

# Final Report: Category Review of Resident Fish and Sturgeon Projects

INDEPENDENT SCIENTIFIC REVIEW PANEL  
ISRP 2020-8 AUGUST 6, 2020



Cover design by Eric Schrepel, Technical and Web Data Specialist, and cover photos by Erik Merrill. Main and bottom left photos are Sekokini Springs hatchery property and trout in rearing tank, MT; center is Lake Roosevelt, WA; and bottom right is Kootenai white sturgeon rearing tank viewed by Paul Anders on far right and former ISRP members Bob Naiman and Richard Alldredge.

Paul Anders recently passed away, and the ISRP recognizes his many contributions to improving Fish and Wildlife Program research and management, especially regarding sturgeon. His inquisitive, positive, and generous spirit are greatly missed.



## Independent Scientific Review Panel

for the Northwest Power & Conservation Council

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## Note on ISRP Membership and Conflicts of Interest

This review occurred during a significant transition of ISRP membership. Dave Heller, Robert Naiman, Greg Ruggerone, Steve Schroder, and Chris Wood have completed their terms but participated in this review to ensure continuity and understanding of this complex set of projects. Their positions were recently filled by Richard Carmichael, Patrick Connolly, Kurt Fresh, Josh Korman, and Thomas Quinn.

ISRP reviewers do not have direct, current financial conflicts of interest with projects funded by the Bonneville Power Administration. But members do have a variety of relationships with fish and wildlife agencies, researchers, and restoration practitioners who propose projects. For example, relationships include past employment at Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, and NOAA Fisheries. We take steps to avoid introducing the appearance of conflict or bias into reviews, including the recusal of panel members on specific reviews where appropriate.

# ISRP Final Report: Category Review of Resident Fish and Sturgeon Projects

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## Table of projects

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ID	Title	Proponent	Meets ISRP Criteria?	Page
<b>Lower River White Sturgeon</b>				
<a href="#">198605000</a>	Evaluate Sturgeon Populations in the Lower Columbia River	Oregon Department of Fish and Wildlife	Yes	<a href="#">27</a>
<a href="#">200715500</a>	Develop a Master Plan for a Rearing Facility to Enhance Selected Populations of White Sturgeon in the Columbia River Basin	Columbia River Inter-Tribal Fish Commission (CRITFC)	Not applicable	<a href="#">34</a>
<a href="#">200845500</a>	Sturgeon Management	Yakama Confederated Tribes	Not applicable	<a href="#">40</a>
<b>Kootenai River including Kootenai White Sturgeon</b>				
<a href="#">198806400</a>	Kootenai River White Sturgeon Aquaculture Conservation Facility	Kootenai Tribe	Yes	<a href="#">45</a>
<a href="#">200200200</a>	Kootenai River Habitat Restoration Program	Kootenai Tribe	Yes	<a href="#">49</a>
<a href="#">199404900</a>	Kootenai River Ecosystem Restoration	Kootenai Tribe	Conditional	<a href="#">53</a>
<a href="#">198806500</a>	Kootenai River Fishery Investigations	Idaho Department of Fish and Game (IDFG)	Yes	<a href="#">64</a>
<b>Lake Roosevelt and Rufus Woods Lake including White Sturgeon</b>				
<a href="#">200811600</a>	White Sturgeon Enhancement	Colville Confederated Tribes	Yes	<a href="#">71</a>
<a href="#">199502700</a>	Lake Roosevelt Sturgeon Recovery	Spokane Tribe	Yes	<a href="#">76</a>
<a href="#">199104600</a>	Spokane Tribal Hatchery Operations and Maintenance (O&M)	Spokane Tribe	Yes	<a href="#">82</a>
<a href="#">199104700</a>	Sherman Creek Hatchery Operations and Maintenance (O&M)	Washington Department of Fish and Wildlife (WDFW)	Yes	<a href="#">86</a>
<a href="#">200102900</a>	Ford Hatchery Operations and Maintenance (O&M)	WDFW	Yes	<a href="#">90</a>
<a href="#">199500900</a>	Lake Roosevelt Rainbow Trout Net Pens	Lake Roosevelt Development Association	Yes	<a href="#">94</a>
<a href="#">198503800</a>	Colville Hatchery Operation and Maintenance (O&M)	Colville Confederated Tribes	Yes	<a href="#">99</a>
<a href="#">200740500</a>	Rufus Woods Habitat/Passage Improvement, Creel and Triploid Supplementation	Colville Confederated Tribes	Yes	<a href="#">108</a>
<a href="#">199501100</a>	Chief Joseph Kokanee Enhancement	Colville Confederated Tribes	Yes	<a href="#">114</a>
<a href="#">200810900</a>	Resident Fish Research, Monitoring and Evaluation (RM&E)	Colville Confederated Tribes	Yes	<a href="#">122</a>
<a href="#">199001800</a>	Lake Roosevelt Rainbow Trout Habitat and Passage Improvement	Colville Confederated Tribes	Yes	<a href="#">132</a>

<b>ID</b>	<b>Title</b>	<b>Proponent</b>	<b>Meets ISRP Criteria?</b>	<b>Page</b>
<a href="#">200811500</a>	Lake Roosevelt Burbot Population Assessment	Colville Confederated Tribes	Yes	<b>141</b>
<a href="#">199404300</a>	Lake Roosevelt Data Collection	Spokane Tribe	Conditional	<b>145</b>
<a href="#">201700400</a>	Northern Pike Suppression and Monitoring	Colville Confederated Tribes, Spokane Tribe, WDFW	Yes	<b>161</b>
<b>Pend Oreille (and Dworshak)</b>				
<a href="#">200714900</a>	Non-Native fish Suppression	Kalispel Tribe	Yes	<b>175</b>
<a href="#">200724600</a>	Restoration of Bull Trout Passage at Albeni Falls Dam	Kalispel Tribe	Yes	<b>188</b>
<a href="#">199700400</a>	Resident Fish above Chief Joseph and Grand Coulee Dams	Kalispel Tribe	Yes	<b>193</b>
<a href="#">199500100</a>	Kalispel Tribe Resident Fish Program	Kalispel Tribe	Yes	<b>207</b>
<a href="#">201101800</a>	Pend Oreille River Basin Initiative: Land Acquisitions, Watershed Restoration, Conservation Hatchery	Kalispel Tribe	Yes	<b>218</b>
<a href="#">201900500</a>	Lake Pend Oreille/Dworshak	Idaho Department of Fish and Game (IDFG)	Yes	<b>224</b>
<b>Coeur d'Alene</b>				
<a href="#">199004400</a>	Coeur d'Alene Reservation Fisheries Habitat	Coeur d'Alene Tribe	Yes	<b>233</b>
<a href="#">200702400</a>	Coeur d'Alene Trout Ponds	Coeur d'Alene Tribe	Yes	<b>242</b>
<a href="#">200103300</a>	Hangman Creek Fish & Wildlife Restoration	Coeur d'Alene Tribe	Conditional	<b>250</b>
<a href="#">200103200</a>	Coeur d'Alene Fisheries Enhancement-Hangman Creek	Coeur d'Alene Tribe	Conditional	<b>257</b>
<b>Libby and Hungry Horse</b>				
<a href="#">199500400</a>	Libby Reservoir Mitigation Restoration and Research, Monitoring and Evaluation (RM&E)	Montana Fish, Wildlife and Parks (MFWP)	Conditional	<b>268</b>
<a href="#">199101903</a>	Hungry Horse Mitigation Habitat Restoration and Research, Monitoring and Evaluation (RM&E)	Montana Fish, Wildlife and Parks (MFWP)	Conditional	<b>278</b>
<a href="#">201900100</a>	Sekokini Springs Hatchery	Montana Fish, Wildlife and Parks (MFWP)	Yes	<b>287</b>
<a href="#">199101904</a>	Hungry Horse Mitigation-Creston Hatchery	US Fish and Wildlife Service (USFWS)	Conditional	<b>294</b>
<a href="#">199101901</a>	Hungry Horse Mitigation/Flathead Lake Restoration and Research, Monitoring and Evaluation (RM&E)	Salish and Kootenai Confederated Tribes	Conditional	<b>303</b>
<a href="#">200200300</a>	Secure and Restore Fish and Wildlife Habitat in Montana	Salish and Kootenai Confederated Tribes	Yes	<b>315</b>
<b>Southern Idaho and Southeast Oregon</b>				
<a href="#">200717000</a>	South Fork Snake River Yellowstone Cutthroat Trout Recruitment and Survival Improvement	Idaho Department of Fish and Game (IDFG)	Yes	<b>321</b>
<a href="#">199201000</a>	Fort Hall Habitat Restoration	Shoshone-Bannock Tribes	Pending response	<b>329</b>

<b>ID</b>	<b>Title</b>	<b>Proponent</b>	<b>Meets ISRP Criteria?</b>	<b>Page</b>
<a href="#">199701900</a>	Evaluate Life History of Native Salmonids in Malheur River Subbasin	Burns-Paiute Tribe	Yes	<b>335</b>
<a href="#">199501500</a>	Duck Valley Reservation Reservoir Fish Stocking Operations and Maintenance (O&M)	Shoshone-Paiute Tribes	Conditional	<b>340</b>
<a href="#">199701100</a>	Duck Valley Reservation Habitat Enhancement	Shoshone-Paiute Tribes	Conditional	<b>348</b>
<b>Clearwater</b>				
<a href="#">199501300</a>	Nez Perce Trout Ponds	Nez Perce Tribe	Yes	<b>359</b>
<b>Warm Springs</b>				
<a href="#">200715700</a>	Bull Trout Status and Abundance on Warm Springs Reservation	Confederated Tribes of Warm Springs	Pending response	<b>368</b>

# ISRP Final Report: Category Review of Resident Fish and Sturgeon Projects

## I. Introduction

This report provides the Independent Scientific Review Panel's (ISRP<sup>1</sup>) recommendations and comments on [44 proposals](#) submitted for the Resident Fish and Sturgeon Category Review to implement the Columbia River Basin Fish and Wildlife Program. The ISRP finds that 30 proposals meet scientific review criteria and 10 proposals meet scientific criteria with some conditions requiring further action. Two projects were primarily administrative and "not applicable" for our scientific criteria; the science of those projects is being reviewed in the Council's Step Review process. We requested responses on two other projects, but the proponents were given a time extension to complete their responses. A final review of those projects is anticipated by fall 2020.

We recognize the personal and societal hardships and uncertainty caused by the coronavirus pandemic, and we greatly appreciate the effort put into this review by all involved. In our preliminary review, we asked for responses for 43 out of the 44 proposals, which was the highest percentage in category reviews. Despite work restrictions, the project proponents provided informative and constructive responses that largely addressed our requests. This positive response effort and increased scientific dialogue with the ISRP should provide a strong foundation for the projects moving forward and also reduce follow-up reviews by the ISRP. Overall, we were impressed with the proponents' commitment to the objectives of the Program as demonstrated by their many accomplishments, their constructive approach toward scientific review, support and interest in other projects beyond their own, and the effort they devoted to the proposals, presentations, and responses.

This report provides final recommendations on each project and includes our preliminary report comments and response requests. The report also provides a discussion of programmatic issues that apply across projects to inform Program development and performance. Programmatic topics include native and non-native fish management, lake and river fertilization, habitat protection versus restoration, climate change, adaptive management, multicultural perspectives, integration of projects within geographic areas, and improving communication. The ISRP strives to ensure that its multi-year recommendations for the projects and the Program have a sound, well-documented scientific foundation.

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<sup>1</sup>"ISRP" refers to both ISRP members and Scientific Peer Review Group (PRG) members.

## II. The ISRP Review Process

### A. Review criteria

ISRP reviews are based on criteria provided in the 1996 amendment to the Northwest Power Act. The amended Act directs the ISRP to review projects for consistency with the Council's Fish and Wildlife Program and whether they:

1. are based on sound science principles;
2. benefit fish and wildlife;
3. have clearly defined objectives and outcomes; and
4. contain provisions for monitoring and evaluation of results.

Pursuant to the 1996 amendment, the Council must fully consider ISRP recommendations when making its recommendations regarding funding and provide an explanation in writing where its recommendations diverge from those of the ISRP.

### B. Review steps and recommendations for improvement

ISRP reports include written recommendations and comments on each proposal that is amenable to scientific review. These reports reflect the ISRP's consensus. To develop recommendations for this review, the ISRP used a multi-step process. The steps are described below with some lessons learned and recommendations for improvement.

#### **1. ISRP outreach and informal feedback on goals and objectives (November – January 17).**

Over the past two decades of ISRP reviews, a persistent concern has been that most project proposals do not include quantitative objectives that are specific, measurable, actionable, relevant, and time-bound (i.e., SMART objectives). These goals and objectives are critical to facilitate all stages of adaptive management, including implementation and effectiveness monitoring as well as ISRP review. Although we have provided guidance and instructions in the past on developing objectives, we strongly felt that more effort was needed to improve objective development, so partnering with the Council staff, we took the following actions:

- We revised the proposal form template, instructions, and figures showing examples.
- We participated in two proposal development workshops that emphasized the importance of including quantitative, time-bound (SMART) objectives.
- We offered to provide informal feedback to proponents on the draft objectives before proposals were formally submitted, and proponents for 12 of the 44 projects took us up on our offer.

**Outreach and training:** This outreach seemed to improve proposals' goals and objectives. We evaluated the objectives in 12 projects that sought our advice before proposal submission. Almost half of these projects developed sound goals and objectives to guide implementation and monitoring/evaluation, which provided a better foundation for review. Additionally, in our preliminary review, we found that most projects that did not request assistance did not prepare goals and objectives consistent with SMART guidance and provide a solid foundation for review. Overall, the proponents that requested ISRP assistance generally provided better goals and objectives initially than those that did not. The revised goals and objectives submitted in the proponents' responses to the ISRP were much improved, though some proposals still require additional development of SMART objectives. Continued assistance with development of effective rigorous goals and objectives is likely to improve the quality of projects supported by the Fish and Wildlife Program. The ISRP intends to work with the Council to continue and expand the use of more formal training for developing goals and objectives through area workshops or webinars.

**2. Individual ISRP reviewer evaluations (January 31 – March 1).** Each project was initially reviewed by three or more members who were selected based on expertise and previous experience reviewing the project. Each reviewer provided a preliminary and independent written evaluation of the project, which was then shared for discussion prior to step 3. Individual reviewer's comments and records of discussions are confidential and not available outside of the ISRP.

**3. Project presentations (March 3-4).** Over two full and well-attended days, the proponents presented their proposals to the ISRP, other project proponents, and Council and BPA staff. Time was reserved for questions and discussions. These discussions greatly aided the ISRP in clarifying specific concerns and understanding the projects. The presentations are available on the Council's [project review webpage](#).

**Site visits:** Unfortunately, the Resident Fish and Sturgeon Category Review did not include field visits. In the relatively recent past, such visits were part of the review process, allowing ISRP members to talk face to face with proponents on their own turf, see work that was completed and in progress, and discuss needs and obstacles faced by project proponents. These visits provided an important venue to encourage meaningful communication and build strong working relationships, but they have not occurred for the last few years, presumably because of budget and coordination constraints. Even though proponents deliver presentations and answer questions in Portland as part of a review, the presentations provide information differently and certainly do not replace the many benefits to the program associated with field visits.

For future ISRP field visits, the Council and Council staff could select critical projects that represent innovative advances or major challenges. Visiting these projects could allow the ISRP to develop first-hand knowledge of these issues and the proponents' perspectives. We understand the coronavirus epidemic has changed the calculus for planning site visits, but the ISRP is hopeful site visits will be feasible for future reviews. In the near-term, alternative approaches to achieve similar goals of understanding restoration sites and facilitating informal discussions should be explored, such as virtual tours.

**4. ISRP group evaluation meetings (March 5).** Individual reviewer comments were compiled, and following the presentations, review teams met to discuss individual reviews, develop a consensus recommendation for each proposal, and ensure consistency across reviews. These meetings were attended by ISRP and PRG members only, and the deliberations are confidential.

**5. Preliminary report completion (March 6 - April 2).** After the evaluation meetings, a lead reviewer synthesized individual reviewer's comments into a consensus statement on each proposal. The ISRP and PRG reviewers evaluated and edited these draft consensus statements to produce a preliminary report ([ISRP 2020-4](#)). We requested responses on 43 projects of 44 projects. Project proponents for those 43 projects were provided an opportunity to respond to our concerns by June 23, 2020.

**6. Response review and completion of the final report.** In late June, the ISRP received responses for 41 of the 43 projects for which a response was requested. Two projects were given time extensions, and the ISRP anticipates completing its review by the fall 2020. For those 41 projects that responded, the ISRP again followed steps 2 and 4 above: individual reviewers evaluated the responses; those evaluations were compiled; the ISRP met by online teleconference to discuss the evaluations; and a final draft was circulated to confirm ISRP consensus. Of the 41 projects providing a response, the ISRP found that 29 projects met scientific review criteria, 10 projects met criteria with some conditions, and 2 were not amenable to scientific review.

***Revised proposals:*** Fifteen of the projects in the response loop revised their proposals in response to the ISRP preliminary review concerns. The ISRP believes a revised proposal that includes all the proponents' additions and changes in response to the ISRP's questions provides the best integration of information provided in the response loop. The revised proposal gives the proponent a guiding document that is complete and meets scientific criteria. In past reviews, most all responses were provided in separate documents from the proposal, and important responses that needed to be incorporated into the proposal to reach "meets scientific criteria" never got added to the proposal. This resulted in a proposal that is incomplete, does not efficiently inform contracting, and does not serve well as a standalone guiding document to inform future reviews. The

ISRP recommends that project proponents should incorporate changes to their project resulting from the response loop in a revised proposal.

The ISRP identified other improvements to the review process and proposal form that we intend to work with Council staff to incorporate in future review processes.

### Next Steps

The ISRP will present its findings at the Council’s [August 12, 2020 meeting](#). The public comment period on the report will be open until September 7, 2020. Council staff anticipates presenting recommendations for Council discussion at the September 15, 2020 meeting, and the Council is tentatively scheduled to make recommendations at its October 14, 2020 meeting. See the [Council’s review webpage](#) for details.

### C. Recommendation categories

Table of ISRP recommendation categories and use in ISRP preliminary and/or final reports.

Recommendation	Prelim	Final	Short description
Meets Scientific Review Criteria	x	x	Substantially meets the ISRP’s criteria
Meets Scientific Review Criteria - Conditional		x	Mostly meets criteria but further proposal justification, adjustments, or reporting needed
Does Not Meet Scientific Review Criteria		x	Significant deficiency in one or more of the ISRP’s criteria
Not Applicable	x	x	Objectives not amenable to scientific review
Response Requested	x		Clarification needed before the ISRP can make a final decision

The full definitions of the ISRP’s recommendation categories are:

**1. Meets Scientific Review Criteria** is assigned to proposals that substantially meet the ISRP’s criteria: “[1] are based on sound scientific principles; [2] benefit fish and wildlife; and [3] have a clearly defined objective and outcome with [4] provisions for monitoring and evaluation of results.” Proposals do not have to contain tasks that independently meet each criterion 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 the proposal clearly demonstrates this integration. Unless otherwise indicated, a “Meets Scientific Review 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 – Conditional**<sup>2</sup> is assigned in the ISRP's final review to a proposal for which additional actions by the proponent are needed to fully justify the entire proposal and substantially meet all the ISRP's criteria. For example, a particular implementation objective or method may need to be modified or removed, a comprehensive results report may be required, or a management plan may be needed. In some cases, the proposal includes some objectives/methods that substantially meet the ISRP's criteria and some that do not. The ISRP specifies which objectives do not meet the review criteria. In general, a proposal that receives a Conditional recommendation will be reviewed subsequently by the ISRP outside the standard review process.

The ISRP expects that needed changes to a proposal receiving a "Conditional" recommendation will be determined by the Council and BPA in consultation with the proponent in the final project selection process. Regardless of the Council's or BPA's recommendations, the ISRP expects that, if a proposal is funded, subsequent proposals for continued funding will describe how the ISRP's conditions were addressed by project actions or policy decisions.

**3. Does Not Meet Scientific Review Criteria** is assigned in the ISRP's final review to a proposal that is significantly deficient in one or more 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. Some projects receiving this recommendation propose actions that could unintentionally harm non-target, native fish or wildlife. The ISRP notes that proposals in this category may attempt to address needed actions or are an integral part of a coordinated watershed effort, but the proposed methods or approaches are not scientifically sound. In some cases, an alternative approach or project may be warranted to address the needed action.

**4. Not Applicable (N/A)** is assigned to proposals with objectives that are not amenable to scientific review. Projects receiving "N/A" recommendations in previous reviews were largely administrative, such as regional coordination and law enforcement projects and projects that propose plans to develop plans. The ISRP generally identifies programmatic issues with such projects and provides comments on how the science to inform and evaluate the projects could be incorporated to improve the project.

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<sup>2</sup> The ISRP previously used "In Part" and "Qualified" recommendations, but "Conditional" is less confusing and better fits our intent and usage.

**5. Response Requested** is assigned to a proposal in a preliminary review that requires more information on specific issues before the ISRP can make a final recommendation. This does not mean that the proposal has failed the review. The ISRP requests responses on many proposals and, in the past, most proposals provided sufficient additional information during the response loop to meet the ISRP's scientific review criteria in the final report.

### III. Programmatic Comments

#### A. Native and non-native fish interactions and management

##### 1. Management of recreational fisheries for non-native species

Approaches for managing non-native and native fish species often are vague, confusing, or contradictory. Considerable efforts are being spent studying, managing, and enhancing native species, many of which are target species for recreational and subsistence fisheries. Non-native predators can have negative impacts on these same species of native trout, anadromous fish, and other native fish species while supporting non-native sport fisheries. In many cases, non-native sport fisheries are regulated by co-managers rather than the project proponents themselves. Projects should explain how non-native sport fisheries are managed to minimize detrimental effects on native fish populations and how they coordinate with fisheries regulators to protect native resident fish. This contradiction is a major challenge for the consistent management of Columbia River Basin native fishes and calls for an explicit conceptual framework and integrated plan for dealing with these problems.

*Recommendations:*

- *The Council should direct project proponents to provide a plan to minimize detrimental effects of non-native sport fisheries on resident native fish populations and native sport fisheries.*
- *Projects should describe their ongoing efforts to coordinate with co-managers to minimize detrimental effects of non-native sport fisheries.*

##### 2. Bycatch in sampling

Many projects did not adequately describe the potential adverse impacts of bycatch on native species of special concern in a wide range of sampling activities. For example, gillnetting and electrofishing are used to determine the abundance of focal species (e.g., bull trout, burbot, triploid rainbow trout) and for suppression or eradication of non-native predators (e.g., northern pike, lake trout, brook trout, smallmouth bass, walleye). However, native species of concern (e.g., redband trout, bull trout) may be killed in the process as bycatch, even if they are released quickly after catch. Many studies have investigated the mortality of target species in catch and release programs. The proposals provided little information on this issue. Bycatch is reported in annual reports for some studies but not others. There is limited information on what percentages of the native focal species populations are being handled or killed.

Ongoing efforts to minimize bycatch on non-native predators, such as smallmouth bass and walleye are equally confusing. In gillnetting activities to suppress northern pike in Lake Roosevelt, thousands of other non-native predators are released in the main reservoir but at the same time, these same species are targeted and killed by gillnetting in the Sanpoil Arm of the reservoir. It is not clear what percentages of the non-native predator populations are being handled or released.

*Recommendations:*

- *The Council should require projects to explain potential adverse impacts of bycatch on native species of special concern and report bycatch consistently in all annual reports. Projects also should estimate percentages of the native focal species populations that are being handled or killed.*

### **3. Northern pike management**

Recent reports by the ISAB have concluded that tribes and regional fisheries agencies will need to manage relevant feedbacks between anglers and fish populations and ecosystems, rather than simply attempting to control northern pike populations themselves ([ISAB 2019-1](#); [ISAB 2019-3](#)). Several project proponents propose to suppress nonnative northern pike, but current efforts are either not yet effective in reducing spread and abundance (e.g., Lake Roosevelt) or they are effective but must continue in perpetuity (e.g., Boundary and Box Canyon Reservoirs, Coeur d'Alene Lake). Two other critical priorities in northern pike suppression are to 1) prevent development of a sport fishery and/or advocacy groups for this fishery, and 2) prevent individuals from transporting pike into the areas currently accessible to anadromous fish, including downstream into the mid- and lower Columbia River. Human transport has apparently been a major vector of northern pike invasions in the region ([ISAB 2019-1](#)).

Given the large investment in fisheries management of various native and nonnative species in waters like Lake Roosevelt, increased investigation is needed to determine whether the assumptions that 1) northern pike prey substantially on these focal fish species and 2) that northern pike can detrimentally alter the food web are correct. Literature from other locations indicates that strong negative effects often occur but are not inevitable. Instead, food-web effects are complex and often counterintuitive (see [ISAB 2019-1](#); [ISAB 2019-3](#)). Northern pike prey substantially on focal fish species but also eat other species of fish and aquatic organisms. To what degree do northern pike prey on salmonids across different habitats, seasons, and food webs? The literature includes examples where salmonids are not preferred prey of northern pike, such as in Alaskan rivers and some reservoirs like Merwin Reservoir in the Columbia River Basin. Even in cases where consumption of salmonids is substantial, the effects in the food web may not be as linear/direct as often assumed. Do northern pike simply eat salmonids and other

native fish prey and reduce their abundance and perhaps eliminate them? Alternatively, northern pike might eat walleye, smallmouth bass, or northern pikeminnow and actually reduce total predation on native salmonids and others.

Northern pike currently occur primarily above the anadromous portion of the Columbia River, but invasion of northern pike below Chief Joseph dam is likely ([ISAB 2019-1](#)). The control and management of northern pike likely will become an issue for all states within the Columbia River Basin. Regional invasive species councils could appoint a task force of scientists, agency managers, and project leaders to pursue these questions across a range of reservoirs and rivers in the Pacific Northwest where northern pike have invaded. Such a group could increase the efficient use of funds by optimizing study design, field gear and efforts, analysis, and reporting. Results of the task force would have wide applicability across waters of the region. A task force also could be a focal point for control efforts where control is deemed necessary and could address education and outreach at large, multi-jurisdictional scales.

*Recommendations:*

- *The Council should explore the creation of a multi-state task force for northern pike in collaboration with the Invasive Species Councils in the Columbia River Basin.*
- *The special task force for northern pike could coordinate diet and bioenergetic studies in the region to determine:  
1. the extent to which northern pike prey on salmonids and other focal fish species, and  
2. whether the effects of northern pike on their prey are linear or complex and indirect food web responses.*
- *Project proponents and co-managing state agencies should immediately discontinue posting images of large northern pike on signs at boat ramps and program websites and providing them to other media outlets (newspapers, websites). Such images imply the potential for a trophy fishery and are immediately spread by social media. Consequently, they have high potential to foster angler advocacy groups for these large predators and their illegal transport into other waters, including the anadromous zone.*
- *The Council and BPA should consider an angler reward program for northern pike that engages youth and adults in local and regional communities. This could provide the opportunity to educate anglers of all ages about fish ecology, unique native species, risks and negative effects of illegal stocking of nonnative predators, thereby potentially helping reduce illegal transport into*

*other waters, including the anadromous zone. However, the ISRP acknowledges an angler reward program can create additional risks by unintentionally developing a wider constituency for northern pike and creating a public expectation of long-term funding. Consequently, an angler reward program should be carefully considered with these risks and potential benefits in mind.*

- *The Council and BPA should encourage education and outreach programs to explain the benefits of non-native fish suppression, including avoiding additional restrictions associated listed species or species of concern. Outreach programs could target and educate sports and angler clubs.*
- *The proponents of multiple projects involved in northern pike suppression should jointly hire specialists with formal training in community outreach and social media to facilitate more effective outreach.*

#### **4. Stocking triploid fish to reduce risk to native fish**

Declines in the distribution and status of native fish are a major conservation challenge in the western United States. For example, redband trout are native to certain drainages in the upper Columbia basin in Washington, Idaho, and Montana, but pure (non-hybridized) populations are found in at most only 8% of the length of streams tested and 19% of the area of lakes tested (Muhlfeld et al. 2015). Redband trout are unique and evolutionarily divergent from other rainbow trout lineages. Nevertheless, many anglers may not realize or appreciate the distinctions among the rainbow trout subspecies, and the uniqueness of Columbia River redband trout. Nonnative brook trout and hatchery rainbow trout have been widely stocked in the upper Columbia basin but compete for food and space with native Columbia River redband trout (*Oncorhynchus mykiss gairdneri*; Muhlfeld et al. 2015), a unique subspecies of rainbow trout. Nonnative forms of rainbow trout that are widely stocked also hybridize with redband trout, destroying their genetic integrity. Wherever triploid trout are used, proponents should ask hatcheries to provide a high level of assurance for the accuracy of percentages of triploid fish being produced. Managers consistently demand fish that are 100% pathogen free, so why not also expect 100% triploids?

Managers should be aware that stocking “triploid trout” does not eliminate the risk of establishing non-native fish populations in locations where they do not occur. For example, in one proposal (Coeur d’Alene Trout Ponds), the triploids stocked in the ponds are reported to be at least 95% triploids. This leaves a potential for 5% to be fertile diploids. If these fish escape, as can occur during floods, or are transported by humans, then there is the potential for transfer

into watersheds where they could hybridize with native redband trout, or native cutthroat trout.

Given the large amount of time and expense biologists are investing to remove nonnative salmonids and to restore native salmonids to many watersheds throughout the region, it is prudent to push for the use of 100% triploid fish and exercise this additional level of prevention to avoid creating further invasions of nonnative trout. Furthermore, annual monitoring and reporting of the frequency of triploid fish is needed.

*Recommendations:*

- *BPA should require projects to acquire triploid fish from suppliers that can provide the greatest assurance of triploid composition (as close to 100% as possible).*
- *Projects should require annual monitoring of triploid frequency from suppliers and report the measured triploid frequency in annual reports.*
- *BPA should require that brook trout used in stocking projects are restricted to sources assured to be greater than 95% triploid fish to reduce the risk of escape and prevent new invasions of diploid brook trout where they do not occur.*
- *Projects that stock triploids of generic rainbow trout to protect native subspecies, such as redband trout, should attempt to obtain triploid redband trout (>95%) rather than triploid rainbow trout. This could prevent new instances of hybridization if these fish escape and encourage an eventual shift towards native trout species.*
- *The Council and BPA should encourage education and outreach programs to emphasize the cultural and ecological importance of ancestral native fish of the region to tribal members, the public, and especially youth.*

## **5. Brook trout suppression through YY male releases**

One approach to suppressing non-native fish is based on the theory that releasing fish with so-called “Trojan” sex chromosomes that, once mated into local wild-type populations, skew sex ratios such that local populations are reduced and ultimately eliminated. Most commonly, the approach involves producing males in a hatchery that have an extra Y chromosome (e.g., have a YY chromosomal genotype). When YY males mate with wild females (XX) all of the offspring are

male (XY). As the number of females is reduced with subsequent stocking, in theory it becomes more difficult to find suitable mates until the population fails to reproduce entirely.

The use of YY male brook trout to attempt to eradicate this nonnative species is an untested tool. The ISAB review of predation impacts and management effectiveness for the Columbia River Basin ([ISAB 2019-1](#)) recommended that uncertainties regarding the effectiveness of stocking YY males to reduce or eradicate non-native fish populations should be addressed by a combination of simulation and experimental studies. To that end, work funded to suppress non-native fish populations should be carefully and rigorously designed with treatments and controls to ensure that the efficacy is thoroughly assessed and that the factors affecting success are identified. Project 200714900 (Pend Oreille Non-Native Fish Suppression and Eradication) and 199101900 (Hungry Horse Dam Mitigation) both propose to use YY males to eradicate nonnative brook trout, but neither project has a rigorous experimental design to test the success of their actions. Regional management agencies need rigorous experimental designs (i.e., including controls, treatments, and statistical analyses) to inform and strengthen efforts to eradicate non-native species using YY males.

*Recommendation:*

- *The Council, BPA, and regional management agencies should develop collaborative research projects with rigorous experimental designs (i.e., including controls, treatments, and statistical analyses) to determine the effectiveness of projects to eradicate non-native species using YY males.*
- *Collaborative projects should determine how many YY male brook trout should be stocked and for how long. At what size should YY fish be released to avoid excessive mortality of stocked fishes due to predation?*
- *Collaborative projects should determine how much additional suppression effort, if any, is necessary to shorten time to extirpation due to YY male stocking.*

## **6. Assessment of risks of translocation or broodstock collection for donor stock populations and downstream fish populations**

Several projects propose to collect or currently do collect wild native fish for translocation or use as hatchery broodstock (e.g., bull trout, redband trout, cutthroat trout) for the purpose of rebuilding populations that have severely declined or been extirpated. It is critical to select the most biologically appropriate source populations, and to ensure that removal of fish for translocation and hatchery broodstock does not jeopardize the productivity and genetic integrity of the donor populations (Dunham et al. 2011). The benefits for the receiving

population should outweigh the risks to the donor population. For several of the translocation or hatchery production efforts in this review, it does not appear that such criteria for the protection of donor stocks were considered or that benefit-risk assessments/plans were developed.

A critical component of any translocation or broodstock development strategy is identification of donor populations and assessment of risks to the populations associated with removal of fish. The ISAB ([2019-3](#)) found the donor stock selection process to be scientifically credible for reintroduction of salmon and steelhead above Grand Coulee Dam by the Upper Columbia United Tribes. Criteria for selection of appropriate donor stocks included donor stock abundance, ancestral similarity to extirpated populations, life history compatibility, pre-existing adaptations, and risks such as pathogen transfers, genetic effects, competition for food and space, and predation on reintroduced fish by resident piscivores (Warnock et al. 2016; Hardiman et al. 2017). More consistent application of a comprehensive donor population selection process, formal benefit-risk analyses, and donor population protection criteria are needed for consistent and biologically sound application across projects involving broodstock collection and translocation of native fish.

*Recommendations:*

- *The Council should direct project proponents to describe the selection process and criteria used to select donor populations.*
- *The selection process should assess the potential risks and benefits for the donor populations and the translocated populations.*

## **7. Contaminants in native and non-native fish**

State and federal agencies throughout the Columbia River Basin assess human health risks associated with consuming fish and issue fish consumption advisories for all species that contain elevated concentration of contaminants. The ISRP recommends that the Colville Confederated Tribes, Spokane Tribe of Indians, and Washington Department of Fish and Wildlife consider the consequences of contaminants in different fish species consistently in fisheries management and project development. The proponents should work with biologists in WDFW, Washington Department of Health, and Washington Department of Ecology to evaluate mercury and PCB concentrations in hatchery rainbow trout in Lake Roosevelt and its tributaries because these fish probably do not have the health risks identified in past analyses of "rainbow trout." Previously, the Washington Department of Health identified health risks associated with eating too many rainbow trout, sturgeon, burbot, northern pike, walleye, and other fishes in Lake Roosevelt and issued a fish advisory. However, new harvest regulations implemented by the co-managers in Lake Roosevelt require live release of unmarked native redband trout. The

ISRP suspects that the high concentrations of mercury and PCBs detected previously in rainbow trout were largely due to samples that included naturally produced redband trout, which are exposed to these contaminants for a much longer period of time compared with hatchery put-and-take trout. The concentration of mercury and PCBs in hatchery salmon and trout was examined and reduced many years ago by reducing amounts of certain forage fish in the diet. Since new regulations prohibit "catch and eat" fisheries on redband trout, we recommend that contaminants be re-evaluated in stocked rainbow trout.

*Recommendations:*

- *The Council should explore collaborations with state and federal health agencies to assess both marked hatchery fish and naturally produced fish when measuring contaminants in fish and developing fish consumption advisories.*
- *If appropriate following contaminant analyses, education and outreach programs could emphasize both the conservation benefits of catch and live-release of unmarked naturally produced fish and the potential decreased health risks of eating marked hatchery trout.*

## B. Lake and river fertilization projects

Lake fertilization and river fertilization are used to restore resident fish populations in several projects in this review—Dworshak Reservoir, Lake Pend Oreille, South Arm of Kootenay Lake, and Kootenai River. Fertilization also has been conducted in other project under the Fish and Wildlife Program, such as the Redfish, Pettit, and Alturas Lakes by Shoshone-Bannock Tribes, and the Methow River basin. Many more fertilization programs have been implemented by government agencies and research groups. More than 50 lakes and rivers of the Pacific Northwest, including Canada and Alaska, have been fertilized in attempts to increase the abundance of fish populations. Fertilization techniques have included addition of dissolved nutrients, time-released fertilizer, fish carcasses, and fish carcass surrogates (e.g., packets of fish meal, carcasses of other species). Results of fertilization are varied, especially in terms of changes in fish numbers and/or biomass. In this Category Review of Resident Fish and Sturgeon Projects, proponents reported both positive responses and lack of responses in focal fish populations. Several reviews have examined the results of fertilization projects with both resident and anadromous fish in large reservoirs and lakes, small lakes, small streams, and large rivers, including citations from the projects we reviewed. These reviews have differed in their conclusions, with some indicating that nutrient additions are largely beneficial while others have found that mitigation of diminished salmonid runs to be limited.

While potentially effective, fertilization projects are expensive, require continued implementation, may have unintended consequences for the food web, and can be a form of eutrophication or pollution if nutrient additions exceed natural loading. Such projects are difficult to change after substantial investment and development of public support. The Fish and Wildlife Program would benefit from a thorough review of published results of efforts to increase fish numbers and biomass through fertilization of lakes and rivers. Given the complex ecosystem responses to nutrient addition strategies and the substantial, ongoing costs of such projects, such a review could inform decision makers and practitioners by identifying both the range of ecological outcomes and sources of uncertainty or complex responses.

*Recommendation:*

- *The Council should request a review of lake and river fertilization projects by the ISAB or a qualified external source with subsequent review by the ISRP.*

### C. Habitat protection versus restoration

The ISRP recommends the development of strategic approaches for prioritizing or weighting protection of high-quality habitats versus restoration of degraded habitats. Several project proposals identified habitat protection as a major objective, but none included a description of analytical methods and actions to prioritize protection actions. In previous report, the ISRP and ISAB have strongly endorsed the importance of protecting high quality habitat rather than only restoring degraded habitats. We recently reviewed several projects that include strategic processes for prioritizing or weighting protection of high-quality habitats relative to restoration of degraded habitats. The ISAB Upper Columbia Spring Chinook report ([ISAB 2018-1](#)) recognized the importance of prioritization systems for habitat protection and restoration in the Columbia River Basin (e.g., [UCSRB 2014](#)). The Colville Confederated Tribes recently proposed to extend the prioritization approach used in the Wenatchee, Entiat, and Methow subbasins to the Okanogan subbasin as well ([ISRP 2020-1](#)), and the ISRP emphasized the need for an explicit prioritization strategy.

Land managers in the region have developed spatially explicit assessments of priorities for habitat protection based on habitat conditions, fish distributions and abundances, and potential limiting factors. In the early 2000s, the Flathead/Kootenai and the Intermountain subbasin planners used Qualitative Habitat Assessment (QHA). More recently, the Colville Confederated Tribes refined and used Ecosystem Diagnosis and Treatment (EDT) in the Okanogan subbasin in the anadromous zone and for reintroduction assessments above Chief Joseph and Grand Coulee dams. In addition, the US Forest Service developed a network of Priority Watersheds in

the Mid and Upper Columbia Basin for protection of high-quality habitat and also provided special management for Key Watersheds with high-quality habitat for anadromous fish.

*Recommendations:*

*The Council should require project proponents proposing to protect high quality habitats and restore degraded habitats to:*

- *include explicit prioritization processes for assessing the relative benefits and tradeoffs of protection and restoration.*
- *identify metrics for desired outcomes (e.g., population abundance, survival, cumulative habitat quality, inundated floodplains, riparian forests, water temperature, rearing habitat, spawning habitat) in prioritization processes.*
- *indicate how protection of high-quality habitats would be prioritized or weighted relative to restoration of degraded habitats.*
- *assess the overall benefit for species of concern and the relative cost-effectiveness of protection and restoration actions.*
- *identify processes for evaluating protection efforts to confirm the intended long-term outcomes.*

#### D. Climate change

The ISRP's [2012 Resident Fish Review](#) stated, "It makes sense to consider potential climate change impacts before committing substantial resources to improve habitat or manage invasive species in landscapes or waterscapes that may be inhospitable to the focal species in several decades." Although climate change remains a major concern, the ISRP sees no evidence that climate change considerations significantly influence the design or long-term funding of projects, which creates greater risk for those projects most likely to be adversely affected by climate change. Many project proposals acknowledge climate change as a confounding factor, but few demonstrate the ability, resources, or willingness to assess risks and substantially alter activities whose benefits may be reduced or eliminated by future conditions. Projects rarely indicated how climate change would alter the outcomes of their actions and the degree to which benefits of restoration would be reduced or enhanced. Proposals often did not provide enough context to understand individual project's contributions to climate resilience.

*Recommendation:*

- *The Council should require project proponents to describe how consideration of climate change directly influences project selection, design, location, implementation, and monitoring in future proposals.*

## E. Structured decision management and adaptive management

The current review does not indicate that structured decision management (SDM) has gained traction as a tool for use in resident fish projects. The ISRP's [2012 Resident Fish Review](#) includes the statement, "*this review revealed many situations where SDM could be beneficial. Specifically, the ISRP recommends SDM as a process to identify and evaluate alternatives that engage stakeholders, experts, and decision makers in rigorous analysis and thoughtful dialogue to create a roadmap for planning, analysis, and consultation about resource conservation and restoration decisions.*" Despite ISRP encouragement, wider use of this process since 2012 is not apparent.

Similarly, as recommended by the ISRP in past reports, project proponents need increased guidance on adaptive management processes. In the Review of Umbrella Habitat Restoration Projects ([2017-2](#)), the ISRP identified four major obstacles to developing and implementing effective adaptive management processes. First, adaptive management requires quantitative objectives with explicit timelines that are expressed in terms of expected outcomes for aquatic communities or habitats. Second, evaluation requires appropriate monitoring, access to data, and explicit methods for evaluating and documenting results. If monitoring is not sufficient to meet the needs of the project and its collaborators, it should be highlighted in annual reports to the Council and Bonneville Power Administration. Third, monitoring and evaluation may require additional technical capacity beyond what currently exists for some projects. Fourth, reporting should document outcomes (i.e., not only implementation of actions but also changes to habitat and fish populations), identify lessons learned, and describe how knowledge is shared through public meetings, targeted workshops, and peer-reviewed publications.

