 vs. 2.88 for 2000). In Table 4 these replacement rates are now 6.78 versus 7.06 for natural and supplementation in 1998 and 2.81 versus 3.5 for natural- and supplementation females in 2000. How did these estimates change in the interval since the earlier reporting?

The observation that hatchery spawning yields an increase in adult fish is not surprising. This common observation is the primary reason supplementation is contemplated as strategy to improve the status of ESA listed species. When this is realized in a supplementation system it is not evidence of success of supplementation. It is a necessary, but not sufficient, condition for supplementation to provide a benefit. The report in 2007 that supplementation fish had a lower replacement rate than natural-spawning female was evidence that a fundamental condition for

supplementation was not being achieved. Supplementation cannot provide a benefit if the fish taken into the hatchery produce fewer adults than fish left in the stream. The corollary, that if supplementation fish produce more adult progeny than natural spawning fish, then supplementation is beneficial is not true. The measure of benefit is whether natural spawning by a mix of supplementation and natural adults produces more adult progeny than the natural adults alone would have. This is a challenging evaluation. It requires comparing the production from the supplemented system to a reference unsupplemented population.

This essential evaluation does not appear in the proposal accomplishments.

Perhaps the most significant finding is that hatchery broodstock do reproduce in the wild successfully, at a rate that is 7.25 times that of their natural counterparts.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The principal linkage for this project to regional programs, based on the proposal, is to Wy-Kan-Ush-Mi Wa-Kish-Wit; the Columbia River Anadromous Fish Restoration Plan developed by the Nez Perce, Umatilla, Warm Springs, and Yakama Tribes. The proposal identifies elements of the 2008 BiOp that recognizes the actions in Johnson Creek, and considers Johnson Creek to be an important component of the South Fork Salmon spring Chinook Major Population Group. No specific reference is provided to the Council Research Plan or to the recent Anadromous Salmon Monitoring Strategy.

### *4. Deliverables, Work Elements, Metrics, and Methods*

The project is part of the DFRM database management program. This looks strong, but is difficult to evaluate from this perspective. Also, the plan for five-year review looks commendable.

The hatchery expansion or new construction needs the Council's Three-Step Review.

## 200740300 - Spring Chinook Captive Propagation-Idaho

**Proponents:** Idaho Department of Fish and Game (IDFG), National Oceanic and Atmospheric Administration (NOAA)

**Short description:** The IDFG captive Chinook project develops and evaluates captive-rearing methods as a recovery/restoration strategy for Salmon River Spring Chinook in selected populations at high risk of extinction while avoiding the impacts of multigenerational hatchery culture.

**ISRP final recommendation:** Meets Scientific Review Criteria

### **Comment:**

The response adequately addresses the ISRP's response request, especially to provide a summary of results to date. The material provided in the revised Major Accomplishments section now gives a clearer picture of the status of the program. Much needs to be done to provide strong results (to make up for a slow, at best, start).

The proponents also discuss the need for additional resources to complete a joint summary captive propagation report with ODFW, NOAA, and perhaps other co-managers. A summary of past efforts to produce captive reared spring Chinook adults is needed and essential. The joint summary report should complete the adaptive management for the project and identify the broader basinwide implications of the research, which will have been conducted for nearly two decades at the completion of field collections and genetic analysis.

The ISRP believes there are several critical challenges to using this technology as a salmon recovery strategy. One is deciding at what point (the trigger) in the decline in population abundance should captive propagation begin. A second is to identify the time needed to get infrastructure in place to make a difference in the population's recovery trajectory. A third would address what geographic scale of intervention is required to support the metapopulation structure of an ESU with 31 populations. If all populations are in serious decline, how many need to be incorporated into captive propagation? If only a few are in serious decline, is intervention justified?

### **Preliminary comment requesting a response:**

The ISRP requests that the proponents provide a more detailed summary of the results-to-date in a few succinct tables and text narrative.

Summary: This project remains an important one within the overall basin's investment aimed at understanding how artificial production might be used to assist salmon recovery efforts.

The project's overall goals about comparing different captive rearing and release methods seems to have gotten lost amid the details of on-site sampling and genetic parentage analysis. Linkages from methods to analyses to the overall project goals and potential applications need to be more clearly stated.