The ISRP Review of Umbrella Habitat Restoration Projects ([2017-2](#)) also recommended development of a workshop and pilot demonstration. The report concluded that "a multi-day workshop is needed to resolve practical obstacles by bringing together restoration practitioners from all umbrella projects, other habitat restoration practitioners, research and monitoring teams, the ISRP, and the Council." The ongoing deficiency in development and implementation of structured decision management and adaptive management frameworks in most projects may be improved if the ISRP assumed a role in identifying and providing training for projects in developing structured decision making and adaptive management frameworks.

*Recommendations:*

- *The Council should explore options for training on adaptive management and/or structured decision making for projects and develop effective examples from the Fish and Wildlife Program.*
- *The Council and the ISRP should discuss and determine responsibilities for training and the appropriate role for the ISRP in identifying and providing such training.*

## F. Multiple cultural perspectives on knowledge and adaptive management

During the course of this review, the ISRP discussed the value of different cultural perspectives and processes to inform and conduct science-based restoration and adaptive management. In our reviews, we often raise concerns about how proponents understand, prioritize, and evaluate their conservation and restoration actions. Social scientists have long recognized multiple approaches to developing knowledge, and both social scientists and ecologists now recognize traditional ecological and indigenous knowledge to be a valid and informative scientific approach for observation and understanding. Furthermore, awareness is increasingly growing around how strongly imperialism is embedded in our current scientific logic frameworks, at the expense of other knowledge frameworks and potentially ecosystem recovery.

This issue applies to the Independent Scientific Advisory Board as well, and together we have a fundamental responsibility to address diverse cultures and perspectives in our science and its role in informing policy and management. We have a social and scientific responsibility to consider the cultural histories, rights, and trust agreements that shape current resource management and to consider the full extent of knowledge about the natural resources and landscapes the Columbia River Basin. We are considering ways to strengthen our reviews by increasing the breadth of knowledge and understanding we incorporate in the review process.

The ISRP has recognized the value of traditional ecological knowledge in past reviews, for example, the Confederated Tribes of the Umatilla Reservation's First Foods concept. The ISRP realizes that some projects engage scientists, managers, tribal decision makers, tribal members, and local public to review their outcomes and consider a wide range of alternatives. We want to more closely examine alternative approaches for understanding, prioritizing, and adaptively managing projects. We will consider constructive steps we might take to improve our scientific review process and meet our review responsibilities more effectively, while remaining vigilant

to identifying the practices that are scientifically sound and most likely to effectively and efficiently recover the fish and wildlife of the Basin.

Using traditional ecological knowledge and cultural information will require the ISRP and ISAB to adapt as well and will be an ongoing process. It will require time for us to learn more about how to incorporate multiple ways of knowing in a common process and recognize the adaptive value of alternative approaches. We have sources in the region—tribes, academics, agencies—who can provide guidance and help us improve our processes and policies to increase the effectiveness of regional efforts to conserve and restore fish and wildlife resources.

*Recommendations:*

- *The ISAB and ISRP should work with the Columbia River Inter-Tribal Fish Commission, Upper Columbia United Tribes, Upper Snake River Tribes, NOAA Fisheries, and Council and Council staff to explore the extent to which alternative cultural perspective and processes are consistent with and inform sound science principles, would benefit fish and wildlife, could define objectives and outcomes, and could provide new approaches for monitoring and evaluation. We should explore approaches that recognize the values of different cultural perspectives for developing understanding of natural resources and alternative processes for adaptive management.*

## G. Communication and project integration

### 1. Communication between BPA, Council, and ISRP

Over the past several years, the ISRP has identified numerous instances where increased communication and transparency between BPA and the Council and ISRP would improve project review and ultimately the Program. Specifically, the ISRP requests better communication of how and to what extent BPA implements the Council’s and ISRP’s project recommendations.

As part of the current Category Review of Resident Fish and Sturgeon Projects, the ISRP evaluated the projects’ responses to past Council recommendations and ISRP reviews. Four project proponents reported that they attempted to respond to past ISRP reviews and Council recommendations and develop an M&E plan, but BPA did not allow them to allocate funds within the Fish Accord to address the ISRP recommendations (proposals [199501100](#), [199001800](#), [200103300](#), and [200200300](#)). As a result, the ISRP again finds the lack of evaluation to be a deficient scientific criterion for those projects and many others. Among other criteria,

the 1996 Amendment to the Northwest Power Act and the Council charge the ISRP to assess whether projects “have provisions for monitoring and evaluation of results” ([Sponsor Packet](#), November 6, 2019). Implementation without meaningful efforts to measure success is not scientifically rigorous, nor is it prudent because the ongoing actions may not provide the intended benefits.

The communication process between the ISRP, the Council, the project proponents, and BPA remains a work in progress but currently hinders effective project and program implementation. The ISRP fully recognizes that the Council and BPA base their decisions on many factors, in addition to sound science. We do not expect the Council, BPA, or the proponents to endorse all ISRP recommendations, but we believe better communication of BPA’s decisions regarding implementation of recommendations from the Council and ISRP would encourage coordination and consistent actions across the Fish and Wildlife Program. It would also improve the relationship between the ISRP and proponents by reducing the likelihood that the ISRP will repeatedly make requests of proponents without the context of BPA’s decisions and restrictions.

The Council’s recently adopted Addendum 2 to the 2014 Fish and Wildlife Program directly calls for improved communication between the Council and BPA communications about changes to projects. Under the section “Protect productive work during budgetary processes” the Council states, “Bonneville shall provide regular public information to the Council on project implementation, so that the Council can understand whether and how implementation differs from the work recommended after project review” ([Council document 2020-01](#), page 11). This is exactly the type of information that the ISRP is requesting, especially before we review a project, so we understand the full context of decisions affecting a project.

*Recommendation:*

- *The ISRP recommends that Council and Council staff explore alternatives for 1) better communication and documentation of BPA decisions affecting project implementation and review and 2) sharing relevant information with the ISRP.*
- *The ISRP encourages more active participation of BPA staff in future Category Reviews.*

## **2. Information sharing and publication of results**

To support informed management decisions at a number of different geographic scales, temporal scales, and organizational levels, information must be provided clearly and effectively

to decision-makers. This dissemination may occur through publications or through education and outreach efforts that include meetings, workshops, reports and other informational publications. Developing processes to ensure that information is effectively communicated with managers and incorporated into decisions affecting conservation and restoration actions is critical for long-term success. Several of the projects that were reviewed have developed effective information sharing and adaptive management loops, working with local managers and cooperating agencies.

The Mainstem and Program Support Review ([ISRP 2019-2](#)) identified communication, information sharing, and public engagement as a major programmatic issue:

*Communication, information sharing, and public engagement are critical to building the social, institutional, and scientific fabric needed for successful habitat mitigation and restoration in the Basin. As noted in [ISRP 2018-8](#) (page 14), “Information sharing is identified as a vital element of the current Fish and Wildlife Program and as a cornerstone of adaptive management. A lack of information sharing has been widely recognized as a main reason for restoration failures.”*

The 2019 ISRP review and earlier reviews (e.g., [ISRP 2012-6](#)) also recommended greater emphasis on evaluating the efficacy of information sharing activities, such as user satisfaction, impact on restoration design and decision-making, user needs, and application of new techniques. Below are updated recommendations from the 2019 Mainstem and Program Support Review that continue to be relevant:

*Recommendations for the Council:*

- *Direct project proponents to report not only task completion and biological and physical results but also the broader impacts of their project by describing how they have influenced management, benefited society, or improved effectiveness and efficiency.*
- *Provide more support to disseminate project results to other practitioners and the public through open-access journals and forums.*
- *Encourage proponents of multiple projects located within a common geographic area to jointly hire specialists with formal training in community outreach and social media to facilitate more effective outreach.*
- *Support workshops, webinars, and other web-based learning experiences on contemporary topics emerging at both sub-regional and Basin-wide scales.*

*The culture associated with the Fish and Wildlife Program and the proponents conducting the restoration activities are evolving at an ever-increasing pace with the emergence of new technologies, knowledge, and environmental perspectives. The Program has an obligation to lead and assist in shaping the course of that evolution.*

- *Support proponents to participate in workshops, trainings, and other opportunities for disseminating information.*

The ISRP continues to believe that the above recommendations need to be given special emphasis in future reviews and that projects that perform well in one or more of these items be used as positive examples for other proponents. Additionally, we encourage Council staff to discuss these recommendations with BPA program managers to gain their support for addressing them in future proposals, proposal revisions, and project annual reports.

### **3. Fish management plans**

Common management plans and guiding documents would improve overall effectiveness and cost efficiency of projects in the same geographical area with substantial overlap of co-managers, focal species, and monitoring efforts. A coordinated management plan would create a common frame of reference, document evaluation and decision-making processes, and provide a historical record as projects evolve. Co-managers in major subbasins, such as Lake Roosevelt, Pend Oreille, Kootenai, and Coeur d’Alene, indicate that they work closely together, but they often base their management on separate guidance documents. A common management plan could coordinate management actions, field methods, data management, methods documentation, online data repositories, and adaptive management processes. Improved integration of multiple projects in the same geographic area also could improve the cost effectiveness of the overall suite of projects.

The ISRP found that proposals from projects in the same geographical area often referred to many different documents rather than citing a common guiding document to direct project activities and adaptive management. For example, the Resident Fish and Sturgeon Review includes 14 projects from the Lake Roosevelt area that are sponsored by the Colville Confederated Tribes (CCT), the Spokane Tribe, and their co-managers. These proposals refer to at least six separate guiding documents for Lake Roosevelt and the adjacent region (Lake Roosevelt Management Team 2009, CCTFW 2015a, CCTW 2015b, CCTW 2020, Kalispel Natural Resources Department 2017, Lake Roosevelt Management Team 2020). Many of these guiding documents did not explain the ecological basis for the management actions and provided incomplete information on project evaluation and adaptive management processes. New guiding documents recently completed (CCT Fisheries Management Plan 2020) or currently in

review (Lake Roosevelt Fisheries Guiding Document) may provide some of the coordination the ISRP recommends, and we anticipate that coordination and use of a common integrated framework will improve during the coming funding cycle. The comments we provide here for Lake Roosevelt also apply to other subbasins with multiple related projects.

The ISRP anticipates that this same issue will arise in the review of anadromous fish habitat and artificial production projects, and our recommendations should inform planning for that upcoming review.

*Recommendations:*

- *The Council and BPA should encourage and support development of integrated management plans by co-managers in major subbasins where multiple projects are implementing conservation and restoration actions for the same fish and wildlife species and habitats.*

#### **4. Synthesis documents**

The ISRP strongly recommends that groups of related projects develop synthesis documents that integrate multiple projects, analyze collective data, and create conceptual frameworks for future actions. Such a synthesis should address issues raised in guiding documents or management plans for their geographic areas. Numerous projects or groups of projects in the same geographical area have assembled many years of data and results, some of which are beginning to become available through online data portals. We believe that creating a process for producing a synthesis document can be one of a project's most valuable outcomes. It forces proponents to ask themselves what all their data mean scientifically and from a management perspective. The [Ocean Synthesis](#), [the Umatilla Initiative](#), the [Grande Ronde Model Watershed Synthesis](#) have guided adaptive management and identified future actions that evolved directly from the synthesis efforts. Many projects have long-term data sets, and synthesis of the ecology of the subbasin and status of focal species can guide future activities. The synthesis process also should identify areas where cooperation and streamlining of activities could save money and make funds available for other activities.

*Recommendations:*

- *The Council should identify projects or groups of related projects that have developed spatially extensive, long-term data sets that would benefit the Fish and Wildlife Program through collective analysis and synthesis.*

- *Synthesis reports should document the broader impacts of the projects by describing how they have influenced management, benefited society, or improved action effectiveness and efficiency.*

## H. References

- CCTFW (Colville Confederated Tribes Fish and Wildlife Department, Resident Fish Division). 2015a. Fisheries Management Plan for Stocked Waterbodies: Colville Confederated Tribes Resident Fish Hatchery. Colville Confederated Tribes, Nespelem, Washington. BPA Document ID P170669.
- CCTFW (Colville Confederated Tribes Fish and Wildlife Department, Resident Fish Division). 2015b. Operational plan: Colville Confederated Tribes Resident Fish Hatchery. Colville Confederated Tribes, Nespelem, Washington. BPA Document ID P170670.
- CCTFW (Colville Confederated Tribes Fish and Wildlife Department, Resident Fish Division). 2020. Fisheries Management Plan for Stocked Waterbodies: Colville Confederated Tribes Resident Fish Hatchery. Colville Confederated Tribes, Nespelem, Washington. In Press.
- Dunham, J., K. Gallo, D. Shively, C. Allen, and B. Goehring. 2011. Assessing the feasibility of native fish reintroductions: a framework applied to threatened bull trout. *North American Journal of Fisheries Management* 31:106-115.
- Hardiman, J.M., R.B. Breyta, C.A. Haskell, C.O. Ostberg, J.R. Hatten, and P.J. Connolly. 2017. Risk assessment for the reintroduction of anadromous salmonids upstream of Chief Joseph and Grand Coulee Dams, northeastern Washington: US Geological Survey Open-File Report 2017–1113, 87 p. <https://doi.org/10.3133/ofr20171113>.
- ISAB (Independent Scientific Advisory Board). 2018-1. Review of spring Chinook salmon in the upper Columbia River. ISAB 2018-1, Northwest Power and Conservation Council, Portland, Oregon, USA. (April 10, 2018) [www.nwcouncil.org/fish-and-wildlife/fw-independent-advisory-committees/independent-scientific-advisory-board/review-of-spring-chinook-salmon-in-the-upper-columbia-river](http://www.nwcouncil.org/fish-and-wildlife/fw-independent-advisory-committees/independent-scientific-advisory-board/review-of-spring-chinook-salmon-in-the-upper-columbia-river)
- ISAB (Independent Scientific Advisory Board). 2018-3. Review of the 2014 Columbia River Basin Fish and Wildlife Program. ISAB 2018-3, Northwest Power and Conservation Council, Portland, Oregon, USA. [www.nwcouncil.org/fw/isab/isab2018-3](http://www.nwcouncil.org/fw/isab/isab2018-3)
- ISAB (Independent Scientific Advisory Board). 2019-1. Review of predation impacts and management effectiveness for the Columbia River Basin. ISAB 2019-1, Northwest Power and Conservation Council, Portland, Oregon, USA. [www.nwcouncil.org/isab2019-1](http://www.nwcouncil.org/isab2019-1)

- ISAB (Independent Scientific Advisory Board). 2019-3. ISAB Review of the Upper Columbia United Tribes' Fish Passage and Reintroduction Phase 1 Report: Investigations Upstream of Chief Joseph and Grand Coulee Dams (Reintroduction Report). ISAB 2019-3, Northwest Power and Conservation Council, Portland, Oregon, USA.  
[www.nwcouncil.org/reports/isab2019-3](http://www.nwcouncil.org/reports/isab2019-3)
- ISRP (Independent Scientific Review Panel). 2012-6. Final review of proposals for the Resident Fish, Data Management, and Regional Coordination Category. 2012-6, Northwest Power and Conservation Council, Portland, Oregon, USA. [www.nwcouncil.org/fish-and-wildlife/reviews/final-review-of-proposals-for-the-resident-fish-data-management-and-regional-coordination-category](http://www.nwcouncil.org/fish-and-wildlife/reviews/final-review-of-proposals-for-the-resident-fish-data-management-and-regional-coordination-category)
- ISRP (Independent Scientific Review Panel). 2017-7. Final 2017 Wildlife Project Review. ISRP 2017-7, Northwest Power and Conservation Council, Portland, Oregon, USA.  
[www.nwcouncil.org/reports/final-2017-wildlife-project-review](http://www.nwcouncil.org/reports/final-2017-wildlife-project-review)
- ISRP (Independent Scientific Review Panel). 2018-8. 2018 Research project status review for the Columbia River Basin Fish and Wildlife Program and 2017 Research Plan. ISRP 2018-8, Northwest Power and Conservation Council, Portland, Oregon, USA.  
[www.nwcouncil.org/sites/default/files/ISRP%202018-08%20ResearchStatusReview28Sep.pdf](http://www.nwcouncil.org/sites/default/files/ISRP%202018-08%20ResearchStatusReview28Sep.pdf)
- ISRP (Independent Scientific Review Panel). ISRP 2019-2. ISRP Final Report: Mainstem and Program Support Category Review. ISRP 2019-2, Northwest Power and Conservation Council, Portland, Oregon, USA. [www.nwcouncil.org/reports/isrp2019-2](http://www.nwcouncil.org/reports/isrp2019-2)
- Kalispel Natural Resources Department. 2017. Kalispel Resource Conservation Plan.
- Lake Roosevelt Management Team. 2009. Lake Roosevelt Fisheries Guiding Document. March 2009.
- Lake Roosevelt Management Team. 2020. Lake Roosevelt Fisheries Guiding Document. Technical Draft. Bonneville Power Administration, Portland, Oregon. 93pp.
- Muhlfeld, C. C., S. E. Albeke, S. L. Gunckel, B. J. Writer, B. B. Shepard, and B. E. May. 2015. Status and conservation of interior redband trout in the western United States. North American Journal of Fisheries Management 35:31-53.
- UCSRB (Upper Columbia Salmon Recovery Board). 2014. Integrated Recovery Program Habitat Report. Upper Columbia Salmon Recovery Board, Wenatchee, WA.
- Warnock, W.G., D.H.P. Stroud, and J.E. Merz. 2016. Donor stock selection of Chinook salmon for reintroduction to the Transboundary Reach of the Columbia River. Report prepared for Canadian Columbia River Inter-Tribal Fisheries Commission, December 2016.

## IV. ISRP Recommendations and Comments on each Proposal

In this section, the ISRP provides recommendations and comments on each of the 44 projects in this review. Links are provided to the project proposal and, for most projects, the proponents' response to our preliminary review and, for some projects, a revised proposal. The proposals include a short description summarizing the project's purpose, major past results, and plans for the future; consequently, we do not summarize the projects in our comments. Following the links, our final recommendation and comments are given. For all but one of the projects, our final comments are followed by our preliminary report comments. These comments are provided as a record of our initial review and include comments on each proposal section and the questions we asked the project proponents to address in the response loop.

Our project comments begin with sturgeon projects and then are organized by geography (Kootenai, Lake Roosevelt, and so on) and entity (tribes, states, and such).

### A. Lower Columbia River White Sturgeon

#### 198605000 - Evaluate Sturgeon Populations in the Lower Columbia River

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Oregon Department of Fish and Wildlife

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The ISRP appreciates the proponents' thoughtful response to our comments on their proposal. In particular, they provided a detailed explanation of how data and modelled estimates are used to make harvest management decisions (response item 1. problem statement), and they provided several informative plots describing critical data and modelled estimates (response item 3. progress to date). This information should be included in the next proposal to facilitate review.

The proponents' response to our question on the sustainability of the current harvest regime (response item 2. sustainability of harvest regime) partly addresses our concerns. They indicate that the exploitation rates being used are similar to those applied to long-lived marine species. In our view, this argument is unconvincing because: a) marine fish populations are often overexploited; and 2) those rates are only applicable to Columbia white sturgeon if recruitment rates are similar. It is possible that recruitment rates for white sturgeon in the Columbia are

lower than for long-lived marine species (owing to impoundment or other factors), requiring lower exploitation rates. The second component of the proponents' response to our question on harvest rates is more convincing. They indicate that patterns in recruitment and age-structured abundance estimates show that recruitment is still occurring. We agree with this overall conclusion, and this underscores the need to maintain accurate abundance and recruitment estimates in all reservoirs where harvest is occurring. We note that recruitment indices for John Day Reservoir have been zero or near zero since 2013 (see Fig. 1 of the proponents' response), and that recruitment upstream of McNary Dam and in Snake River reservoirs has not been monitored since 2011 and 2005, respectively. In our view, these limitations provide strong support for the proponent's request to expand the scope of population monitoring into these systems (Project Additions A and B) but also the need for precautionary exploitation rates until data from these project additions are available.

The proponents' response to our comments on the need for open population models is appreciated, although the ISRP does not fully agree with all aspects of it. They first indicate that open models require amending annual estimates of abundance as more data become available, and that open models are not needed because only the most recent annual estimate is used to inform harvest management decisions. We do not agree with either of these arguments because the most recent estimate from an open model (or robust-design open model) will still be better than an estimate from a closed model and will likely have more realistic (wider) confidence intervals. More accurate "amended" estimates of abundance are preferred over less accurate ones, especially when retroactively examining the effects of harvest, and whether spawner abundance is limiting recruitment.

The latter part of the proponents' response to the ISRP's comment on open population models is thoughtful and demonstrates they have been exploring them. In The Dalles Reservoir, the open model estimated that abundance in 2014 was ~70,000 compared to ~87,000 based on the closed model. In 2008, the open model abundance estimate was ~70,000 compared to ~133,000 from the closed model. These differences in abundance estimates between models are large, supporting our recommendation to pursue development of an open model (or open-robust design model) for all reservoirs. The proponents indicate some hesitancy to pursue open models due to funding limitations. Presumably, the existing open model developed for The Dalles Reservoir could be improved and eventually applied to other reservoirs. This effort would provide insight on how the model performs over a range of data situations. In our view the costs of the additional analyses are minor compared to the total cost of the project, and we encourage the proponents to continue working on an open population modelling framework.

The ISRP finds justified two new elements identified in the proposal (Project Additions A and B) that will monitor abundance, age structure, and recruitment in Ice Harbor, Lower Monumental, Little Goose, and McNary reservoirs, and the Hanford Reach. This expansion is important, given uncertainties about the sustainability of harvest rates and effects of hatchery introductions.

The ISRP finds partially justified the other new elements that evaluate spontaneous autoploidy (SA) in Bonneville, The Dalles, and John Day reservoirs (Project Addition C), and study diet and contaminant burdens in white sturgeon in the lower Mid-Columbia reservoirs (Project Addition D). The rationale provided by the proponents for Project Addition C is that this would inform decisions on stocking. There is some support for this objective, although other important effects of stocking should be considered, like the resulting effects of higher densities on growth and maturation of wild sturgeon, increased exploitation rates on wild fish promoted through the presence of hatchery fish, and mixing of wild genomes with potentially maladapted hatchery genomes. The justification for Project Addition D is the weakest of all additions because the objectives of the diet component were not articulated in the proposal.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

Since its inception, this project has consistently provided annual indices of white sturgeon recruitment and harvest, and triennial estimates of abundance in the Bonneville, The Dalles, and John Day reservoirs. The proponents propose to expand the geographic scope of biological monitoring upstream to Lake Roosevelt and into the Snake River as far as Lower Granite Dam. They also propose new studies to collect information on ploidy, diet, and contaminants from fish in Bonneville, The Dalles, and John Day reservoirs. The proponents have explicitly avoided studying mechanisms of recruitment limitation.

Strengths of the proposal include a good problem statement and carefully framed SMART objectives. Funding for this project has remained constant, so the proponents identify costs for the new components separately in the event they cannot be funded. The proposal largely focuses on basic stock assessment, and the ISRP supports this focus given constraints on funding.

**Responses requested:**

To help us determine if the project meets scientific review criteria, the ISRP requests that the proponents provide responses to address the following issues:

1. The Problem Statement should be expanded to explicitly describe how recruitment indices, abundances by size range (i.e., below the slot size limit, within the slot size range, and above the slot size limit), and harvest data are used to make harvest management decisions.
2. Please provide evidence to support the assumption that the population is sustainable if two-thirds to three-quarters of future spawners are removed by harvest. The ISRP is

uncertain about the reliability of the productivity assumption inherent in the determination of annual harvest rates for fish within the slot size range and the resulting lifetime exploitation rates. In the short term, harvest rates can be adjusted based on estimates of abundance below the slot size and estimates of the number of spawners at large. But in the long-term, the sustainability of the population and fishery is uncertain, especially given considerable flow-dependent variation in recruitment. The problem statement should address this issue and better explain how short-term adjustments will be made.

3. The Progress to Date section is largely a list of deliverables. It should be modified to include a summary of key findings (e.g., time series of recruitment indices, and abundance and harvest estimates, such as presented in slides 6-10 of the presentation) and how the proponents interpret them with respect to harvest management decisions.
4. The proposal needs to discuss in more detail the utility of population viability models (PVAs) to determine minimum population size. Population persistence is an essential goal, but PVA-based estimates of minimum population size will be highly uncertain in the absence of productivity estimates (recruits/spawner) or a stock-recruitment curve. Current forecasts of the effects of variable recruitment and exploitation on persistence also seem highly uncertain.
5. The Methods section should be modified to provide a better rationale for the closed-population modeling approach used to estimate abundance. The targets for PIT tag application (4,000 fish) and mark rate (3-5%) should also be justified, or at least discussed. The methods used to estimate size-selectivity of set lines should be summarized and weaknesses discussed. For example, is it assumed that gill nets are not size-selective in determining the size-selectivity of setlines? If so, what data support this assumption?
6. Please provide more detail about the methods used to estimate catch rates, effort, and harvest rates, and the uncertainties in these estimates (see comments under Methods below).
7. Please comment on the feasibility of using an open population model as a more robust approach to analyzing the population data (see comments under Methods below).

## **Comments not requiring an immediate response**

### **1. Problem statement**

Correct the sentence which states that “age-0 indexing surveys annually in these three reservoirs through annual creel surveys.” Expand this section as described in the overall comments provided above.

### **2. Progress to date**

This section needs to be expanded considerably as summarized in the overall comment section. In addition, this section of the proposal should clarify the current trends in population abundance. The 2019 annual report states “*Overall abundance of White Sturgeon >54 cm Fork Length (FL) increased 18% from 191,893 to 225,861 in The Bonneville Reservoir from 2015 – 2018.*” In contrast, the Discussion section of the same report states “*This year-over year increase is predominantly due to a change in methodology. ... If the new gear vulnerability curve is retroactively applied to the 2015 data, it actually produces a slight decrease in this size class. This decrease is consistent with low catches of young-of-year (YOY) during age-0 sampling in recent years.*”

### **3. Goals and objectives**

No context is provided for the target uncertainty (5%) in abundance estimates, and this level of certainty does not seem realistic. As described in the overall comment section, a better rationalization for the PVA-based objective is warranted given very limited information on the productivity of the populations.

### **4. Methods**

The ISRP suggests that the proponents consider replacing their closed population abundance estimator with a size-stratified robust design open population model. The latter would provide estimates of abundance, recruitment to the marked population, and annual survival rates by size class. This model would provide more reliable estimates of abundance for pre-slot, within slot, and post-slot (potential spawner) age groups, and could also estimate growth rates to predict size transition probabilities. Estimates from this integrated growth-recruitment-abundance model could then be used to provide more reliable predictions of the lifetime exploitation rate (which depends on survival and growth rates) and potential spawner abundance (which helps determine if harvest adjustments are conservative enough to maintain the population).

It is unclear whether the triennial sampling regime provides a sufficient number of recaptures to support an open population modeling approach. Thus, it would be useful if the proposal included a summary of release-recapture data in matrix form (survey years as rows and columns, with each cell specifying the number of recaptures from releases in year 'x' recaptured in survey years 'x+3', 'x+6', etc.).

The proposal does not include estimated confidence intervals of closed population estimates, so the ISRP cannot determine whether the target mark application (4000 tagged fish) or rates (3-5% of population) are sufficient to meet the stated precision goals (+/-5%). Thus, the Progress to Date or Methods sections should include a table with sample sizes (number of recaptures), most likely estimates of abundance, and estimates of uncertainty in abundance, for each reservoir and survey year.

The method used to estimate effort, catch rates, and annual harvest rates should be described in more detail. The current method does not calculate uncertainty, an essential element of modern stock assessments, for any of these metrics. We recommend that the proponents update their modeling approach in this next phase of work so that uncertainty in all elements is computed. Decision-makers may be more cautious in harvest management (date when fishery is closed) if they were aware of the potential for considerable error in the number of fish harvested by any given date in the fishing season.

There is potential to substantially underestimate catch rates (and hence harvest) given a one-fish daily bag limit, as anglers that have been successful are more likely to leave before the creel is conducted, compared to anglers that have not met the bag limit. The proponents should describe how this potential bias is accounted for in the survey design or analysis. As a check on the estimated harvest, does the sum of estimated catches across three years explain the change in abundance of cohorts before and after they pass through the slot (as determined by mark-recapture model-based estimates of abundance)?

## **5. Project evaluation and adjustment process**

The most recent Annual Report states (on page 11): *“The Stock Assessments in Bonneville Reservoir in 2018 indicated that the overall abundance of White Sturgeon, including fish in the legal size (96 – 137 cm FL) slot limit has increased. The abundance of sub-legal size fish (< 96 cm FL), however, has decreased substantially. Because there are fewer sub-legal fish to grow into the slot limit than years past, a cautious approach is warranted. Harvest guidelines for Bonneville Reservoir were correspondingly increased from 650 to 1000 for 2019 through 2021.”* In what sense is this being cautious?

## **6. Potential confounding factors**

Have the proponents considered the extent to which trends in abundance and age distributions within reservoirs might be affected by migration among reservoirs? Presumably this could be (and perhaps has been) done by examining PIT-tag and genetic data. Also, what is the history of releasing hatchery-reared sturgeon into the reservoirs being surveyed in this project, and what is the prevalence of hatchery-reared sturgeon in the survey samples, either from direct release or from immigration from other reservoirs?

## **7. Timeline**

No comments.

## **8. Relationships to other projects**

The ISRP is aware of and has participated in region-wide white sturgeon workshops, but we feel that the Program may benefit from even greater interaction among proponents of white sturgeon projects. For example, proponents for projects in Lake Roosevelt and the Kootenai River are using open population models to estimate abundance and survival. Conversely, this (lower Columbia) project has produced a very informative flow-recruitment relationship, and more detailed study of recruitment in the Dalles and Bonneville reservoirs might improve understanding of recruitment limitation in the upper Columbia and Kootenai Rivers.

## **9. Response to past Council recommendations and ISRP reviews**

The proponents note that funding has limited their ability to investigate questions posed by the ISRP in previous reviews, but that these questions are being addressed in separately funded projects. However, it is not clear who is doing what, and how the work is being coordinated. This apparent lack of an integrated approach to address data needs for management was noted in two recent reviews by the ISRP (Sturgeon Framework review, [ISRP 2013-5](#), and Critical Uncertainty review, [ISAB/ISRP 2016-1](#), Appendix D). The proposal could be improved by clarifying which projects are investigating the questions previously posed by the ISRP.

## **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

The proponents frequently mention that the available budget precludes expanding the proposal to address research questions repeatedly raised by ISRP reviews. It is important that these questions are addressed, if not through this project, then through coordination with other projects. It remains unclear in this proposal how that will happen.

## 200715500 - Develop a Master Plan for a Rearing Facility to Enhance Selected Populations of White Sturgeon in the Columbia River Basin

- Box: [Original proposal](#) and [Response](#)

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

**Final recommendation:** Not applicable

**Final comment:**

This proposal from CRITFC and the companion proposal (200845500) from the Yakama Confederated Tribes cover a variety of planning, administrative, and financial accountability issues that are not amenable to scientific review. We recommend that the BPA contracting officer and Council consider budget issues related to the duration of the master planning process and the adequacy of procedures to ensure coordination and accountability of separate projects working to complete the same master plan.

In contrast, a rigorous scientific review has already begun as part of the Council's Three-Step Review process. In our last review ([ISRP 2016-5](#)), we recommended that the Hatchery Master Plan *Meets Scientific Review Criteria for Step 1 (Qualified)*. The Council approved funding to refine the master plan consistent with Step 2 and NEPA requirements. The ISRP looks forward to reviewing the Step 2 Master Plan when it is submitted.

Specific comments on the 2020 responses to ISRP requests (can be addressed in Step 2 of the Step Review Process):

### **Improve SMART objectives**

The response does not address the request to add or clarify implementation objectives that define tasks, timelines, and products for the next five years. The proponents include the original Gantt chart and indicate that they are working with BPA staff to develop a more detailed schedule for completion of Step 2 activities, including the NEPA review process. What is required, however, is a set of sequential objectives that clarify the steps the proponents will take to meet the Step 2 requirements and a schedule that indicates when various portions of the master plan will be completed.

The response helps to clarify the reference density in Objective 2.1 for limiting sturgeon biomass in enhanced populations response by pointing to Table 17 (page 125) in the Master Plan. The reference density is not specified explicitly but is said to be roughly equivalent to the current density in the Bonneville and The Dalles reservoirs (about 90 lbs. per acre).

The response acknowledges the ISRP's advice to add quantitative targets for precision and bias for each of the five variables in Objective 3.1. The proponents state they will address this issue in Step 2.

### **Information to adjust hatchery program**

The proponents were asked to describe the metrics and information that would be used to modify or terminate the hatchery program. The original proposal lists three conditions that would trigger modification or termination of the hatchery program without indicating how these conditions would be assessed and how they would trigger a decision to adjust hatchery targets. The response includes some additional information about the metrics (e.g., production level, survival rates), activities (e.g., surveys, studies) and decision processes (SMTF, project review meetings) that would inform the decision to adjust the program. However, more text and quantitative detail were expected about the metrics, decision criteria, the relevance of the selected metrics and how they will be used in the decision process.

### **Response to previous ISRP questions**

The response does not directly address our request for additional information on what is known about the possible effects of multiple catch-and-release stressors on re-maturation. Instead, the proponents point out that the hatchery program will not necessarily increase the capture rate or impacts of angling on wild sturgeon, and that annual fishing closures are designed to protect sturgeon congregating in spawning areas. The ISRP agrees that closing fishing near spawning locations likely helps to reduce stress on maturing sturgeon.

The response also includes additional references that indicate incidental mortality from capture and release is low and unlikely to cause a decline in population abundance. However, no evidence is provided to refute our suggestion that trauma from repeated catch and release may reduce reproductive effort of mature individuals, for example, by lengthening the re-maturation interval between spawning events. Spawning periodicity in female white sturgeon is thought to be two to four years and sometimes longer (Scott and Crossman 1979). Consequently, re-maturing sturgeon could be exposed to multiple stressors from catch and release events. We urge the proponents and their partners to consider ways to determine the incidence and reproductive consequences of multiple recapture events for individual re-maturing fish.

The response adequately clarifies that <5% of the tagged fish recaptured had originated in upstream reservoirs. In other words, 5% may be regarded as an upper limit for the estimate of immigration from upstream reservoirs. The proponents indicate that they are developing more detailed mark-recapture models to estimate annual rates of emigration.

## References:

Scott, W.B. and E.J. Crossman. 1979. *Freshwater Fishes of Canada*. Bulletin 184. Fisheries Research Board of Canada. 966 pp

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

## Overall comment:

The proponents provide compelling arguments that a hatchery program is the only feasible and cost-effective alternative for providing significant mitigation of lost fishing opportunities for white sturgeon in reservoirs in the lower Columbia and Snake rivers. These impoundments create more rearing habitat than existed previously, and they could produce substantial numbers of white sturgeon if effectively “seeded.” The proponents have made substantial progress in developing a Master Plan for a hatchery through the Council’s Three-Step Review process. The draft Step 2 Master Plan is scheduled for submittal for review in 2020.

## Responses requested:

To help us determine if the proposal meets scientific review criteria, the ISRP asks the proponents to address the following issues in their response:

1. Improve the SMART objectives as follows:
  - a) add *implementation* objectives that define tasks, timelines, and products that will be completed during the upcoming five-year project period.
  - b) In Objective 2.1, “levels consistent with those of productive impounded subpopulations” is too vague as a reference point for limiting sturgeon biomass in enhanced subpopulations.
  - c) In Objective 3.1, just adding the phrase “Increase precision and reduce bias” without indicating by how much does not make the objective quantitative. Moreover, it is not clear how precision and bias would be characterized for some of the variables in the list (e.g., limiting factors, broodstock limitations). As it stands, the objective means little more than “learn more about limiting factors...” We suggest splitting this single objective into five objectives to separately address the issues of limiting factors, habitat capacity, broodstock limitations, population parameters, and immigration/entrainment of natural sturgeon subpopulations.

2. Describe the metrics and decision rules that would trigger modification or termination of the hatchery program. The proponents list three conditions that would require modification or termination of the program, but they do not describe how the conditions will be measured or how assessment of conditions would trigger a decision to adjust hatchery targets.
3. Provide additional details to address two previous ISRP concerns ([ISRP 2016-5](#)). The numbers correspond to those assigned by the proponents in their draft Step 2 response.
  - a) #60 - We agree that the evidence from mark-recapture studies indicates that white sturgeon can survive repeated catch and release with high probability. Is there any comparable evidence to indicate that repeated catch and release does not reduce reproductive effort of mature individuals? It seems plausible that trauma from capture (by hooks for example) would reduce feeding rates following each capture-release event and that the cumulative impact might be to lengthen the resting period between spawning seasons. In other words, what are the arguments that an expanded catch and release fishery would not significantly reduce the reproductive effort by the natural population? How could any unexpected loss of reproductive capacity of the natural population due to an expanded catch and release fishery be detected and avoided? References to the growing literature on this topic in salmonids would be helpful.
  - b) #66 - The response states "an extensive data set has documented a very low incidence (<5%) of downstream movement of sturgeon among reservoirs." Does this indicate a 5% probability of movement annually or the cumulative prevalence of immigrants within a downstream reservoir? Because we are concerned about potential impacts of migration over a full generation, we would like to know the probability that a fish stocked within an upstream reservoir would move downstream from that reservoir in its lifetime.

### **Comments not requiring an immediate response**

#### **1. Problem statement**

The proponents have completed Step 1 of the Council's Three-Step Review process. The proposed program is consistent with the Council's Fish and Wildlife Program.

#### **2. Progress to date**

The proposal includes an excellent summary of progress to date, which includes a series of workshops (2009 – 2013) and a Master Plan that was approved at Step 1. The proponents are

now compiling environmental compliance information, engineering details, and finalizing facilities designs to meet Step 2 requirements.

### **3. Goals and objectives**

Three goals and corresponding biological objectives reflect desired endpoints that are expected to occur after the sturgeon hatchery becomes operational. The objectives under Goal 2 are quantified, but there are no timelines for completion. Two of the objectives are vague and should be clarified (as noted under the requested responses above). Also note the typo in Objective 2.4, “to effective” should be “the effective.” SMART *implementation* objectives should be added to define tasks, timelines, and products that will be completed during the upcoming five-year project period.

### **4. Methods**

The steps needed to complete the Master Plan are adequately explained. Complete methodological details are provided in the Master Plan Step 1.

### **5. Project evaluation and adjustment process**

Figure 72 in the proposal illustrates the steps and decision points for adaptive management once the hatchery is operational. The figure indicates key questions to be addressed by staff from CRITFC, ODFW, and WDFW at 5-year intervals. However, it is not clear how or if assessments of project actions will occur annually.

The proponents list three conditions that would lead to modification or termination of the program. How will these conditions be measured? What metrics and decision rules would trigger modification or termination of the hatchery program? More explanation is needed.

### **6. Potential confounding factors**

The proponents list possible ecological, demographic, and genetic impacts of hatchery operations on natural white sturgeon populations in mid-Columbia and lower Snake River reservoirs. They also acknowledge uncertainties associated with estimates of carrying capacity, abundance, and the extent of limiting factors. The Master Plan includes appropriate strategies to address these contingencies. The ISRP, again, suggests that benefits from the hatchery program might be undermined if public health concerns about contaminants in harvested fish were to increase.

### **7. Timeline**

A Gantt chart is provided to illustrate the scheduling of major activities from 2020 through 2025.

## **8. Relationships to other projects**

Relationships with BPA projects 1986-050-00 and 2008-504-00 are adequately described, but the relationship to the Sturgeon Management project (2008-455-00) is confusing and needs further explanation (see the ISRP comments for that proposal).

## **9. Response to past Council recommendations and ISRP reviews**

The proponents state that ISRP's comments on the review of the Sturgeon Framework ([ISRP 2013-5](#)) were generally favorable, which is true, but our review also included the caveats:

*“The move to fast-track sturgeon hatcheries and supplementation is strongly emphasized in the Framework. That emphasis may be warranted in specific locations, but the ISRP has concerns that release of hatchery juvenile sturgeon in the mainstem Columbia River above Bonneville may pose risks to the large self-sustaining sturgeon population below Bonneville. This self-sustaining segment below Bonneville is the foundation of future natural reproductive capability in the basin and perhaps throughout the range of the white sturgeon. Maintaining its viability should be the highest priority. Further justification for a hatchery approach and a discussion of risk assessment and monitoring should be added. Comments regarding the apparent success of hatchery programs (e.g., Kootenai) should be qualified in terms of the ability to hatch, rear, and release post age-0 fish. These successes, while impressive, do not necessarily equate with long-term viability of hatchery-reared fish as future successful parents of viable, naturally spawning fish.*

*Similar questions need to be asked about the relative reproductive success of hatchery origin sturgeon as are being asked for salmon and steelhead. Studies need to be designed to determine if hatchery sturgeon and their progeny are as reproductively competent as those originating from wild sturgeon. Unlike salmonids, where such an assessment can be evaluated in 10-15 years, a similar appraisal for sturgeon may take half a century.”*

Most of the ISRP's concerns (ISRP 2016-5) are addressed in detail in Appendix A (linked to this proposal). However, we are requesting clarification or more detail for responses #60 and #66 (see request 3 in requested responses above).

## **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No comments.

## 200845500 - Sturgeon Management

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Yakama Confederated Tribes

**Final recommendation:** Not applicable

**Final comment:**

This proposal from the Yakama Nation and the companion proposal (200715500) from CRITFC cover a variety of planning, administrative, and financial accountability issues that are not amenable to scientific review. We recommend that the BPA contracting officer and Council staff consider budget issues related to the duration of the master planning process and the adequacy of procedures to ensure coordination and accountability of separate projects funded to complete the same master plan.

In contrast, a rigorous scientific review has already begun as part of the Council's Three-Step Review process. In our last review ([ISRP 2016-5](#)), we recommended that the Hatchery Master Plan *Meets Scientific Review Criteria for Step 1 (Qualified)*. The Council approved funding to refine the master plan consistent with step 2 and NEPA requirements. The ISRP looks forward to reviewing the Step 2 Master Plan when it is submitted.

Specific comments on the 2020 responses to ISRP requests (can be addressed in Step 2 of the Step Review Process):

The response clarifies that project 200845500 would provide \$150K to cover personnel costs to ensure that experience and expertise in white sturgeon culture acquired by the Yakama Nation (through other projects initiated in the 1990s) would be properly utilized in helping CRITFC to develop the Master Plan for a Rearing Facility to Enhance Selected Populations of White Sturgeon in the Columbia River Basin (project 200715500). The response indicates that these two complementary projects were set up as separate contracts to facilitate timely administration and contracting and accounting, and that conceptually and scientifically, this project can be considered to be an essential component of the Master Plan project.

The proponents also clarify how their previous and continuing studies (funded by other sources) provide information that will help guide the culture of white sturgeon in the mid-Columbia Basin (below McNary but above Bonneville dams) and lower Snake River. For example, their research has helped to identify appropriate rearing densities and water requirements, and to develop (with CRITFC) the conceptual design for a mid-Columbia River sturgeon hatchery. The hatchery program being proposed differs from sturgeon culture activities in the upper Kootenai and in the transboundary region of the Columbia River in that substantially more juveniles will be reared and released.

The response does not adequately address the request for SMART objectives (ISRP Request 3). Instead the proponents refer to the accomplishments listed in their response to ISRP Request 2. These accomplishments are impressive, but they do not indicate what may come next. An exception is the statement that future investigations will examine how best to sort and grade juvenile sturgeon during the rearing period. This is an important topic because the growth rate of juvenile sturgeon can be highly variable in captivity, and sorting by size facilitates rearing. However, the proposed work should be more clearly delineated and linked to SMART objectives.

We note that the last annual progress report posted for this project is for 2016. It is not clear from the proposal or response what progress has been made since then.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

This proposal appears to be a component of BPA project 2007-155-00 (Develop a Master Plan for a Rearing Facility to Enhance Selected Populations of White Sturgeon in the Columbia River Basin) rather than an independent project. Much of the proposal, including the goals and objectives, was cut and pasted from the Master Plan proposal. The proposal requests an annual budget of ~\$150K for personnel to “assist in the hatchery master planning three-step process under CRITFC project number 2007-155-00” (as indicated in Methods, page 12, and discussion following the presentation at the ISRP review meeting on 3 March 2020).

**Responses requested:**

To help us determine if the proposal meets scientific review criteria, the ISRP asks the proponents to address the following issues in their response:

1. Explain why personnel costs for this work should be treated as a separate project instead of including them as a budget item in the proposal for BPA project 2007-155-00.
2. The Progress to Date section summarizes progress achieved by the Yakama Nation since the 1990s in developing and applying methods for the hatchery propagation of white sturgeon. The proponents should clearly describe the specific contributions of this project (2008-455-00).
3. The proposal should describe SMART objectives and deliverables for activities planned for this project in the next few years. The current text is identical to that in the proposal for project 2007-155-00.

4. Methods for activities in the Master Plan are adequately described, but it is not clear which methods pertain to work to be done under this proposal. Describe the specific activities being proposed. Presumably hatchery rearing and releases will continue, but are those activities part of this project?
5. The current text for Project Evaluation and Adjustment Process is identical to that in proposal for the Master Plan project 2007-155-00. Explain how work by this project would be evaluated as part of the Master Plan project or using the same adaptive management process.
6. The Timeline is identical to that proposed in project 2007-155-00. Explain how work particular to this project would be scheduled.
7. Clarify how activities funded through this proposal would continue to support the Yakama Nation's involvement in developing the Master Plan.

### **Comments not requiring an immediate response**

#### **1. Problem statement**

The problem statement refers to the Master Plan project (2007-155-00). It is unclear what the role of this project (2008-455-00) will be in addressing the problem statement given that the budget includes only personnel costs (as noted in the requested responses above).

This proposal also indicates three more specific purposes: (1) to develop Tribal expertise to effectively spawn and rear white sturgeon, (2) to use lessons learned during this process to provide information on costs and infrastructure needs to a regional aquaculture effort designed to restore white sturgeon in the mid-Columbia and Snake River reservoirs, and (3) to produce preliminary guidelines for how a Yakama Nation sturgeon hatchery should be operated until a more comprehensive Master Plan being developed by CRITFC is completed. The ISRP recognizes that gaining hands-on experience in sturgeon culture is important, and that each location for artificial culture has unique conditions (e.g., water chemistry and temperature, rearing vessel configurations, etc.) that may need to be adjusted to achieve acceptable survival and growth rates. However, under Progress to Date, the proponents indicate that they have successfully reared juvenile sturgeon at their Marion Drain hatchery since 2009. What additional experience and information is expected over the next several years?

#### **2. Progress to date**

This section summarizes the progress achieved by the Yakama Nation since the 1990s, but it is not clear what role funding through this project (2008-455-00) has had in that progress (as noted in the requested responses above).

No lessons learned from these endeavors are mentioned. The proponents should recount how their rearing methods have changed over time, what they have learned about where, how, and when to release hatchery reared sturgeon in reservoirs, and how their efforts to collect wild juvenile larvae may inform future attempts to obtain such fish. Successful methods of collecting sturgeon larvae in the upper Columbia have been developed and utilized by the Confederated Colville Tribes and Spokane Tribe of Indians. We urge the proponents to consult with these two tribes to determine whether larvae collection methods in the lower Columbia River might be improved.

### **3. Goals and objectives**

The goals and objectives are identical to those for project 2007-155-00. However, this proposal should describe SMART objectives and deliverables for activities specific to this project planned for the next few years (as noted in the requested responses above).

It appears that the actual purpose of this project is stated at the beginning of the Methods section (page 12): “Assist in the hatchery master planning three-step process under CRITFC project number 2007-155-00.” If this is the case, the proposal should be revised to describe the nature of that assistance and how it will be provided.

### **4. Methods**

Methods for activities in the Master Plan are adequately described, but it is not clear which methods apply to work to be done by this project. What specific activities are being proposed? Will the project generate data that need to be archived? How will results be shared?

### **5. Project evaluation and adjustment process**

The text in this section is identical to that in the proposal for the Master Plan project 2007-155-00. Explain how work supported by this project would be evaluated as part of the Master Plan project or using the same adaptive management process. It is not clear if retrospective reviews of project actions and targets will occur annually, and if other entities will participate in the review process.

### **6. Potential confounding factors**

The twelve items listed are implementation strategies, as stated, not confounding factors. Potential confounding factors (e.g., predation by non-native fishes, possible effects of spontaneous autopolyploidy on survival of hatchery juveniles, loss of genetic diversity or genetic swamping) should be identified. Another potential confounding factor is that benefits from the hatchery program might be undermined if public health concerns about contaminants in harvested fish were to increase.

## **7. Timeline**

The timeline is identical to that proposed in project 2007-155-00. Explain how work particular to this project would be scheduled.

## **8. Relationships to other projects**

The proposal includes a list of related projects but does not describe the role of this project in those relationships. Explain how funding through this proposal would continue to support the Yakama Nation's involvement with existing hatchery activities or in developing the Master Plan to expand hatchery activities.

## **9. Response to past Council recommendations and ISRP reviews**

The following comments from [ISRP 2009-22](#) remain unaddressed in this proposal (or in the Master Plan being developed in project 2007-155-00):

*"This project is closely affiliated with and complementary to the CRITFC proposal #200715500 but needs to provide more detail of how their actions will be coordinated with that project. Some linkages with other agencies are adequately described. However, it is unclear how this project will coordinate with ongoing activities by WDFW and ODFW, both of whom have some of the management responsibilities for sturgeon in the general region. ... Similarly, it is unclear as to how this proposed project will coordinate with or be part of the PUDs' (Grant, Chelan, and Douglas counties) White Sturgeon Management Plans."*

## **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

The budget is relatively small - \$150K annually to cover personnel costs. Thus, the role and duration this project appears more limited than is stated in the proposal. Again, it is not clear how this project contributes to the hatchery activities described in the Progress to Date section.

No estimated costs for the last two years of the project are included due to uncertainties about how other funding sources may contribute to the project and whether a central sturgeon hatchery will be built as planned. Given how long it takes to review hatchery construction plans, the authors could complete their budget assuming the facility will not be built and add a caveat that additional funds for personnel, supplies, equipment, etc. would be needed if the hatchery were to be constructed.

## B. Kootenai River including Kootenai White Sturgeon

### 198806400 - Kootenai River White Sturgeon Aquaculture Conservation Facility

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Kootenai Tribe

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The proponents provided clear and satisfactory responses to all the ISRP requests. They also provided excellent responses to most of our other comments that did not require an immediate response. In future proposals and reports, the proponents should reconcile differences in sturgeon population estimates for the Kootenai. The proponents indicate a current juvenile sturgeon estimate of 12,000 to 15,000, while the Kootenai River Resident Fish Mitigation project (# 198806500; Figure 4) suggests abundance of about 14,000 to 18,000 since 2006. Does the difference reflect different datasets, collection methodologies, or data analysis? An analysis and description of the basis for the differences should be completed.

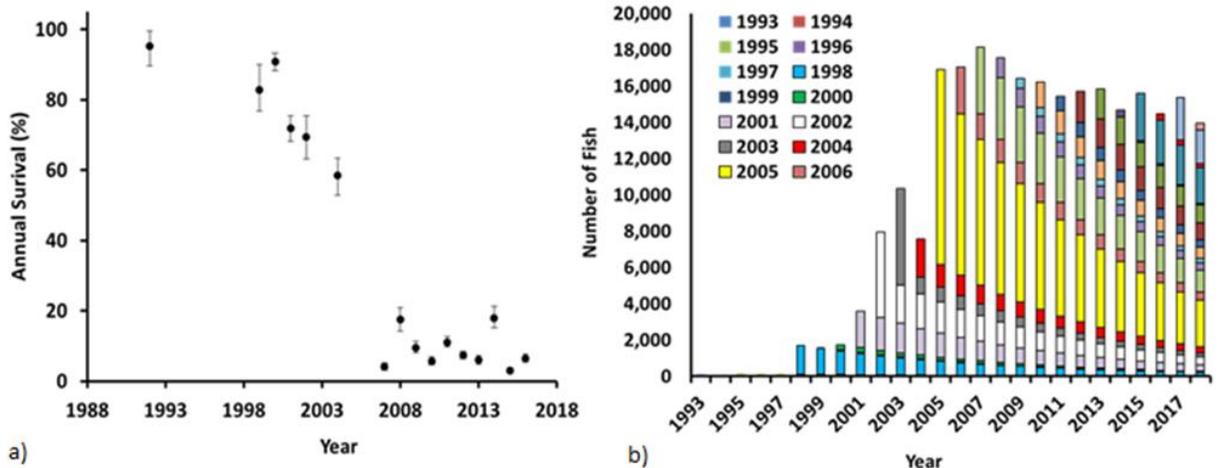


Figure 4 – Age-1 annual survival (a) and abundance (b) of juvenile hatchery fish stocked into the Kootenai River from 1992-2018.

**Preliminary ISRP report comments: response requested** (Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)

**Overall comment:**

This long-running project has quantitative objectives and has been adaptively managed to adjust hatchery rearing practices and fish release strategies (e.g., time, location, fish size) to benefit white sturgeon and burbot. The proponents also tried unsuccessfully to re-establish kokanee in the Kootenai River (Quantitative Biological Objective 3.1) and continue to include that objective as a placeholder for future activities should kokanee eggs become available.

Stocking of hatchery-origin white sturgeon has led to density-dependent reductions in growth and survival of hatchery-origin sturgeon, and likely also natural-origin sturgeon. Thus, overstocking has the potential to reduce natural reproduction and to conflict with the objective of restoring natural recruitment. The Transboundary Reach projects are developing a population model to better evaluate hatchery and harvest impacts. A similar effort would likely be useful for the Kootenai projects.

**Responses requested:**

To help us determine if the proposal meets scientific review criteria, the ISRP asks the proponents to address the following issues in their response:

1. Please clarify the goals related to kokanee in the Kootenai River. Some explanation of the role of the project in re-establishing kokanee in the Kootenai should be included if it is to remain a goal of the project.
2. Please explain the rationale for the white sturgeon targets of 8000 adults (age-26+) and annual natural recruitment of 700 age-3 fish (see suggestions in Goals and Objectives below).
3. More information is needed as to how polyploidy will be determined in the field. How will this be accomplished? Will the proponents be determining the rate of occurrence of polyploidy in wild sturgeon and, if so, how?

**Comments not requiring an immediate response****1. Problem statement**

The problem statement is clear, but there is no mention of kokanee.

**2. Progress to date**

This program continues to be impressive with respect to advancement of culture methods.

The rationale for the need for parentage-based tagging (PBT) for white sturgeon is not clear given that all individuals are PIT-tagged. Is the idea that PBT is needed for larval-stage releases

that are too small to PIT-tag but may be useful for assessing recruitment bottlenecks? Or is it to determine whether captured juvenile sturgeon that are not PIT-tagged are produced from hatchery-reared sturgeon? Will this method work if progeny are produced in part from wild-hatchery spawners, given that the genotype of all wild fish is not known? PBT analysis of burbot and the multi-life stage release strategy has the potential to substantively improve our understanding of factors that limit recruitment. The burbot culture and PBT program is impressive.

### **3. Goals and objectives**

While the meaning of many Biological and Implementation objectives can be inferred, the wording is not clear in several cases. For example, Biological Objective 1.1 seems to be missing some elements. Is this what is meant? “Sustain a hatchery-origin juvenile and sub-adult (ages 3-24) abundance of 12,000-15,000 in the Kootenai River in order to achieve and sustain an adult abundance of 8,000 26+ year-old adults (hatchery and/or wild) through 2045...”

Biological objective 1.2: “Through 2030, Kootenai River White Sturgeon adults (whether the current wild adults, future hatchery-origin adults, or a combination) demonstrate consistent natural in-river production of juveniles, with production of wild age-3 juveniles occurring at an annual average of at least 700 individuals over 10 consecutive years.” A more succinct wording is “Verify the production of at least 700 wild age-3 juvenile white sturgeon (as progeny of either hatchery-origin or wild adults) in at least 3 of every 10 years through 2030.” This objective could be followed by the qualifiers.

Independent of the wording of the objectives, what is the rationale for targets of 8,000 age-26+ and 700 age-3 juvenile white sturgeon? The current abundance of hatchery-reared juveniles in the Kootenai River is in excess of ~18,000 based on results presented in the Kootenai River Fisheries Investigation proposal. This abundance is above the stated goal.

Implementation Objective 2.2a indicates the plan is to collect 25 female burbot and cross them with 125 males to create 25 distinct “family groups” The proposal should explain why only maternal families will be tracked.

### **4. Methods**

This section was difficult to review because the methods are very complex. Understandably, the proponents have tried to simplify the text by citing other more detailed sources. However, in many cases the citations were not linked for easy inspection or not included in the past reports page of Taurus. Many of the sources appear to be gray literature that can be difficult to find. For example, the Aquaculture Manuals developed for this project (cited as KTOI 2016 on page

23) was not readily available. In some cases, the reader was referred to other project proposals that are still being reviewed.

It is not clear how 12n fish will be removed from the river and if or how their ploidy state will be determined in the field (as noted in the requested responses).

## **5. Project evaluation and adjustment process**

Much of the adaptive management is conveyed in the Progress to Date section, which contains information about how management decisions were made. The annual review working group of co-managers functions well, but there is little documentation here to show how decisions are being made.

## **6. Potential confounding factors**

No comments.

## **7. Timeline**

No comments.

## **8. Relationships to other projects**

This long-running project has connections and partnerships with others throughout the Columbia Basin.

## **9. Response to past Council recommendations and ISRP reviews**

The proponents have adequately addressed all the issues raised in the ISRP's review of the 2010 Master Plan. However, there is still little detail about monitoring. Previous ISRP concerns about sampling intensity have not been addressed. For example, the ISAB and ISRP Critical Uncertainty review ([ISAB/ISRP 2016-1](#), Appendix D) states "There is no information on how the fish will be sampled or the sampling intensity. These are major components of trend monitoring that need to be planned prior to introduction of the hatchery-origin fish." Also, it is not clear in the response to ISRP's question (#3) about harvest plans whether there is sufficient information to evaluate exploitation rates.

## **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No comments.

## 200200200 - Kootenai River Habitat Restoration Program

- Box: [Original proposal](#) and [Response and revised proposal](#)

**Proponent:** Kootenai Tribe

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The proponents provided thoughtful and detailed explanations to the ISRP concerns and questions, and these are greatly appreciated. In a few instances where definitive responses were not possible, they clearly indicate that they will consider the issues and respond at a future date.

The ISRP has two remaining concerns, which can be addressed in the next proposal:

1. Potential Confounding Factors: There was no direct response as to “how the potentially confounding effects of fertilization, habitat restoration, and hatchery inputs will be separated.”
2. While the ISRP appreciates that “the Tribe is acutely aware of the importance of social dynamics and beliefs, and the ways they can change over time,” we were expecting a more concrete and detailed discussion of how the Tribe will incorporate these issues into the programmatic strategies. It may be self-evident to the proponents, but it is often useful to articulate the strategy in writing. In the next proposal, it would be useful to the ISRP to see a full description of the role of the KTOI in the Kootenai Valley Resource Initiative.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP’s questions; see response link and final review above.)*

**Overall comment:**

This project, when combined with the nutrient fertilization program, is one of largest mainstem restoration efforts ever attempted. Overall, the progress to date has been extraordinary. The major challenge for the habitat restoration program is quantifying the biological benefits, and, in particular, benefits to the vital rates of focal fish species (white sturgeon, burbot, rainbow trout) that ultimately determine their abundance.

## Responses requested:

To help us determine if the proposal meets scientific review criteria, the ISRP asks the proponents to address the following issues in their response:

1. The proposal cites a mathematical model used to predict the most likely sites for sturgeon spawning habitat in the Meander Reach (Hatten et al. 2018), but those sites do not appear to correspond to the two pilot sites in this project. Did the authors of this publication work collaboratively with the proponents, in which case, why were different sites selected? If not, were the proponents unaware of the research by Hatten et al. (2018) or did they have reasons for not coordinating these efforts?
2. The only biological benefit reported due to the restoration work in the Braided Reach is an 11% increase in upstream movement of adult white sturgeon into what is thought to be better spawning habitat. It is not certain, however, whether this modest improvement was due to deeper pools or pool-forming structures. How will the proponents determine which feature was responsible for the increased occupation of this reach? How will they determine the appropriate restoration action to implement?
3. We ask the proponents to justify or adjust their interpretation of the data on the benefits of substrate enhancement in the Straight Reach. The map of white sturgeon position relative to these structures (Figs. 24 and 25) does not seem to support the statement "that some white sturgeon prefer the constructed features." This figure shows that white sturgeon more commonly occupy areas outside of the boundaries of the enhanced portions of the riverbed, and that they did not preferentially select enhanced areas. A similar pattern is indicated by the egg mat data in the Shorty's Island area (Fig. 29), which shows no evidence of improved egg and larval survival due to these structures (p. 52). The ISRP is concerned by this apparent misinterpretation of some of the few results directly relevant to the benefits of this project for white sturgeon.
4. What is the plan to eventually complete the Kootenai white sturgeon early life stage research (p. 21)? This important aspect of white sturgeon life history needs to be better documented.
5. Why was the microchemistry analysis of Kootenai white sturgeon fin rays (p.21) not feasible? The results would appear to be an important part of the white sturgeon life history puzzle.
6. What scoring process or criteria were used to "whittle down our list of potential restoration priorities" (page 72)?

## **Comments not requiring an immediate response**

### **1. Problem statement**

A very thoughtful, well-articulated presentation.

### **2. Progress to date**

The proponents provide an excellent summary of how they have developed a comprehensive process to restore habitats and native fishes in the long term.

This section of the proposal is, however, very complex to evaluate because it contains long descriptions of activities yet does not provide rigorous evaluations of biological responses or links to rigorous evaluations that would satisfy a skeptical reviewer. Fortunately, the draft 2020 synthesis document contains more detailed evaluations and figures, which provide reassurance that this complex project is indeed making good progress.

### **3. Goals and objectives**

The proponents have developed commendable SMART objectives. However, the timelines are sometimes confusing. Several of the biological implementation objectives are for the years 2014 to 2017, suggesting that they have already been completed, whereas some objectives have desired outcomes for 2030 or 2040. It may be helpful to distinguish these as interim versus ultimate objectives.

The qualitative social, cultural, and economic objective 1 (program-scale strategy), while convincingly written, does not provide enough specific details to allow later evaluation. What will be actually accomplished during the funding cycle? The outline (Table on p. 67-68) provides a solid template for providing a timeline of specific activities to be accomplished by 2025.

Finally, we have assumed that the sub-section “Studies” starting on page 92 describes planned work in three topic areas: (a) resource availability, (b) nitrate loading, and (c) spatial variation of fish assemblages. The first two topics are followed by a list of “objectives” that are very general, e.g., “Compile foodweb data for data review and synthesis.” Is our assumption that these are simply ideas for future studies correct? If not, these “objectives” will need to be converted to discrete SMART objectives.

### **4. Methods**

This section provides considerable general information on what the proponents wish to do but little information on the specific methods that will be used. Additionally, with the widely variable timelines identified in the previous section, it remains unclear as to what will be accomplished during the funding cycle.

The ISRP asks the proponents to address three concerns listed as requested responses above.

### **5. Project evaluation and adjustment process**

The proposal includes a good overview of the annual workshop process. The sample agenda and diagram showing annual adaptive management cycle tailored for this project are helpful and reassuring. However, there should also be an agreed-upon cycle for longer-term review, perhaps every five years. It does not seem reasonable or efficient to attempt to review and adjust the vision, goals, and biological objectives annually.

### **6. Potential confounding factors**

This section is well articulated, but there is no discussion of how the potentially confounding effects of fertilization, habitat restoration, and hatchery inputs will be separated. A major uncertainty is missing: social dynamics and beliefs, and how they might change in the coming years. This uncertainty is a concern because water rights, land, and timber are increasingly controlled by large corporations from outside the region, and government regulations will likely change – on both sides of the border – in response to political pressure.

### **7. Timeline**

The timeline helps to clarify what the proponents hope to accomplish with this proposal during this funding cycle. However, Tables 10 and 11 do not show monitoring and evaluation activities.

### **8. Relationships to other projects**

While this project is well coordinated with other projects, the overlap of the actions of this project with those of other projects is unclear. The ISRP is gratified that other organizations are recognizing the comprehensive approach and successful actions being performed in the Kootenai ecosystem.

### **9. Response to past Council recommendations and ISRP reviews**

The ISRP continues to encourage the proponents to publish their results in scientific journals. The fact that the program is already known internationally (page 112) reinforces the need to share results of the work to a wide audience. The program's adaptive management plan developed in response to ISRP comments (page 114) is a fine example that should be shared with proponents of other projects. The draft synthesis report looks excellent (upon quick inspection) and was very helpful in reviewing this project. We will provide a review of the draft synthesis report in our final report.

## 10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)

What portions of the restoration actions will be supported by funds from this project and what proportion will be supported by funds from other projects or sources? For example, it seems logical that the nitrate loading topic should be funded by the fertilization project (1994-049-00).

### 199404900 - Kootenai River Ecosystem Restoration

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Kootenai Tribe

**Final recommendation:** Meets scientific review criteria – conditional

#### **Conditions:**

The ISRP appreciates the proponents' efforts in responding to our wide-ranging concerns. This complex project has many essential environmental components that collectively contribute to a connected, well-functioning ecosystem for the Kootenai/y. Some responses clarified and justified the scientific activities, but the ISRP still has significant questions about several project components. As a result, further resolution is needed in some instances and, as well, the responses raised a few additional questions.

The ISRP requests that the proponents address the conditions below and respond point-by-point to each condition. The response can be a report to the ISRP with detailed answers to each of the conditions, a revised proposal with highlighted changes, or an addendum to a revised proposal. The ISRP's preference is for the proponents to revise their proposal to ensure that the additional information requested is easily accessible by Council, BPA, and the public in a single document. A revised final proposal that includes and integrates all information will guide the project for the next five years and facilitate future project reviews. Understanding the need for flexibility, the ISRP suggests that the proponents and the Council staff agree on a mutually determined date for a response, preferably by the end of 2020 or early in 2021. If additional clarification regarding our review is needed, the proponents are encouraged to request a follow-up meeting with the ISRP.

The conditions for the Kootenai River Ecosystem Restoration project (see below) are consistent with recent ISRP recommendations ([ISRP 2020-6](#)) for improving the Kootenai Synthesis Report to meet a qualification of the 2012 Resident Fish, Data Management and Program Coordination Category Review. Despite this overlap, we request that the proponents directly address the conditions given for this proposal in a separate report to the ISRP. We expect, however, that responding to the conditions placed on this proposal will be useful in revising the Kootenai Synthesis Report to address our concerns with the Report as well.

**Condition 1. Kootenai River fertilization:** The ISRP asked for more robust analysis to increase confidence in the effects of the fertilization program on fish populations. The proponents acknowledged our concerns of their analysis and interpretations in their response, and indicated they would like to improve the program, but they did not provide a strategy or indicate that a plan would be developed. A strategy to improve the program, including reasonably detailed plans, is needed to guide the activities, to illustrate how the results are used in decision-making, and to eventually determine if the fertilization project has been successful. For instance, data are needed to support the inference that the downstream reaches lacked the productivity to support the KTOI-stocked fish, and to provide some indication of what timing and concentration of fertilization is needed to achieve the required productivity. Further examples of the need for strategically linking data and findings are detailed below.

The ISRP questions the proponents' conclusion, based on CPUE data, that there is a positive fish response even though "all lines of inference suggest that the Rainbow Trout population was already increasing prior to the implementation of the nutrient addition program and that CPUE-inferred increases in Rainbow Trout abundance occurred in both the control and treated reaches of the river." The proponents discuss a change in fishing regulations that reduced rainbow trout harvest, which is used to explain why the trout were increasing prior to fertilization. They hypothesize that fluvial rainbow trout in the mainstem Kootenai River migrate upstream, within, and downstream from the nutrient project's control site to spawn. If this hypothesis is true, is the experimental design of the study still valid? Recognizing these potential limitations, the IDFG has proposed alternate methods for evaluating the effect of fertilization on trout, but further detail is needed to understand and evaluate the new methods. For instance, if harvest is being incrementally and/or frequently adjusted, based on fish population response, then this could be a continuous confounding factor as to the real effect of fertilization. The proponents should demonstrate that their collective actions with collaborators are coordinated and promote an adequate, statistically robust study design.

The ISRP requested clarification on the timing and duration of nutrient additions to the river. The proponents provided important context about the permitting of the nutrient program. However, the response did not provide the requested evidence to support the extension of the annual fertilization period, except to say that their group concluded that it was necessary in 2009-2010. While the proponents say that they have "convincing [evidence] that most of the P is rapidly taken up and mostly depleted within 15 km of additions and that changes in our current protocol would be beneficial to productivity," it is not clear how the spatial uptake of nutrients leads to the conclusion that earlier initiation of fertilization is beneficial.

Additionally, the proponents state that "these river reaches do not have the productivity necessary to support the increasing fish biomass from the KTOI conservation aquaculture program." What is the evidence for this conclusion? Have bioenergetic or other models been

used to determine if this is correct? Otherwise, how does one know if it may be true? The proponents should provide the data and analyses used to support this critical assertion.

**Condition 2. Lake Kootenay fertilization:** In response to ISRP concerns that the South Arm fertilization is failing to recover kokanee, the proponents argue that the kokanee initially responded to nutrient additions and that the declines over the past 7 years are likely associated with rising piscivore abundance (Gerrard rainbow and bull trout). The proponents assert that predator management is the key to restoring kokanee and are planning predator removal efforts for the near-term forward, though details are not provided on predator removal plans. They emphasize the need for continued fertilization to provide food for the recovering kokanee and other river fish (e.g., burbot, sturgeon). While the proponents may be correct that kokanee abundance is a long term and possibly cyclic process, the ISRP remains concerned about other predators of zooplankton (e.g., mysids, other invertebrates) or other bioenergetic pathways that may become dominant. The lake is a complex and dynamic ecosystem. The proponents have not provided quantitative evidence or analyses to demonstrate with reasonable certainty that kokanee eventually will be the dominant beneficiary of the added fertilizer.

The ISRP felt that there are three main limitations to the proponent's responses to our comments about the fertilization of the South Arm:

a. They do not acknowledge that the trends in zooplankton data may have been misinterpreted. For instance, the recent upward trend in zooplankton abundance may be due to the collapse of kokanee predation on zooplankton rather than a positive effect of fertilization. This suggests that the proponents are not considering alternate ecological pathways.

b. The proponents do not describe how they will control the predator populations, which are highly valued (Gerrard trout) and a species of special concern in British Columbia (bull trout), to reduce predation on kokanee. Gerrard trout abundance is already low, at only ~1/3 of the historical abundance. It is not clear how much more the proponents want to reduce abundance and what the potential risks are. As well, information on bull trout abundance is lacking, so evaluating the efficacy of control measures will be problematic. As well, these are native predators and public appetite for reducing their abundance likely will be limited, especially given that the original purpose of the fertilization project was to enhance their abundance. Gerrard trout abundance collapsed in 2015, and there is still no concrete plan to restore them. The ISRP cannot scientifically review the scale and efficacy of a predator control program that is only vaguely described, much less consider its justification.

c. Finally, and most importantly, the proponents fail to acknowledge that fertilization may be contributing to the unstable kokanee-predator dynamic in Kootenay Lake. Gerrard trout escapement to the Lardeau River has been monitored for decades, and well before initiation of fertilization. It therefore seems possible that the 2015 collapse was at least partly caused by an instability between predator and prey interactions resulting from fertilization. Yet the only

solution offered is to control predator numbers so that kokanee can recover. If there is evidence to the contrary, the ISRP would like to be made aware of it.

Based on the data provided to us, the statements contained in the revised objectives, and the admission that the fishery objectives are not being addressed (p. 26), the ISRP concludes that the Lake Kootenay South Arm fertilization is not working as intended. Therefore, the ISRP recommends that additional information, analyses, and justification be provided regarding the South Arm fertilization program and for ISRP examination as to whether it meets scientific review criteria, before the next planned fertilization in spring 2021. The work, as currently described, does not meet scientific review criteria.

**Condition 3. Revised objectives:** The objectives related to Goals 2 and 4 do not meet the criteria for SMART objectives. They should be revised and resubmitted to the ISRP for evaluation as part of the response to conditions.

**Condition 4. Proposed new fertilization facility:** Since it is highly likely that a new facility will operate for several decades at considerable costs, the ISRP has a responsibility to review the overall management plan before the site is selected and construction begins. The management plan should describe criteria for choosing the fertilization and the reference sites, explain why specific application and reference sites were chosen, evaluate the physical characteristics of the reach to be fertilized and any factors that will affect dosing rates (e.g., extensive hyporheic exchange), and state in quantitative terms the desired outcomes. The ISRP recommends that implementation of a new fertilization facility should be paused until a management plan and adequate data to support the additional fertilization actions are provided and found to be scientifically justified by the ISRP.

While the ISRP appreciates the timeline for developing the additional site, the response provided no evidence that the braided and meander reaches are limited by unnaturally low productivity. Given the data collected by IDFG, quantitative information should be available to demonstrate that Libby Dam adversely limits natural levels of ecosystem productivity, and that fertilization would be an appropriate and effective restoration action. Such analysis is critical and has not been included in the proposal to justify initiating the fertilization project in the braided reach. The ISRP would like to examine the analysis and supporting data that the project partners used in reaching that working assumption. The analysis and data used needs to be presented as a separate section in the management plan document.

**Condition 5. Cyanobacteria:** The response to ISRP concerns regarding cyanobacteria highlights the variability in density over time and the rising ambient N loads in the river. The response acknowledges the spike (35% of the sample) in a dry and warm year and that the two datasets have conflicting results. The ISRP was not able to find the referenced project summary report (Figure 67, page 54), but KTOI's biomonitoring project indicates that cyanobacteria have "remained below 20%." The ISRP is not convinced that this reference level is ecologically

acceptable and within normal ranges for the river. Please document whether or not this reference level is a risk to environmental and human health.

The ISRP was concerned by the proponents' confidence that a harmful algal bloom will not develop, without any evidence to support that claim, and the lack of a plan for responding to rising cyanobacterial abundances. Particularly given the increased N concentrations, the management plan for the proposed fertilization site should clearly document how the proponents would adjust fertilization concentrations, timing, and releases to respond to a harmful algal bloom. Is it the proponents' belief that no feasible amount of titrating P will push the Redfield ratio back to its 2005 level (or lower)?

**Condition 6. Synthesis article:** The ISRP is excited to learn of this interest and appreciates the invitation to participate. However, to maintain our independent role, we cannot join the writing team, as much as we might like, but we commend the proponents' for planning a synthesis publication.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The Kootenai River fertilization project is impressive, and likely one of the most rigorous and intensive restoration efforts on a large mainstem river ever attempted. This effort has made a significant contribution to the primary literature on ecosystem response to fertilization (eight papers in primary journals, four papers in preparation). These results indicate that the project is making good progress toward achieving the intended benefits.

While the response of the monitored fish populations in the Kootenai River is promising, the ISRP found that a shift towards better evaluation of fertilization effects appears warranted on fish populations, and in particular rainbow trout, burbot, and white sturgeon. The response of rainbow trout (one of the target species) to fertilization is not as strong or clear as it is for suckers and mountain whitefish. A mark-recapture program would quantify somatic growth rates of individuals upstream and within the zone of fertilization influence, and also residency in each zone. As well, there is no mention of benefits for white sturgeon or burbot, yet nutrient limitation is one of the dominant hypotheses for recruitment failure (see Kootenai River Fishery Investigations proposal). These species are already tagged (PIT and PBT, respectively), and recapture data could be used to determine if growth rates or residency is higher in the fertilization zone.

The South Arm fertilization program is not resulting in improvements to fish populations. The Kootenay Lake program appears to only recognize food (plankton) as limiting. High rates of predation on kokanee by Gerrard rainbow trout and bull trout have reduced kokanee populations throughout Kootenay Lake to historic low levels, which ultimately led to the collapse of the Gerrard rainbow trout population (Andrusak 2015). The ISRP does not follow the logic of continuing to fertilize the South Arm to produce more plankton (Schindler et al. in press) as few kokanee are present to take advantage of greater food availability. High predation pressure from bull trout and a potentially recovering Gerrard trout population are likely bigger limitations on kokanee abundance. The poor status of kokanee and Gerrard trout populations is concerning, yet the proposal makes no mention of whether South or North arm fertilization will be curtailed. In addition, a significant portion of the budget is used to support scientific assessments that are reported rarely in gray literature; the record of primary publications is very weak. Thus, the South Arm component of this project seems hard to justify.

The ISRP has a suggestion for the proponents to consider. We believe a synthesis article in the peer-reviewed literature is critically needed to document how long-term mitigation efforts at large spatial scales are required to address ecological impacts of river impoundment. Worldwide, the number of dams under construction and the number of proposed dams is staggering (tens of thousands). The proponents have an opportunity, if not a responsibility, to share their findings and insights with the rest of the world. While the Kootenai/y ecosystem restorations/investigations are important, the lessons learned are vital for those in other regions where new dams are under construction or will be soon. Most of these regions do not have the financial resources or the political will to conduct long-term mitigation.

### **Responses Requested:**

The ISRP requests responses to the following questions and issues to help us better understand the scope and potential outcomes of the Kootenai/y restoration program:

1. Objectives: While some of the objectives (i.e. under Goals 1 and 3) are well written, others (i.e. under Goals 2 and 4) need to be revised as SMART objectives. Re-stating these objectives should provide the language that allows them to be evaluated in future years.
2. The ISRP was unable to evaluate the scientific merit of the additional nutrient augmentation site because adequate details were not provided. The ISRP requests that the KTOI and their partners prepare a scoping document, for review, that details the proposed activities. This document should also include data supporting the need for the facility, how the different physical setting will be considered in the dosing and in the

expected ecological responses to the fertilization, as well as the timeline and costs. In addition, the proponents should clarify if baseline, pre-treatment data are available for this new site (i.e., similar to data that were so useful in the evaluation of the original fertilization site).

3. Please clarify whether investigations were conducted to explore limitations due to micronutrients being trapped or altered by Libby Dam, especially silica since it is vital for diatom growth. If there are any existing micronutrient limitations (e.g., K, Mg, Ca), how are they interacting with P-limitation?
4. Please clarify whether the percentage of blue-green algae (cyanobacteria) has been increasing over the past five years. This finding was mentioned in the presentation but somewhat contradicts information provided in the report: page 22: "Proportions of blue-green algae remained similar over time for all of the river zones, remaining largely below 20% on an annual basis." In addition, it raises questions about what adaptive management processes should be in place to ensure that the project does not push the system towards a periphyton/phytoplankton community characterized by excessive growth of cyanobacteria. The ISRP requests that the proponents explain how their adaptive management process will address this issue.
5. Explain if (and how) drift rates of macroinvertebrates are measured. Could invertebrate drift rates be considered as an index for food availability for sight-feeding fishes (e.g., trout)?
6. Please explain why a positive fish response to nutrient additions can be inferred even though the Catch Per Unit Effort (CPUE) of rainbow trout increased in both the control and the treatment sections. Is current CPUE monitoring adequate to determine causal relationships? In our view, more detailed mark-recapture information is needed to determine if growth rates of trout are higher in the treated versus control sections and the extent of movement between these areas that may explain the positive response in CPUE in the control reach.
7. Please describe how the improved fish production in the Kootenai River is being harvested (e.g., recreational fishing) or used in some way by the KTOI or the public. Considerable effort and money are spent to improve fish production, and it appears to be effective in Kootenai River, but not in Kootenay Lake. Provide details on fishing effort and catches, as well as impacts on fish population dynamics, the local economy and Tribal community. If the improved fish production is not being used, is there an abundance threshold (by species) above which harvest will be allowed? In addition, are improvements seen in largescale sucker and mountain whitefish populations due to fertilization also translating into benefits for target populations such as burbot and

white sturgeon? For example, is there any evidence that burbot or white sturgeon are more productive (i.e., growing faster) in response to higher prey availability?

8. The ISRP is concerned that the addition of nutrients to Kootenay Lake is failing to meet the objective of increasing abundance of kokanee and the top predators Gerrard rainbow trout and bull trout (that feed on kokanee). British Columbia has a long history of lake fertilization projects. Some projects have been successful and others not. How do the results from Kootenay Lake compare – in a general sense – to the results seen from other lakes in the province? How are the results from the BC lake fertilization program being used to inform activities on Kootenay Lake? Similarly, are the methods that increased kokanee abundance in Dworshak Reservoir (fertilization) and Pend Oreille Lake (suppression of non-native fish) being considered to mitigate negative trends in Kootenay Lake?
9. The statement (p. 52) that “Target Catch-per-unit-effort will be greater than 840 fish per hour, with total fish community biomass -per-unit-effort greater than 162 pounds per hour, within a well-balanced native fish community by 2030” seems optimistic and needs clarification. For instance, what method is used to determine catch-per-unit-effort (e.g., nets, angling), what species are targeted, over what area and time period, and what will be the expected impacts on species population dynamics?
10. In their presentation, the proponents mentioned that they plan to begin fertilization earlier in the season than in past years, but they did not state when this change would occur, or if it was certain to occur. The ISRP requests the proponents to explain the biological rationale for either restricting the nutrient addition period from June to September or expanding the period to earlier in the Spring. Periphyton actively grow throughout the year and especially so in early spring (i.e., March/April). As well, lag times of at least several weeks are expected as the nutrients and organic matter move through the food web before increasing fish growth or survival.
11. By what date do the proponents plan to have the methods for the Kootenay Lake studies published on the [MonitoringResources.org](http://MonitoringResources.org) website?
12. Was the food-web modeling funded? If not, why is the modeling not being requested in this proposal?
13. Budget: It appears that a significant portion of the budget is supporting fertilization and studies in Kootenay Lake, where the fertilization treatment appears to be having a negative effect on fish populations. Data on the declining trends in fish populations are not being widely shared. There is no mention of the fish population trends in the recent synthesis of Kootenay Lake phytoplankton and zooplankton responses to fertilization

(Schindler et al. in press). This paper incorrectly attributes the most recent increases in zooplankton to fertilization rather than to the more likely cause of reduced grazing pressure due to the collapse of the kokanee population. There is not enough detail in the budget to determine the precise portion of the budget dedicated to this objective. The ISRP, unless convinced otherwise, will recommend that this part of the project (Kootenay Lake) be terminated because it does not appear to be producing the intended benefits.

### **Comments not requiring an immediate response**

#### **1. Problem Statement**

The statement provides a detailed summary of the many threats facing the Kootenai system, as well as the justifications for working there (e.g., location, high ecosystem function, existing partnerships). The project takes a food web perspective at the effects of nutrient addition. The inclusion of “sustainable human communities” in the statement of goals is unique and commendable. Will there be any assessment of its success? In general, the significance to the Fish and Wildlife Program, the BiOp, and other regional plans is well articulated.

The problem statement could be improved by providing quantitative information on how climate change, and social, political and economic factors, are impacting the Kootenai ecosystem now and into the near future. The ISRP is interested in learning about current trends in important factors as well as the projected consequences of those trends. For instance, how many new species are expected to arrive in the next decade and are any of them expected to have a significant impact on the Kootenai ecosystem? As well, it would be informative to have a list of the “exceptional opportunities” for restoration in the coming decade, at least the ones that might be achievable.

#### **2. Progress to Date**

The ISRP found the progress to date statement to be marginally adequate and has a number of questions and concerns listed under responses requested above. Other comments not requiring an immediate response include:

- Many of the figures (e.g. Figures 1 & 2, pages 19-20) need better explanations of lines so the reader need not look back through the text to understand what the treatments are.
- Lessons learned (primary productivity) states: “Later years have seen significantly lower algae biomass levels even with nutrient addition. This is likely due to macroinvertebrate grazing pressure, differences in Libby Dam operations, and differences in nutrient

loading between wet-years and dry-years.” Will the proponents be testing hypotheses as to why algae biomass declined?