One of the charges to the ISRP is to produce a retrospective report for Council (which also serves the Governors, state legislatures, and Congress). To complete that task, the ISRP needs a succinct summary of the material in the cumulative annual reports. Toward that end, the proposal needs to include clearer statements, tables, and figures about progress to date than it does in its present form.

Eventually a report from the proponents to Council is also needed that compares the captive rearing methods (strategies) in the Salmon River rearing and releasing adults, with the Grande Ronde rearing to adults/spawning and producing smolts for release. This is one of the few adaptive management experiments in the basin. The report needs to compare the methods and evaluate the efficacy of the strategy/methods. The report needs to compare the methods and evaluate the efficacy of the strategy/methods. The report should be evaluated by the ISAB and ISRP as a report to the Council on an independent conclusion on the scope of the benefit (and cost) of using this approach to rescue populations that have extremely small numbers of spawning adults.

Reviewers were surprised that proponents were not carefully looking at the smolt-to-adult work, especially considering that the Shoshone-Bannock Tribe had a smolt trap and were taking tissue samples. They should collaborate.

#### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

Adequately described.

#### *2. History: Accomplishments, Results, and Adaptive Management*

Proponents assert that the hatchery propagation and M&E of spawning components have been completed; however, this section is deficient in adequately presenting results to date. The proposal provides many details on its internal protocols, but consistently lacks overview tables or statements summarizing results to date. The proposal would benefit from a clearer presentation of results to date, steps to be taken over the remaining timeline for the project, and how the conclusions of the project will be utilized by proponents and other fisheries managers in the Columbia River Basin. A succinct set of tables and narrative text explaining the outcome of this experiment is needed.

Additionally, the comparison of captive rearing methods (strategies) – Salmon River rearing and releasing adults, Grande Ronde rearing to adults/spawning and producing smolts for release – is one of the few adaptive management experiments in the basin. A report comparing the methods and evaluating the efficacy of the strategy/methods is needed. That report should be evaluated by the ISAB as a report to the Council (states and feds) on an independent conclusion on the scope of benefit (and cost) of relying on this approach to rescue populations that have extremely small numbers of spawning adults.

*3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

Adequately described.

*4. Deliverables, Work Elements, Metrics, and Methods*

Adequately described.

**200890500 - Supplementation, Monitoring, and Evaluation Program**

**Proponents:** Shoshone-Bannock Tribes

**Short description:** The Supplementation, Monitoring, and Evaluation Program was developed to increase Chinook salmon and steelhead abundance in the Salmon River Basin. Numerous populations of salmon and steelhead are at demographic risk of extinction, therefore the Tribes propose to utilize a combination of supplementation techniques to immediately increase adult abundance. The program will attempt to measure benefits and risks associated with differential hatchery supplementation projects.

**ISRP final recommendation:** Does Not Meet Scientific Review Criteria

**Comment:**

The proponent needs to provide a more comprehensive proposal that describes and justifies the proposed monitoring and evaluation. Planning for this project would benefit from coordination with the Columbia River Hatchery Effects Evaluation Team project. The proposed program should be reviewed as part of the Lower Snake River Compensation Plan (LSRCP) and the Crystal Springs Step Review. The program needs to identify criteria, metrics, and methodology that will be used to evaluate success or failure of the supplementation. Please see additional comments below.

*1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

In 2004, the Shoshone-Bannock Tribe's Fish and Wildlife Department developed the Supplementation, Monitoring, & Evaluation Program (SMEP) to increase abundance of salmon and steelhead populations in the Salmon River Basin. The program is directed to identify populations at immediate risk of extinction and develop artificial propagation strategies designed to significantly increase adult abundance. Research, monitoring and evaluation are completed to assess benefits and risks associated with each supplementation strategy. The program currently includes four supplementation projects, but additional projects may be developed if additional populations are at high risk of extinction for abundance and productivity. Following the guidance of the Tribe, existing monitoring and evaluation plan, each supplementation project will be assessed so that operations can be adaptively managed to optimize hatchery and natural production, minimize ecological impacts, and sustain harvest. The program has been underway for a number of years through funding from a variety of sources, most recently the LSRCP. The

intent of this proposal is to provide additional funding for the program to facilitate full participation in operations and maintenance and monitoring and evaluation. The effort to supplement Chinook and steelhead within the Salmon River subbasin is consistent with Fish and Wildlife Program, LSRCP, US v Oregon, and the Salmon River subbasin plan.