- The fertilization program is based on extensive data and understanding of the nutrient dynamics and food web and has been developed through collaboration with academics and fish management agencies. However, it seems like some details of the food web dynamics (e.g., role of carbon) could be better understood, which might help the proponents understand some of the mixed results, or more importantly how changes in hydrology and N loading should impact fertilization treatments.
- The ISRP is impressed that harvest is now allowed for burbot. Details on harvest rates and impacts on burbot population dynamics would be appreciated.
- The ISRP had difficulty locating the Peck et al (2019) article on the Kootenai Lake fertilization project and could only find one other report describing the project from the list of publications at <http://kootenaiisrpreview.org>. As a consequence, the methods employed and the results are not fully transparent. The ISRP would appreciate learning more about the activities and plans for synthesis.

### **3. Goals and Objectives**

The ISRP found the goals and objectives statement to be generally adequate but see the first response requested above. Other comments not requiring an immediate response include:

- Will nutrient addition need to continue forever? The term “restoration” implies that at some time the system will be self-sustaining.
- It is not clear how the specific objectives of secondary and tertiary productivity relate to the ultimate objective of increasing abundance and productivity of native fish populations. For example, what is the rationale for the 162 lbs/hr goal for Kootenai River or the 65,000-140,000 kokanee spawning target in the south arm of Kootenay Lake?

### **4. Methods**

Some clarification of methods is called (see list of responses requested above). The ISRP commends the proponents on their use of BACI, BA, and other project design and analyses methods.

### **5. Project Evaluation and Adjustment Process**

This project maintains a desirable feedback loop between collecting data, disseminating results to stakeholders, and making project adjustments.

## **6. Potential Confounding Factors**

The statement on potential confounding factors is adequate. The proponents provide insightful discussion about the major confounding factors and uncertainties but do not indicate how they will respond to these factors. They do not mention how effects of physical habitat restoration in the Kootenai River on fish populations will be separated from fertilization effects on fish populations. Negative effects of hatchery fish on growth and survival of naturally recruited sturgeon is also a confounding factor.

## **7. Timeline**

While generally adequate, this section is very lean on details and does not include data synthesis as a key category. The ISRP feels that the timeline could be more finely tuned to activities on a monthly basis.

## **8. Relationships to Other Projects**

The statement describing relationships to other projects is adequate. The various projects in the Kootenai River and Kootenay Lake appear to be integrated and cooperating well with each other.

## **9. Response to Past Council Recommendations and ISRP Reviews**

The ISRP found the statement responding to past Council recommendations and ISRP reviews to be adequate.

## **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

The ISRP found the statements responding to the miscellaneous sections to be adequate.

### **Literature cited:**

Andrusak, G. 2015. Gerrard Rainbow and Bull Trout In-Lake Population Abundance. Report prepared for Fish and Wildlife Compensation Program – Columbia (project F-F16-05) by Redfish Consulting Ltd., Nelson BC.

Schindler, E.U. and others. In press. Characterizing the phytoplankton and zooplankton communities in Kootenay Lake: a time series analysis of 24 years of nutrient addition. Can. J. Fish. Aquat. Sci. (in press).

## 198806500 - Kootenai River Fishery Investigations

- Box: [Original proposal](#) and [Response and revised proposal](#)

**Proponent:** Idaho Department of Fish and Game (IDFG)

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The proponents provide satisfactory responses to the ISRP queries. The ISRP appreciates the tone and care taken in helping us better understand the project details. Overall, this is a very good, constructive response, clarifying all our concerns as well as informing us about important details that we did not know.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The white sturgeon population monitoring component has provided some useful results on abundance, survival, growth, density-effects on survival, and required levels of natural recruitment. The burbot component is newer and the newly developed parentage-based tagging (PBT) approach offers great potential to learn about factors limiting natural recruitment. A general ISRP concern is that the program for other species (largescale sucker, mountain whitefish, rainbow trout) appears to be largely based on Catch Per Unit Effort (CPUE) but does not provide information on vital rates that are often mentioned in the Goals and objectives section. A mark-recapture program is mentioned for rainbow trout, but the effort does not seem adequate to estimate growth, survival, recruitment, or habitat use and differential survival/growth in restored or fertilized environments.

**Responses Requested:**

The ISRP requests responses to the following questions and issues to help us better understand the scope and potential outcomes of the Kootenai/y restoration program:

1. Re-write objectives to meet SMART criteria. At least some of the objectives should address the years covered by this funding period (2021-2025).
2. The following objectives need further explanation:

- a. Goal 1: Objective 2: “Improve wild recruitment by 2030. The down-listing objective is currently set at an average of 700 naturally produced juveniles over a 10-year period.” It is not clear what level of improvement is expected by 2030. Is the objective to meet the down-listing number or would 50% of the number be adequate for 2030?
- b. Goal 1: The goal is 700 naturally produced white sturgeon per year over a 10-year period, but there are ~ 18,000 hatchery-produced white sturgeon at large (some older than 20 years). Is the abundance produced from this hatchery production consistent with the abundance target for mature fish? What adult abundance would be maintained with an annual age-1 recruitment of 700 fish?
- c. Goal 2: Objective 2c. A key issue that warrants more discussion is whether the anticipated natural production benefit from hatchery-produced spawners (as yet unknown) will offset the reduction in growth or survival of naturally produced fish caused by high densities of stocked fish (as observed in hatchery origin fish). If the natural recruitment bottleneck continues, the current hatchery program will maintain some genetic diversity and population abundance but at the cost of reducing natural recruitment. In addition, provide a more complete discussion of results from the flow experiments focused on influencing spawning locations. Higher flows from Libby Dam have encouraged white sturgeon to move farther upstream to spawn, but as yet, have not increased larval recruitment (< 10 caught annually).
- d. Goal 2: Objective 3 (page 29) suggests that cannibalism may decrease burbot age-0 survival, but cannibalism is not mentioned elsewhere in the proposal. Please discuss the basis for the concern; is there evidence in the literature that cannibalism is an issue?
- e. Goal 2, Objective 3.1b. Please provide information that will improve our understanding of how movement rates between the river and lake will influence stocking or removal efforts. Much of the telemetry-based work seems to be based on evaluating hypotheses that do not seem that relevant (or a better case about their relevance needs to be made).
- f. Goal 2, Objective 3.3. As with the white sturgeon telemetry efforts, it is hard to understand the utility of the work. The Progress to Date section mentions that burbot can reach spawning tributaries under higher winter flows. Has this question not been fully resolved?

- g. Goal 3, Objective 1.2 Are vital rates being adequately estimated from what appears to be a largely CPUE-based program with occasional closed population estimates (see the Responses Requested item #3 below).
  - h. Implementation Objective 2.2a. Please explain the logic behind this element. Much investigation has shown that most white sturgeon in the Kootenai River spawn over unsuitable (sandy) substrate. The telemetry-based approach used for this implementation objective would identify these sites as suitable since fish are spawning there (or at least holding during spring). Thus, it seems that viable spawning locations can only be confirmed by monitoring recruitment of larvae or age-0 sturgeon in these areas, not just the presence of adults.
3. There are a number of concerns and questions about Methods for which the ISRP requests responses:

Goal 1, Objective 1:

- a. The population model, hopefully well parameterized from an open population mark-recapture program, is critical for management decisions. Ideally hatchery and habitat/fertilization effects can be evaluated jointly using this model. Will this be possible?
- b. Provide additional detail on whether gonad sampling/endoscopy is only done on older hatchery-origin fish, or if this method also applied to natural-origin fish. The method is invasive and could harm natural-origin fish. Is this part of the program yielding informative results?

Goal 1, Objective 2:

- a. Clarify how the occupancy model provides estimates of detection probability in this application. Is it based on the presence/absence of eggs among mats during one sampling period (assuming eggs are distributed throughout mat-placement area), or present/absence differences within mats across sampling periods (assuming eggs are available throughout sampling period)? Neither assumption seems realistic, so reliability of occupancy model results will likely be poor.
- b. This subobjective has the same problem as for (a), as well as additional requirement that a sufficient number of larvae and eggs need to be captured so that ratio of larvae/eggs can be used as a good index of hatching success. It appears that <10 larvae are caught annually, which does not seem like enough to provide a reliable index of hatching success.

- c. Tracking appears to show that larger sturgeon hold over sandy substrates in spring, yet these spawning characteristics are thought to lead to poor egg/larvae survival. If true, then monitoring locations of potential spawners via telemetry is not useful. Habitat preference models have a long history of not being useful and sometimes making predictions that have led to harmful management actions (e.g., minimum flows). This element of the proposal is probably expensive given the physical modeling, acoustic tagging, and maintenance of acoustic arrays. Given the problems with interpretation, can the proponents explain whether the cost is justified?
- d. Given the poor catch of larvae (<10 annually), the current sampling approach does not appear to be a good method to index recruitment. The detection probability of this gear may be too poor to detect recruitment trends. Would capture rates of age-1 or age-2 fish in gill nets be a better approach for assessing recruitment success and quantify progress toward the 700-fish goal, even if the results are not as immediate?

Goal 1, Objective 3:

- a. The ISRP does not understand the utility of this effort. It is not clear if the models mentioned will be able to assign improved growth or survival to restoration efforts. It seems that a multi-state model that estimates the amount of time spent in enriched versus non-enriched reaches and improved versus unimproved habitat sections would be required, with different vital rates estimated in these four (or more) areas. The ISRP questions whether the data are sufficient to support such a model. As a result, it may not be possible to separate the benefits of fertilization from the benefits of physical habitat improvement, let alone benefits of particular project elements.

Goal 2, Objective 1:

- a. Is it possible to use PBT methods to separate hatchery-origin juveniles from natural-origin juveniles given that not all wild sturgeon are in the PBT baseline? Please clarify how any increase in natural recruitment will be attributed to spawning conditions, stream fertilization, habitat improvements, or all the above?
- b. If eDNA only provides presence/absence of burbot (spawners) in tributaries, then please explain how the importance of different tributaries to natural production (or the contribution of tributaries versus mainstem to natural production) will be determined. Can the eDNA method help to resolve these questions?

Goal 2, Objective 3:

- a. The ISRP suggests that it would probably be useful to integrate estimates of age-0 abundance and survival from the Cormack-Jolly-Seber (CJS) model with estimates from the age-4+ model. Doing so may provide a more direct way of assessing effects of age-0 survival variation that better accounts for uncertainty (e.g., uncertainty in the extent of cannibalism/abundance of age-4+ fish can be incorporated into estimates of survival relationships).

Goal 3, Objective 1:

- a. More detail on the CJS model is required. If it is applied every two years, then it seems probable that a closed model is being used to estimate abundance. But this approach would not provide estimates of somatic growth, survival, recruitment, or the duration of time spent in treated (habitat restoration or fertilized) and untreated reaches.
  - b. Please explain the value of data from the newly fertilized reach given that no before-fertilization data will be available. The ISRP believes it would be necessary to monitor prior to fertilizing a new section. For micro-chemistry work, a high proportion of spawners from tributaries (or not) does not say much about the benefits of the fertilization program to mainstem survival rates or growth, which could lead to higher recruitment even if fish move to tributaries to spawn. A better justification for this project element is required.
4. Please explain the utility of information from the acoustic tracking component of the white sturgeon and burbot programs. How will the information be interpreted to make useful inferences about Libby Dam flows, habitat restoration, and fertilization effects? For example, how will better understanding white sturgeon movement between the river and lake influence stocking or removal efforts? If white sturgeon are holding over sandy substrates during the spring and spawning over sandy substrate, how will additional data on spawning locations farther upstream inform recruitment limitation hypotheses? Spawner position does not seem to be an informative metric of recruitment success. More elaboration on these topics would help us understand the utility of the research.
  5. Please explain how the effects of different treatments will be identified. For instance, both flow and habitat are thought to be important determinants of sturgeon movement upstream into what is thought to be better spawning habitat. Contrast in the design matrix is needed to separate different effects of flow and habitat. Is there a spatial element to the design matrix that allows separation of flow and habitat effects for upstream movement? In cases where fish move between the fertilized reach and areas with and without habitat

improvements, it may not be possible to distinguish the effects of fertilization and habitat treatments on vital rates. It would only be possible if these rates can be estimated separately in different areas, and the residency in each area is established (i.e., a multi-state open model with movement). The proposal does not include sufficient details on the mark-recapture modeling to show if this is being done or is possible given the number and location of recaptures and sampling effort. If these effects cannot be separated, then the proponents might have to clearly articulate the design flaw inherent in doing everything over the same time period (i.e., the “kitchen-sink” approach to habitat restoration).

### **Comments not requiring an immediate response**

#### **1. Problem Statement**

The problem statement is adequate.

#### **2. Progress to Date**

The progress to date statement is adequate, but the proposal far exceeds the suggested page limits and lacks an overall summary. Consequently, it does not effectively communicate the essential results to reviewers. This section would benefit from a distilled list of lessons learned (perhaps as a Table). That said, the lessons learned provide evidence of adaptive management. To our knowledge, the physical habitat restoration part of the project has not yet generated any primary publications.

#### **3. Goals and Objectives**

See concerns listed in responses requested above.

Have any hypotheses been developed as to why largescale suckers have shown an increased growth rate, but mountain whitefish have not?

#### **4. Methods**

Most methods are well documented, but a number of issues are listed among the responses requested above. The ISRP commends the proponents for publishing their methods at [MonitoringResources.org](http://MonitoringResources.org) and for providing information on data/information management. Culling of 12N white sturgeon based on polyploidy determination in the field with a Coulter Counter suggests that the fish will have to be held alive until their blood has been analyzed. More detail on this method is needed, e.g., how quickly can a sample be taken and analyzed in the wild?

## **5. Project Evaluation and Adjustment Process**

This section is adequate, and adaptive management is readily evident in the lessons learned associated with Question 2.

## **6. Potential Confounding Factors**

The discussion of potential confounding factors is adequate.

## **7. Timeline**

The timeline for meeting project goals and objectives is adequate.

## **8. Relationships to Other Projects**

Relationships to other projects are well described throughout the proposal.

## **9. Response to Past Council Recommendations and ISRP Reviews**

Responses to past Council recommendations and ISRP reviews are adequate.

## **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No comment.

## C. Lake Roosevelt and Rufus Woods Lake including White Sturgeon

### 200811600 - White Sturgeon Enhancement

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Colville Confederated Tribes

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The ISRP thanks the proponents for their clearly written, informative, and comprehensive responses to our requests for additional information.

The ISRP encourages the proponents to share the results of their investigations and field sampling tools via publications in the peer-reviewed literature. The work being done is innovative and groundbreaking and will be of value to other groups involved with wild sturgeon conservation.

Specific comments on the 2020 responses to ISRP requests:

It is likely that the proponents have already evaluated the usefulness of JSATS (Juvenile Salmonid Acoustic Telemetry System) and juvenile lamprey acoustic tags for their juvenile dispersion studies. If not, we suggest they contact Pacific Northwest National Laboratory personnel who helped develop and test these tags to learn about their availability, detection range, and tag life. The past successful use of these tags in juvenile salmon and lamprey could make them suitable for tracking relatively small juvenile sturgeon.

The results of the calcein marking study that are presented in the proponent's response are thorough and impressive. It is encouraging to see that these marks have been retained for up to 15 months and will likely last even longer. Photobleaching is often a drawback to using fluorescent dyes as fish marking agents. Thus, restricting mark retention examinations to mouth parts was a clever approach. As mentioned, this is a location where such marks are not going to be affected by light. Although results from the controlled marking study are very promising, we are encouraged to hear that additional mark retention studies are planned. It is prudent to evaluate whether similar long-term mark retention will occur on larvae that are less developed than those used in the proponents' pilot marking study.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The Colville Confederated Tribe's White Sturgeon Enhancement Project is an important and productive element of the international effort to conserve and eventually create a self-sustaining population of white sturgeon in the Transboundary Reach. The proponents have developed innovative methods and tools to identify factors responsible for recruitment failure in this portion of the Columbia. An admitted and ongoing challenge for the project has been the development of sampling gears that can effectively capture 0-age sturgeon to index recruitment trends and the success of larval translocation experiments. This issue is being addressed in the current proposal.

However, for the ISRP to determine if the project meets scientific review criteria additional information is needed on:

1. The factors that led to unequal representation of hatchery-origin families of white sturgeon surviving in Lake Roosevelt are unclear. Was it, for example, caused by differences in size, date, area of release, differences in release numbers, or differences in survival rates?
2. How will ongoing fisheries for hatchery white sturgeon reduce the proportional abundance of over-represented hatchery-origin maternal families? Please provide a brief summary of harvest data or information on the distribution patterns of hatchery white sturgeon families that support this approach.
3. What methods will be used to assess the density of age-0 white sturgeon during gear efficiency trials? Will multiple gear types be evaluated simultaneously in the same locations to obtain a relative measure of efficiency?
4. How are long-term mark retention and possible mortality effects due to calcein marking being evaluated? We suggest that several hundred calcein marked fish be held for six months or more for mark retention and mortality assessments.
5. How will results from an Individual-Based Model (IBM) of larval drift be used to help evaluate recruitment failure hypotheses?
6. How frequently will the project evaluate results in the adaptive management cycle?

**1. Problem statement**

The work being proposed is a continuation of the proponent's efforts to: (a) identify and investigate factors preventing recruitment, (b) build, refine, and populate a relational database, and (c) assist in semi-annual stock assessments. Ample background information is provided on

white sturgeon biology, past and current environmental conditions, and how those conditions affect white sturgeon in the Transboundary Reach. Recently, fisheries for hatchery-origin white sturgeon have taken place to reduce the presence of over-represented families. The ISRP requests more information on what caused the disproportionate abundance of some hatchery origin families. Was it caused by differential survival associated with size or time of release, conditions during hatchery rearing, or other factors? During the project presentation, it was indicated that hatchery fish from low- and high-abundance families were distributed differently throughout portions of the Transboundary Reach. Please provide more information on these family differences in vulnerability and how these differences will be exploited to change the proportional representation of families of hatchery fish subjected to fisheries.

The proponents developed sampling gear that is currently being used to catch thousands of naturally produced and genetically diverse sturgeon larvae. The project now rears wild-caught larvae to supplement the sturgeon population in the Transboundary Reach. This strategy will presumably reduce family over-representation problems.

## **2. Progress to date**

The proposal provides an overview of the project's past accomplishments, results, and lessons learned in three areas—stock assessment (tracking trends in population abundance and age structure), recruitment (identifying factors that limit natural recruitment), and contaminants (assessing contaminants in harvested hatchery-origin white sturgeon). All areas were adequately covered.

## **3. Goals and objectives**

The project has three over-arching goals—"inform decisions for white sturgeon conservation and management"; "index natural recruitment and monitor the success of experimental releases to test recruitment failure hypotheses"; and "determine if larval drift distance and drift rate influence recruitment." Each of these general goal statements had two to four objectives. When coupled with the details from the Methods portion of the proposal, the project's objectives largely meet the SMART criteria.

Some of the predictions and alternative hypotheses should be refined. For instance, the Alternative Hypothesis under Objective F is "*No annual recruitment to the fall age-0 juvenile stage is detected from natural production or the experimental releases.*" The wording "is detected" seems like a prediction. A better alternative hypotheses might be similar to Objective E, that recruitment does not occur or recruitment occurs but is not detectable even with more efficient gear because densities are too low over a wide area.

In general, the clarity of this section could be improved by providing more detail on how results would be used to rank the alternative hypotheses.

#### **4. Methods**

The proponents have been on the forefront of developing methods and tools that have contributed substantially to the recovery of white sturgeon in the Transboundary Reach. For example, they have tested and used an apparatus to collect thousands of sturgeon free embryos and feeding larvae at depth, built a video system that will be used to help investigate the effects of drift and water flow on larval recruitment success, and fabricated a device that can be used to release translocated larvae and age-0 juveniles directly to the river bottom.

The biggest challenge that the proponents currently face is developing sampling gear that can effectively capture age-0 juveniles. We have a few questions and suggestions about some of the project's efforts to find effective sampling gear for age-0 sturgeon. The proposal states "*Catch data generated for each experimental gear type will be used to estimate the level of effort required to detect age-0 sturgeon at various densities.*" How will you know the density of age-0 sturgeon after they disperse? Is it possible that the wrong habitat is being sampled for this age group? Is it possible to test gear effectiveness in a situation where density can be controlled or monitored, perhaps even watched with video? Once gear efficiency issues are sorted out, might it be possible and advantageous to release several differentially marked batches of hatchery-reared larvae at intervals between initial collection and age 1 to determine the duration of the early period of high mortality/disappearance?

The proponents are using calcein to mark batches of larvae in their gear efficiency studies. Currently, they plan to take subsamples of 30 marked fish from each batch and hold them for 24 hours to assess short-term mortality and mark retention. We suggest that several hundred calcein-marked larvae, along with unmarked controls, be held at the hatchery to demonstrate longer term survival and mark retention. Finally, more detail on the data analysis to 'validate' the drift model is needed. Is there an assumption of equal mortality across days between release and recapture? And how does the IBM of larval drift contribute to the understanding of recruitment limitation?

#### **5. Project evaluation and adjustment process**

The proposal indicates that retrospective assessments of the project follow the structured decision-making process described by the USGS Science Center. A link to that process is provided in the proposal. A diagram shows that reviews of project actions occur in two places, within the Lake Roosevelt Co-Management Team and within the UCWSRI Technical Working

Group. Additional information is needed, however, on the frequency of these reviews. Do they occur on a regular monthly, annual, or multi-year schedule or on an *ad hoc* basis?

## **6. Potential confounding factors**

The proposal acknowledges that factors, such as reductions in flows, predation by invasive predators, shifts in spawning timing due to temperature changes caused by climate change, stresses from catch-and-release fisheries, and increased pollution may reduce the survival of early life stages and interfere with white sturgeon conservation. Specific unknowns directly linked to the project were also listed. These included uncertainties about where hatchery white sturgeon may spawn—they may choose less suitable areas than wild sturgeon. Direct egg takes were used during the first ten years of the aquaculture program. Stress associated with this process may have led to spontaneous autopolyploidy (SA). Whether this occurred, and how SA might affect fish behavior and long-term reproductive potential, are currently unknown. Hybrids with higher ploidy states may pose a conservation risk to hatchery supplemented populations. Possible effects of proposed spawning habitat restoration are also unknown and may potentially disrupt spawning. The project's proposed work will allow the possible importance of these factors to be assessed and evaluated.

## **7. Timeline**

A Gantt Chart that presents when various components of the project will occur over the five-year period of the project was provided.

## **8. Relationships to other projects**

The project collaborates closely with the Lake Roosevelt Sturgeon Recovery Project (BPA 1995-027-00). Both projects work together on stock assessments, fall recruitment monitoring, and larval collection. The project is also working and sharing knowledge with the Evaluate Sturgeon Populations in the Lower Columbia River (1986-050-00), The Kootenai River Resident Fish Mitigation (1988-065-00) and Kootenai River White Sturgeon Aquaculture Conservation Facility (1988-064-00). The project is also an important component of the UCWSRI and manages the UCWSRI relational data base that facilitates data sharing with other UCWSRI partners. Project proponents are also working closely with Douglas and Grant County PUDs as they develop and implement white sturgeon management plans under their FERC licenses. For example, the CCT have a contract with Douglas County PUD to supply wild white sturgeon larvae captured in the Roosevelt Reach for the PUD's Wells Fish Hatchery. The project also shares staff and equipment with the CCT's Lake Roosevelt Burbot Population Assessment Project (2008-115-00).

## 9. Response to past Council recommendations and ISRP reviews

In previous reviews the ISRP raised concerns about possible duplication of effort between the CCT's sturgeon project and the STOI's Lake Roosevelt Sturgeon Recovery Project (1995-027-00). The proponents work collaboratively with the LRSRP project but perform separate tasks while conducting stock assessments, recruit monitoring, and larvae collection. The LRSRP and WSEP also conduct activities that are entirely separate from one another, e.g., the WSEP is involved with larval drift and translocation research and database development while the LRSRP is examining how predation and food habits impact sturgeon larval survival as well as helping with telemetry tracking and conservation aquaculture.

The ISRP also raised questions about who would develop a hydrodynamic model that would be used to characterize larvae transport and the methods that would be used to collect data (e.g., geomorphological, substrate data, etc.) for the model. These questions were answered in the current proposal. The model has been built and future work is being planned to validate its predictions.

## 10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)

References are cited, experience and education levels of key personnel are provided, and a budget is included.

### 199502700 - Lake Roosevelt Sturgeon Recovery

- Box: [Original proposal](#) and [Response and revised proposal](#)

**Proponent:** Spokane Tribe

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The proponents provided the additional information requested on how harvest objectives and fishing regulations were determined for white sturgeon in Lake Roosevelt. They reported that stock assessment data showed that many hatchery sturgeon from a few families created by direct gamete take had survived. This raised a concern that these fish could be responsible for genetic swamping if they all reached maturity. Based on abundance and distribution data, the proponents established an objective of harvesting ~20,500 hatchery origin sturgeon.

The proponents indicate that creel survey data are not used to determine how the fishery may impact overall sturgeon abundance in Lake Roosevelt. Instead, creel data are used to estimate the harvest of hatchery fish and the number of fish below and above the slot limit that are caught and released. The creel survey is also used to collect PIT tag data from harvested sturgeon and to collect data on the residency (origin) of anglers. PIT tag data recovery is an important component because tag codes will be used to identify the family origins of the hatchery fish being harvested and provide information on growth rates. The stock assessment surveys are being used to monitor abundance (by year class) to determine if program objectives of removing overabundant hatchery sturgeon are being met.

The ISRP also asked about the possibility of using data collected during annual abundance surveys (as shown in the proposal's Figure 30) to ascertain whether decreases in specific hatchery year classes were proceeding as planned. This possibility is not directly addressed in the response. However, uncertainties about differences in susceptibility to sampling gear caused by: (a) fish size, (b) seasonal distribution patterns, and (c) habitat preferences, plus varying sampling effort may make this approach less reliable than the methods currently in place.

As requested by the ISRP, the proponents developed a list of SMART objectives for their proposed work on population demographics, conservation aquaculture, recruitment failure, and food habits. The objectives met SMART criteria and should become important elements in the project's adaptive management process.

The ISRP also asked how food habit data and bioenergetics modeling would be used to evaluate the carrying capacity of white sturgeon in the transboundary reach. The proponents note that they were not planning, at least at this time, to perform any carrying capacity modeling. They acknowledge however, that this was an important biological question that would need to be answered in the future. They point out that food habit information is currently limited. They plan to analyze previously gathered samples and collect additional ones to obtain more diet information. Additionally, they plan to collect body tissues from wild adult sturgeon for stable isotope analysis. If funding permits, similar samples will be collected on hatchery-origin fish. The proposal indicates that once these data are available, bioenergetic modeling will take place. As this work proceeds, the proponents will need to indicate in their annual reports how new information on food habits and bioenergetics modeling will be used to estimate carrying capacity.

The proponents' response also included a description of the adaptive management process employed by the project. As described, the process is multi-layered. Research and monitoring data derived from the project and its international partners are provided to the Lake Roosevelt Sturgeon Technical Team. Possible changes to project actions based on this information are

then proposed to the Lake Roosevelt Management Team for consideration. Final decisions are determined by a Policy Team that also considers inputs from Tribal membership and the public.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The project has made substantial progress in standardizing survey methods, assessing the post-release survival of hatchery fish, and refining adult abundance targets. Research is now focused on investigating a short list of hypotheses that could explain recruitment failure between early larval and yearling life stages.

The ISRP requests the following information to complete our review:

1. Provide more detail to explain how the harvest objectives and fishing regulations are determined, and how creel survey results would influence these decisions. Creel survey results may be too imprecise to determine the impact of fishing on sturgeon abundance, or to tailor future regulations. To achieve the stated purpose of culling overrepresented year classes of hatchery origin fish, would it be sufficient to simply examine changes in the more reliable relative abundance data by year class obtained from the stock assessment surveys, as shown in Figure 30?
2. Develop SMART objectives. The proposal includes sensible statements about the intended directions for future monitoring activities and research. However, the current objectives are not specific or quantitative enough to meet SMART criteria.
3. How will food habit information and bioenergetics modeling be used to evaluate carrying capacity?
4. Document the adaptive management process that has been (or will be) used to evaluate outcomes and adjust directions and activities. The lessons learned and adjustments to the project since 1995 indicate that the process is working, but it should be described.

**1. Problem statement**

The proponents are members of the Upper Columbia White Sturgeon Recovery Initiative, an international group that has developed a conservation plan to ensure the persistence of naturally reproducing white sturgeon in the United States and Canadian portions of the Transboundary Reach. This project comprises semi-annual stock assessments, recruitment

monitoring, acoustic telemetry, creel surveys, larval monitoring and collection, and diet studies in the United States portion of the Transboundary Reach.

The proposed work is consistent with the Council's Fish and Wildlife Program goals for fish and wildlife that have been impacted by hydroelectric actions, as well as Subbasin objectives and elements of the Council's 2017 Research Plan. The project also supports the Canadian National Strategy (NRTWS 2007) to prevent extirpation of white sturgeon in the Transboundary Reach.

## **2. Progress to date**

Information obtained by all the Upper Columbia White Sturgeon Recovery Initiative (UCWSRI) partners about white sturgeon biology and the factors that limit their abundance and recruitment in Transboundary Reach are presented. Changes in the methods and actions used to acquire these data and the rationale for those alterations are also given. This portion of the proposal was very informative and provided needed background information. Some clarification on the following issues is needed. First, it is not clear how research under the "diet" subheading corresponds to the hypotheses listed on page 28, except perhaps as an extension of the previous section on "food availability." Second, can density (number per hectare or per cubic meter) be ruled out as a simple explanation for the declining condition of hatchery juveniles as fish are sampled farther upstream from the Marcus area towards the international border and into the lower Keenleyside Reach? Third, more detail should be provided about the models used to date, and being developed, to determine harvest options. It is not clear how the harvest objectives and fishing regulations are determined, and how the creel survey results influence these decisions. And lastly, the proposal indicates that the acoustic telemetry program provides details on the spatial location of acoustically tagged fish. Is this information incorporated into the mark-recapture models?

## **3. Goals and objectives**

Project goals fall into four categories: population demographics, conservation aquaculture, recruitment failure, and food habits. Each category has an overall goal and each goal has from one to four objectives. The overall goals are suitable, but none of the objectives under these goals fully meet SMART criteria, even with the additional explanatory text. The proponents should revise their objectives to meet SMART criteria. In many cases, a little wordsmithing for clarification would be sufficient. The ISRP asks for SMART objectives to promote adaptive management and retrospective assessments.

## **4. Methods**

Descriptions of methods are concise, and effectively linked to more detailed sources of information. Annual Progress Reports also contain excellent descriptions of methods used in

previous years. However, some additional information on the following topics and objectives is needed. More detail is needed to understand how food habit information and bioenergetics modeling would be used to evaluate carrying capacity. Additional information is needed on the protocols being used to perform the creel survey on Lake Roosevelt and how this activity is expected to occur. For example, does the creel effort track the number of PIT-tagged hatchery fish removed from the population due to harvest? A link to the report by Miller and Rehm (2019) should also be provided. A brief description of the procedure used to evaluate gear selectivity for juvenile white sturgeon attributed to Miller and Holts (1997) should also be included in the Methods Section of the proposal.

For Objective 1A, we offer the following suggestion. Given the large number of recaptures and extensive telemetry datasets, is it worth considering development of a custom population model that integrates these two sources of data to derive more robust parameter estimates that are internally consistent (growth, movement, survival, abundance all estimated in one model)? It is not clear if the current model is size-stratified, which seems important given likely changes in the proportion of smaller fish due to hatchery practices. Smaller fish may have different capture, movement, and survival probabilities. A multi-state model that includes movement and size transitions would therefore be useful.

## **5. Project evaluation and adjustment process**

The proponents provide examples of how lessons learned have led to changes in their protocols and methods. These changes suggest that some sort of adaptive management or retrospective review process is taking place. A description of the process used to make these changes is needed. For instance, do annual reviews occur where methods and objectives are evaluated and refined if needed? If changes have been *ad hoc*, we recommend establishing a formal process. This section will remain incomplete until the proponents explain how they make changes to the project's methods and objectives. Information is also needed on how these changes will be or are currently disseminated to other UCWSRI cooperators.

## **6. Potential confounding factors**

The proponents have provided a list of natural and political factors that may interfere with their efforts to recover white sturgeon in the Transboundary Reach. Solutions or work arounds for some of these factors are suggested. In other instances, for example, the probable effects of climate change are acknowledged as substantial challenges. Expected changes in precipitation patterns, hydro-operations, and warming water temperatures due to climate change, for example, are hypothesized to complicate the recovery and sustainability of white sturgeon in the upper Columbia River. Renegotiation of the Columbia River Treaty may also change hydro

operations in ways that could affect white sturgeon. The proponents are monitoring the treaty negotiations and appear to be ready to change project objectives and methods to accommodate any possible changes.

## **7. Timeline**

A Gantt chart in the proposal shows the timelines for each of the major activities in the four parts of the proposal (population demographics, conservation aquaculture, recruitment failure, and food habits). It is unclear, however, whether data analyses and report writing activities have been included in the timeline.

## **8. Relationships to other projects**

It is apparent from the proposal narrative that the project is part of a larger coordinated effort to recover white sturgeon in the Transboundary Reach. This portion of the proposal provides a clear delineation of its partnership with the CCT's WSEP project (BPA 2008-116-00). These two projects combine staff and resources to perform stock assessment, recruitment monitoring, and white sturgeon larvae collections. The project is also collaborating with B.C. Hydro to coordinate overall stock assessment, genetic monitoring, and acoustic telemetry. Additionally, the project is linked to WDFW's Sherman Creek Hatchery (BPA 1991-047-00) where captured wild larvae are taken for rearing and release. And once proposed food habit studies begin, the project will be working with the Lake Roosevelt Fisheries Evaluation Program (BPA project 1995-043-00).

## **9. Response to past Council recommendations and ISRP reviews**

Two main issues, the need for a standardized comprehensive stock assessment methodology and concerns about stocking rates of hatchery white sturgeon were raised in previous ISRP reviews. The proponents and other partners in the Transboundary Reach designed and are now implementing a standardized stock assessment method throughout the entire reach. Additionally, a spreadsheet model is being used to determine annual stocking targets for hatchery juveniles. Limitations in this model are recognized and a new one is currently under development.

## **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No comment.

## 199104600 - Spokane Tribal Hatchery Operations and Maintenance (O&M)

- Box: [Original proposal](#) and [Response and revised proposal](#)

**Proponent:** Spokane Tribe

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The Spokane Tribe submitted an improved proposal that addresses most of the questions and issues that were brought up in the preliminary review. The proponents' response provides clearly defined SMART objectives. In addition, comprehensive fish cultural methods (including details on fish feed size, feeding rates, rearing densities, water quality assessments, fish marking protocols, flow requirements, information on water sources and rearing vessel sizes, and sanitation and biosecurity) are reported. Tabular data summarizing fish performance (e.g., survival, growth, and condition) are included and indicate that the hatchery is routinely meeting its objectives. In future reports, however, it would be useful to include tables that show performance objectives as well as their measured values. Tables with this type of information provide immediate feedback to the proponents and would be useful in their adaptive management process. As requested, a flow diagram that depicts how triploid rainbow trout are moved from the hatchery to net pens, directly released, or transferred to the Sherman Creek Hatchery was provided. An explanation for the project's adaptive management process was also given.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The Spokane Tribal Hatchery's triploid rainbow trout program performs a crucial role in helping to support and maintain Tribal subsistence and non-tribal recreational sport fisheries in Lake Roosevelt. Fish culture operations (incubation, rearing, transfer, and release) appear to have been consistently accomplished as planned. However, to complete our review, the following information is requested:

1. Quantitative SMART objectives for within-hatchery operations (e.g., for survival from one life stage to the next, growth, fish health, size-at-transfer).
2. Details on how within-hatchery performance is being evaluated are needed and should be included in the Methods Section. How, for example, are estimates made of eyed-egg to ponding survival, fry to release survival, growth rates, numbers released, fish health at the time of release, size-at-transfer, overall egg-to-release survival rates?

3. A description of the retrospective or adaptive management process that is used (or will be used) to evaluate and possibly change within-hatchery operations.
4. A table with data from the past three to five years that shows: (a) number of imported triploid eggs by source, b) survival of eyed eggs to ponding, (c) survival from ponding to fingerling, and (d) similar production data. These data can help illustrate how closely hatchery standards are being met.
5. A flow chart is needed that displays how both sources of triploid eggs (Troutlodge and Spokane Trout Hatchery) are moved from the Tribal hatchery to other hatcheries and to the net pen locations where they will be reared and released.
6. A discussion of whether the project has standards for triploid and adipose clip success rates? If so, what are they and what happens when observed rates do not meet project standards?

## **1. Problem statement**

An overview of the actions taken to mitigate for the effects of the construction and operation of the Grand Coulee Dam (GCD) on upper Columbia anadromous salmonids populations is presented. To mitigate for their loss, a program using three hatcheries and a volunteer net pen rearing program was established to create reliable Tribal subsistence and recreational rainbow trout and kokanee fisheries in Lake Roosevelt and Banks Lake. The Spokane Tribal Hatchery is one of the facilities contributing fish to this mitigation effort.

The production of triploid rainbow trout at the Spokane Tribal Hatchery is compatible with the Council's Fish and Wildlife Program and supports elements of the Upper Columbia and Spokane subbasin management plans.

## **2. Progress to date**

The original goal of the Spokane Tribal Hatchery was to provide kokanee and rainbow trout to support Tribal subsistence and non-tribal recreational fisheries. Hatchery kokanee released into Lake Roosevelt, however, consistently failed to meet a minimum (>5%) return rate to the creel. Conversely, hatchery rainbow trout have consistently met the  $\geq 5\%$  return to creel standard. This lack of performance by hatchery kokanee combined with difficulties in obtaining eggs from native broodstock led to the termination of the kokanee program. The last release of hatchery kokanee into Lake Roosevelt is scheduled for 2020.

The rainbow trout program has also changed. Beginning in 2017 the Spokane Tribal Hatchery began using triploid rainbow trout eggs from Troutlodge as well as Spokane Trout Hatchery

triploid stock. In 2019, the Lake Roosevelt Data Collection (LRDC) project investigated return rates to the creel for each of these triploid stocks. Preliminary results showed that triploids from Troutlodge had higher return rates to the creel and that broodstock source affected where the fish were caught in Lake Roosevelt. These results from the LRDC project were incorporated into the operation plans of the Spokane Tribal hatchery, which will now exclusively rear and release Troutlodge triploids. These alterations in the objectives of the hatchery along with changes in broodstock sources indicate that the hatchery's operations are under review and subject to change when warranted.

### **3. Goals and objectives**

The hatchery's overall goal of providing trout to support Tribal subsistence and sport angler fisheries in Lake Roosevelt is clearly stated. The four current objectives of the hatchery largely meet SMART objective criteria with text in the Methods providing additional needed details. Explicit expectations for release numbers, size at release, and destinations or release locations of trout produced by the hatchery, for instance, are presented. Yet for completeness, within-hatchery survival and growth expectations should be described and added to the project's implementation objectives.

### **4. Methods**

The Methods Section indicates that standard practices for cold-water fish culture will be followed to meet expectations for within-hatchery survival and growth. Although not mentioned, it appears that hatchery staff will be responsible for measuring and obtaining data on within-hatchery performance. Some minimal details on how within-hatchery performance will be evaluated should be included in the Methods Section.

Specific annual tasks, e.g., marking and releases of different groups (numbers, size, age, release locations, and release dates) of triploid rainbow trout are described. This information provides needed details to the project's implementation objectives. The Methods Section also indicates that hatchery operating plans and annual progress reports will be uploaded to [cbfish.org](http://cbfish.org).

### **5. Project evaluation and adjustment process**

Three groups, the Lake Roosevelt Management Team (LRMT), Lake Roosevelt Hatchery Coordination Team, and the Lake Roosevelt Data Collection project (LRDC) develop and revise the Lake Roosevelt Guiding Document which is being used as an adaptive management tool. The LRDC project collects and analyses fishery monitoring data and presents these results to the LRMT. The LRMT annually works with the Hatchery Coordination Team to make any needed

changes in management and hatchery operations. This process is adequate for assessing post-release and some within-hatchery performance metrics (e.g., adipose clip rates). However, the ISRP requests more information on the adaptive management process that is used to evaluate and possibly change within-hatchery operations.

## **6. Potential confounding factors**

Predation by non-native fishes (e.g., walleye, smallmouth bass, and northern pike) and entrainment over the Grand Coulee Dam were listed as potential confounding factors that could prevent the project from meeting its objectives. The possible importance of these issues is assessed annually by the LRDC project. Other considerations, such as climate change and accumulation of toxins, were given less weight because the triploid trout releases are used in annual put-and-take fisheries. The adaptive management process that relies on data from the LRDC and subsequent management decisions from the Hatchery Coordination Team was established to help overcome recognized confounding factors.

## **7. Timeline**

A detailed Gantt chart was included in the proposal. It provided an overview of when egg incubation, fish rearing, transfer, release, and marking will take place on an annual basis for project years 2021–2025.

## **8. Relationships to other projects**

Associations between the Spokane Tribal Hatchery and the hatchery programs at the Sherman Creek and Ford Trout hatcheries, the Lake Roosevelt Rainbow Trout Net Pen project, and the LRDC project are adequately described.

## **9. Response to past Council recommendations and ISRP reviews**

Previous reviews by the ISRP raised concerns about the viability of the Lake Roosevelt kokanee program. Results of LRDC assessments of the kokanee program were provided to the Hatchery Coordinating Team and LRMT. Based on unacceptably low return rates of hatchery kokanee to the creel a decision was made to suspend the kokanee program.

The ISRP was also concerned about possible genetic introgression and harvest effects on native redband trout due to the program's releases of hatchery rainbow trout. Triploid trout are now released by the program to limit genetic introgression. Adipose clips are used to identify hatchery fish and restrict the taking of native redband trout. The proponents acknowledge that the current method of manually marking fish provides uneven marks and is stressful to the fish.

They plan to obtain a mechanical mass-marking trailer by 2022 (dependent upon funding) to improve mark quality.

#### **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

References, biographies of key personnel, and budget information were provided.

#### **199104700 - Sherman Creek Hatchery Operations and Maintenance (O&M)**

- Box: [Original proposal](#) and [Response and revised proposal](#)

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

**Final recommendation:** Meets scientific review criteria

#### **Final comment:**

As requested by the ISRP, the proponents provided SMART objectives for their within hatchery operations. These objectives identify expected: (a) survival rates during rearing, (b) size at transfer to net pens, (c) numbers transferred, and (d) condition factor value at transfer. Brief descriptions of the methods used to determine if these objectives were being met are provided. Information on adipose clip percentages and triploid conversion rates is presented in tabular form as requested. In addition, copies of the hatchery's planting and release records are provided to document the past performance of the hatchery in meeting its fish cultural objectives. These records show that the hatchery routinely meets its performance criteria. Our request for a description of how net pen release strategies might have changed or been improved over time was not directly answered. Instead, the proponents indicate that the Lake Roosevelt Data Collection project is responsible for this portion of the integrated triploid trout program. Nevertheless, a brief description of any changes that might have occurred would have been useful.

In future annual reports, the ISRP recommends that one or more tables that show performance objectives and their associated measured values during the project period should be included.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The Sherman Creek Hatchery's triploid rainbow trout program plays an important role in providing Tribal subsistence and recreational fisheries in Lake Roosevelt. Additionally, this hatchery program coordinates closely with the Spokane Tribal and Ford Trout hatchery programs and the Lake Roosevelt Net Pen project. The hatchery continues to foster educational outreach for local school children and serves as a pivotal rearing location for wild-caught white sturgeon larvae.

However, for the ISRP to determine if the project meets scientific review criteria, the following information is requested:

1. Quantitative SMART within-hatchery objectives for survival, growth, size-at-transfer to net pens, transfer numbers, etc. (see comments under Goals and objectives).
2. Descriptions of the methods (or links to them) used to evaluate within-hatchery performance and measure environmental parameters at the hatchery.
3. Descriptions of how release strategies for trout reared by the project were altered to increase recruitment to the creel.
4. A table showing adipose fin clip percentages and triploid conversion rates for project fish over the past five years.

**1. Problem statement**

The proposal provided information about the abundance of anadromous and resident fish species prior to the construction of the Grand Coulee Dam (GCD), emphasized the cultural and dietary importance of these species to upper Columbia River tribes, and summarized the attempts to mitigate for the effects of the hydrosystem by using hatchery production. The project's goals are consistent with the Council's Fish and Wildlife Program -- to provide harvest mitigation and to use hatchery approaches that do not interfere with native fish populations.

**2. Progress to date**

Original mitigation goals as well as initial implementation and biological objectives for the hatchery's kokanee and triploid rainbow trout programs are described. Retrospective assessments of the hatchery's kokanee and triploid rainbow trout programs by the Lake Roosevelt Hatcheries Coordination Team led to substantial changes. The hatchery's kokanee project will cease after 2020 due to shortages of native broodstock and poor contributions to

the creel. Conversely, the triploid rainbow trout program has consistently met its production and return to creel objective ( $\geq 5\%$  of releases are caught) and will continue.

If available, additional information regarding the triploid rainbow fishery would strengthen the proposal. For example, information on the number of triploid rainbow trout caught each year by fishery (Tribal subsistence and Recreational) since the inception of the triploid program, catch rates (fish/person/day), annual participation of Tribal subsistence and recreational fishers, and some measure of angler satisfaction could be included in the proposal. All these metrics provide information that can be used to help document the success of the stocking program.

### **3. Goals and objectives**

In-hatchery objectives (e.g., survival from one life-stage to another, growth and condition factor objectives, release numbers, size at release, health at release, etc.) should be included in the proposal. Although not monitored by the project, within-hatchery objectives should include 100% triploidy and 100% fin-clip marking to identify hatchery fish. Information on fin clip and triploidy rates are needed so that hatchery operations can be monitored and evaluated. Do hatchery staff assist Lake Roosevelt Data Collection personnel in making these assessments?

### **4. Methods**

The Methods Section states that cold-water fish culture practices described by Piper (1982) will be followed to meet within hatchery survival and growth expectations. Although not mentioned, it appears that hatchery staff are responsible for measuring and obtaining data on within-hatchery performance. Some minimal details on how within-hatchery performance will be evaluated and how environmental conditions during the rearing period are assessed should be included in the Methods Section.

The Sherman Creek Hatchery also rears naturally produced white sturgeon larvae caught in Lake Roosevelt. The rearing period lasts for approximately nine months with a survival goal of 50%, and a release goal of 200 g fish. Although this activity is paid for by the Lake Roosevelt Sturgeon Recovery project (BPA #1995-027-00), it is an important service provided by the hatchery. A link or brief description of the fish culture methods and procedures being used to rear and release white sturgeon at the hatchery would be a useful addition to the proposal.

## **5. Project evaluation and adjustment process**

The proposal indicates that the Lake Roosevelt Management Team, a hatchery coordination team, and the Lake Roosevelt Data Collection project produced and continue to update the Lake Roosevelt Guiding Document that is used in adaptive management. A link to the current Guiding Document should be included in the proposal. The proposal also mentions that "the program has provided adaptive management strategies including revisions in hatchery release strategies for rainbow trout that have improved overall recruitment of hatchery fish to the fishery." Details of release strategies that have improved recruitment to the fishery are important and should be described or cited in the proposal.

## **6. Potential confounding factors**

Several possible confounding factors were identified: predation by non-native species, entrainment of project fish due to dramatic changes in reservoir levels and operations, and aging infrastructure (buildings, net pens, etc.). The importance of these and other potential deterrents are currently being assessed and monitored by the LRDC program and documented in the Lake Roosevelt Guiding Document to support adaptive changes as needed.

## **7. Timeline**

A Gantt chart presents the fish production (rearing periods, transfers, and releases) and infrastructure maintenance schedules established for the hatchery from FY 2021 – 2025.

## **8. Relationships to other projects**

Linkages among Sherman Creek hatchery operations and the Spokane Tribal Hatchery, Ford Hatchery, Lake Roosevelt Rainbow Trout Net Pen program, and two white sturgeon recovery and enhancement projects are clearly described.

## **9. Response to past Council recommendations and ISRP reviews**

Two concerns about the scientific validity of the project were raised in previous ISRP reviews. First, the ISRP questioned the success of the hatchery kokanee program. Based on results of a subsequent review and evaluation, this program will be terminated after 2020.

Second, the ISRP raised concerns about the possible impact of the hatchery rainbow program on the genetic integrity of native redband trout. The program now uses triploid rainbow trout to minimize genetic introgression. Since triploid production can vary, the Lake Roosevelt Data Collection project is evaluating the level of triploidy in the program's fish. Additionally,

assessments of the adipose clip rate on the triploids released into Lake Roosevelt are being made to address a related concern by the ISRP on the possible harvest effects of the subsistence and recreational fisheries on native redband trout. Alternative methods of adipose fin clipping are being explored to increase marking rates.

The Lake Roosevelt Data Collection Project is evaluating triploid and adipose clip rates. The ISRP requests that a table showing the results of these evaluations over the past several years be added to the proposal. This information would help us better understand the potential risks posed by the triploid rainbow trout program on native red band trout.

#### **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

The experience and education levels of key personnel are provided, and a budget is included.

#### **200102900 - Ford Hatchery Operations and Maintenance (O&M)**

- Box: [Original proposal](#) and [Response and revised proposal](#)

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

**Final recommendation:** Meets scientific review criteria

#### **Final comment:**

The proponents provided additional information on within hatchery performance objectives specific to: (a) survival from one life-stage to the next, e.g., from eyed egg to ponding, from ponding to fingerling, etc., (b) size and condition factor at transfer, and (c) numbers transferred were provided. They also briefly describe the methods being used to assess within hatchery performance, as requested. Additionally, results of triploid rates and adipose clip success are presented in tabular form. In future reports, we recommend that one or more tables that show performance objectives and their measured values during the project period be included.

The proponents acknowledge that the hatchery, which was constructed in 1941, needs infrastructure upgrades. The operating budget supplied by BPA only covers the cost of raising fish at the hatchery. Consequently, the proponents have relied on opportunistic funding to make essential repairs. The lack of consistent maintenance funding is concerning and will need to be addressed by the proponents in the future. In this regard, the ISRP feels that the facility upgrades are justified due to the expanded role the hatchery is playing in the Lake Roosevelt triploid trout program.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

Triploid rainbow trout and kokanee production at the Ford Trout Hatchery has played an important role in providing Tribal subsistence and recreational fisheries in Lake Roosevelt and Banks Lake. The hatchery appears to consistently meet its release and size-at-release targets for rainbow trout and kokanee. Within-hatchery performance objectives for survival, growth, size at release, and fish health undoubtedly exist but were not included in the proposal. Kokanee culture at the hatchery has been suspended due to poor recruitment to the creel.

For the ISRP to determine if the project meets scientific review criteria, the following responses are requested:

1. Within-hatchery SMART performance objectives (e.g., survival from one life state to the next, size at release, see comments under Goals and Objectives).
2. Descriptions of the methods (or links to them) used to evaluate within-hatchery performance and measure environmental parameters at the hatchery.
3. An explanation on how repairs and possible additions to hatchery infrastructure are being addressed.
4. Annual assessments of triploid success and adipose clip rates of hatchery fish made by the Lake Roosevelt Data Collection project. A table is needed showing the results of these evaluations over the past several years. This information is needed to better understand the potential risks posed by the triploid rainbow trout program on native redband trout.

**1. Problem statement**

An adequate summary of project history, including the justification for the mitigation effort to increase sport and tribal harvests of trout and kokanee in Lake Roosevelt is provided. The project has evolved over time, and its kokanee production is slated to end because too few hatchery kokanee were caught in the fisheries.

The production of triploid rainbow trout at the Ford Trout Hatchery supports and is compatible with the Council's Fish and Wildlife Program and with Upper Columbia and Spokane subbasin management plans.

## **2. Progress to date**

The hatchery's role in the mitigation effort has been to stock 700,000 kokanee into Banks Lake each fall and to annually rear triploid rainbow trout for the Lake Roosevelt Program. The effectiveness of the Banks Lake kokanee program was under review from 2001-2019 by the Banks Lake Fishery Evaluation Project (BLFE; BPA Project 2001-028-00). Results of the evaluation by the BLFE led WDFW to terminate the Banks Lake kokanee program.

The Ford Trout hatchery will now rear triploid rainbow trout for release into Banks Lake starting in 2021. The effectiveness of this endeavor in producing viable Tribal and non-tribal fisheries will be evaluated by the Banks Lake Fisheries Evaluation project.

## **3. Goals and objectives**

New implementation and biological/social objectives are included to reflect changes in the hatchery's overall goal. Some largely meet SMART objective criteria as annual quantitative goals for return to creel rates ( $\geq 5\%$ ) and production targets (e.g., annual release of 200,000 triploid trout into Banks Lake) are listed. However, no explicit within-hatchery objectives are described. In-hatchery objectives (e.g., survival from one life-stage to another, growth, condition factor, release numbers, size at release, health at release.) need to be included in the proposal. Additionally, although not monitored by the project, objectives should specify 100% triploidy and 100% fin-clip marking to identify hatchery fish.

## **4. Methods**

The Methods section is too brief and does not indicate how within-hatchery performance metrics related to survival, growth, release size, etc., will be determined. It should also describe or cite methods for the collection of routine environmental data (e.g., for water temperature, flow, total dissolved solids, dissolved oxygen)

## **5. Project evaluation and adjustment process**

Four separate groups, the Lake Roosevelt Management Team (LRMT), Lake Roosevelt Hatchery Coordination Team (LRHCT), Lake Roosevelt Data Collection (LRDC) program, and the Banks Lake Fisheries Evaluation program collectively update the Lake Roosevelt Fisheries Guiding Document (LRF GD) which is used as an adaptive management tool. The proposal recounts that the LRDC and BLFE programs conduct research and M&E for the LRMT and they also provide information to the LRHCT. Based on this new information, the LRHCT formulates and establishes changes in hatchery operations on an as-needed basis.

## **6. Potential confounding factors**

Predation by non-native fishes (e.g., walleye, smallmouth bass, and northern pike), entrainment of project fish over the Grand Coulee Dam and out of Banks Lake, and aging infrastructure were identified as factors that may prevent the project from meeting its objectives. No information, however, was provided on how needed repairs to infrastructure may be prioritized and accomplished. Please provide a brief explanation on how repairs and possible additions to hatchery infrastructure are addressed.

## **7. Timeline**

A Gantt chart depicts when hatchery maintenance, fish rearing, fish transfers to Sherman Creek Hatchery, and releases of fish into Banks Lake are scheduled during 2021–2025.

## **8. Relationships to other projects**

Linkages between activities at the Ford Trout Hatchery, Sherman Creek and Spokane Tribal hatcheries, Lake Roosevelt Rainbow Trout Net Pen project, and the LRDC and BLFE programs are adequately described.

## **9. Response to past Council recommendations and ISRP reviews**

In previous project reviews the ISRP expressed skepticism about the validity of continuing kokanee releases into Banks Lake. The continued low survival and contribution rates of hatchery kokanee to the creel appeared to negate any possible mitigation benefit from these releases. A recent review by the BLFE on the Banks Lake kokanee program recommended that the kokanee program be suspended and replaced by releases of triploid rainbow trout. That recommendation was accepted.

Concerns about possible genetic introgression and harvest impacts on native redband trout due to the release of triploid rainbow trout into Lake Roosevelt were also raised by the ISRP. In response, the Lake Roosevelt Data Collection project is annually assessing triploid success and adipose clip rates. A table showing the results of these evaluations over the past several years needs to be added to the proposal. The Lake Roosevelt Data Collection project also monitors the abundance of hatchery rainbow in redband trout spawning areas. A summary of the results of these spawning ground evaluations over the past several years should also be included in the proposal. This information would help us better understand the potential risks posed by the triploid rainbow trout program on native red band trout.

## 10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)

The experience and education levels of key personnel are provided, and a budget is included.

### 199500900 - Lake Roosevelt Rainbow Trout Net Pens

- Box: [Original proposal](#) and [Response and revised proposal](#)

**Proponent:** Lake Roosevelt Development Association (LRDA)

**Final recommendation:** Meets scientific review criteria

**Final comment:**

In our preliminary review we asked for additional information on: (a) the project's SMART objectives, (b) how successful the project was in meeting fish survival and release goals, (c) the methods used to make these assessments, (d) factors that could affect net pen operations, and (e) how the project's performance is reviewed and altered if necessary.

The ISRP appreciates LDRA'S positive and informative response, including the revised proposal. The response largely addresses the ISRP's questions.

The project provides a service function for the Colville Confederated Tribes, Spokane Tribe, and WDFW. Agency staff transfer triploid rainbow trout to six complexes of net pens established in Lake Roosevelt. The co-managers (see other proposals) develop the net pen rearing objectives and direct the LRDA volunteers to rear and release fin-clipped triploid (sterile) rainbow trout for the fishery in Lake Roosevelt. The proponents provided objectives describing expected numbers and sizes of fish entering the net pens in the fall plus their sizes and numbers at release the following spring. Data presented in the proponent's proposal (see their Table 2) shows that survival rates in the net pens, fish per pound (fpp) targets at entry, and fpp objectives at release are being reliably met. While numbers of fish reared varies and depends upon fish availability, survival in the pens typically exceeds 90%.

The Lake Roosevelt Data Collection project (LRDC, 199404300) is responsible for assessing fish condition, survival, and growth during the net pen rearing period. Consequently, these methods are not described in this proposal; links to them, however, would have improved the proposal and facilitated its review. The ISRP recommends that the volunteers keep track of fish rearing data collected by the LRDC in the net pens. Predation by mammals and birds, and fish escapement from the pens due to damage caused by storm or reservoir fluctuations are identified as the two main confounding factors facing the project. The proponents suggest that climate change will not be a confounding factor for the project because it is an annual put-and-

take fishery. This explanation identifies an important aspect of the project and why it may be less vulnerable to negative consequences of climate change, but it disregards the consequences of climate changes on rearing conditions and survival after release. In future proposals, greater consideration should be given to potential influence of climate change on rearing conditions and post release survival. Adaptive management is the responsibility of the Lake Roosevelt Hatchery Coordination Team.

The LRDA states that new net pens are needed to improve safety for the volunteers, and the ISRP finds this request is justified.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The proposal provides little of the technical detail required to evaluate the scientific merits of the project. The project is connected to three hatcheries producing triploid rainbow trout and the Lake Roosevelt Fisheries Evaluation Program. The net pen program is managed and operated by volunteers, trained primarily within the project. They are required to submit non-technical annual reports and are part of the Lake Roosevelt Development Association. The proponents state that new net pens are needed as existing ones are unsafe for the volunteers.

The ISRP encourages the proponents to work together with its partners (WDFW, Spokane Tribe of Indians, and the Colville Confederated Tribe of Indians) to produce a comprehensive report and a single comprehensive response to ISRP comments in the future. To enable us to assess if the net pen component of the overall trout stocking/fisheries program meets scientific review criteria, we request that the proponents:

1. Provide quantitative SMART objectives for fish entering the net pens, their size at entry, survival rate, maximum number of escapees, growth, and number and size of fish released.
2. Provide a more complete description of progress to date, including a table listing the numbers of fish entering the net pens, survival and health observations, number of escapees, growth during pen residence, number of fish released, and location of release.
3. Describe protocols for collecting these data. (Please upload them to [MonitoringResources.org](http://MonitoringResources.org).)
4. Explain how this project participates in the evaluation and adjustment processes (adaptive management) or if it simply takes directions from partners.

5. Describe potential confounding factors affecting the net pen operations.
6. Clarify how the quantitative objectives and findings are linked and coordinated with other aspects of the overall trout stocking effort.

### **1. Problem statement**

The project is associated with three trout hatcheries and the Lake Roosevelt Data Collection project (Project 199404300). A summary of project history, including the justification for the mitigation effort to increase sport and tribal harvests of trout and kokanee, and interactions with other groups and hatcheries is provided. The project has evolved over time, and the hatchery kokanee effort is slated to close in 2021 because catch rates in the fisheries were consistently below target levels. The proponent notes that the Ford Trout Hatchery will begin supporting LRHP mitigation efforts in 2021.

### **2. Progress to date**

The discussion of the progress to date is extremely brief. The proponents state that triploid rainbow trout releases exceed the lower end of the 5% to 20% return to creel objective (3 of the past 4 years had values less than 8%). The program has a target of 150,000 trout harvested by anglers each year, but total harvests by sport and tribal members were not described. The latest annual progress report (2018) noted that a total of 439,605 trout were released by the Lake Roosevelt Net Pen Program and the Sherman Creek Hatchery Net Pens, which is considerably below the release objective of 750,000 trout. If 750,000 trout were released and 20% were caught, that would be a total annual catch of 150,000. Is this the basis of the targets? The reason for this large shortage in number released was not discussed. If fewer than the target number of trout were released, and the catch rate was also below the target as well (but within the acceptable range), then the overall catch will be well below the goal. Moreover, the overall trout program collects data on trout survival while rearing in the net pens, but no data were provided.

The program investigates return rate to the creel of triploid Spokane trout versus triploid Trout Lodge trout. Initial findings indicate that the return to creel rate of Trout Lodge trout was more than twice that of Spokane trout. However, this finding may be confounded by release and/or capture location; more discussion is warranted.

The proposal does not indicate how the net pen project itself has changed due to lessons learned. For example, have changes been made in net pen design, locations, cleaning frequency and methods, predator protection strategies, feeding regimes, diets, and release operations? Such changes, and the rationale behind them, should be included in the proposal. On the other

hand, if no changes have been made, that should also be made clear. In the Methods portion of the proposal, the proponents state that the net pens need to be replaced due to safety concerns. How will lessons learned affect net pen design, durability, safety, locations, etc.?

### **3. Goals and objectives**

The net pen effort, which utilizes volunteers, is just one component of the overall triploid trout program to produce trout for a segregated harvest program for tribal subsistence and sport angler fisheries in Lake Roosevelt. The net pen project lacks objectives for the survival of trout while rearing in the net pens; 90% survival was mentioned as a target in the Methods section but not in Goals and the objectives section.

Overarching objectives for the trout program should be provided for the three hatcheries, the data collection program, and the net pen program that supports the program. Ideally, the entire triploid trout program should have been presented as a single proposal so that the overall effort can be adequately evaluated.

### **4. Methods**

The methods are extremely brief, and largely state release objectives for each size of trout (these release values are objectives but not methods to achieve the objectives). The proposal should provide brief details or linkages to existing protocols on how: (a) trout are reared [e.g., feeding periodicity, % body weight fed/day, and diet used], (b) mortalities in the net pens are determined, (c) numbers escaping are estimated, (d) growth rates are ascertained, and (e) releases of reared trout take place. Data from the project (presumably mortality, growth rates, size at release, etc.) are reportedly archived in PISCES status reports and non-technical annual reports. Protocols and methods at the net pens should be described at [MonitoringResources.org](http://MonitoringResources.org).

### **5. Project evaluation and adjustment process**

The proponents briefly describe their adjustment process, as shown in figures in Appendices A and B. However, they need to indicate how they participate in this process, are they active participants that provide input to the process or do take direction from their tribal and state partners?

## **6. Potential confounding factors**

The proposal should have described potential confounding factors affecting the objectives of the net pen component of the triploid trout effort, then referenced a report covering the overall project. Factors affecting survival, growth of trout, and numbers escaping would seem to be key potential confounding factors but there was no mention of these or similar issues. Also, do reservoir operations or climate-related factors affect net pen operations? Net pen quality is another potential confounding factor. This section should include a description of how these factors can be overcome, if possible, by the proponents.

## **7. Timeline**

A Gantt Chart that illustrates when specific tasks will take place over the five-year project period is included in the proposal.

## **8. Relationships to other projects**

The proponents could have presented relevant data collected by the other projects either here or in other parts of the proposal.

## **9. Response to past Council recommendations and ISRP reviews**

The proponents address previous ISRP concerns about the release of triploid trout into Lake Roosevelt. These ISRP concerns included possible genetic impacts of hatchery rainbow trout on native redband trout, and how harvest rates on project trout may affect redband trout due to unauthorized retention or handling stress (i.e., the regulations require live release, but catch-and-release fisheries still have some effect on the fish).

Previous ISRP requests for information specific to the net pen project were not addressed by the proponents. For example, the ISRP asked for a tabular summary of the hatchery origin, number, and size of trout the project receives and releases from each pen site. Information on fish performance, growth, survival, incidence of disease, water quality compliance, food conversion, during the rearing period was also requested. Additionally, annual estimates of entrainment were requested, if available. Finally, an ISRP request for brief descriptions of the methods and metrics being used to assess the fish while they are being reared in net pens has not yet been met.

## 10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)

No comment.

### 198503800 - Colville Hatchery Operation and Maintenance (O&M)

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Colville Confederated Tribes (CCT)

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The ISRP commends the CCT for providing detailed and specific responses to our comments, including the completion of the Fisheries Management Plan (FMP). The FMP is a valuable document that will help guide the CCT fisheries program into the future. The FMP provides SMART objectives for hatchery performance standards (e.g., survival, growth, and condition), stocking and fish catch rates in waterbodies, and monitoring data showing whether the objectives are met. Quantitative objectives, monitoring results, and the need for management changes are nicely captured in concise summary tables for each waterbody. These simple tables provide a highly informative summary of program operations and success. The proponents have made significant progress in documenting their project, retrospective analyses, and future plans since the 2012 ISRP Review.

The CCT acknowledge potential negative effects of fish stocking (e.g., brook trout, Lahontan cutthroat trout, and sterile triploid rainbow trout) on native fish communities and describe their M&E actions to detect such effects and adjust their practices. Only 1% of their fish used for stocking is into streams (the rest being lakes), where competition with native redband trout could have detrimental effects. The proponents are aware of potential detrimental effects and work within the Tribe's decision-making processes and the community to reduce possible negative impacts while providing fishery benefits from stocked fishes. Continued education and outreach will be important for improving the CCT fishery and hatchery program, e.g., catch and live-release of unmarked trout (native redband trout), impacts of non-native predator fishes, illegal fish transplanting, rationale for sterile triploid brook trout, and health risks associated with eating too many of certain fish species.

The ISRP recommends that CCT consider the consequences of contaminants in different fish species consistently in fisheries management and project development. The proponents should work with WDFW, Washington Department of Health (DOH), and Washington Department of Ecology (DOE) to evaluate mercury and PCB concentrations in hatchery rainbow trout because

these fish probably do not have the health risks identified in past analyses of "rainbow trout." Previously, DOH identified health risks associated with eating too many rainbow trout, white sturgeon, burbot, northern pike, walleye, and other fishes in Lake Roosevelt ([DOH fish advisory](#)). The Colville Hatchery stocks rainbow trout into Rufus Woods Reservoir immediately downstream of Lake Roosevelt. However, new harvest regulations implemented by the CCT and co-managers in Rufus Woods and Lake Roosevelt require live-release of unmarked native redband trout. The ISRP suspects that the high concentrations of mercury and PCBs detected in rainbow trout in the past were largely due to samples that included naturally produced redband trout, which are exposed to these contaminants for a much longer period of time than hatchery put-and-take trout.

The concentrations of mercury and PCBs in hatchery salmon and trout were examined and reduced many years ago by reducing amounts of certain forage fish in the hatchery fish diet. Since new regulations prohibit "catch and eat" fisheries on redband trout, we recommend that contaminants be re-evaluated in stocked rainbow trout. If contaminant analyses reveal major differences in contaminant loads between naturally produced fish and hatchery fish, education and outreach programs could emphasize both the conservation benefits of catch and live-release of unmarked naturally produced fish and the decreased health risks of eating marked hatchery fish.

The response and FMP provide useful summaries of the stocking program for each primary stocking location and identify revised quantitative objectives. The FMP describes the characteristics of each location and explains why these species are stocked in each site. The FMP could be improved by explaining how the objectives were developed (e.g., numbers released, size and condition, angler catch rate, angler effort, CPUE).

The proponents acknowledge that stocking diploid (i.e., reproductive) non-native brook trout is not an ecologically sound practice, sends mixed messages to the public, and increases the potential for illegal transplanting by anglers. They indicate that they are committed to working with the CCT leadership (Colville Business Council) to discuss more ecologically sound options, such as stocking sterile triploid brook trout and developing education and outreach efforts to build public and Tribal support. A key advantage of triploid trout to anglers is their relatively fast growth rate. Ideally, the use of triploid brook trout should have been discussed in the new FMP; this information should be provided when the FMP is revised. The fish screen at the mouth of Owhi Lake, which supports a naturalized population of non-native brook trout, is a good step forward to reduce potential spreading of this non-native species. The ISRP commends CCTs openness and positive response to the ISRP recommendation to switch from diploid to triploid brook trout in the hatchery and encourages the CCT to keep this task as a high priority.

The proponents indicate that they are continuing to develop the Resident Fish Database. Much of the database is not currently accessible to the public, but interested users can contact the CCT and get password-protected access. This is a reasonable compromise at this stage, but the ISRP encourages the proponents to increase the portion of the database that is open to public access as they continue to develop the data portal.

The FMP describes the overall decision-making process, metrics used for management decisions, and past modifications. This information is extremely useful. The response does not indicate whether the annual program review has identified alternative outcomes and the actions they would likely take if those outcomes occur. The ISRP encourages the CCT to consider a proactive assessment of possible outcomes and alternative actions they would pursue if unexpected changes occur. This information would improve the Evaluation and Adjustment section of the proposal and should be added in the future.

The proponents provide additional information on confounding factors related to wildfires, climate change, and possible reintroduction of Chinook salmon above Grand Coulee Dam. The CCT clearly recognize the importance of the factors, and the ISRP encourages them to continue to build information that will strengthen their management actions in the face of these and other confounding factors.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

Overall, this is a well-managed project that has a comprehensive M&E program, Fisheries Management Plan (update in progress), and an adaptive management process. The proponents indicate that these components are being used to ensure that expected fishery benefits are being derived from the project's hatchery fish. However, key elements of this proposal are apparently described in a comprehensive Fisheries Management Plan requested by the ISRP in 2016. This report is "in press," but a draft has not yet been provided to the ISRP. The ISRP requests responses to the following questions and issues, which are discussed in more detail in the main text below:

1. Please provide the new Fisheries Management Plan (CCTFW 2020) to enable the ISRP to complete its review.
2. Strictly speaking, the project is not designed to improve or enhance native resident fishes but rather is substituting non-native hatchery fish for the loss of anadromous fish to the tribes. The stocking activities of this project may increase predation or competition between native fish assemblages and non-native fish. The project's survey

information can inform management by indicating locations where stocked fish could have negative impacts on native redband trout populations in the streams and lakes of the reservation and surrounding areas. However, neither the project proposal nor the CCT Integrated Resource Plan directly address how these conflicting purposes will be balanced. Please address this issue.

3. Provide SMART fish stocking objectives (i.e., number, size, date) for each release location.
4. Please separate implementation objectives or metrics that involve the activity of the Colville Hatchery from metrics that involve measurement of native redband trout and catch rates of non-stocked fish. Please explain why these unrelated objectives are part of the Colville Hatchery project.
5. The ISRP expects that there are established standards for within hatchery production (egg take, eyed egg-to-ponding success, fry-to-release survival, numbers transplanted). Please describe the methods being used to estimate survival of fish from one life stage to the next while they are in the hatchery. Have these standards been consistently met?
6. Brook trout is a non-native species that is often targeted for removal rather than stocking. Rather than using diploid brook trout, the proponents could purchase triploid brook trout, raise them in the hatchery, and stock them in Owhi Lake and the closed lakes where Tribal members want a brook trout fishery. The use of triploid brook trout may require education and outreach to convince Tribal leadership of the conservation and fishery management benefits. What would be required to make this strategy convincing to the Tribe and operationally feasible? While sensitive to the wishes of the Tribal fishing community, the ISRP is concerned about the mixed message being sent by stocking diploid brook trout in some places and simultaneously endeavoring to control or eradicate them elsewhere.
7. Are project data available on the online database? All data (PIT tags, size, abundances, genetic or biological analyses, environmental data) should be reported in the Data Portal in addition to the stocking numbers. In the future, the portal should provide graphical summaries for major components of the database. These database development efforts should be coordinated with other projects to provide a central repository and online portal for data on Lake Roosevelt.
8. Please describe how the management group reviews monitoring assessments and how decisions are recorded and archived. For example, have alternative actions been identified ahead of time for major scenarios of project outcomes?

9. Please briefly discuss potential confounding factors related to 1) climate change and the increased risk of fire, and 2) implications of anadromous salmon reintroductions for the net pen operations and trout stocking in Rufus Woods Lake.

### **1. Problem statement**

The proposal describes the history and the purpose of the Colville Hatchery Operation and Maintenance Project, which is primarily mitigation for the loss of anadromous fish in the blocked area. Stocking of hatchery fish is intended to provide subsistence harvest for tribal members and sport-fishing harvest for both tribal members and non-members. The hatchery operation uses nonnative fish species including triploid, feminized rainbow trout, Lahontan cutthroat trout, and brook trout. The majority (98%) of the fish are stocked into two streams and seven lakes. The Tribe also contracts with a commercial net pen operation to rear some rainbow trout. All fish are adipose fin clipped.

Recently, the CCT combined the fish management plan and hatchery operational plan into a single integrated fisheries management plan (CCTFW 2020, in press), but the document is not yet available for ISRP review.

### **2. Progress to date**

The proponents provide a summary of progress to date, largely focused on stocking into various water bodies. Stocking of triploid rainbow trout in the Sanpoil River was reduced by more than 75% to lessen potential negative effects on native redband trout, but a complete, detailed description of annual stocking into each waterbody (16 lakes and 2 streams) is not presented. Similarly, information on catch rates and the size and condition of fish does not seem to cover all areas. Little information was provided on in-hatchery performance, though the use of net pens was reported to greatly increase the size of trout and catch rates by anglers. We assume more details will be forthcoming when the comprehensive report requested by the ISRP in 2016 is released. Detailed progress for each quantitative objective is needed (see below).

The hatchery facility has been upgraded since 2012, primarily by replacing or updating old equipment.

### **3. Goals and objectives**

The project has two broad goals: providing subsistence harvest opportunities for tribal members and providing management data on water bodies where stocking occurs, including measures or indices of abundance, size, and angler catch rates.

Adequate quantitative objectives for catch rates (fish per hour) and fish size are presented for the eight largest and most utilized waterbodies. Buffalo Lake, North Twin Lake, and South Twin Lake have metrics for largemouth bass and kokanee, which are not reared by the Colville Hatchery, so it is unclear why these metrics are the responsibility of the Colville Hatchery project. No objectives are presented for nine other smaller waterbodies that receive less stocking (Bourgeau, Duley, Gold, La Fleur, Little Goose, Round, Simpson, Soap, and Summit lakes).

No quantitative objectives are presented for the number of fish by size to be stocked into each waterbody, although some of this information is provided elsewhere, and may be present in other reports (see M&O report). Similarly, no quantitative objectives are presented in the proposal for in-hatchery and net pen performance. What are the project's objectives for survival during incubation, from ponding to release, and size-at-release for each species?

The project is not designed to improve or enhance native resident fishes, but rather substitutes non-native fish for the loss of anadromous fish. The stocking activities of this project could increase predation or competition between native fish assemblages and non-native fish, depending on the nature of ecological interactions. Although many of the stocking locations are isolated and not typically connected to other waterbodies, neither the proposal nor CCTFW (2015) discuss the potential for released hatchery fish to be caught and illegally transplanted into other lakes and streams in the area. The survey information informs a management team about locations where the hatchery fish could have negative impacts on native redband trout populations in the streams and lakes of the reservation and surrounding areas. Stocking has been greatly reduced in some areas to prevent these negative impacts. This is complicated by customary subsistence angling for many of these non-native fish on the Colville reservation over the last century, often with encouragement or assistance from state and federal agencies. However, neither the project proposal nor the CCTFW (2015) directly addresses these conflicting purposes and explains how competing benefits and risks are balanced.

Neither the proposal nor the CCTFW (2015) management plan explains how the metrics or implementation objectives for the different lakes and streams are developed. Is there a biological or technical basis, or are they simply a proportional distribution of the hatchery production into favored locations for the Tribal fishery? What group is responsible for determining the specific implementation objectives, and how do they obtain input from regional co-managers or Tribal members?

#### 4. Methods

The proposal indicates that "facilities features, program overview, rearing techniques, and related protocols that were developed to improve the health and quality of fish" are provided in the new Fisheries Management Plan (CCTFW 2020). This plan was not included in the documents for this review. The new plan reportedly contains the methods and protocols for broodstock collection, egg acquisition, fertilization, incubation, biosecurity, best management practices, marking, and stocking. As soon as the document is available, it should be sent to the ISRP as part of this review.

The proposal briefly describes the general methods for lake, stream, and creel surveys, which are also stored and reviewed in the MonitoringResources.org website. Previous reviews of this project and others in Lake Roosevelt have raised questions about the accuracy of gill net CPUE as measures of fish abundance. These concerns apply directly to this project.

The project stocks non-native brook trout into lakes that are adjacent to locations possessing native redband trout. Some of the lakes, for example, are close to areas where YY males are being stocked to eradicate brook trout. Even though these lakes are physically closed, anglers could still transfer brook trout to their favorite locations. As an alternative, the hatchery could purchase triploid (i.e., sterile) brook trout, raise them in the hatchery, and stock them in Owhi Lake and the closed lakes where Tribal members want brook trout fisheries. Education and outreach efforts may be needed to convince Tribal leadership of the conservation and fishery management benefits of stocking triploid brook trout.

When the proponents monitor a lake or stream by gill netting or electrofishing, do they identify, enumerate, and measure all species, including non-sport species, such as native sculpins, suckers, minnows, lampreys, and other species? Such data are extremely valuable in the long run for various purposes and should be recorded and archived.

Stocking records for the project are uploaded into a database developed by the CCT, which is publicly available, but it is not clear whether the database for the M&E surveys is publicly available. The stocking records are available on the public portal for the CCT resident fish data. The PIT tag data are archived in the PTAGIS database.

Are additional data available on the online database? All data (PIT tags, size, abundances, genetic or biological analyses, environmental data) should be reported in the Data Portal in addition to the stocking numbers. In the future, the portal could also provide graphical summaries for major components of the database. These database development efforts should

be coordinated with the other projects to provide a central repository and online portal for data on Lake Roosevelt.

## **5. Project evaluation and adjustment process**

The resident fish program conducts bi-annual meetings to review goals and objectives, evaluate results, and plan future activities. The timing and composition of these meetings will be identified in a new Fisheries Management Plan (CCTFW 2020), which is currently not available. This new management plan is expected to provide a more comprehensive summary of program goals and objectives and the background to understand the rationale behind them in the fisheries management plan. It also is intended to summarize the adaptive management process and provide a general introduction and history for the project. An annual program review is held in winter to discuss results, management implications, and make decisions on future management actions.

A brief diagram is provided in the proposal to illustrate the adaptive management framework and the sequence of defining goals and objectives, designing and implementing strategies, and evaluating monitoring results. It does not clearly describe how the management group responds to monitoring assessments and how decisions are recorded and archived. Additionally, it is not clear if alternative actions have been identified ahead of time for major scenarios of project outcomes. Clearly specified options for decision making can improve management responses and promote effective use of available resources.

## **6. Potential confounding factors**

Multiple confounding factors are identified—climate change, total dissolved gas and temperatures in two reservoirs, non-native predators, non-native cyprinids, and escapees from the steelhead net pen operation.

The proposal describes the challenges faced in Rufus Woods Lake for temperature, total dissolved gas, and disease. Given regional warming trends, it would be precautionary for the project and Tribal managers to initiate a focused assessment of alternatives to the net pen rearing in Rufus Woods Lake.

The Colville Reservation has experienced several large fires in recent years. The discussion of climate change and regional warming does not discuss this as a confounding factor, but it seems likely that many locations for stocking non-native fish might be impacted by future fires and subsequent problems with sediment, temperature, and water quality. Another

precautionary measure would be to develop a response plan to adjust hatchery operations and stocking locations based on challenges created by fires and other climate related stresses.

A major confounding factor that is not discussed is the potential for reintroduction of anadromous salmon above Chief Joseph Dam. Continued operation of the net pens should be reviewed if anadromous salmon are reintroduced above Chief Joseph Dam. Returning adult salmon might carry IHN, which could cause major mortalities in the net pens and possibly the hatchery. As a result, all fish from the hatchery would have to be inoculated for IHN prior to transfer into the net pens. This is a substantial confounding factor that the CCT will face as they take future steps to reintroduce anadromous salmon into the blocked area.

## **7. Timeline**

The proposal's Gantt chart should include rearing periods for the project's hatchery-produced fish. Other than this minor oversight, the chart adequately indicates when other aspects of the project are expected to annually occur.

## **8. Relationships to other projects**

The proposal provides brief but acceptable descriptions of how the project interacts with the Chief Joseph Hatchery (BPA 2003-023-00), Rufus Woods Habitat/Passage Improvement, Creel and Triploid Supplementation (BPA 2007-405-00), and Chief Joseph Kokanee Enhancement (BPA 1995-011-00) projects, as well as with WDFW.

## **9. Response to past Council recommendations and ISRP reviews**

The proposal indicates that the CCT began purchasing triploid rainbow trout from a different source in response to the ISRP's previous concern that the triploid prevalence was only 95%. The proponents indicate that the current source has a triploid prevalence near 100%. Is triploidy assessed each year? These annual values and the methods used to determine them should be reported.

The ecological effects of triploid fish on native fishes should be investigated including competition, predation, and displacement from habitat, and the effects of the fishery in Lake Rufus Woods.

The CCT updated the Fisheries Management Plan in 2020, which apparently contains metrics, goals, and management actions taken to meet those goals. However, it is unclear if the

modified FMP provides a technical explanation for the stocking rates for the major release locations.

#### **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

The Budget totals in the proposal were incorrect and needed to be refreshed (F9). The budget includes a Total Budget, which includes Overhead and Utilities and Telecommunication. The next row is Budget totals and it is the total cost without Overhead and Utilities and Telecommunication. Which row represents the funds requested in this proposal?

#### **200740500 - Rufus Woods Habitat/Passage Improvement, Creel and Triploid Supplementation**

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Colville Confederated Tribes

**Final recommendation:** Meets scientific review criteria

#### **Final comment:**

The ISRP appreciates the proponents' positive and constructive responses to the ISRP's questions. The proponents provide an updated Fisheries Management Plan (CCTFW 2020), provide additional information about their creel census, discuss protection measures they are implementing for native redband trout, and describe future options for changes in the project and addition of a food web study.

The ISRP commends the CCT's barbless hook requirement and catch-and-release regulation to protect unmarked redband trout. We encourage CCT and WDFW to incorporate these regulations in the WDFW regulation pamphlet for Rufus Woods Lake and Lake Roosevelt.

The proponents agree with the ISRP's suggestions for streamlining the creel census effort and using funds as efficiently as possible, but they do not want to change the creel census because of management changes in Rufus Woods Lake and monitoring responsibilities for the Fisheries Management Plan. The ISRP understands these concerns but still encourages the proponents and the CCT to streamline the creel census to make funds available for other needs. The project could explore alternative and less time-consuming methods for assessing angler harvest, such as written survey forms at boat ramps or online reporting. Evaluation of alternative methods should be completed and included in the 2021 Annual Report.

The proponents agree that additional marking of fish released in Rufus Woods Lake would provide more accurate estimates of catch rates on trout stocked into Rufus Woods Lake versus those entrained from Lake Roosevelt. The proponents suggest using coded wire tags, but they also might consider thermal marking. The Colville Hatchery has both ambient and chilled water in its incubation room, making it possible to thermally mark otoliths of all fish while they are incubating at the hatchery with little additional labor. Heads of marked fish could be returned at boat ramps for removal of CWT or otoliths by the project. A more efficient creel survey could free money for these other efforts.