Technical Background: Incomplete. There is a brief narrative on the status of spring Chinook and steelhead in some of the watersheds that are proposed for treatment. However, the technical background is generally deficient in presenting the limitations of supplementation, the history of supplementation in the Salmon and Clearwater Rivers in Idaho, and other areas of the Columbia River Basin. The technical background does not clearly identify that at present there has been no evidence that supplementation can yield an increase in abundance of natural-origin adults, which needs to be the key response variable. The technical background should succinctly recognize the content in the Ad Hoc Supplementation report, and the various ISAB and ISRP reports on evaluating supplementation, and supplementation risks. An experimental design is needed to evaluate the supplementation effort. The streamside incubators, adult outplants, and smolt releases need to be conducted in such a way that they can be individually evaluated.

Relative reproductive success of hatchery versus natural salmon and steelhead is inadequate to evaluate supplementation success. The evaluation of supplementation requires a comparison of the trends in abundance of natural-origin salmon in supplemented and unsupplemented reference streams. The successful return of hatchery-origin adults is a necessary condition for supplementation to yield a benefit to the abundance of natural-origin salmon (measured in the next generation), but is not the measure of success. The return of the hatchery-origin adults is the treatment, and the response is natural-origin adults in the next generation. If there are density dependent (or other ecological constraints) limits on production then the progeny of hatchery-origin spawners may replace, not add to, the adults produced by natural-origin adults. Issues regarding Chinook minijacks should be discussed.

Objectives: Incomplete. The proposal needs clear objectives for adult returns of both hatchery and natural-origin salmon, an explanation of the disposition of those fish for harvest, hatchery propagation, and for natural spawning. If the PNI of the Chinook program is 0.30 this will be a hatchery driven population that could rapidly lose adaptation to the local environment, and long-term this goal is inconsistent with current best practices and the Fish and Wildlife Program. Enumeration of the metrics needed to estimate VSP parameters is justified.

## *2. History: Accomplishments, Results, and Adaptive Management*

There is an adequate description of the past history of the project. It is clear from the presentation that insufficient attention has been given to experimental design, collecting monitoring data, and analysis. After releasing many thousand eyed-eggs and smolts, no results or interpretation are provided. There does not appear to be a robust monitoring plan for the eyed-egg component or evaluation of stream capacity. For example, with the large releases in the Yankee Fork they should carefully consider the implications if they do not get adult returns. They should consider otolith marks for the eyed-egg releases.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

Project Relationships: Incomplete. The relationship to many projects is provided, but linkages to other supplementation efforts in the Snake River are absent. From the map it appears that a portion of the project is geographically near Johnson Creek. The target populations may be near supplementation or reference sites for the ISS. All of this needs to be developed in a proposal.

The proponent should participate in the Columbia River Hatchery Effects Evaluation Team effort, adopt standardized measures and evaluation of supplementations, and include these sites in a basinwide evaluation of whether there are benefits to supplementation.

The HSRG has encouraged a sliding scale for collecting broodstock and permitting adult hatchery fish on the spawning grounds. They relax conservative guidelines when natural-origin abundance is small. The ISRP continues to point out that there is no empirical evidence that this sliding scale reduces extirpation likelihood. The sliding scale could be subject to an adaptive management experiment, but to date it has not.

An in depth consideration of the HSRG evaluation of supplementation by the Sho-Ban Tribe through the LSRCP and the USFWS evaluation of the program is beyond the time line for this proposal review. The ISRP is scheduled to serve as an independent reviewer of the LSRCP and anticipates complete top to bottom review of this effort through that process. The LSRCP review will take place over a three-year period, one species (ESU) per year, with spring Chinook in 2010, steelhead in 2011, and fall Chinook in 2012.