As noted in the ISRP review of the Colville Hatchery (198503800), the ISRP recommends that CCT work with the WDFW, Washington Department of Health, and Washington Department of Ecology to evaluate mercury and PCB concentrations in hatchery rainbow trout released into Rufus Woods Lake. These fish probably do not have the health risks identified in past analyses of "rainbow trout." The ISRP suspects that hatchery rainbow trout may have lower contaminant levels because of lower concentrations of contaminants in their commercial diet and because the fish in this put-and-take fishery spend less time in the reservoir. Education and outreach programs could emphasize both the conservation and health benefits of not eating (i.e., catching and releasing) unmarked native redband trout if the analyses confirm lower contaminant levels in hatchery fish.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The Rufus Woods Habitat/Passage Improvement, Creel and Triploid Supplementation Project (Rufus Woods Project) of the Colville Confederated Tribes (CCT) is a straightforward creel survey. The project provides creel survey data to tribal fisheries managers to determine whether objectives for tribal subsistence and sport trout fisheries are met. The creel survey is well designed, and previously published methods are being used to analyze the data to provide effort and harvest information.

The ISRP commends the project proponents for revising and expanding their original 2015 Fisheries Management Plan (CCTFW 2015). Although unavailable during our initial review, we look forward to seeing the new plan (CCTFW 2020).

In order to determine if the project meets scientific review criteria, The ISRP requests responses to the following questions and comments:

1. Please provide the new Fisheries Management Plan (CCTFW 2020), which includes a description of the adaptive management process.

2. Clarify how stock-specific harvest rates are estimated, given the probable inclusion of Lake Roosevelt rainbow trout in the creel (see details below). Can estimates of catch of trout originating from Lake Roosevelt be made? For example, could estimates of harvest rates for fish from Lake Roosevelt and Rufus Woods Lake be made by using multiple tags (PIT, CWT, Floy, fin clips)? This approach would also allow the project to measure Floy tag retention rates rather than using estimates from the Midwest.
3. Although the percentage of native trout in the catch is small, how many are caught each year, and could catch and release mortality affect the sustainability of native trout?
4. Based on the linear relationship between stocking rates and harvest numbers, could the CCT save or reallocate funds by scaling back the creel survey if harvest objectives are met? If not, how much more data are needed before such streamlining is possible?
5. What statistical metrics for the estimates of catch and harvest are required? Please provide SMART objectives for key metrics that will stem from the creel survey (e.g., total angler hours, fish caught per hour, total catch of hatchery and native trout, percentage of hatchery and native trout originating from Lake Roosevelt).
6. In addition to the targeted overall abundance of hatchery trout, does the CCT have a maximum limit for total catch (or mortality of released fish) of native redband trout that they do not want to exceed in order to sustain the native population? If not, could one be developed and how will the objective be used to manage the fishery?
7. Are all data for stocking, creel census, and environmental monitoring available on the CCT Resident Fish Database? Are all data in the online data portal publicly available?
8. The proponents indicate they would like to conduct studies of the food web, of entrainment and other losses, and of reservoir-wide water quality if funds become available. Could existing activities be streamlined to make funds available?

## **1. Problem statement**

The Rufus Woods Project estimates angler effort, harvest, and catch to meet objectives of the Colville Tribes Resident Fisheries Management Plan (CCTFW 2015), which is designed to mitigate for the loss of salmon and steelhead above Chief Joseph Dam. The fishery objectives are designed to maintain a total annual angler harvest of 40,000 rainbow trout. One of the annual actions to achieve this objective is to stock 50,000–75,000 rainbow trout  $\geq 400$  g/fish during the spring.

The creel census of harvest and catch is adequate for the mitigation purpose, but there is no assessment of the effects of this stocking program on native biota. The proponents note that native trout represent  $\sim 1\%$  of the catch. If anglers catch 40,000 hatchery trout each year, 400

native redband trout could be caught and released. What is the survival rate of fish that are caught and released? How would post-release mortality affect the overall population of redband trout?

The proposal describes the history of this stocking program for rainbow trout, but it does not explain how recent objectives were developed. Neither the proposal nor the CCTFW (2015) explains how the numbers of rainbow trout stocked annually are determined. Are they based on production limitations in the hatchery, carrying capacity in the reservoir, subsistence requirements, or angler preferences? What is the conceptual or quantitative basis for the stocking rate?

Management recommendations and objectives after 2015 are described in the new integrated fisheries management plan (CCTFW 2020), but this document is not available at the time of the review.

## **2. Progress to date**

Rainbow trout harvest in Rufus Woods Lake has been driven largely by CCT stocking levels. Over 70% of Rainbow Trout > 400 g stocked during the spring/summer were harvested by anglers during the same year they were stocked, essentially making this a put-and-take fishery. Greater than 99% of harvested trout were of hatchery origin as indicated by clipped adipose fins. Rainbow trout harvests are directly correlated with numbers of rainbow trout stocked (Figure 1 in proposal). Some rainbow trout immigrate into Rufus Woods Lake from Lake Roosevelt, but there is no mention of how many Lake Roosevelt rainbow trout might contribute to this fishery.

Based on the linear relationship between stocking rates and harvest numbers, could the CCT save or reallocate funds by scaling back the creel survey in the future if harvest objectives are met? The proposal does not discuss this option. If not, how many years of additional data are needed before such streamlining is possible?

## **3. Goals and objectives**

Goals and objectives are described differently in the section on significance to the Fish and Wildlife Program versus the section on Goals and Objectives. The section on significance to the Fish and Wildlife Program provides explicit goals and annual implementation objectives that are semi quantitative and explicit. The first goal is to achieve full mitigation for anadromous fish, native resident fish, and wildlife losses, but “full mitigation” is not defined clearly. The objectives for this goal do not have specific numerical targets but rather call for maintaining constant or increasing trends for focal fish species.

The second goal is to enhance the harvest of both resident and anadromous fish, but measurable implementation objectives have not been identified or adopted. The objectives are

really tasks (i.e., estimation of angler harvest, average catch and harvest rate for rainbow trout, and total catch and harvest rate of rainbow trout). What are the required statistical metrics for these estimates? Please provide quantitative objectives for key metrics that will stem from the creel survey (e.g., total angler hours, fish caught per hour, total catch of hatchery and native trout, percentage of hatchery and native trout originating from Lake Roosevelt).

In addition to the targeted overall abundance of redband trout, does the CCT envision a maximum limit for total catch (or mortality of released fish) of native redband trout that should not be exceeded in order to sustain the native population? If not, could one be developed and how will the CCT develop it.

The proponents should clearly distinguish their biological objectives from their implementation objectives to improve project evaluation and future adaptive management.

#### **4. Methods**

The CCT developed a stratified creel survey with assistance from Dr. John Skalski of the University of Washington. The survey is well designed and is documented in annual reports, the CCTFW (2015), and [MonitoringResources.org](http://MonitoringResources.org).

The analysis of Floy tagged fish detected in the creel survey assumes a Floy tag retention rate of 91%, based on a study from the Ozarks. The CCT should consider future tagging opportunities to develop an estimate of tag retention rate for Rufus Woods Lake. They could use PIT tags or coded wire tags in conjunction with Floy tags to better track the different sources of fish for stocking and at the same time develop a more accurate estimate of Floy tag retention rates.

The CCT makes data on all resident fish stocking publicly available in the CCT Resident Fish Database. Data from PIT-tagged fish are available in the PTAGIS database. Data from the creel survey do not appear to be available in the CCT Resident Fish Database or any other publicly available website. All data could be made available on the CCT Resident Fish Database. The project should indicate how it plans to incorporate those data in its online data portal.

Data from all stocking events within CCT waters are uploaded into the CCT Resident Fish database. Are data from the creel surveys entered into this database? Are the creel data and other data about the fishery and water quality publicly available in the data portal?

#### **5. Project evaluation and adjustment process**

An adaptive management process is not described in the proposal or CCTFW (2015). The proposal indicates that the new integrated fisheries management plan (CCTFW 2020) includes a description of the adaptive management process. The CCT plans to conduct annual project reviews to evaluate results and assess management implications. The annual project review will

have regularly scheduled meetings, a specific group has been identified to make management decisions, and all recommendations will be documented in the Fisheries Management Plan.

## **6. Potential confounding factors**

The proposal identifies accidental commercial net pen escapes, total dissolved gas, and non-native predators as confounding factors. Commercial net pen escapes are unpredictable and largely beneficial because commercially reared fish are marked triploid rainbow trout, consequently no management actions are warranted.

Climate warming was not identified as a potential confounding factor, but the information about the effects of total dissolved gas and temperature clearly indicates that climate warming may be a substantial confounding factor in the future. The project should develop a process to track regional warming trends and temperature issues in Rufus Woods Lake to incorporate in a plan for both short-term responses to major stress events and long-term project adjustments to persistent trends.

## **7. Timeline**

The proposal provides the annual timeline for the creel surveys, rainbow trout stocking, and public outreach. The description of the creel survey approach in the Methods section is more informative about the timing of the projects' activities than this very simple chart.

## **8. Relationships to other projects**

The proposal does not describe relationships with other fishery managers, such as WDFW. To what degree is the CCT's rainbow trout fishery in Rufus Woods Lake coordinated with fish management by the state of Washington?

## **9. Response to past Council recommendations and ISRP reviews**

The proponents state that they recognize the need for additional investigation of reservoir productivity, but they suggest there is little potential for a put-and-grow-and-take fishery because the prey-base is underutilized. They do not indicate why such a large proportion of the rainbow trout stomachs are empty. It is possible that the trout rely on a part of the food web that is not abundant, that hatchery and net pen environment has modified their feeding behavior to the point that they cannot use food resources in the reservoir, or that the fish reared in the hatchery and net pens are poorly adapted to the larger reservoir environment upon release. How will the project develop the information to understand the growth rates of released rainbow trout or collaborate with other projects in Lake Roosevelt?

The CCT identifies concerns about the long-term costs of a stocking program to maintain a put-and-take fishery in a large reservoir. Future decisions about the success and cost effectiveness

of the project would be better informed if their managers better understand the food web and the potential for growth and survival in Rufus Woods Lake. The proponents indicate that they would conduct studies of the food web and feeding behavior of the fish if funds became available. Basically, they postpone responding to the ISRP's recommendation. The ISRP continues to consider this a major question for the project and recommends future reallocation of resources to address this need. For example, if data from the creel survey continues to show a strong relationship between stocking rates and angler harvest, the creel survey could be streamlined, and funds made available for a food web study.

The ISRP commends the project for developing the fisheries management plan (CCTFW 2015). The ISRP looks forward to the projects' reporting of the implementation of the master plan and the adaptive management process described in this proposal and the new fisheries management plan (CCTW 2020).

#### **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

The budget covers the salaries of two senior leaders (0.2 and 0.3 FTE) and three full time technicians. Are three technicians required to conduct monthly creel surveys for a 50-mi long reservoir with several access points along its length and to assist in stocking fish from the net pen project? Dr. Skalski should be consulted to provide the tradeoff between creel sampling effort (and cost) versus precision and accuracy of the estimates needed to evaluate the objectives. Given the linear relationship between stocking rates and angler harvest, could the creel census be streamlined to make funds available for other activities?

#### **199501100 - Chief Joseph Kokanee Enhancement**

- Box: [Original proposal](#) and [Response and revised proposal](#)

**Proponent:** Colville Confederated Tribes

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The ISRP commends the CCT for providing thorough, informative, and constructive responses to our questions. Several of the responses are included as revisions to the proposal. The proponents should consider adding their entire response to their proposal to assist the CCT personnel, funders, and reviewers in the future. Quantitative objectives are improved, but the ISRP was uncertain about the basis for the predator control targets (e.g., remove 25% of the walleye and smallmouth bass population). This information should be provided in the annual report.

Kokanee, along with other fishes, are very important for Tribal and non-Tribal harvest. The origins of the kokanee in Lake Roosevelt are shrouded in the past and create uncertainties that cannot easily be sorted out. For example, the ISRP is aware that searches for kokanee beach spawning areas have been ongoing for decades. Overall, the CCT seem to be doing the right things in a very difficult situation with biological uncertainties, logistic challenges, and management complexities.

The response adequately describes the need for kokanee stock identification to help set harvest regulations (e.g., liberalized harvest regulations could occur if many kokanee predominately originate from upstream hatchery stocking of imported kokanee). Given this management situation, the ISRP recommends visual marking of upstream hatchery kokanee, rather than relying on genetics or otolith analyses to identify upstream hatchery fish. Therefore, the ISRP encourages the CCT to work with upstream hatcheries to ensure that hatchery kokanee are marked, if they are not already. After 2021, hatchery kokanee will not be stocked directly into Lake Roosevelt, so any marked kokanee would be from the upriver hatchery.

The CCT explains that there is no centralized database for Lake Roosevelt, but the STOI, CCT, and WDFW exchange information and provide raw data when formally requested. The decision matrix in the proposal and response identifies the different teams that are responsible for separate databases. The proponents believe the information exchange is functioning appropriately and lack of data availability is not a significant problem. Information exchange can improve the success of the projects that are occurring on Lake Roosevelt. The ISRP recognizes the proprietary interests of the three major co-managers but emphasizes that easy access to information on Lake Roosevelt projects is important for managers, scientists, and the public. It is unclear to the ISRP whether or not the data are stored in a format that can be easily utilized by other co-managers when requested. The ISRP encourages the co-managers to work collaboratively to create centralized, open access information portals to the degree possible as they continued to build critical information on Lake Roosevelt.

The CCT provided useful information on their effort to develop a more efficient and effective data management system and their attempts to contract with firms to develop data collection forms, software, and database. It is clear that they are committed to developing a robust data management system. The ISRP recognizes that developing and maintaining an effective data management system and database are significant and common challenges for complex, ongoing projects such as this. The CCT recognize the need for a full-time data manager but do not have funds to support this position. The ISRP strongly endorses their efforts and encourages the proponents and Tribal leadership to continue to allocate staff and funds to accomplish this important task. A possible solution for the lack of funds for a full-time data manager would be to hire a data manager to oversee the development of related databases in the various projects and assist the project lead scientists in developing and maintaining their individual databases.

BPA's decision to eliminate funding for all travel, training, and conferences will reduce opportunities for communication among scientists and may hinder scientific progress.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The goal of the Chief Joseph Kokanee Enhancement (CJKEP) is to protect and enhance wild kokanee populations above Chief Joseph and Grand Coulee dams to support tribal subsistence and non-tribal recreational fisheries. This project attempts to do this by removing non-native predators in the Sanpoil River and by investigating where kokanee are spawning in the Lake Roosevelt region. Only 20 kokanee have spawned in the Sanpoil River per year, on average, from 2008 to 2018. Despite this low number, a major effort has been underway for a number of years to control non-native predators in this watershed, which spans much of the Colville Reservation. Predation does seem to be a key limiting factor in this region, based on predation rate findings from this effort. In contrast, kokanee are growing to a large size, suggesting prey availability is not a significant issue.

A key issue is the identification of kokanee spawning locations in Lake Roosevelt, its tributaries, and upstream areas. In their presentation, the proponents noted that if most kokanee rearing in Lake Roosevelt originate from areas above Lake Roosevelt, then harvest rates on kokanee could be increased because fish originating from upstream populations would not be able to return to their natal sites. Genetic analyses, otolith microchemistry assessments, and acoustic tagging have been used to determine the possible origins and spawning locations of kokanee sampled in Lake Roosevelt. Yet, these efforts to ascertain the ancestry and recent origins of kokanee found in the lake have not yielded unequivocal results.

Given the complications in collecting and interpreting samples, and the diversity of potential spawning locations throughout the region, ISRP requests that:

1. The proponents discuss in detail how stock composition data will influence fishery management and predator control efforts.
2. Quantitative biological objectives consistent with SMART criteria need to be stated. For example, why is the objective for kokanee escapement based only on an implementation (operating a weir) and not a biological objective? What is the biological objective for adult kokanee escapement? Explain the technical basis for the numerical targets.

3. Are environmental measurements (temperature, dissolved oxygen) coordinated with the LRMP and included in a centralized database? Is dissolved oxygen thought to be a limiting factor for kokanee? Are the monitoring protocols, methods, field locations, and data archiving coordinated between the multiple projects on Lake Roosevelt? If not, the project should describe how they plan to work with other projects in Lake Roosevelt to coordinate methods, data analysis, and online accessible archives.
4. Database development is an implementation objective. Part of the database development should be devoted to creating online data with summaries and interactive graphics that will be useful to managers and the public. Only the hatchery webpage from the Resident Fish Data Portal was accessible. Data on genetics, adult escapement, suppression catches for all species, and other project data would be useful to include in the Data Portal. Are these data available on the online database, if so, are they, or will they, be available to the public?
5. A narrative description of project evaluation and adjustment processes is requested. The description should relate the adaptive management process to the master plans, such as the CCT Integrated Resource Plan and the Chief Joseph Kokanee Enhancement Project Implementation Plan. The narrative should describe the schedule for meetings, the composition of decision-making groups, and how decisions are documented, archived, and reviewed.

## **1. Problem statement**

The proposal thoroughly describes the history of hydrosystem development in the upper Columbia River, the decisions to develop the kokanee populations to mitigate for the loss of salmon and steelhead, and the significance to the Fish and Wildlife Program and other regional plans. The proponents provide data and literature review for kokanee in Lake Roosevelt and the region.

The proponents note that wild kokanee in Lake Roosevelt are not abundant, and that the population is unstable due to inconsistent recruitment. Predation seems to be a major population constraint, whereas large size of kokanee suggests that growth is not (though information on size at age would be more useful than merely the total size). While non-native predator removal is ongoing in the Sanpoil River, it is not clear how the project's predator component will benefit kokanee in Lake Roosevelt given that so few kokanee spawn in the Sanpoil River. A wild kokanee fishery continues to exist in Lake Roosevelt, indicating the kokanee are likely spawning in other locations within or outside the system, according to the proponents. The proponents have been trying to identify these spawning areas because they

believe higher harvest rates could be allowed if most kokanee originate upriver from Lake Roosevelt. The wild population is said to "have suffered consistent population losses for the past 20 years" so why are they fished at the current levels? This logic needs more explanation. In 2016, approximately 10,000 kokanee were harvested (by far the most), but there was no discussion of why the harvest was so high.

## **2. Progress to date**

The project has developed a large body of information. The ISRP commends the project and the Colville Confederated Tribes (CCT) for developing the Chief Joseph Kokanee Enhancement Project Implementation Plan and a database to make this information publicly accessible. Key ongoing actions include monitoring adult escapement, removing non-native predators in the Sanpoil River, understanding the genetics of wild kokanee, and understanding their distribution.

The hatchery component of the kokanee effort will be completely discontinued in 2021; egg and fry plants were terminated at an earlier date. The ISRP agrees with this decision because few hatchery kokanee contributed to the fishery and because hatchery kokanee recently originated from Lake Whatcom rather than the local population. Given the objective to rebuild the native kokanee population, kokanee from Lake Whatcom should not have been stocked into the area. Furthermore, it was not clear where the yearling outplants were expected to spawn.

Large numbers of non-native predators have been removed in the Sanpoil River by the project, but only 20 kokanee spawners have returned to the river each year, on average, since 2010. The suppression of non-native predators may still be useful for native redband trout populations and the net pen rainbow trout (for angler harvest), but it leaves critical questions for this project about the lack of recovery of wild kokanee in the Sanpoil River.

The suggestion that kokanee are coming down from Canadian populations, based on otolith microchemistry, is intriguing but the hypotheses and tests are not clearly expressed. In addition, it is not clear how the information would be used in managing this population or complex of populations (see similar comments above).

Kokanee remain a valuable component of the fishery, yet the apparently low abundances raises the question of why there is a two fish per day per person limit without any limit on the total fish harvested.

An online database was created as part of the Resident Fish Data Portal. The ISRP only had access to a small component of the webpage. Are all data available on the online database?

Data on genetics, adult escapement, suppression catches for all species, and other project data would be useful to include in the Data Portal. The portal should also provide graphical summaries for major components of the database so trends can be easily tracked.

### **3. Goals and objectives**

The project goal is to conserve and enhance the wild kokanee populations above Chief Joseph and Grand Coulee dams to support tribal subsistence and non-tribal recreational sport fisheries. To reach this goal, six kokanee objectives and a database objective were presented. The CCT Integrated Resource Plan and the Chief Joseph Kokanee Enhancement Project Implementation Plan are important guidance documents that provide context for the goals and objectives. However, in general, the hypotheses leading up to the objectives are not clearly stated in the proposal, and some objectives are not quantitative and seem open-ended.

Objective 1a provides a reasonable quantitative implementation metric for predator reduction, but it was not clear why this large effort was proposed, given the small kokanee population in this area. Also, justification for the CPUE target was not provided. Later we learned that this effort also benefits native redband trout which are more abundant; it would have been more helpful if the information had been consolidated. Effort is made to limit the number of native redband trout killed as bycatch in the predator gillnets, but how many redband have been killed each year?

Objective 2 involves deployment of temperature and DO monitors, but it was not clear why this was needed, given that kokanee egg-to-fry survival was considered high (later in the proposal it was mentioned that temperature was high in two years). Why are these data not collected by the Lake Roosevelt Monitoring Project? Are the measurements coordinated with the LRMP and included in a centralized database?

Objective 3 is an implementation objective for operating a weir to enumerate kokanee escapement, but the proposal did not identify a biological objective for kokanee escapement. Obviously, the proponents desire more kokanee, but the program could provide a target for the number of kokanee the watershed could support. Given the great uncertainties as to the recent and more distant origins of the kokanee in the reservoir, it is unclear what a reasonable expectation would be for the river.

The stock composition implementation objective (Objective 5) could have been stated more clearly by including the hypotheses that new SNP data will address and how this anticipated information will be used in management and evaluation of population status.

Objective 6 involves an evaluation of how reservoir operations or other factors affect the wild kokanee fishery. A key dependent variable, such as catch per unit effort, should have been mentioned.

Part of the database development (Objective #7) should be devoted to creating online data summaries and interactive graphics that will be useful to managers and the public.

Objective 8 was included to measure heavy metals in the diet and tissues of wild kokanee, but the proposal indicates that the objective is not funded. It is unclear whether this objective is part of the current proposal. Given the likely short lifespan of the species and their tendency to feed on zooplankton, why is it expected that they might accumulate heavy metals?

#### **4. Methods**

The methods are described in adequate detail and are included in [MonitoringMethods.org](http://MonitoringMethods.org).

The proponents indicate that the project will subcontract with a statistician to determine if changes in non-native predators can be detected in a 10-year data set. They may wish to expand this contract to include a review of extant monitoring designs and field methods to determine if improvements can be implemented in their future evaluations of non-native predators. The proposal also reveals that a statistician will be contracted to develop a logistic regression model to understand the cyclic nature of the kokanee fishery. We suggest that the proponents also discuss analytical options with statisticians and modelers that are currently involved with developing and refining life cycle models in the Columbia River Basin.

The proposal states that DNA assignments from kokanee will be used in "harvest regulation discussions and conservation priorities." In addition to DNA, there are also phenotypic traits that can help shed light on ancestral origins and population structure. Are these traits also being used to help identify the stock composition of Lake Roosevelt kokanee? The analysis of factors driving the kokanee fishery appears to be lacking some key metrics (e.g. there seems to be no stock and recruitment relationship, no estimate of stock size, no estimates of exploitation rates etc.). Perhaps some more basic fisheries science approaches could be employed?

#### **5. Project evaluation and adjustment process**

The proposal provides a flow chart accompanied by a brief narrative of how information developed from the major Lake Roosevelt projects is used by the CCT, STI, and WDFW in an adaptive management process. More information is requested. How will different results from each objective be used to adjust management in order to achieve overall project goals? How

are decisions documented, archived, and reviewed? Many objectives in this effort do not readily lend themselves to management decisions, e.g., to remove predators or to identify stocks in harvests.

The section on project evaluation and adjustment does not mention the guiding documents or master plans, such as the CCT Integrated Resource Plan and the Chief Joseph Kokanee Enhancement Project Implementation Plan. Any evaluation process should be based on the frameworks provided in these master plans and should be clearly identified and implemented.

The Lake Roosevelt Forum is an annual conference for sharing environmental and natural resource information about Lake Roosevelt sponsored by the Upper Columbia United Tribes, BPA, WA DOE, and other partners. This outreach effort is an important component of adaptive management. It is surprising that it is not highlighted in this proposal.

## **6. Potential confounding factors**

The proposal describes non-native predators and water temperature as two major confounding factors for protecting and enhancing the wild kokanee population, and both are valid.

The proposal indicates that the non-native predator suppression program will determine whether non-native predator abundance is going up, down, or staying the same. While this may be correct, it assumes catches and locations of the suppression efforts are accurate indices of predator abundances, an assumption that has not been validated, especially for predators that affect kokanee throughout Lake Roosevelt. Furthermore, to what extent might northern pike, typically a structure-oriented edge predator, affect kokanee which are typically found in the open water column, vertically migrating from day to night?

The proposal indicates that the project has monitored water temperatures in critical salmonid tributaries after the droughts of 2015 and 2016. Given the potential for regional warming, it would be beneficial for the co-managers to develop potential actions to be implemented in the case of different temperature scenarios.

## **7. Timeline**

Gantt charts are provided for the monthly and annual timing of all objectives.

## **8. Relationships to other projects**

The proposal adequately described its relationships to other projects in the upper Columbia River and their relationships to other management entities, including PUD's, National Park

Service, BIA, and Bureau of Reclamation. In addition, they described their coordination with other co-managers, including other departments of the CCT and WDFW.

### **9. Response to past Council recommendations and ISRP reviews**

The proposal describes how the proponents addressed previous ISRP concerns about non-native predators and trends in kokanee abundance. They adjusted harvest regulations to minimize impacts on native redband trout and to increase the control of walleye populations. They also discontinued the stocking of hatchery out-of-basin kokanee for harvest.

The proposal does not address concerns about additional studies of entrainment or development of other capture techniques for non-native predators.

### **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No comment.

## **200810900 - Resident Fish Research, Monitoring and Evaluation (RM&E)**

- Box: [Original proposal](#) and [Response and revised proposal](#)

**Proponent:** Colville Confederated Tribes

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The ISRP commends the proponents for providing a substantial amount of additional information for our review and for revising their proposal to provide a more complete document for the project, Tribal leaders, co-managers, and future ISRP reviewers. Their efforts to make the proposal thorough, informative, and useful as a context for understanding the scientific basis of their actions are appreciated, both for this review and future program development and review. Most of the responses are narrative and a number result in changes to the proposal. Additional explanation and formulas were added in some cases to the proposal, such as a better description of the creel census and its analysis.

A revision that we found especially informative is the excellent explanation of the derivation of the escapement goals for redband trout based on the EDT model. The approach for establishing a desired minimum escapement level seems valid as an overall management strategy and is

based on watershed conditions and biological potential. The proponents noted the potential for improved escapement as a result of harvest management changes and habitat restoration.

In addition, changes to the Adaptive Management Plan are well done, as are the additions to the proposal section on Confounding Factors. Their summary of redband trout projects in the upper Columbia River is quite useful and helps the ISRP better understand the complex nature of redband research in the Lake Roosevelt ecosystem. In the future, it would be useful to see this information presented by area rather than for all of Lake Roosevelt. Objectives are significantly improved and now provide a clear understanding of what proponents are trying to accomplish in this study. The Methods section is updated to provide explanations for several of the biological targets. Future readers of the proposal would benefit from the addition of citations of specific sections of the subsequent Methods section for each quantitative biological objective.

Several documents are referenced that are important to this study and undoubtedly to other biologists who are studying and managing redband trout. These are:

1. Fisheries Management Plan (CCTFW 2020). The ISRP was unaware until we read the proponents response that the FMP is actually a product of the Resident Fish Hatchery Project, and is not produced by this project (i.e., 200810900). Moreover, the FMP seems to focus on hatchery fish, which are only peripherally connected to this proposal.
2. Lake Roosevelt Guidance Document. This document seems foundational to much of the work going on in Lake Roosevelt.
3. Redband Trout Stock Assessment Plan.

Prior to the completion of the Scope of Work, links to all three documents should be provided in the proposal. In addition, prior to the next resident fish review, the most current versions of all three of these documents (or links) should be provided to the ISRP as background.

Because this response adequately addresses our questions and concerns to this complex effort, we have placed no conditions on the proposal but have several suggestions (not requiring additional interaction with the ISRP) for further improving the proposal.

**Hooking Mortality:** The proponents acknowledge that they do not directly measure survival of fish after being caught and released. We commend the proponents for adding a value for hooking mortality in their evaluation of angler harvest; the proponents have proposed using the upper end of literature values for hooking mortality in their analysis. While we compliment proponents on this conservative approach, we suggest that a hooking mortality study specifically for Lake Roosevelt redband trout is needed. This could be a joint project among various co-managers.

**Stream Temperature Monitoring:** While the ISRP recognizes that stream temperatures are useful data to collect, we recommend that proponents consider re-conceptualizing and re-structuring the proposed work. The sole focus seems to be on lethal temperatures as stated in objective 5.1 “Ensure lethal water temperatures ( $\geq 24$  °C) are not exceeded within the Sanpoil River, weir and screw trap operations, and 15 priority Redband tributaries....” The proponents should not ignore effects of sub-lethal temperatures that can impact growth and movements of fish. The monitoring plan is focused on the extreme downstream ends of the tributaries that provides an integrated view of what is going on in the watershed as a whole. We suggest establishing a rotating group of temperature gauges that can be spread out in single watersheds to evaluate local conditions. There may be places in various watersheds that exceed lethal limits, but by the time the water flows downstream, it could mix with cooler water and the high temperature signal will be lost.

**Entrainment:** Entrainment is a major concern in many reservoir ecosystems of the Columbia River Basin. For example, we note that project 199404300 of the Spokane Tribe also proposes to investigate entrainment in Lake Roosevelt. The study of entrainment in this proposal is largely opportunistic and lacks a detailed study design. Redband trout with transmitters are released during existing reservoir operations, and a portion of these marked fish might be detected downstream after passing Grand Coulee Dam. The experimental design, statistical power, and validity of conclusions based on the observations are not described. We suggest the proponents consider several alternative designs. The first would be to reallocate numbers of fish tagged each year. For example, tags could be concentrated in 2 or 3 years to increase sample size. A second alternative would be to work with other entities and create an overall experimental design to study entrainment that includes tag releases from multiple sources (e.g., Colville Tribe and Spokane Tribe). This would increase sample sizes of tagged fish released and detected for a given study year. The proponents should assess alternative designs and summarize the strengths and weaknesses and provide a study plan in a future annual report. Although this project involves wild redband trout, the proponents should be aware that the ISRP is recommending the CCT to differentially mark rainbow trout stocked into Rufus Woods Lake so that entrainment of hatchery rainbow trout stocked into Lake Roosevelt can be assessed in the Rufus Woods creel survey.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP’s questions; see response link and final review above.)*

**Overall comment:**

This long running project focuses on collecting data on redband trout ecology and stock assessment primarily within the Sanpoil River system and throughout the Colville Confederated

Tribe's (CCT) reservation. The project tracks the status of native redband trout, whose numbers have declined to levels that cannot support Tribal and recreational harvests -- a key Fish and Wildlife Program goal in this region. Project information on distribution, abundance, status, and genetic characteristics of redband trout populations are used by the CCT to identify limiting factors as part of their landscape analysis using EDT.

The ISRP requests responses to the following in order to complete our review:

1. Please provide the new Fisheries Management Plan (CCTFW 2020) to enable the ISRP to complete its review.
2. Several objectives need to be modified to meet SMART criteria. Please include a time element for completing or progress toward completing each objective, for example, during the 2021-2025 project period. Explicit SMART criteria are also needed for biological objectives. They should include more than just estimating a key parameter or metric. For example, a quantitative target for escapement of redband trout is needed along with the task of counting trout at weir or through PIT tag detections.
3. Provide a brief description of the experimental design that will be employed in the entrainment study. This explanation should include a discussion of how releases of acoustically tagged fish will occur, how PIT tag and genetic data will be analyzed, and what environmental parameters (e.g. amount and timing of spill) will be collected.
4. Please explain how escapement goals were derived. Did they originate from the 2014 EDT assessment done on the Sanpoil River?
5. Provide more details on the creel surveys and harvest monitoring associated with the project. Will these efforts provide estimates of (a) the number of redband trout caught and released (both clipped and unclipped), (b) numbers caught and retained (wild and hatchery), and (c) survival after catch and release? Some information on otolith collection and analysis is also needed.
6. More information on the adaptive management process is needed. The proponents state that the adaptive management process is provided in the Lake Roosevelt Guidance Document (2020). Further elaboration, however, is needed to fully understand how the project evaluates its past actions, results, and institutes changes when needed.
7. A broader examination of confounding factors is needed. The discussion currently describes potential effects of climate change and northern pike. The possible effects of potential management actions (e.g., changes in reservoir operations and harvest

regulations), occurrence of wildfires, entrainment, and the release of triploid rainbow trout on the project should also be considered.

## **1. Problem statement**

The proposal provides an excellent summary of what is known about redband trout, including their life history diversity and importance for the basin. The proposal provides the reviewer with information without extensive use of additional materials and provides links to supporting documents, plans, and online databases. The proposal thoroughly describes most methods and includes links to Monitoring Resources.org. The primary goal for the Resident Fish RM&E Project is to conserve, enhance and restore native fish populations on the CCT Reservation and Usual and Accustomed areas, and when appropriate, provide opportunities for subsistence harvest by the Colville Tribal members and non-tribal recreational anglers. The current work of the RM&E project focuses on the protection and conservation of upper Columbia Redband Rainbow Trout.

The project is guided by a broader master plan, the Integrated Resource Management Plan developed by the Colville Confederated Tribes (CCT) in 2015. There is also the Redband Trout Stock Assessment Plan (Lee and McClellan 2011), which is a project specific plan. Recently, the CCT combined the fish management plan and hatchery operational plan into a single integrated fisheries management plan (CCTFW 2020). This new integrated plan also includes a description of the adaptive management process. The proponents should provide the new Fisheries Management Plan (CCTFW2020) before the ISRP completes its review.

The proposal provides a detailed explanation of its significance to the Fish and Wildlife Program and the Council's High-Level Indicators, and also describes the project's significance to other regional fisheries management programs (e.g., Intermountain Province Subbasin Plan, Lake Roosevelt Guiding Document, WDFW). The ISRP notes, however, that some of these plans like the IMP (2004) are dated, and we wonder how relevant they are to the current situation in the Lake Roosevelt Basin. Issues like predation by non-native species can change dramatically in a few years. The ISRP would like to see the revised Redband Stock Assessment Plan when it becomes available.

## **2. Progress to date**

The proposal describes the results/lessons learned for each of the project's six major tasks. There is an adequate summary that highlights project successes and failures, leading to new approaches or questions. The descriptions are thorough, include reports and publications, graphs and tables of results, identify problems and efforts that failed, explain changes that were made in the project for the future, and describe the consequences for the understanding of redband trout for the project area. The description of results and lessons learned is self-

critical. This provides a valuable example of how to approach results and lessons learned that could be used by other projects.

One of the interesting examples of results and lessons learned is the monitoring of adfluvial harvest. The CCT became concerned that observed declines in the redband trout populations in the Sanpoil River might be related to sport angling mortalities in Lake Roosevelt and the Sanpoil population makes up the majority of redband trout in the reservoir. They estimated that the annual mortality of redband trout in Lake Roosevelt was 66%. The project used an Adaptive Fisheries Assessment and Management (AFAM) model to evaluate the consequences of mortality rates and the ability of the population to sustain measured angler harvest. The model indicated the population could not sustain the current level of harvest mortality. The CCT and co-managers adopted harvest regulations to protect natural-origin rainbow trout (adipose present) on Lake Roosevelt. The project found that regulation was not immediately effective. However, only 10 native redband trout were detected in the creel survey in the lower end of Lake Roosevelt near the mouth of the Sanpoil River after three years of more protective regulations. This is an excellent example of the use of monitoring data, adaptive management, and subsequent monitoring to determine the outcome and need for additional actions.

The proposal also describes the efforts of the project to change their tagging program to use full duplex PIT tags to make them consistent with PIT tag detectors in the hydrosystem downstream in the Columbia River and allow them to measure entrainment. This required additional expenditures and installation of new antenna arrays. Unfortunately, an unusually high flood event in 2017 destroyed the Sanpoil River PIT tag detection site, and the project is gradually establishing a new site. They are using the opportunity to update the detection system and use more cost-effective antennas.

There are an estimated 15,000 to 50,000 native juvenile trout per year that move from Sanpoil to Lake Roosevelt. The project switched from examining individual tributaries of the Sanpoil to looking at the aggregate population at mouth of the river. This makes sense, and proponents are commended for making this change.

### **3. Goals and objectives**

General Comment on Goals and Objectives. The goals and objectives are consistent with the Fish and Wildlife Program. Quantitative implementation objectives are often described below biological objectives (often described as tasks). Where appropriate, the proponents should describe how the information will be used to inform management decisions.

Objectives are generally adequate and contain a number of elements of SMART Objectives, but some improvements are needed. First, many do not include a time component. The ISRP

requests that proponents provide some indication of how long any particular task will need to be conducted to attain a desired outcome. Some tasks may be needed continuously, such as population estimates, but others not.

Second, biological objectives do not have explicit quantitative criteria or targets other than estimating the key parameter or metric. The proposal includes quantitative biological and implementation objectives for each primary task, but most are annual survey objectives. These objectives are implementation objectives to provide data about biologically important phenomena. The one exception is the biological objective for monitoring escapement. The objective identifies explicit desired returns of adult redband trout by 2025 based on a landscape level EDT analysis of carrying capacity. Hypotheses are developed for three of the six primary tasks.

Adult Abundance Estimate. One of the key objectives (Objective 3.1a) of this proposal is to annually estimate the abundance of adult redband trout in the Sanpoil River. This objective is connected to the habitat restoration effort, understanding population dynamics of redband trout, and is important to the kokanee effort (since both species are caught in the same trap). The ability of the proponents to make this estimate has been uncertain due to the challenges of sampling in the lower Sanpoil River using the existing weir design; we appreciate that an upgrade to the existing weir is beyond the budget of this project. While funding for a new weir is pursued, we suggest looking at the feasibility of using other methods (e.g., redd counts, mark and recapture) to estimate escapement.

Entrainment. The ISRP understands the importance of and interest in entrainment as a management issue. Past efforts have tracked entrained fish movement below Chief Joseph dam (0.4 to 3% entrainment); 25% of “steelhead” returning to Chief Joseph Dam came from above Grand Coulee. However, given the tools available (PIT tags, genetics, telemetry) it is not clear how the capture of tagged fish (PIT or acoustic) will be used to estimate entrainment. The proponents should explain the field and analytical procedures for estimating entrainment and the confidence limits for these estimates. The description should include how 1) the acoustic tag releases will be structured (e.g., time and location), 2) numbers of tagged fish will be determined, 3) data will be analyzed, 4) physiochemical parameters (e.g., amount and timing of spill) will be determined, 5) these data will be used to develop management or conservation actions, and 6) current and future work will relate to past entrainment results.

#### **4. Methods**

Genetics. The ISRP notes that this project and several others have been and will continue to collect genetic samples from redband trout (Objective 6). The proposal does not explain

explicitly the purpose of the genetic analysis of redband trout. It states “*Understanding the genetic diversity and maintaining the genetic integrity of the Redband population in the upper Columbia River is a priority for the Colville Tribes. This information is used to ensure management and conservation goals for each sub-population can be established and maintained.*” This statement does not define a research hypothesis or explain how the information will guide management of redband trout. We need more information to evaluate the genetic study. For example, the proposal states that one to three new populations will be added to the database. How will these be determined? What is the extent and power of the baseline data? It was also not clear how the genetics data would be used in either a harvest management or conservation context. We believe that this and other projects related to redband trout would greatly benefit from cooperation and collaboration regarding genetics approaches. We encourage them to develop a plan for collecting, analyzing and interpreting the existing genetic data before additional genetics data are collected.

On a longer timescale (2 years), the ISRP also believes there is great value to projects in the Lake Roosevelt system in synthesizing existing information on redband trout genetics. Such a synthesis could address such questions as, which populations are highest priority to analyze and/or manage, and how exactly genetic data will inform management and conservation. Such a synthesis would help the program evolve and ensure that critical information is obtained.

Harvest Monitoring in the Lake. The project should describe the methods used in harvest monitoring more clearly. In particular, does the study estimate the number of redband trout caught and released (both clipped and unclipped) and numbers of redband trout caught and retained (wild and hatchery) and the likely survival of fish after they are caught and released (hooking mortality)? How are otoliths collected and analyzed? Is there an education program to train anglers to live-release native fishes? We read that triploid trout are otolith marked but could not find any documentation of where trout otoliths are being collected or for what purpose.

Monitoring Recruitment. Recruitment, defined as the number of juvenile redband emigrating from their natal tributary into the upper Columbia River and Lake Roosevelt, is a major objective of data gathering for this project. The ISRP does not yet understand some of the specifics concerning how recruitment is being estimated, primarily at the main trap at the mouth of the Sanpoil. For example, how often are mark-recapture estimates generated, how is flow used in estimates, and how is trap efficiency being incorporated into the estimates (e.g., is there a trap efficiency/flow curve that is developed and used somehow in the estimate?).

The ISRP notes that the confidence intervals on recruitment estimates seem quite large (nearly 100% for some years) which suggests that the estimates lack precision. As we understand it, the

recruitment estimate, and confidence intervals are made using a mark-recapture estimator. The ISRP recommends that the project explore other estimators to ascertain if confidence intervals can be improved. For example, an estimator often used in downstream trapping situations is a flow-based estimate, in which a trap efficiency-flow relationship is calculated. Daily abundances can be estimated using this model, and confidence intervals can be calculated.

## **5. Project evaluation and adjustment process**

The ISRP is impressed with the proponents' history of implementing adaptive management. The project developed a technical team in 2011 comprised of biologists from the CCT, Spokane Tribe (STI), WDFW, Lake Roosevelt National Park Service, and Colville National Forest. They also contributed to the Conservation Strategy for Interior Redband, demonstrating the integration of the projects results into regional conservation strategies. We commend their response to apparent overharvesting of wild redband trout that resulted in a change in management whereby only adipose clipped redband trout could be retained.

However, the description of adaptive management in the proposal is not comprehensive. The proponents state that the adaptive management process is provided in the Lake Roosevelt Guidance Document (2020). We reviewed the relevant section in the guidance document that was referenced and found that it is not detailed enough. Recently, the CCT combined the fish management plan and hatchery operational plan into a single integrated fisheries management plan (CCTFW 2020). This new integrated plan also includes a description of the adaptive management process. The proponents should provide the new Fisheries Management Plan (CCTFW2020) and a thorough description of the adaptive management process for the project before the ISRP completes its review.

An annual meeting of the CCT Resident Fish Program Team (Program Manager, a Research Scientist, three Principal Biologists and four junior Biologists) alone does not provide integration with related projects of the CCT. This team may be working closely with the other projects, but the proposal does not describe such meetings and an explicit adaptive process. Does the project have a specific sequence of regular meeting for evaluating results and implementation and making decisions about future actions? Are the results of these meetings documented and archived? The project should explain the adaptive management process more clearly and thoroughly.

## **6. Potential confounding factors**

The proposal identifies two potential confounding factors -- global climate change and invasion by northern pike. Climate change is clearly a major confounding factor, and management

alternatives should be described in great detail. For example, adaptation to climate change could be discussed in future meetings of the technical team and documented in annual reports and the CCT management plan. What is the expectation for how climate change will affect the Sanpoil River Basin, and is there anything to be done in anticipation or reaction to the effects?

We believe that there are several other potential confounding factors that should be considered by project proponents. First, we found no discussion of wildfires. It is surprising that the potential for more frequent and extensive fires is not discussed in relation to potential climate warming and increased droughts. Recent fires have created problems with sedimentation and temperature in the Sanpoil basin. More discussion of this and its relation to land use and riparian conditions is warranted

Another confounding factor that was not explicitly considered is entrainment downstream of Grand Coulee Dam. The proposal discusses this in other sections but does not address it as a potential confounding factor.

Finally, the release of rainbow trout by the net pen operations or stocking in the tributaries would seem to be important. The CCT has changed its stocking practices to use triploid feminized rainbow trout in its net pen operations in tributary stocking. It seems warranted to include this as a potential confounding factor until it is clear that these other sources of rainbow trout are not influencing native redband trout.

## **7. Timeline**

No Comments

## **8. Relationships to other projects**

The ISRP commends the proponents for their efforts at coordination. Each co-manager began a Redband Stock Assessment Project in 2011. This project was designed to be collaborative in nature, maximize resources, and ensure data gaps were filled. When will data from all the various collaborators be compiled and analyzed?

The ISRP would like to see more details on how this proposal relates to other projects of the CCT, WDFW, Kalispel Tribe, and the STI. For example, there are at least five projects that deal with redband trout that we could identify. In some cases, we could not determine who is doing what, when, and where.

A more explicit discussion of the linkage to the habitat restoration effort, for instance, is needed. The proposal indicates that the RM&E project is intended to detect overall population increases of redband trout from the Sanpoil subbasin that might respond to CCT habitat restoration actions. At some point in the future, it would be useful for the RM&E project and the technical team to conduct a statistical power analysis to determine the magnitude of increase that could be detected given the project's monitoring activities. This sort of analysis could help guide future monitoring efforts (e.g., how much effort might be needed to detect change for various stock assessment parameters) as well as targeting restoration efforts. It might be more effective, perhaps, to cluster actions in fewer sub-watersheds to detect a response. If the actions are effective, the methods could be applied to other sub-watersheds within the Sanpoil basin.

## **9. Response to past Council recommendations and ISRP reviews**

The RM&E project was last reviewed by the ISRP in 2009, and the proponents addressed recommendations in a written response ([Proponent Response](#)). From 2009-2011, the project operated under an ISRP reviewed proposal that included changes requested by the ISRP. In 2011, a new proposal was submitted to align the project with the Redband Stock Assessment Plan created for Lake Roosevelt and the upper Columbia River (Lee and McLellan 2011).

## **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No Comment.

### **199001800 - Lake Roosevelt Rainbow Trout Habitat and Passage Improvement**

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Colville Confederated Tribes

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The ISRP appreciates the detailed, constructive responses to our questions, which adequately address most of our concerns. The ISRP appreciates the willingness of the proponents to develop quantifiable biological objectives based on models using EDT results. The ISRP did not expect the proponents to complete such analyses and develop new objectives within the response period, but we are pleased to see that the project intends to develop biological

objectives, such as spawner abundance, juvenile abundance, and redd abundance. We encourage the CCT to present this information in their next annual report.

The proponents indicate that funding limitations prevent consideration of upslope processes in the prioritization process. This does not explain why existing information on upslope conditions cannot be included in the prioritization analysis. The ISRP encourages the proponents to incorporate upslope information available in the EDT database and update the preliminary assessment with information gained through subsequent on-the-ground site inspections of high priority sites.

The proponents acknowledge that the prioritization process biases project selection toward restoration more than protection because it weights potential benefits by change in population parameters. They indicate they could not revise the prioritization process within the timeframe of the response loop, but the ISRP did not expect such an immediate modification. The ISRP strongly recommends the CCT to revise the prioritization process to balance the benefits of both protection and restoration. Potential benefits for resilience to climate change provided by protecting high quality habitat should be included explicitly in the benefit analysis in the prioritization process. Recent changes to better assess benefits of protection in the prioritization process of the Upper Columbia Salmon Recovery Board could provide useful options for the project's prioritization efforts. Modifications of the prioritization process and the ranking of priority actions should be reported in the annual reports to BPA.

The ISRP understands the limitations that BPA has placed on funding the monitoring of habitat restoration projects and realizes that this is largely beyond the proponent's control. The proponents provide information on measures of implementation success and habitat outcomes that would not require major monitoring investment. We encourage the project to build on these types of assessments. The ISRP also encourages BPA to work with the proponents to find ways to evaluate outcomes of the restoration actions to demonstrate project success and provide lessons learned for other projects.

The proponents and other related projects on Lake Roosevelt are developing a multi-project database development and approaches for public access and authorized access. The ISRP encourages the proponents to continue their collaboration with other projects, co-managers, and Tribal decision makers to create a centralized, open access database to the degree possible as they continue to accumulate knowledge on Lake Roosevelt.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The proposal includes quantitative implementation objectives that are based on pre-project planning activities. An EDT model is used to evaluate anticipated benefits of habitat restoration actions for resident fish populations. This tool could be used as it was in the UCUT Reintroduction Report to develop quantitative biological objectives (hypotheses) with explicit timeframes (e.g., potential adult spawners, juvenile abundance, trout redds) for prioritized protection and restoration actions. The combination of biological objectives and habitat metrics would help to evaluate the relative benefits of protection actions versus restoration actions for redband trout.

The proponents attempted to respond to past ISRP reviews and Council recommendations by developing an M&E plan. However, BPA did not allow the proponents to allocate funds within the Fish Accord to address the ISRP recommendation. As a result, we again recommend that monitoring and evaluation is needed to assess the strengths and weaknesses of the proposed actions. Implementation without any measure of success is not scientifically rigorous, nor is it prudent because the ongoing actions may not have the intended benefits.

The ISRP requests responses to the following questions in order to determine if the project meets scientific review criteria:

1. How are habitat restoration priorities linked to upslope processes that influence limiting factors? Are upslope watershed conditions included in the prioritization of restoration actions? Are upslope restoration actions considered as separate restoration alternatives?
2. Are protection and restoration actions evaluated and prioritized concurrently in the prioritization process? For lands within the Colville Reservation, is land use regulation or specific protection status considered for protection priorities? Does the CCT have an overall land use plan for the Colville Reservation? For lands outside the Colville Reservation, is acquisition considered as a potential action in this project? The proposal states that protection of high-quality habitat is more effective than restoration of degraded habitat.
3. Can the EDT model be used to estimate potential biological outcomes for redband trout? If so, the project could compare the relative benefits of protection actions with

the benefits of restoration actions. The project should develop quantifiable biological objectives with explicit timeframes that could be evaluated in the future.

4. EDT projections should be evaluated after implementation with monitoring and evaluation. At the very least, implementation outcomes should be documented, and critical site conditions targeted for restoration should be assessed. Does the project plan to monitor its habitat restoration actions?
5. Are data on implementation and outcomes of this project included in the CCT Data Portal? Is this information publicly available? The proponents are asked to describe their plans to make their information available on the CCT Data Portal.
6. How does this project contribute to the implementation of the Lake Roosevelt Guiding Document?
7. Does the project have an explicit adaptive management plan? Is there an annual schedule for evaluating project actions and making decisions about actions for the coming year and adjustments to the project plans? Are the decisions documented and archived for future reference?

The ISRP will ask the BPA to explain its reluctance for the project to respond to ISRP or Council recommendations to monitor and evaluate the success of its restoration actions.

### **1. Problem statement**

The Lake Roosevelt Rainbow Trout Habitat and Passage Improvement Project (LRHIP) adequately describes its approach for restoring habitat for native redband trout populations within the boundaries of the CCT Reservation and Traditional Territories. It is coordinated with the Resident Fish RME for redband trout and mitigates anadromous fish losses caused by Chief Joseph and Grand Coulee dams. It is based on a landscape-level habitat assessment using Ecosystem Diagnosis and Treatment (EDT). The LRHIP prioritized potential restoration actions based on this habitat information and developed a habitat restoration plan in 2017.

The proposal lists the numbers of the goals in Themes 1 and 2 of the Fish and Wildlife Program for which the project's products are significant but does not say anything specific about them. The proposal also describes the significance to the subbasin plans, NPCC High Level Indicators, and the Lake Roosevelt Guiding Document. WDFW is a co-manager and cooperator in developing the LRGD. The proponents should identify specific activities of WDFW that benefit from the actions of this project.

A list of relevant literature for seven types of habitat restoration is included at the end of the section, but the proposal does not explain the list or indicate how it relates to the project.

## **2. Progress to date**

The LRHIP identified 25 priority reaches that could be improved through large wood additions, riparian restoration, livestock exclusion, floodplain reconnections, channel re-meandering, wetland restoration, barrier removal, and protection. These 25 priority restoration actions would account for 38% of the modeled potential habitat improvement. Life history diversity in rainbow trout is particularly high in the lower reaches of the Sanpoil subbasin, and recent analysis indicates that restoration there could be more beneficial than in the upper reaches, where much of the earlier work was conducted.

A restoration plan that involves protection of high-quality habitat and seven common stream and riparian habitat actions was produced by the proponents. There is no explanation of how protection is valued relative to restoration of degraded habitat. The proponents should explain the approach for prioritizing protection relative to restoration of degraded habitat and how it would be implemented.

## **3. Goals and objectives**

The first operational goal is to protect high quality habitats that are intact and functional, which is consistent with the priorities of the 2014 Fish and Wildlife Program. The ISRP supports this priority, but the proponents do not explain how this relative prioritization of protection versus restoration is determined and implemented. In the Methods section, the proponents indicate that protection will not occur because of lack of funds, but funds are allocated to restoration actions. Does this mean that the project values protection less than restoration?

The objectives listed in the proposal are implementation objectives for habitat actions, but the objectives do not include measurable biological outcomes. For example, the overarching biological objective (“protect and improve/restore habitats within priority reaches selected for implementation (n=10) for this proposal period”) is an implementation objective rather than a measurable biological outcome. Can the EDT model be used to estimate the relative benefit to redband trout populations for specific protection or restoration actions?

The second objective for goal 1 is to restore habitat connectivity by removing selected anthropogenic barriers to fish passage. What proportion of the impaired connectivity within the LRHIP area is addressed by these actions?

#### 4. Methods

Even though a landscape level EDT analysis is the basis for identifying priorities for protection and restoration, none of the goals and objectives address upslope conditions and their influences on redband trout populations. Given the sedimentation problems caused by the many extensive fires in the LRHIP area in recent years, the risks for the project's protection efforts are substantial and should be addressed in the watershed assessment. Likewise, the detrimental effects related to adverse upslope conditions or disturbance events can easily negate restoration actions. How might upslope processes and conditions affect the intended actions? How are the Tribes and co-managers addressing these factors?

The EDT model has been used to estimate potential fish populations, as demonstrated in the UCUT Reintroduction Report. It seems that the proponents could use this tool to develop biological objectives (e.g., potential adult spawners, trout redds, juvenile abundance) for the prioritized protection and restoration actions. Is information adequate to use the EDT model for this purpose? If the EDT model could predict potential adult spawners, trout redds, and juvenile abundance, the proponents could compare the relative benefits of protection actions with the benefits of restoration actions. They could then develop quantitative biological objectives with explicit timeframes that could be evaluated in the future.

The proposal identifies priority reaches for habitat protection but indicates that it is not likely that protection actions will occur in these reaches under the current LRHIP funding level. However, the project identifies several restoration actions that will be implemented under the current LRHIP funding level. Does this mean that the project gives restoration a higher priority than protection? This contradicts sections of the proposal that indicate that protection of high-quality functioning habitat is more critical than restoring degraded habitats. The proponents should explain the framework for deciding between protection actions and restoration actions and how this framework is reflected in the investment of LRHIP funds.

The proposed restoration actions to restore floodplain connection do not include geomorphic analysis of floodplain inundation or actions designed to physically reconnect floodplains or remove barriers to inundation. The only actions for floodplain reconnection are the installations of engineered log jams (ELJ) and wood placement. It is unlikely that the primary cause of floodplain isolation or disconnection is the lack of large wood. The objectives and the methods call for adding 1 to 2 ELJs per year in each of three reaches. Either the restoration actions will involve more geomorphic modification than simply installing ELJs or this habitat restoration component is simply designed to increase geomorphic complexity in the hope that greater floodplain inundation will occur. The proposal does not explain the long-term processes that

will deliver wood to provide in channel and floodplain geomorphic function rather than relying on artificial ELJs and wood additions.

The proposal describes a need for a hydrologic analysis to determine the timing and duration of flows between Round Lake and downstream areas as a basis for remeandering Cornstalk Creek. How would remeandering the channel result in perennial flow in contrast to current conditions of drying? Remeandering could increase the area of habitat within the valley segment, but how could it restore summer low flow? The proponents need to explain the conceptual basis and site-specific characteristics that justify the sequence of actions planned to create more perennial flow for rearing of juvenile redband trout.

What proportion of riparian function in the selected reaches and LRHIP area would be restored by these actions? The proposal indicates the restoration efforts within a reach will be designed to achieve conditions similar to restored conditions or conditions in a favorable reference reach, but it does not indicate how reference reaches have been determined and if there is an overall conceptual framework for riparian composition, abundance, and connectivity.

The proposal also does not link riparian conditions to upslope conditions. Based on the history of logging, fire, and grazing in this area, connections between upslope areas and riparian areas likely will have been reduced greatly. The project should consider coordination of the management and restoration of the uplands with the management and restoration of the riparian forests.

The proponents gained experience in anticipating logistical impediments ahead of time, especially ownership, property boundaries, and authorization requirements. Several restoration projects were damaged during high flows. The recent prioritization process for the Regional Technical Team of the Upper Columbia Salmon Recovery Board (UCSRB) includes a step in the process for risk evaluation, and the CCT participates in that prioritization process. Does the project include risks associated with potential for extreme weather events and regional climate and disturbance trends in the prioritization process?

## **5. Project evaluation and adjustment process**

The proposal does not describe an adaptive management process. Annual progress reports describe project outcomes, and the technical team reviews these reports internally. However, this review is not regularly scheduled, nor does it have an explicit process for comparing outcomes with specific objectives. A clear adaptive management process that is guided by a

master plan would provide a structured process to document and evaluate the findings of the technical team and make changes in the project's future activities.

## **6. Potential confounding factors**

Potential confounding factors identified by the proponents relate to conflicts between aquatic habitat and commercial timber production, agricultural production, and future residential development. The suggested approach for detecting and accounting for these factors are the habitat protection actions identified in the first goal. High quality habitats must be protected to avoid degradation by land use practices, but such protection will not happen simply because of a mapping process. Does the Lake Roosevelt Guiding Document provide land use regulation and guidance? Does the Tribe have a long-term development plan for the tribal lands? If the Tribe simply relies on maps of high-quality habitat developed at different dates, the eventual outcome will be the gradual reduction of the area of these important habitats.

The proposal also identifies the lack of control over practices on the lands outside their jurisdiction. The proposal acknowledges that restoration actions are not likely to succeed in certain areas because of conflicting land uses, and the ISRP commends this honesty. The prioritization process should directly include these limitations. How are known risks associated with land uses outside the control of the CCT currently addressed in the prioritization process?

The proposal identifies changes in precipitation and flood events related to climate change as a potential confounding factor. Interestingly, the proposal does not identify fire associated with climate change as a potential confounding factor. The Colville reservation has recently experienced several major fires, which have resulted in sedimentation of important stream reaches. How will the CCT incorporate potential for increased fire frequency and extent associated with climate change in its land management and stream protection and restoration?

## **7. Timeline**

The proposal provides a Gantt table of the timing of its different actions by season in year. The proposal does not identify products that are planned or the sequence of their completion.

## **8. Relationships to other projects**

The proposal briefly describes coordination between LHRIP and the Resident Fish RM&E Project and the CCT Chief Joseph Kokanee Project. The kokanee project in the Sanpoil River has only counted an average of 20 spawners per year in recent years (from another proposal); predation

by non-native fishes on fry is a key limitation. How will restoration actions affect predators (e.g., walleye, smallmouth bass, northern pike)?

How does this project interact with other programs of the CCT and other tribes and agencies in the implementation of the Lake Roosevelt Guiding Document? How is this native trout project related to the non-native fishery enhancements from hatcheries and the fisheries on them? To what extent will these wild trout be fished in the lake, the river, etc.? What is the plan for trout in the basin, with respect to wild and triploid production, stream vs. lake fisheries, catch and release vs. retention, tribal vs. non-tribal, total number of participants, satisfaction level, and other considerations?

### **9. Response to past Council recommendations and ISRP reviews**

The proponents raise a critical question for the Council and BPA in their response to past Council recommendations and ISRP reviews. The ISRP has made several recommendations in previous reviews for the project to evaluate the success of their restoration actions. The proponents believe that population abundance will change in response to restoration, but there is no evidence from field measurements that this assumption is correct. The proponents attempted to respond to past ISRP reviews and Council recommendations and develop an M&E plan. BPA did not allow the proponents to allocate funds within the Fish Accord to address the ISRP recommendation. As a result, the previous conclusions and recommendations of the ISRP remain relevant for identifying deficiencies in the proposal. The responsibility for these deficiencies rests with the funding agency and not the proponents. We again recommend that monitoring and evaluation is needed to measure the success of restoration and protection actions. Implementation without any measure of success is not scientifically rigorous.

Several of the suggestions we have made in this review call for the proponents to assess the potential biological benefits of the alternative actions considered. This will require the development of species-habitat rules for redband trout for use in the EDT model. The proponents indicate that they have already developed such rules by incorporating external expertise. They indicate that funding limitations restrict their ability to address these questions any further. Are these limitations imposed by the funding agency or by the CCT itself? Applying even a simple set of rules, like the rules for steelhead in the EDT model, would strengthen the prioritization process of this project

## 10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)

The budget is greater than the amount funded by MOA for 2021 and 2022. Shortfall in 2021 is \$80,679 and \$78,376 in 2022. What portion of this project will be deferred if the additional funds are not obtained?

### 200811500 - Lake Roosevelt Burbot Population Assessment

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Colville Confederated Tribes

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The ISRP appreciates the detailed response to our comments. The response provides greater clarity on project plans to gather data on the mechanisms affecting burbot recruitment in Lake Roosevelt.

The ISRP strongly supports the CCT's effort to create a conceptual model for burbot ecology, recruitment, and management before the initiation of this new effort in 2021. The CCT has information and hypotheses about burbot in Lake Roosevelt, and the creation of a conceptual model should help the proponents further identify and organize what is known and not known about burbot in Lake Roosevelt. The conceptual model should help further development of hypotheses, guide field research, identify key uncertainties, and help distinguish recruitment mechanisms that are linked to management actions from those that may be independent of management.

The ISRP recommends further utilization of creel survey data by the proponent, including coordination with the co-managers to collect appropriate data and biological samples that can be used by the CCT to better understand burbot recruitment. In their response, CCT provide creel survey data and explain that the survey methodology changed (and improved) beginning in 2016. Data collected prior to 2016, however, are not directly comparable to more recent information. The CCT should review the current creel survey methodology for burbot and make recommendations on how it can be improved further, if needed, to help evaluate burbot recruitment. Furthermore, attempts should be made to collect biological data whenever possible, including length and age (e.g., from otoliths). The ISRP recognizes that this would require additional effort, but such information could be valuable over the long term. CPUE and catch distribution patterns should be analyzed. The ISRP understands that only three years of

data have been collected using the new methodology. Nevertheless, coordinated efforts to gather and analyze creel survey data, such as CPUE, age composition and catch distribution, could complement the field efforts of this project.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The proponents developed a comprehensive and well-researched proposal whose overall purpose is to obtain information that can be used to conserve burbot in Lake Roosevelt while providing harvest opportunities. The burbot population in Lake Roosevelt is relatively stable and supports an important winter fishery for a small group of sport and Tribal fishers. Burbot in Lake Roosevelt, however, have fairly high levels of mercury and the Washington Department of Health has issued a warning to limit their consumption to 1-3 servings per week, depending on the individual.

To help us complete our review of this proposal, the ISRP asks the proponents to address the following questions in their response:

1. The proposed effort is complex and logistically challenging in a reservoir as long as Lake Roosevelt. Would it be easier to make management robust to the uncertainty in recruitment rather than trying to fully understand it? Unravelling the factors controlling recruitment in this situation, for this species, may be difficult and ultimately not improve the management process if the factors are beyond the control of the managers. Although the proposal identifies several factors that may affect burbot recruitment, it is not clear how the life history information collected here will be used to test these hypotheses, and how management can react.
2. Please describe the recent level of fishing effort by sport and Tribal anglers and the number of burbot harvested each year. How many individual anglers participate in the fishery each year (versus total effort [days or hours])? Is it possible to expand creel survey data collection (CPUE, length frequency analysis, location of catch), if needed, and use this information to manage and conserve burbot in Lake Roosevelt?
3. The proponents agree with past ISRP reviews that the Tribe should not encourage higher harvest levels on burbot due to conservation concerns and health risks from consumption. Please justify the large proposed level of effort to evaluate burbot life history and recruitment, given the health risk warning to restrict their consumption.

4. How many burbot will be killed by the overall research sampling effort, and how does this compare with harvests by anglers? Is it possible to use non-invasive techniques to identify the reproductive condition for fish not needed in the fecundity relationship?
5. Why is a stratified sampling design being used for Objective D (monitor movements)? Is there a reason to expect that movements will depend on capture/tagging location?
6. Regarding the use of stratified random sampling: if the project reveals that juvenile burbot are concentrated in a limited number of areas, will the sampling plan be redesigned to account for this distribution?
7. Has there been any consideration of vertical or oblique tows (bottom to surface) during the phase when efforts are focused on finding larval burbot? They might be more efficient.

### **1. Problem statement**

Burbot are an important subsistence and sport fish in Lake Roosevelt. Burbot support a winter fishery consisting of a small core group of anglers. Unlike many other burbot populations, Lake Roosevelt burbot appear to be stable and self-sustaining. The ultimate goal of this effort is to collect information that can be used to support burbot management and conservation.

The proponents provide an excellent summary of factors affecting the recruitment of burbot in other regions, as well as what is known about burbot recruitment in Lake Roosevelt. Table 1 in the proposal provides an extensive list of hypothesized factors affecting recruitment, which appears to be largely set by age 3. However, recent attempts to explain the observed variability in recruitment using correlation analyses did not reveal significant relationships. The proponents propose to better understand the life history and recruitment of burbot to manage and conserve the population.

### **2. Progress to date**

The proponents provide an excellent summary of progress to date, including lessons learned for each objective. This information is valuable for assessing the current status of burbot in Lake Roosevelt.

### **3. Goals and objectives**

The overarching goal of the co-managers is to conserve the Lake Roosevelt Burbot population while providing harvest opportunities. Within this goal, the proponents identify four additional sub-goals and multiple objectives. Research questions are presented along with alternative

hypotheses, and predictions. The proposed effort should enhance the knowledge of burbot life history in Lake Roosevelt. However, the objectives currently do not directly address the recruitment hypotheses (Table 1). Will information gathered from this effort be used to test these hypotheses?

The proponents describe a comprehensive investigation of burbot. The ISRP suggests that, alternatively, they consider making management robust to the uncertainty in recruitment rather than trying to fully understand it. This approach is increasingly being recognized for marine fisheries, where there is limited scope for understanding or controlling complex processes affecting recruitment. Unravelling the factors controlling burbot recruitment in this situation may be difficult and ultimately may not serve the management process if the factors are beyond the control of managers. It is not clear how the information obtained in this effort will be used to make decisions about burbot management and conservation.

#### **4. Methods**

The description of methods is thorough and largely adequate, but the approaches are highly diverse: larval fish surveys, e-DNA to assess spawning in rivers, benthic habitat mapping, assessment of maturation schedules, sonic tracking, etc. The long reservoir will require significant effort and will be logistically challenging. A few questions and comments about the sampling program are listed above in the response request.

#### **5. Project evaluation and adjustment process**

A chart is provided showing the general decision-making process for overall management of Lake Roosevelt burbot by the co-managers. Please describe how the information obtained in this effort will feed into fishery management decisions regarding burbot. In other words, how will this effort potentially alter current management?

#### **6. Potential confounding factors**

The proponents recognize many key factors that might affect burbot conservation and sustainable harvests, including climate, reservoir hydrology, predators, and fishing pressure. They propose to monitor recruitment and early life history, so the effects of these factors on the population should not come as a surprise. Information of fishery catch rates and total catch should be incorporated into the analyses.

One major confounding factor that affects the harvest and consumption of burbot is contaminants. This was not identified in the proposal as a confounding factor (though it was

discussed elsewhere), and yet it should be. The Washington Department of Health has issued warnings to people to limit consumption of burbot depending on age and other risk factors.

## **7. Timeline**

The study timeline is adequate.

## **8. Relationships to other projects**

Adequately explained, however, please ensure that bycatch data are shared with other appropriate studies.

## **9. Response to past Council recommendations and ISRP reviews**

Appropriate responses are provided to address most of the previous ISRP concerns. Given that the proponents agree that the Tribe should not encourage higher harvest levels on burbot due to conservation concerns and health risks to people that consume burbot, we wonder whether the large proposed level of effort to evaluate burbot life history is needed to conserve and manage burbot in Lake Roosevelt. Also, while the proponents identify several hypotheses about factors affecting recruitment (Table 1), it does not describe how the new information from this effort would help test these hypotheses. The proposed effort should include a conceptual model for burbot ecology, recruitment, and management as an end product.

## **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No comment.

### **199404300 - Lake Roosevelt Data Collection**

- Box: [Original proposal](#) and [Response and revised proposal](#)

**Proponent:** Spokane Tribe

**Final recommendation:** Meets scientific review criteria - conditional

#### **Conditions:**

The ISRP appreciates the proponents' responses to our questions, which provide useful information to better inform our review. The ISRP also appreciates the revisions to the proposal, which will be useful for the project and Tribal leaders, BPA, the Council, and future

ISRP reviewers. The proponents explain the mission of the project and the complex interactions with co-managers and other projects, and the relationships between the different sub-projects. The proponents described the studies of redband trout work in Lake Roosevelt, including higher-level management plans and brief descriptions specific tasks. The proponents agreed with the ISRP recommendation to coordinate with other regional projects studying the genetics of redband trout and described the genetic sampling in greater detail. The discussion of the education efforts being conducted was excellent and helped the ISRP understand this component of Lake Roosevelt fisheries management.

Despite significant improvements in the proposal, the ISRP has several conditions that will require additional review by the ISRP. In addition, we have made several recommendations to improve the scientific and management contributions of this important project, which do not require a response but should be carefully considered by the proponents. The ISRP requests that the proponents address the conditions below and respond point-by-point to each condition. The response can be a report to the ISRP with detailed answers to each of the conditions, a revised proposal with highlighted changes, or an addendum to a revised proposal. The ISRP's preference is for the proponents to revise their proposal to ensure that the additional information requested is easily accessible by Council, BPA, and the public in a single document. A revised final proposal that includes and integrates all information will guide the project for the next five years and facilitate future project reviews. Understanding the need for flexibility, the ISRP suggests that the proponents and the Council staff agree on a mutually determined date for a response, preferably by the end of 2020 or early in 2021.

We recognize that it is impractical to cease work on this entire project until our conditions are met because of the strong support/service functions to other Lake Roosevelt work provided by this project. The proponents can respond to all conditions that can be met quickly and identify how they will meet conditions that will require longer to address. If additional clarification regarding our review is needed, the proponents are encouraged to request a follow-up meeting with the ISRP.

**Condition 1. Goals and objectives:** The ISRP appreciates that the proponents rewrote their objectives and updated the goals and objectives section in their revised proposal. Several of the objectives and associated hypotheses are improved. The majority, however, still do not effectively reflect the biological or implementation intent of the project.

In general, we found that the objectives and hypotheses are ambiguous and lack explicit timeframes. For example, the quantitative biological objective of the Mitigation Fishery sub-project is to evaluate the effects of the hydrosystem using the Angler Creel survey. The series of subsequent sub-objectives and/or hypotheses call for the project to "evaluate" but provide no numerical targets for any biological phenomena. The stated hypotheses are not mechanistic

hypotheses but rather simply test whether composition and distribution differ between years. There is no baseline abundance or distribution that identifies the desired outcome. The objective does not provide a timeframe for the comparisons.

As another example, for the FWIN survey, the objective stated by proponents is to “evaluate”, and the hypothesis is that the hydrosystem operations do not influence the annual predator population structure. What aspect(s) of population structure is being evaluated? How will the project determine whether the hydrosystem operations influenced the populations rather than other factors, such as harvest, environmental conditions, or predators? Similar ambiguity exists for the objectives for the limnological surveys, food web study, and genetic study.

The proponents need to develop a complete set of SMART (specific, measurable, achievable, realistic, and timebound) objectives for this project and submit them in the revised proposal or report to meet the conditions. The ISRP offers to review draft versions of these objectives as we did for other proponents at the beginning of this review. SMART objectives help focus work efforts and are a necessary component to the adaptive management cycle.

**Condition 2. Juvenile native fish sampling design:** The ISRP appreciates the willingness of the proponents to develop a juvenile native fish sampling design. The juvenile fish sampling design is a key part of the project and should be included in the report or revised proposal to meet the conditions.

**Condition 3. Repatriation:** Objective 3-4 states that proponents will “Pilot a Redband Trout Repatriation Project in watersheds with declining or at-risk Redband Trout populations within the Spokane Tribe’s usual and accustomed areas.” The ISRP is aware that there are a number of redband trout populations that are declining or at risk in the Lake Roosevelt watershed, including populations associated with Spokane Tribal lands, and that rebuilding efforts are necessary. However, we have serious concerns about the plan to capture wild trout for rearing and subsequent re-release. This approach potentially creates significant ecological risks for both the donor populations and the established population that must be addressed. The ISRP recommends that the proponents should develop a plan for redband trout repatriation with a thorough risk assessment for both the donor and established populations. If such a plan exists, we encourage the proponents to provide it to ISRP for review. The proponents’ report or revised proposal to meet the conditions should describe details of their approach to conduct the risk assessment.

**Condition 4. Paleolimnology:** The ISRP has significant concerns about how the study of lake sediments will be designed and conducted, what data it will produce, and how results can be used for management of Lake Roosevelt. While we appreciate the additional explanation provided in the response, we believe a full study design and review are required. One issue is

how the early lake sediments will be distinguished from fluvial sediments that were present before construction of the dam. Another issue is how sampling locations will be selected. Paleolimnological samples must be taken from quiet, depositional areas that experience minimal disruption by currents or turbulence associated with drawdown. The ISRP recommends the proponents conduct a two-year pilot study to better determine how to obtain interpretable samples and what can be learned from this work. Based on results of the pilot work, proponents can then develop a full study plan, which should include testable hypotheses, refined methods, explanations of what will be analyzed in the cores, and discussion of how the results will be used to manage Lake Roosevelt. The proponents should submit their plan for the pilot study in the report or revised proposal to meet the conditions. In that plan they should discuss what they will analyze in the cores and describe the criteria they will use to decide whether to proceed. As the pilot study evolves, the proponents should provide their results in annual reports.

**Condition 5. Effects of Reservoir Operations:** Primary Goal 2 reflects a broad effort to “Assess the impact of hydropower operations on mitigation efforts, the fishery, and ecology above Grand Coulee.” The proponents describe the types of information they collect to assess reservoir operations and provided examples of how the data have been used in the past to explore hydrosystem effects. The proponents emphasize the need to gather a large body of information that is relevant to hydrosystem operations and anticipate that eventually one of the co-managers will use it to make decisions about reservoir operations. They do not provide a study design for how the impacts of hydropower operations research will be conducted and how the results will be used. The ISRP believes an overall sampling design is critical to conducting the analyses to achieve this goal. The ISRP recommends the following approach to evaluate the effects of reservoir operations:

1. Based on 25 years of data obtained by this project as well as data collected by other entities working in the Lake Roosevelt watershed, the proponents should develop a synthesis of this information.
2. From the synthesis, a conceptual framework for how reservoir operations affect key fish species or ecological processes can then be developed. This framework should include direct and indirect effects of reservoir operations and biological and physical processes.
3. Based on the conceptual model, a list of explicit hypotheses about effects of hydrosystem operations can then be developed.
4. Finally, a study design can be developed to guide future data collections and analysis using the synthesis, conceptual model, and hypotheses.

A thorough synthesis will require a substantial amount of time to complete, and continued data collection is justified in the meantime. The proponents can submit the synthesis report to the ISRP for review when completed.

## **Additional Recommendations:**

**Modification or elimination of some sub-projects:** As we have noted, this is a large, complex and wide-ranging project that is one of the most complicated and ambitious that the ISRP reviewed. The ISRP found that a number of the objectives could stand alone as separate research projects, and several are new pilot studies. The ISRP is concerned about how much of the numerous sub-projects can be implemented successfully by this project. We recommend that proponents consider scaling back the scope of some of the proposed work and redirecting efforts to higher priority tasks to ensure that this work can be accomplished. For example, the proponents could eliminate the stable isotope analysis of benthic components of the foodweb. The stable isotope effort to determine the benthic portion of the food web would not be a high priority if the foodweb is dominated by the pelagic component (as is likely).

**Objectives for the creel census:** Goal 1 states “Monitor and evaluate the performance of the LRAPP, which provides a recreational and subsistence Rainbow Trout fishery as partial mitigation for hydropower impacts.” The main sub-project under this goal is the creel survey. The proponents should consider development of new, quantitative biological objectives for fishing effort (number of angler-days or angler-hours) and hatchery trout CPUE in addition to the return to creel metric. It may be worthwhile to distinguish tribal versus non-tribal fishers. The proponents’ creel survey should also work closely with the burbot project of the Confederated Colville Tribe to ensure appropriate data (e.g., catch rates, age, length) are being collected to help evaluate burbot population dynamics over time. SMART objectives should be revised or developed and identified in the project’s Statement of Work. We strongly encourage the proponents to revise their proposal and include the new objectives and other additional information they provided in their response, but the ISRP will not need to review the revised proposal.

**Net pen evaluations:** The objective of >95% adipose fin clips in the hatchery trout is reasonable. However, the proponents should monitor additional performance metrics, such as the growth and mortality in the net pens. The net pen proposal notes that these data are being collected, and so objectives should be identified for this data collection and subsequent analysis.

**Entrainment study:** Entrainment is a major concern in many reservoir ecosystems of the Columbia River Basin. For example, we note that project 200810900 which is led by the Confederated Colville Tribe also proposes to investigate entrainment in Lake Roosevelt. The study of entrainment in this proposal is largely opportunistic and lacks a detailed experimental design. Redband trout with transmitters are released during existing reservoir operations, and a portion of these marked fish might be detected downstream after passing Grand Coulee Dam. The experimental design, statistical power, and validity of conclusions based on the

observations are not described. We suggest the proponents consider several alternative designs. The first would be to reallocate numbers of fish tagged each year. For example, tags could be concentrated in two or three years to increase sample size. A second alternative would be to work with other entities and create an overall experimental design to study entrainment that includes tag releases from multiple sources (e.g., Colville Tribe and Spokane Tribe). This would increase sample size of tagged fish released and detected for a given study year. The proponents should assess alternative designs and summarize the strengths and weaknesses and provide a detailed study plan in a future annual report. Although this project involves wild redband trout, the proponents should be aware that the ISRP is recommending that the CCT differentially mark rainbow trout stocked into Rufus Woods Lake to better assess entrainment of hatchery rainbow trout stocked into Lake Roosevelt in the Rufus Woods creel survey.

**Final Comment:**

This complex project includes many essential environmental and ecological measurements required for the management of Lake Roosevelt. The ISRP is still unclear about the connections between the five subprojects within this overall project. However, we acknowledge that this project demonstrates collective collaboration between the two tribes and their state agency co-managers through the Lake Roosevelt Management Team, which we encourage in projects of the Fish and Wildlife Program in similar geographic areas.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The Lake Roosevelt Data Collection project proposes a range of activities designed to help evaluate the Lake Roosevelt Artificial Production program, including habitat assessment, predator suppression, net pen evaluations for hatchery releases, stock assessment, and creel surveys. Species covered range from native and non-native fishes to mussels. The program broadly proposes continued monitoring and research activities in support of Lake Roosevelt co-manager goals.

The ISRP requests responses to the following issues in order to determine if the project meets scientific review criteria:

1. The proposal reads as five large, stand-alone projects. The ISRP requests that the proponents describe how these sub-projects connect and relate to each other and

contribute to the whole project, their history, and why they were selected as major elements of this proposal.

2. The ISRP requests that objectives be re-written to conform to SMART objectives. The 20 objectives in the proposal primarily are implementation objectives, and they currently do not meet SMART objective criteria, i.e. be quantifiable (measurable) with explicit timeframes for completion.
3. The adaptive management process is unclear. The ISRP requests details on the Adaptive Management Process be provided in the proposal.
4. Please provide additional information on the relationships between this project and all the other redband trout projects that are occurring in Lake Roosevelt and its tributaries.
5. The ISRP has supported the Mussel Project in past reviews and continues to support it in the current solicitation. Can the proponents adjust their funding to support some of the needed work on mussels?
6. The proposal describes changes to the creel survey that have been implemented (circa 2015) but are not compatible with the previous survey. Is there a way to “correct” the previous survey such that it can be used to maintain the time series?
7. Please provide details on why redband trout are otolith marked and what hypothesis is being tested with this approach. Are thermally marked hatchery fish, for example being used to evaluate different release strategies? Are otoliths collected during creel surveys?
8. Can proposed habitat surveys also be used to identify stream reaches that need protection from human activities?
9. The program would benefit from additional education for anglers concerning non-native species and catch and live release of wild redband trout. Can some additional education of anglers be provided?
10. The ISRP was unclear how the effects of reservoir operations would be studied. We found no experimental design for this work. Please provide an experimental design for how the effects of reservoir operations will be studied and evaluated.
11. Methods Related to Objective 2-1, Juvenile Sampling in Lake: Please provide an explicit experimental design for the juvenile sampling in the lake. We could not find a systematic, strategic study approach and believe the study would benefit from developing and implementing one.

12. Methods for Objective 2-10, Paleolimnology: Please provide an experimental design for how this objective will be addressed, including field methods and data analysis. Also, please detail the hypotheses to be tested and potential uses of this information. That is, what are the plausible outcomes, and how would each affect management?

The ISRP notes that this project and several others are collecting considerable redband trout genetic information. The ISRP requests that this project work in partnership with other programs involved with sampling redband trout to develop a plan for collecting, analyzing, and interpreting genetics data. We urge that such a plan be completed over the next two years. We further recommend that existing genetics data be synthesized to address questions about which populations are highest priority to analyze, how life history traits relate to genetics data, and how genetics data will be used to inform management and conservation.

### **1. Problem statement**

The proposal by the Spokane Tribe of Indians (STI) adequately describes the history of Lake Roosevelt, the decline of native fishes and formation of the Lake Roosevelt Artificial Production Program (LRAPP). The Lake Roosevelt Data Collection project (LRDC; formally called the Lake Roosevelt Fisheries Evaluation Program) was created to measure the results of the LRAPP and provide information to guide their decisions and future actions. The problem statement is reasonably comprehensive and links project actions to dam construction, operations, blockage of anadromous fishes, and isolation of resident fishes. The history and literature, although brief, is to the point and clear.

The overall project consists of five, large sub-projects. The ISRP is unclear why they are clustered together? While the project clearly focuses on understanding Lake Roosevelt, the purposes are somewhat disjointed—assess the Lake Roosevelt Artificial Production Program (LRAPP), native fish contribution to the fishery, effects of hydropower operations on the fishery and the ecology of the reservoir; and maintain native species through habitat restoration and protection. Each is presented as a standalone project.

This project and other Lake Roosevelt Projects are commended for having developed a large body of data on limnology and fisheries of Lake Roosevelt. The proposal does not provide citations to existing collective syntheses of either the limnology of the lake or the status of the fisheries and native fish communities. What is the chronology of changes in fish composition in Lake Roosevelt? Are trend data available for any of the major species, such as redband trout? This array of purposes and co-management of the lake with the Colville Confederated Tribes (CCT) and the Washington Department of Fish and Wildlife (WDFW) make synthesis an important need but also a challenge.

## 2. Progress to date

Although retention of wild redband trout has declined over the past three years since it became illegal to retain wild trout, harvests of these depleted fish continue. Are improved education and enforcement needed? Also, if wild trout in this region are depleted, why is wild trout retention allowed upstream of the Little Dalles power line (2 unclipped or clipped trout per day >18 inches).