### *4. Deliverables, Work Elements, Metrics, and Methods*

Incomplete. The methods and metrics need to be sufficient to evaluate the supplementation effort. An explicit experimental design with response variables, metrics to evaluate those variables, methods of analysis, and field methods to collect the data with sufficient precision and accuracy is needed. It is not clear who would conduct all of the proposed efforts. No reports from previous efforts of the project (funded by other agencies) were provided.

## 200890600 - Crystal Springs Planning and Operations/Maintenance

**Proponents:** Shoshone-Bannock Tribes

**Short description:** Crystal Springs Planning and Operations/Maintenance is an expense project designed to: develop the existing Crystal Springs site to include a hatchery; develop an adult holding facility and trapping site on the Yankee Fork Salmon River; and, develop locally adapted broodstock for Spring/Summer Chinook salmon and Yellowstone Cutthroat Trout. The Shoshone-Bannock Tribes are initiating this program to ensure future generations have opportunities to fish for both resident and anadromous species.

**ISRP final recommendation:** Not Applicable

**Comment:**

The ISRP determined that this proposal is not applicable for scientific review at this time. The ISRP anticipates reviewing a draft Master Plan for the project in Step One of the Council's Three Step Review, so that they can provide comments and enable changes to the plan before it is finalized. The addition of the Chief Joseph consulting team is promising.

The proposed hatchery project should be developed in conjunction with the Supplementation, Monitoring, and Evaluation Program (SMEP, Project #2008-905-00). The effort should describe its relationship with Idaho Supplementation Studies (ISS), including supplementation of the ESU in the Imnaha, Johnson Creek, and Grande Ronde. Evaluation of the suitability of the Crystal Springs site should be based in part on evaluations of other supplementation projects, including the Northeast Oregon Hatchery Master Plan (Project 198805301). Kevin Myer's (IDFG) research on Yellowstone cutthroat trout should be used to inform, evaluate and justify the use of hatcheries to produce cutthroat trout.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

This proposal would initiate the preparation of necessary environmental and engineering documents, including the master plan and the Three Step Process. The proposed project states that it will follow HSRG recommendations. The proponents claim they will meet regional planning goals, which are primarily conservation goals. However, the proposal did not state how hatchery production and increased harvest on hatchery stocks will meet these conservation goals.

### *2. History: Accomplishments, Results, and Adaptive Management*

Crystal Springs is an existing trout hatchery. This proposal is for development of a new hatchery program.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

The project is linked to SMEP projects, but the proposal did not clearly justify why they could not continue to use existing hatcheries. Justification for supplementation of cutthroat trout could

have been more detailed. Some habitat projects have occurred, but it is unknown to what extent this might allow the supplemented fish to thrive. The proponent should address interactions between the proposed release of cutthroat trout and resident fishes such as redband trout.

#### *4. Deliverables, Work Elements, Metrics, and Methods*

Hatchery planning is to be subcontracted. Most details would be forthcoming in the Master Plan and subsequent reports.

### **199902000 - Analyze the Persistence and Spatial Dynamics of Chinook Salmon**

**Proponents:** US Forest Service (USFS)

**Short description:** Our goal is to examine the relevance of spatial structure to salmon persistence by describing patterns in extinction and colonization dynamics of wild Chinook salmon. To meet this goal, we have developed a unique redd database that is continuous, temporally replicated, and spatially georeferenced. While this research has focused on larger scale spatial questions, it simultaneously provides annual status and distribution information that is being applied by co-managers to guide salmon recovery.

**ISRP final recommendation:** Meets Scientific Review Criteria (Qualified)

**Comment:**

Qualification: The project is adequately justified for this review cycle, but to justify continuation beyond this cycle, the proponents need to establish a clearer linkage between the spatial, persistence, and genetic objectives and population viability analysis, recovery planning, and restoration implementation both in the interior Columbia River Basin planning domain and other ESA salmon recovery regions. There is not an apparent a priori viability analysis for this data to plug into. How does this inform viability analysis and restoration planning in other areas? They have high quality habitat throughout the Middle Fork Salmon River, so results could not inform poor versus good habitat, rather it informs connectivity and size of good habitat as it relates to productivity.

Summary: The project has several strong points: it has been valuable in advancing our understanding of Chinook redd placement and our ability to count redds, its research team is talented and energetic, and the fact that it has been gathering a prolonged dataset deserves special merit. But based on the current proposal the ISRP believes it might be time to think of it as being successfully completed.

The proponents “have 15 years of data, redds georeferenced at a very fine scale, and descriptions of water temperatures and other characteristics across about 800 km of spawning habitat, these data will enable us to monitor potential changes in spawning site selection by Chinook salmon that will be reflected in changes in habitat characteristics as well as redd distributions.” These data provide a “tremendous analytical potential.”

Unfortunately the proposal does not identify what that potential is. Nor are testable hypotheses put forward for this funding cycle. The statement is made that the relevance of patch size/isolation/landscape theory to Chinook is unknown, and that is viewed by some as reason to hope for new insights to come, but to the ISRP that is not convincing.

As a practical matter, it is not apparent what several additional years of data would contribute to assessing Chinook salmon persistence at the population, MPG, and ESU scales? Nothing in the proposal is compelling. The ISRP could be more supportive if valuable and relevant testable hypotheses were provided.

Since this is a long-term data set, it is valuable to maintain for the interim time period. Based on the proposal, and NOAA memo, the redd counts obtained for spring Chinook in the MFSR have contributed to establishing the status and trends from this entirely natural (sub) population of Snake River ESU spring/summer Chinook. On this basis the project (and proposal) meets criteria. The data have been used to establish expansion metrics for Idaho Department of Fish and Game redd counts from index sections in the Middle Fork Salmon River.

The importance of the present funding request hinges on how valuable the long-term data set for Chinook salmon redds in MFSR is, and whether it should be continued. The request is strictly for flying time. Despite the considerable text in the proposal, there is no research component for which funding is requested. It is essentially monitoring, with potential for significant research applications. Those proposing this work have the research qualifications to make sense of the data in broader contexts such as landscape/landscape genetics and fish movement applications. This data set appears to be of sufficient value (and long-term potential value) to the Fish and Wildlife Program to continue its implementation.

### *1. Purpose, Significance to Regional Programs, Technical Background, and Objectives*

This is one of a handful of projects in the Columbia River Basin where the primary focus is on the analysis of spatial structure in a salmon population - in this case spring-summer Chinook salmon in the Middle Fork of the Salmon River (MFSR). The MFSR is a uniquely valuable study area because it lies mostly within a designated wilderness, has not been heavily altered by anthropogenic disturbance, has little hatchery influence, and is used by naturally-produced fish that spawn in multiple locations throughout the drainage system. The technical background was clearly explained, and its importance to regional programs was adequately documented. The objectives of the project are relatively modest (although the geographical scale is quite large), and the budget request is primarily for helicopter time to continue the redd surveys. The addition of a geneticist to the team has provided the opportunity to compare genetic structure among local Chinook spawning populations in the MFSR and has yielded new insights into genetic variability in a major population group that is constantly expanding and contracting. The finding that, to date, genetic diversity has persisted through periods where adult escapements have varied about 100-fold since 1995 (20-2,271 redds) seems important.

From the proposal: “Our study has two primary objectives: 1) to monitor wild Chinook salmon distribution, abundance, and trend by mapping the annual distribution of Chinook salmon redds across the entire MFSR; and 2) to assess spatial and temporal patterns in extinction and colonization dynamics of wild Chinook salmon. We have two secondary objectives: 3) to describe both individual and population level wild Chinook salmon genetic variation; and 4) to evaluate methods for measuring wild Chinook salmon dispersal and for describing salmon life history patterns.”

Objective 1. Redd counts - adequate, and apparently needed.

Objective 2. Assess spatial and temporal patterns - no budget requested. From the proposal it is not clear how the assessment and analysis is to proceed or how many years of data will be required. The question of patch size and spatial distribution of restoration sites is important to salmon management. This question comes up when attempting to consider the biological benefit from a variety of restoration strategies (riparian and stream improvement, flood plain reconnection, etc). Does placement across a landscape matter? It is not entirely evident that this project will advance the understanding of this challenge in a timely manner.

Objective 3. It is not clear how this objective will be completed. Archiving the samples is excellent. But, collaboration needs to be established to further the analysis. Some top-down direction to establish coordination between this project and NOAA or CRITFC projects might be needed.

Objective 4. This objective is worth pursuing. It would be valuable to know the within tributary straying and homing tendencies of these fish. It would seem that information would contribute to developing models of recovery potential from dispersing adults.

Apparently IDFG uses data from this project to expand index area redd counts to arrive at a total count. This needs to be explained in a bit more detail. The text makes it sound like IDFG are expanding MFSR index redd counts. But the text also makes it sound like this project is collecting the essential MFSR data.

Finally, the MFSR has undergone substantial disturbance in the last few years – forest fires followed by landslides and debris torrents in the river. Major rapids have been rearranged. Incorporating disturbance regions into the geospatial models should be considered.

## *2. History: Accomplishments, Results, and Adaptive Management*

Although the proposal states that there have been problems with filing accomplishment reports with BPA, the project’s publication record is good and papers have appeared in high quality journals. Highlights of some of the project’s key findings were included in the proposal, making the project more understandable and its importance clear. A little more information could have been presented on habitat conditions in the MFSR. For example, has the distribution of suitable spawning substrates changed over the past 15 years as a result of wildfires, and if so what might

the implications be for Chinook spawning and rearing? A definition of “patch connectivity” (Si) would have been helpful, since connectivity between suitable spawning locations is critical to understanding spatial changes in spawning distribution.

The project proponent’s responses to previous ISRP questions and suggestions were thoughtful.

It was helpful to know what other interest groups (e.g., Interior Columbia Technical Recovery Team) have used data from this project, but have any policies or management actions changed as a result of the project’s findings?

Major accomplishments:

1. Establishing and maintaining redd counts for MFSR spring Chinook is apparently important. A cross walk with the ASMS would be helpful to confirm that this effort does not duplicate other assessments of spring Chinook and that the data can be combined with IDFG (and other) assessments for VSP parameters.
2. A significant amount of effort went into analyzing alternative redd sampling designs. It is not clear to what extent that analysis is reflected in other redd sampling programs in the Columbia River Basin.
3. Collection of otolith and fin tissue is important, but some effort at developing analysis is needed.
4. Collaboration is needed to complete the genetic analysis. CRITFC has a broad scale analysis of stock structure, and NOAA has a project to evaluate Snake River ESU spring Chinook independent population/MPG boundaries. These projects should be in collaboration to genotype these fish.
5. The landscape analysis of the redd count data is interesting, and some effort needs to be committed to outlining how the data will be analyzed and incorporated into recovery planning and delisting criteria for VSP parameters life-history diversity and spatial distribution. How many years of data are needed before analysis and incorporation into management strategies?
6. The response to past ISRP comments is adequate.

### *3. Project Relationships, Emerging Limiting Factors, and Tailored Questions for Type of Work (Hatchery, RME, Tagging)*

Although this project shares data with a variety of other research organizations, it is not aimed at addressing limiting factors. Rather, it seeks to examine the spatial distribution and genetic structure of a naturally spawning population in a largely wilderness-dominated watershed. It is highly unlikely that the enormous variation in adult Chinook escapement to the MFSR over the past 15 years has resulted from changes in habitat within the MFSR system; instead, the variation has likely been driven by factors such as ocean conditions operating outside the system. That does not lessen the potential importance of the project, however. Adult returns will rise and fall according to a very large suite of factors, and this work will help us understand how changes in spawning population size affect occupancy of suitable habitats within natal streams in an essentially unmanaged drainage. This information will be helpful for interpreting changes in VSP parameters that simultaneously take place in other systems in which restoration programs are occurring.

### *4. Deliverables, Work Elements, Metrics, and Methods*

Deliverables, work elements, metrics and methods are, in general, adequately described. It would have been helpful to present a bit more information on the aerial redd counts. How often are the streams flown? What procedures are in place to correct for bias or error (e.g., double counting a redd on separate occasions, or missing a redd), and how are confidence intervals computed for spawning survey data?

It would seem that streamflow would be an important variable in influencing the distribution of adult Chinook. Are any discharge estimates available for the MFSR streams, and can this information be used to track habitat occupancy during wet or dry years?

How are the data transmitted to Taurus? The proposal mentions WordPerfect as the word processor and QPro as the database management software, but these are not widely used programs.

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