Trout Program. The Hatchery Rainbow Trout subproject found that 30% of the trout died before release but indicated this was normal in fish culture. No references are provided to support this conclusion. The proponents should clarify that this was the mortality rate from eyed egg in the hatchery to release from the net pens (we assume). The proponents also conclude that current practices are sufficient for sustaining the successful hatchery rainbow trout fishery, but no information or references are provided on the fishery to support this conclusion.

Angler Creel Survey. The proposal describes changes to the angler creel survey that occurred about 2015, and that the new survey is not compatible with the previous survey. This is regrettable, but can the time series be reconstructed by correcting the old survey data or by calibrating the two survey protocols side-by-side for several years? Also, the ISRP noted that the angler success rate appears to be high for regional fisheries, and anglers harvest 30,000 to 40,000 hatchery rainbow trout in Lake Roosevelt annually. Angler effort has remained relatively constant over the three years reported. Fishery managers review creel results annually. Total catch of walleye and smallmouth bass is four times greater than the catch of rainbow trout, raising questions about the consistency of maintaining a rainbow trout fishery with the non-native warm water predator fishery. Initial monitoring data in Tables 6, 7, and 8 indicate that non-native species outnumber redband trout and are increasing. Are these increases in non-native predators a concern? Will management and harvest be changed to address their threat to native redband trout? Additionally, given that only ~8% of the hatchery trout are harvested by anglers, what is the fate of the remaining ~92% of the large trout released into the reservoir?

Lake Fishery Management. The fisheries surveys primarily describe the composition and abundance of larger focal species. Smaller species, such as sculpins and cyprinids, do not appear to be reported but may be ecologically important. The fish assemblage in Lake Roosevelt includes both native and non-native species. Many of the sport fish are non-native predators, such as walleye, smallmouth bass, black crappie, and yellow perch. In several locations, numbers of non-native predators far exceeded native fish species. The proposal seems to indicate that abundance of non-native game species is a benefit, and efforts to suppress northern pike are primarily designed to minimize detrimental effects on these non-native

predators. It is not clear how the impacts of these non-native predators are balanced by the sport fishing benefit. Again, are increasing populations of non-native predators a concern, and will management and harvest be changed to address their threat to native redband trout? The proposal indicates that “there is no funding for suppression efforts of walleye.”

Creel survey results indicate that walleye are abundant or even overabundant but that their condition seems poor. The proponents suggest that walleye exploitation rates need to be markedly increased to reduce their abundance and increase the condition of the remaining fish. Catches of smallmouth bass and northern pike also increased by 157% and 276%, respectively, from 2017 to 2018. The Fall Walleye Index Netting (FWIN) survey, conducted since the 1940s, has documented the decrease in the abundance and distribution of native fishes while the walleye population has grown. The proposal cites studies that estimated that 1) walleye consumed 9.4% of hatchery kokanee and 7.3% of rainbow trout released into the reservoir within 41 days of release (Baldwin et al. 2003), and 2) walleye predation is a potential bottleneck for white sturgeon recruitment within Lake Roosevelt (Howell and McLellan 2013). Again, the approach for managing non-native and native fish species is unclear and seemingly contradictory. The proponents should explain how this impact on native resident fish is being addressed.

Limnological Monitoring. Limnological monitoring is an important component of LRDC and provides information that is useful to many of the fisheries and reservoir management programs for Lake Roosevelt. The measurements (temperature, dissolved oxygen, nitrogen, phosphorus, pH, etc.) are important for understanding lake productivity, food webs, anthropogenic pollution, and trophic succession of the lake. An important area of progress has been the development of an online portal for the limnological data and now it is important for the STI to synthesize the limnological and physical data and relate it to the intended outcomes of the fisheries program. The website currently provides sampling location maps and interactive summaries for water column profiles, water quality laboratory results, and current and historic hydrologic conditions for 2012-2017 and temperature and dissolved oxygen isopleths for 2012-2015. The website provides extremely valuable information for co-managers, the net pen fisheries project, and regional scientists. A high priority for the project should be to expand the online database to include data from recent years and add sections for zooplankton and chlorophyll data. Monitoring of total dissolved gas is extremely important in Lake Roosevelt, where gas concentrations exceed water quality standards.

### **3. Goals and objectives**

Overall program goals. The three primary goals of the LRDC are clearly presented and are to 1) monitor and evaluate the performance of the Lake Roosevelt artificial production program,

which provides recreational and subsistence rainbow trout fishery as partial mitigation for hydropower impacts, 2) assess the impact of hydropower operations on the fishery, ecology, and mitigation efforts in the areas above Grand Coulee, and 3) conserve, enhance, and restore redband trout populations in Lake Roosevelt and its tributaries, and where appropriate, provide opportunities for recreational angler harvest and subsistence harvest by Native American tribes.

General Comments on Objectives. The objectives should be rewritten as SMART objectives. We found 20 objectives that were primarily implementation objectives rather than SMART objectives. The project does not identify any biological objectives. The implementation objectives are not quantifiable (measurable) and do not have explicit timeframes for completion (years, decades), other than conducting the actions annually. The objectives are written as study tasks (rather than quantitative objectives which can be monitored for success). Over half of the objectives do not clearly indicate whether the project is a current activity, a future study, or when it will be conducted. Assuming several of the objectives are new components of the project, it is not clear when they will occur, how long they are intended to be conducted, and how they will be phased. The tables in the Timeline section only indicate the monthly time commitments for a generalized year.

Below are some questions and concerns that the proponents will need to consider or address as the project moves forward:

Objective 2-2 (Juvenile Sampling in Lake): The proponents plan to use various gear types in multiple places at different times to sample juvenile fishes. Given the different catchabilities and efficiencies of each gear, which will differ by species and size, how will these data be analyzed in a meaningful way? What are the objectives of this work? How will data be used for management decisions?

Objective 2-3. How will the project quantitatively relate the growth of native game fishes to reservoir operations? Can the effects of reservoir operations be separated from other factors that affect fish growth, such as water temperature, food (e.g. zooplankton abundance), or the interaction of reservoir operations with these factors? An experimental design or study plan is needed to decipher the relative importance of these and other factors on growth.

Objective 2-10. A paleolimnological assessment for Lake Roosevelt is proposed. An experimental design for how this objective will be addressed, including field methods and data analysis is needed. What hypotheses will be tested. Specifically, what are the plausible outcomes of the study, and what would the management responses be for each of them?

Objective 3-4. Repatriation. A general approach for a pilot program designed to repatriate redband trout into declining populations was described. The general concept appears reasonable; however, an overall plan and protocols for how the work will be done need to be developed. The plan should identify potential release areas, risks, size of fish at release, numbers released per site, release strategies, and how the success of these attempts will be quantitatively evaluated. Will BACI designs be used, will control populations be established, etc.?

Objective 4-3. (Predation). Predation by both native and non-native species is obviously a major mortality factor for trout and kokanee (and other non-focal species that might be ecologically important).

- At what size of trout does the risk of predation by walleye and other predators significantly decline? This information could be used to guide the size at release of trout.
- What do the predator diet data indicate about consumption of trout (and kokanee) by pike, walleye, and smallmouth bass? Which species overlap in diet and consume the most focal species? Does the current focus on pike suppression while ignoring walleye make sense?
- Does the LRAPP have a goal to increase the "health" of walleye (p. 34) -- i.e., remove enough walleye such that their condition improves to benefit the walleye fishery? This seems contradictory for a resident fish management program that has the conservation of native redband trout as a major objective.
- The proponents and their Lake Roosevelt partners will need to examine the consequences of fisheries for hatchery rainbow trout and non-native warmwater fishes on their efforts to conserve and enhance native redband trout and kokanee. The approach for managing non-native and native fish species seems contradictory.

#### **4. Methods**

General. The proponents briefly describe the approaches used for each objective (task) and provide links to numerous specific methods listed on the PNAMP webpage. Methods are described in MonitoringResources.org. In the online database, protocols are described in greater detail and associated method ID numbers are provided. However, for each objective, the proponents should briefly explain the overall sampling design, study locations, and describe how data are summarized and reported (see proposal preparation template and guidance).

For example, the limnological surveys generate essential data for understanding environmental conditions and water quality for all the projects on Lake Roosevelt. Timing and location of these samples are critical, and thus the overall sampling plan should be described in the proposal. To understand the overall sampling program, the reviewer must combine information from the protocol module, a sample design module, and a series of seven specific methods modules in [MonitoringResources.org](http://MonitoringResources.org). The sample design module indicates that sample sites are selected based on a stratified random design by dividing the reservoir into five reaches and subdividing reaches into sections that correspond with fish sampling under the LRDC (technical basis for the fish sampling sites is not explained). Three sites are assigned in each of the five major reaches. Sampling is conducted at each site monthly from May to October. Exact number of sites may vary. Currently, 15 sites are sampled for 6 months producing a total of 90 sampling events annually. Sample sites are then randomly selected by river mile within each reach and sampling is conducted in the thalweg at each site. This design is appropriate for a survey of the reservoir, but repeated reference sites would be useful for trend analysis of a 150-mile long reservoir. Has the project consulted a statistician about the sampling design in terms of long-term trend analysis?

The sample design also indicates that macronutrient and chlorophyll samples are composited from the approximate top, middle, and bottom of the photic zone, but physiochemical profiles and zooplankton tows are taken from the full water column. Lake Roosevelt tends to be relatively holomictic in the upper reservoir but can be weakly or strongly stratified in the lower ends of the main reservoir and the Spokane arm. In the Spokane arm where dissolved oxygen concentrations in the hypolimnion are very low in late summer, dissolved nutrients like nitrate, ammonium, and soluble reactive phosphorus would be expected to change substantially and influence availability of nutrients in the area (e.g., the elevated ammonium concentrations at this site in late summer). Does the project take samples from the hypolimnion and epilimnion for sites that are stratified?

Zooplankton is sampled by vertical tows of the full water column. Such data provide a general representation of the zooplankton community at the site, but they provide no information on location in the water column. Information on the distribution of zooplankton at different times of the day, at least at certain critical seasons, will be needed to understand the food resources available for planktivorous fish. Are any zooplankton samples taken separately for the photic and aphotic zones? Such data would be important for bioenergetic modeling. Kokanee reportedly grow to a large size suggesting zooplankton abundance is adequate for kokanee. The proposal indicates that the abundance of benthic macroinvertebrates is low because of the extensive drawdown of the reservoir but notes that such information from the upper reaches of the reservoir and mainstem river are needed for food web assessment for wild redband trout. Even infrequent periodic sampling of benthic invertebrates would provide fundamental

information for management of native redband trout (The ISRP was unclear what redband trout eat but assume it is benthic invertebrates. Please clarify if we are incorrect in this assumption). Would the information base for management of the fisheries in Lake Roosevelt be strengthened by including macroinvertebrate sampling in the river and upper end of Lake Roosevelt?

Data Portal. The Data Portal is an important product. Most of the data are not publicly available or available to the ISRP for review. How many data sets are included in the Data Portal? Could summary data be made publicly available after passing the QA/QC review? Can the co-managers of Lake Roosevelt develop a coordinated Data Portal for Lake Roosevelt and its watershed? If not, why not? What are the obstacles to providing a centralized data repository for Lake Roosevelt management? How are data from this project coordinated with similar data (e.g., temperature, dissolved oxygen) and incorporated within the Data Portal? The online data portal is an extremely important accomplishment. The portal should be expanded to include data for all project components. The website would be greatly strengthened by developing a synthesis of the limnological, physical, and fisheries data and relating this information to the intended outcomes of the fisheries program. The online database also should be updated to include limnological data from recent years and add sections for zooplankton and chlorophyll data. If such data are already included in the database, the website should at least identify data that are available and provide instruction on how to access those data or obtain permission to access the data.

Net Pen QA/QC). The ISRP encourages the proponents to develop QA/QC procedures for evaluating the net pen program. Issues that we have identified include:

- When counting fish in the net pens, can you separate mortality from leakage? Farmed fish often have some leakage through holes in the net pen caused by predators and if not accounted for could bias release-to-creel estimates
- Are the fish sampled for fin clips randomly sampled? Some ISRP members have been part of programs that have sampled net pens, hatchery tanks, and hatchery ponds and have found these containers are problematic for getting a random sample. Alternative protocols could use larger samples or process entire pens that are randomly selected.

Reservoir Operations: The ISRP appreciates that effects of reservoir operations are important to many management issues. However, we are not clear how effects of reservoir operations are evaluated because we found no experimental design or analytical plan in the methods section. Will this be a simple correlation analysis or modeling? What data will be collected, how will it be analyzed and how will this knowledge be applied? A conceptual model and more thorough

description of the analytical protocol would be helpful. A publication about the effects of reservoir operations on angler harvest is in preparation by Nichols. What additional data are needed for this objective? How is the future effort related to the completed study?

Limnological Survey. Why are macronutrient samples composited for the water column in sites that are stratified, especially those with anoxic hypolimnia? Are any zooplankton samples taken separately for the photic and aphotic zones? Such data would be important for the bioenergetic modeling.

## **5. Project evaluation and adjustment process**

The adaptive management process is incomplete. We found some information on decision making processes for some components in the Lake Roosevelt Guiding Document, but we found this information lacking in detail. What is the adaptive management process, when are evaluation meetings scheduled, and how are decisions made and documented?

The Lake Roosevelt Guiding Document provides a framework for evaluating and adjusting projects based on new information. Logic flow charts illustrate the sequence of actions of the co-managers to 1) develop management plans for fishes and aquatic organisms, 2) implement and monitor the Rainbow Artificial Production Program, and 3) implement and monitor the Kokanee Artificial Production Program (the proposal indicates that the kokanee program has been terminated). The flow paths or adaptive management processes for the other projects are not illustrated. The flow paths do not explain the process, schedule for the process, or composition of the group charged with making the decisions.

There is no indication of how the diverse and sometimes unrelated projects are integrated and how decisions are made for the project as a whole. Are there regularly scheduled meetings in which a designated set of co-managers are charged with evaluating and discussing information, subsequently making decisions, and documenting the decisions?

## **6. Potential confounding factors**

The proposal identifies several potential confounding factors—non-native and invasive species, climate change, heavy metal pollution from the upper Columbia River, and the Columbia River Treaty. A discussion of the confounding effects of non-native species was included but possible effects of non-native sport fishes was not. This contradiction is a major challenge for the consistent management of the native fishes of Lake Roosevelt. Its omission in the section on potential confounding factors only highlights this challenge and calls for an explicit conceptual framework for dealing with this problem.

## **7. Timeline**

The proposal includes Gantt tables of the annual timeline of the 20 objectives. It clearly identifies the sequence of tasks for a hypothetical year, but 11 of the 20 objectives appear to be new activities. There is no indication of when each will occur or how it will be phased. It does not indicate the products that are planned and the timeline for producing those products. The proposal should provide an overall description of when the major projects will occur.

## **8. Relationships to other projects**

The ISRP would like to see more details on how this proposal relates to other projects. We have similar comments on other projects in the Lake Roosevelt cluster. The co-managers (STI, CCT, WDFW) developed a Master Plan, the Lake Roosevelt Fisheries Guiding Document, and hold science forums annually. The proposal describes collaborations between the resident fish RM&E project and other projects of the CCT, WDFW, Kalispel Tribe, and the STI. For example, there are at least five projects that deal with redband trout. The connections between these projects are not well described by these projects, which makes it difficult to review this project within the context of other Lake Roosevelt work. We believe it is important to understand how the goals and objectives of this project are being supported by other projects and vice versa.

The ISRP recommends that the proponents work collaboratively with other programs to develop a synthesis of information on the limnology and fish/fisheries of Lake Roosevelt. There is a vast amount of data that has been compiled on Lake Roosevelt. We were unable to find evidence that this information is (or has been) regularly synthesized and incorporated into the Lake Roosevelt Fisheries Guiding Document or other plans. Such a synthesis will help guide work efforts moving into the future. We suggest that two years is a reasonable timeframe to accomplish this.

The list of projects in Table 9 was a useful indication of relationships to other projects, but a sentence or two explaining their connections would have been helpful.

## **9. Response to past Council recommendations and ISRP reviews**

We commend proponents and their WDFW co-managers for modifying regulations to allow more harvest of walleye given that the FWIN survey did not reveal a measurable impact on their population.

Why is retention of wild trout permitted above the Little Dalles power lines but not in other sections of Lake Roosevelt? Conservation goals would seem to call for non-retention in general.

The proponents indicated they had addressed a concern about lack of success in establishing naturally reproducing runs of redband rainbow trout through changes in sport harvest regulations. They also indicated that they have developed a repatriation pilot project, but no information was presented to indicate whether it has been effective or when they will have sufficient information to assess the success in establishing reproducing runs.

#### **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

This is a major program with a very large budget. The annual budget is approximately \$2 million per year, and the total budget for 5 years is \$9,630,051.

The proposal does not indicate how the budget is distributed across the subprojects. Because one of the major recommendations is to fully develop the online Data Portal that will include information from all projects, and project interactive summary graphics, it would be helpful to understand the allocation of funds to each of the subprojects.

#### **201700400 - Northern Pike Suppression and Monitoring**

- Box: [Original proposal](#) and [Response and revised proposal](#)

**Proponent:** Colville Confederated Tribes, Spokane Tribe, Washington Department of Fish and Wildlife (WDFW)

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The proponents are to be commended on preparing a revised proposal that summarizes the past work well and provides logical objectives and methods. The new proposal is much clearer and easier to understand.

The ISRP can now better understand the logistical and policy constraints that have led to decisions about monitoring and suppression. The proponents clearly are taking a comprehensive, system-wide approach to monitoring northern pike relative abundance and spread, pike suppression, and interacting with anglers and the general public. The ISRP comments that follow should not detract from the substantial body of excellent work and analysis conducted to date.

The need for this project was highlighted by the ISAB Predation Management report ([ISAB 2019-1](#)), but funding has not been available to undertake critical components. In particular, the ISRP strongly supports quantification of northern pike diets, bioenergetic modeling of the three major non-native predators (northern pike, walleye, smallmouth bass), and Virtual Population Analysis of northern pike abundance. Collectively, these components will be needed for effective on-the-ground management of Lake Roosevelt.

Specific comments on items that could improve project outcomes include:

1. The proponents do not commit in this proposal to collect samples to study diets or conduct bioenergetic analysis of northern pike, walleye, or smallmouth bass. The ISRP strongly encourages collecting diet samples from these species, stratified by reservoir location (e.g., upstream vs. downstream), season, habitat (littoral vs. pelagic), and fish size. These samples could be gathered and frozen or preserved for future analysis.

2. The proponents reported that funding is not adequate in this proposal to include the bioenergetic analyses. However, the ISRP concluded that bioenergetic analyses are of critical importance to address the final adaptive management action for suppression (p. 58 of proposal), which states:

“IF monitoring CPUE (fish/net) goals are not met by 2025, THEN the Technical Team will use the available data to determine if the suppression program should continue for another five years.”

a. This decision should ultimately rest on whether northern pike are having a substantially large, or acceptably small, effect on prey populations, and whether this effect is greater or less than the existing effect by walleye and smallmouth bass. Likewise, it will be informed by whether northern pike are having a large or small effect on the other two non-native predators, walleye and smallmouth bass, and hence perhaps having a positive indirect effect on native fish by reducing numbers of these nonnative predators. Without this information that diet data and bioenergetic analysis could provide, co-managers will be left to make this decision without sufficient data, even after expending large amounts of time and money on suppression.

b. Diet data and bioenergetic analyses would also allow assessing whether targeting certain size/age classes of northern pike, such as fish greater than a size threshold, would be more efficient to reduce predation, such as has been found for northern pikeminnow in the lower Columbia River (see ISAB 2019-1 Predation report).

c. As an example of future decisions that these analyses could inform, one possible future scenario is that northern pike invade below Grand Coulee Dam, so that Lake Rufus Woods is then the focus of suppression efforts and all regions of Lake Roosevelt are invaded. In that case, it will be important to know how much suppression effort is needed, and on what size classes, to manage pike in Lake Roosevelt to an acceptably low level to sustain native fish and nonnative sport fish.

Hence, the ISRP again urges the co-managers to place a high priority on seeking funding for and conducting studies of the diets and bioenergetic analyses of the nonnative predators in Lake Roosevelt, especially northern pike.

3. The ISRP also urges the co-managers to pursue the Virtual Population Analysis outlined in their response, to provide an estimate of northern pike abundance that could be used for management decisions, as well as to couple with the bioenergetic analyses to estimate total prey consumption. Nevertheless, even without this VPA estimate of abundance, the bioenergetic analyses would be useful when combined with data on CPUE.

4. The ongoing, statistically valid monitoring of CPUE of all major species is also critical to continue because eventually co-managers will want to analyze whether any change in northern pike abundance is correlated with any change in abundance of native prey fish, and non-native predators. For example, if CPUE of northern pike is successfully reduced to  $<0.1$  pike/net and CPUE of native fish show no increase, then co-managers could infer that either walleye and smallmouth bass predation, or some other environmental factor, compensates for northern pike predation, or that predation by northern pike at the pre-suppression density had no detectable effect on native prey fish.

5. The ISRP commends the proponents for conducting the power analysis to assess sampling effort needed to detect a change of importance to co-managers. This analysis showed that increasing sampling effort in the upper reservoir where northern pike are concentrated to 200 nets during the fall monitoring would be required to detect a 25% change with acceptable power and confidence. The Methods section indicates that effort will be increased in 2021 and future years to meet this goal, but not in 2020.

a. The ISRP also notes that it is not appropriate to calculate power of a statistical test after the fact, as suggested in Research Question 1, p 38). Either a 25% difference was detected, or it was not. Alternatively, if a change this large cannot be detected (i.e., is not significant) it is possible to calculate how large a change could have been detected at a given level of confidence, given the sample. For example, perhaps the change

estimated was 32%, but the difference was not significant. Further analysis might show that a 45% change could have been detected given the sampling effort.

b. The proponents then set a goal of reducing CPUE of northern pike by 10% per year (Task 1.1, Research Question 4, p 39). Given the power analysis, it would not be possible to detect this small a change each year with confidence given the proposed sampling effort. However, it seems logical that the power to detect a trend (rather than a difference between only two years) would increase with the number of years sampled. The ISRP urges the proponents to work with a qualified statistician to analyze the power of detecting a trend of this magnitude (10% decline per year), given the updated data on variability in CPUE estimated from the most recent surveys.

7. The proponents conclude that a majority of the northern pike in Lake Roosevelt recruit from the Kettle River. However, at present no methods have been developed to suppress pike in upstream reaches during their spawning season. This is a high priority issue to address. Have the proponents explored options for capturing pike in a large river like this, perhaps by contacting commercial fishers who do this kind of work in large rivers of the West or Midwest?

8. Several Adaptive Management actions refer to modifying the suppression plan if northern pike are found via eDNA or monitoring/suppression efforts. For example:

“eDNA - If Northern Pike are physically found, technical team will add suppression recommendations for those areas into the overall suppression plan.”

“Suppression - IF new spawning locations are identified through monitoring/suppression efforts, THEN these locations will be added to the next years suppression survey plan developed at the annual Lake Roosevelt Northern Pike Technical Team Meeting.”

Given the urgency of fish invasions, is it not possible to mount a rapid response in the same season or year, rather than simply suggest action the following year? The ISRP notes that northern pike suppression did not begin until 9 years after the first pike were originally detected in Lake Roosevelt (2007 and 2016). This delay allowed much expansion. Now that suppression is ongoing, current responses to invasions in new areas should be much more rapid.

9. The large drawdown in April 2018 prevented northern pike suppression efforts during their spring spawning period. However, was this also potentially a “natural experiment” that greatly reduced pike spawning habitat? If so, could data be analyzed to determine whether this year

class of pike was substantially reduced by this reservoir drawdown, potentially informing managers about the effectiveness of a drawdown management strategy?

10. The proponents report that the Columbia River downstream of Grand Coulee and Chief Joseph dams are not sampled often, justifying the use of eDNA sampling to detect northern pike here. However, only three locations are shown for eDNA sampling in Lake Rufus Woods (Fig. 22), and two below Chief Joseph Dam. Given the low level of fisheries sampling there, would it be prudent to add several more sites along Lake Rufus Woods and downstream of Chief Joseph Dam? Perhaps other agencies are also conducting eDNA sampling in segments below the confluence with the Okanogan River.

In summary, this is an extremely important Tribal and State effort designed to monitor, suppress, and control northern pike in Lake Roosevelt. It deserves to be fully funded so that additional measurement and analysis of three critical components, northern pike diet, bioenergetics, and abundance can be added to the information collected on CPUE, eDNA, and otolith microchemistry to evaluate the overall distribution and impact of this highly invasive and predatory species on the fish assemblages in Lake Roosevelt. Importantly, these data can also inform the design of suppression efforts to maximize the likelihood of, and measure, success. Many of the approaches being used are innovative, and we encourage the proponents to publish the results of their work as they become available.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The ISRP commends the proponents for mounting a rapid response to suppress northern pike in Lake Roosevelt and for monitoring the results throughout the reservoir with several methods and a valid statistical sampling design for gillnet sets. The results indicate that neither the spread nor the relative abundance of northern pike is declining as a result of those efforts, although the efforts are likely preventing northern pike from increasing. Given this, several key points relate to other goals which may be of equal or higher priority. Others relate to previous requests made by ISRP and improvements needed to the proposal to allow adequate review.

The ISRP requests responses to the following in order to determine if the project meets scientific review criteria:

A. The project will benefit from providing data showing that (1) northern pike prey on salmonids and other focal native species in Lake Roosevelt at specific times and locations, and

(2) removing northern pike from the food web has the desired effect of reducing total predation by non-native fish.

1. Please describe how the project will collect and evaluate the technical information that supports the assumptions that (1) focal native fish species are at risk from northern pike predation, and (2) the habitats used by northern pike overlap key habitats used by these focal native fish species. This information is critical to justifying a continued suppression effort. Also please provide any additional information gathered on these two key topics since the last two ISAB reviews related to northern pike management and assessment (Predation Report, [ISAB 2019-1](#); and Reintroduction Assessment Report, [ISAB 2019-3](#)). Northern pike can prey substantially on salmonids, but this may vary with location and season. Much of Lake Roosevelt is not littoral zone habitat preferred by pike. Analysis of diets of northern pike in Lake Roosevelt across habitats and seasons to support the conclusion of strong predation is lacking, so the program may lack the scientific basis needed to target the most effective actions.
2. Please specify what would be required to collect and analyze pike diets based on a valid statistical sampling design stratified across seasons, habitats, and northern pike sizes. The proponents report that some diets of northern pike have been collected and preserved, but not analyzed. Please describe what would be required to conduct a bioenergetic analysis to estimate total predation by pike on the various size classes of focal native fishes. We strongly urge the proponents to consider the value of these studies and seek outside funding and assistance to complete them. For example, Dr. David Beauchamp of the USGS in Seattle (Western Fisheries Research Center) is a good contact about these questions.
3. Please specify what would be required to mount a study to understand the food-web effects of northern pike on native and nonnative fish. Questions to address include the following. What is the relative effect of northern pike predation compared to walleye and smallmouth bass? Will it replace their effects, with some compensation, or be entirely additive, or might predation by northern pike on other predators mitigate the net effects? To what extent are native species being monitored to determine the impacts of northern pike or the benefits of their suppression for the native species? Other non-native piscivorous species (e.g. walleye) have been allowed to proliferate with minimal concern about effects on the food web and native fish.

B. An important challenge the ISRP identified in previous reviews is the need to develop a valid estimate of northern pike abundance.

1. Please describe whether Virtual Population Analysis (VPA), such as used by Ruzycki et al. (2003) to estimate abundance of lake trout in Yellowstone Lake based on their removal program, would be suitable for estimating abundance of northern pike in Lake Roosevelt.
2. Can VPA be coupled with bioenergetic analysis to estimate total northern pike predation on focal native fish species, informing both the food-web analysis and potentially more effective approaches to suppression?

C. Given that suppression has yet to stop the increase in relative abundance of northern pike (measured by Catch Per Unit Effort [CPUE] and Proportion Positive Catch [PPC]) and the additional spread of northern pike in Lake Roosevelt, the ISRP questions:

1. Should two other goals be given equal or higher priority: (a) to prevent a fishery from developing, and (b) to prevent pike from being transported from the basin to other locations upstream or downstream?
2. Has consideration been given to expand the project goals? The ISRP questions if it is prudent to continue to post images of large northern pike on signs at boat ramps and program websites and to provide them to media outlets (newspapers, websites), given the potential for social media to foster angler advocacy groups for large predators and potential illegal transport into the anadromous zone. An additional goal for outreach could be to engage local youth and adults in the sport reward program, educating them about the risks and negative effects of illegal stocking of nonnative predators, thereby potentially helping reduce illegal transport into the anadromous zone. This may require hiring a person trained in community outreach.

D. We ask the co-managers to collaborate in the development of a comprehensive set of consistently formatted goals, SMART biological/physical/social objectives, and SMART implementation objectives for the entire project and provide them in a response. The proposal is confusing in that there are incomplete or confusing goals and objectives which are formatted differently among co-managers. Further, the SMART goals presented are Specific, Measurable, and Time bound, but are they Achievable and Relevant? Given that the trend in northern pike CPUE has been increasing through 2018, based on the most recent annual report, please specify whether it is realistic to set a goal of a decrease in CPUE. The biological basis for the objectives for the monitoring and the suppression goals were not explained in the proposal, nor in the Northern Pike Suppression and Monitoring Plan. Please specify the scientific or technical basis for the specific numerical targets in the biological and implementation objectives.

E. Please specifically address why nonnative predators captured in the monitoring and suppression efforts are released alive, given that they likely prey on juveniles of native redband trout, which is a focal native species for management. Apparent conflicting management actions and objectives need explanation.

F. The spread of non-native macrophytes that provide shallow water habitat for northern pike spawning and juvenile rearing is a potential threat that may increase pike abundance. Do the proponents plan to measure the spread of non-native macrophytes? How will the spread be measured? What are the options for control of these plants? How could the tradeoff between the benefits of direct pike suppression vs. macrophyte suppression be analyzed?

G. Adaptive management processes identify alternative actions based on alternative outcomes from monitoring, but these do not appear in the proposal. Please specify such alternatives to develop an efficient, proactive, and anticipatory process.

H. Several key types of data were missing from the report. For example: (1) earlier plans and reports stated that statistical power analysis will be conducted to determine the sample size of net sets needed to detect a given change in CPUE. This analysis was recently completed, presented to the ISRP, and is a requirement for the response, given the high cost of gillnetting; (2) the proposal indicates that northern pike diets were collected by WDFW (p. 15) and STI (p. 18), but no analyses are presented in any report. What is the status of these two analyses?

I. Please respond completely to three Qualifications from the 2018 ISRP review which were not requested above or addressed sufficiently in the proposal:

1. Finalize the monitoring program with biometric statistician.

It is commendable that the WDFW has utilized their personnel to develop a GRTS sampling design and power analysis to determine needed sample sizes without the assistance of a biometrician. Has the WDFW solicited peer review of the GRTS and power analysis by qualified biometricians to determine if their results are scientifically sound? Clarify data gaps related to eDNA monitoring.

2. Can an eDNA study be conducted to define minimum detection limits for northern pike eDNA in a large reservoir or river?

The proponents have responded with the following, "The amount of DNA in a sample of water will vary depending on the density of fish present, flow of water, sunlight and distance from the DNA source. Anyone using eDNA sampling as a technique must understand these limitations and design studies that acknowledge the limitations."

Please indicate what kind of study could be conducted to determine minimum detection limits.

3. Demonstrate that the number of native fishes expected to be killed as bycatch will be acceptable.

The response does not provide a direct answer to the ISRP qualification. The qualification can be restated in this way -- Demonstrate that the number of native fishes being killed during suppression efforts does not pose a potential threat to populations of individual species of native fishes.

**Additional points (not requiring a response) to consider are listed under each section below.**

### **1. Problem statement**

Pertaining to comment A (1) in the section on Overall comments, although it is true that northern pike can prey substantially on salmonids, this is not a foregone conclusion. Evidence from other research and modeling indicate that 1) they may not overlap strongly with some salmonids in space and time in reservoirs and rivers without extensive littoral habitat, and 2) they may prey on other native (e.g., northern pikeminnow) and nonnative (e.g., walleye, smallmouth bass) predators of salmonids, hence potentially having a neutral or even a positive food-web effect (see Sorel et al. 2016; ISAB 2019-1, the Predation report). If there is evidence of the effects on native fish in rivers or reservoirs of the upper Columbia River system, these should be presented in more detail (e.g., Bernall and Moran 2005; Bean et al. 2011; Walrath 2013). Were these negative effects established by sound scientific methods?

Following on comment C in the section on Overall comments, in response to the most recent ISRP review ([ISRP 2018-3](#), April 2018), one goal expressed by WDFW was to:

*“address Northern Pike population expansion early in order to prevent population establishment and continued downstream movement, which could lead to establishment of a popular Northern Pike fishery.”*

Given the socioecological problems of such a fishery developing and furthering expansion of northern pike, more focus on the policy development and public outreach needed to reach this goal of preventing a sport fishery is needed, and very urgent. However, among the three-pronged strategy of monitoring, suppression, and outreach, relatively little effort and funding appears aimed at policy and outreach.

A second key goal of the project is to prevent expansion of northern pike downstream from Grand Coulee Dam. Can the probability of each mechanism for this downstream movement, including movement over the spillway, through the turbines, and purposeful movement of fish by anglers be determined? What strategies, operations, structures, or devices at the dam might be considered to address potential downstream movement? In contrast, is human transport more likely?

The literature review indicates that northern pike are being managed as a sport fishery in upstream waters. What is the likelihood that these fish will be entrained downstream and add to the numbers in Lake Roosevelt? If the likelihood is great, can the Colville Confederated Tribes coordinate with managers upstream to discourage enhancement and promotion of the fishery?

## **2. Progress to date**

Regarding comment D in the section on Overall comments, results of the suppression efforts initiated in 2015 indicate that the CPUE for northern pike is increasing, and other data show that the northern pike population in Lake Roosevelt is increasing in distribution. Given this, what is the likelihood that the goal and objectives can be attained with the extent of suppression effort that is currently planned?

The 2020 target is to reduce the number captured in gill nets in 2018 by 25%, and additional targets are set for future years. What are the biological or technical basis of these interim targets?

A succinct summary of relevant data is needed to judge the proposal, rather than assuming that reviewers have read previous annual reports or plans. For example, no data were presented to support choosing types of gillnets, seasons, or locations of sampling. Likewise, data on otolith microchemistry are crucial to support targeted removal efforts but are addressed only cursorily. Summary tables, figures, and/or maps would be useful.

Useful information is provided in this summary of progress to date, but many key items discussed only later are important to include here. Examples include results of the study to select the best gillnets for suppression and details of the GRTS design (which also was not presented in sufficient detail in the original plan).

Throughout the proposal, various acronyms are not defined (such as of net types), and key pieces of information are missing (such as locations along the reservoir cited in the text that are not shown on the maps). This made it difficult to review the proposal.

### 3. Goals and objectives

The formatting of goals and objectives is inconsistent among the three co-managers, making it difficult to evaluate them. Consistently formatted goals, SMART biological/physical/social objectives, and SMART implementation objectives are needed for all elements of the project. The proponents should adhere to the ISRP guidelines provided in the template.

Some questions reflect biological objectives, and some objectives reflect implementation objectives. There is a need to state SMART objectives and clearly identify them as either biological or implementation objectives. The hypotheses are simple true or false alternatives for these questions, which provides little insight. Stating the questions as objectives and listing the hypotheses would be clearer.

For the second section on suppression, the goal and objectives are confusing. The goal statement includes a numerical objective, whereas the quantitative biological objective is actually a biological goal and the implementation objective is simply the number of nets, surveys, and combined sets of seines, fyke nets, and set lines.

The goal for the Northern Pike Reward Program is broad and vague, and the biological or social bases for the objectives were not explained. The reasoning and decision process are not clear. These goals and objectives need revision, so they conform to the template provided.

The biological basis for the objectives for the monitoring and the suppression goals were not explained in the proposal, nor in the Northern Pike Suppression and Monitoring Plan. The scientific or technical basis for the specific numerical targets in the biological and implementation objectives needs explanation.

For example, why are the objectives for the suppression a reduction of 25%, and why every two years? How were the ultimate objectives of  $<0.01$  northern pike/net or 0.01 PPC determined? How relevant is Question 4 about whether suppression efforts change the age structure of the northern pike population rather than indicating the specific change in age structure intended (e.g., older, younger, specific age structure).

Following on comment C in the section on Overall comments, an alternative goal for outreach could be to engage local youth in the sport fishing reward program, with potential goals of a) educating future generations about the risks and negative effects of illegal stocking of nonnative predators (hence potentially reducing the risk of youth causing illegal stocking), b) helping them generate funds for worthwhile school or extracurricular activities, and c) engaging

adults in supporting their community youth with providing education, venues to meet, and boats/gear for angling. What is the feasibility of this alternate goal?

The ISRP strongly suggests that all images of biologists holding large pike captured in control programs (and smiling) be removed from websites as soon as possible and substituted with images of moderate to small-sized pike (i.e., those of average size for the population) with guts cut open to reveal salmonid or other fish prey. Images of large northern pike, and happy biologists, send a conflicting message to uninformed anglers who could imagine such fish in their local waterbody, and who may attempt to stock them illegally. Social media can be used to transmit these images in seconds. Likewise, such images should not be provided to other media like newspapers or websites.

The summary of results from otolith microchemistry analysis was not sufficient to allow evaluating the “Northern Pike Natal Origin Monitoring” goals. For example, is it important to know whether northern pike are being transported from upstream reaches of the Colville and Kettle rivers, or is this now known? Have spawning areas in these rivers been identified, and are they being targeted for suppression? If this information appears later, it should be moved to an earlier section (e.g., Progress to Date) to allow evaluation of the goals and relevance to management options.

All locations cited in the proposal should be shown on a relevant map, such as the Swawilla Basin in section 1.3 on eDNA monitoring. ISRP Reviewers often could not find locations on maps.

Insufficient background information is presented to support the goals of, for example, mechanical removal, unless the reader has read all previous documents (which is not possible given the time constraints on reviewers). A better summary is needed to understand the when, who, what, where, and why questions about the Quantitative Implementation Objectives. For example, what information is used to determine when and where this gear will be deployed? An uninformed reader might assume that 1000 nets are set at random locations throughout the entire reservoir, which would clearly be ineffective.

#### **4. Methods**

The Methods are not adequately summarized to allow a reader new to the project to understand what will be done where, when, by whom and why. The eDNA methods are not available. A summary of all methods should be included in the proposal, rather than referring to another report that is not readily available to reviewers. The ISRP commends the proponents for publishing their methods in [MonitoringResources.org](http://MonitoringResources.org).

## **5. Project evaluation and adjustment process**

Many of the adaptive management actions concern issues that are not discussed in the proposal, such as evaluating gill nets and the GRTS design for deploying them for monitoring. This left the reader confused because new background information appeared at the end of the proposal. Likewise, it is not possible for the reader to evaluate the steps in the Adaptive Management plan in the flow chart without reading previous reports. Evaluating this plan requires presenting information in a logical order and providing succinct summaries of information needed.

At the end of the proposal, the reader learns that northern pike are being caught in new areas in the downstream portion of the reservoir (8 northern pike total in the Spokane Arm and from the Sanpoil downstream). Given this, are additional goals now more relevant, such as additional target eDNA and otolith microchemistry sampling and analysis?

Based on information in the proposal, it does not appear that the adaptive management process identifies alternative actions based on alternative outcomes from the monitoring. What are these alternatives, to allow developing a more efficient, proactive, and anticipatory process?

## **6. Potential confounding factors**

Move discussion of the confounding factors that are needed to allow readers to understand the rest of the proposal to the Problem Statement or Progress to Date sections.

Information should be organized under key subheadings, to help the readers understand them better.

How do the proponents plan to address the unintended effects of suppression of northern pike on their recruitment and potential entrainment downstream? That is, if removal of large individuals increases recruitment of juveniles, could this increase the entrainment of juveniles through or over Grand Coulee Dam?

The potential for climate warming to increase the rate of population growth of northern pike and exacerbate their effects on native fishes should be addressed.

## **7. Timeline**

The timeline for achievable suppression seems to be highly optimistic. A revised timeline for the goals and objectives is advised.

## **8. Relationships to other projects**

No response is required

## **9. Response to past Council recommendations and ISRP reviews**

The ISRP notes that more information was learned in this section about otolith microchemistry analysis than elsewhere in the proposal. This information should have been included as background information. Likewise, information from eDNA on northern pike upstream in the Kettle River needs to be presented early in the proposal, rather than only at the end.

## **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No response is required.

### **References cited:**

Independent Science Advisory Board (ISAB). 2019. A review of predation impacts and management effectiveness for the Columbia River Basin. Report ISAB 2019-1, Northwest Power and Conservation Council, Portland. 159 p.

Independent Science Advisory Board (ISAB). 2019. Review of Upper Columbia United Tribes' Fish Passage and Reintroduction Phase 1 Report: Investigations Upstream of Chief Joseph and Grand Coulee Dams (Reintroduction Report). Report ISAB 2019-3, Northwest Power and Conservation Council, Portland. 76 p.

Ruzycki, J. R., D. A. Beauchamp, and D. L. Yule. 2003. Effects of introduced lake trout on native cutthroat trout in Yellowstone Lake. *Ecological Applications* 13:23-37.

Sorel et al. 2016. Predation by Northern Pikeminnow and Tiger Muskellunge on juvenile salmonids in a high-head reservoir: implications for anadromous fish reintroductions. *Transactions of the American Fisheries Society* 145:521-536.

## D. Pend Oreille (and Dworshak)

### 200714900 - Non-Native Fish Suppression

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Kalispel Tribe

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The ISRP commends the proponents for their very thoughtful and thorough set of responses to our comments. The additional information provides important background allowing the ISRP to better understand the management decisions made and the adaptive management process.

The ISRP highly commends the proponents on their successes in managing a complex set of land, water, and fisheries resources in the face of multiple overlapping threats and opportunities.

The comments below should not be construed as detracting in any way from the hard work, persistence, and successes of this program. Rather, they are intended to help foster even greater success for the program in the future. The ISRP emphasizes that finding that outcomes for populations or habitats do not meet a specified SMART objective does not signal project failure or jeopardize future funding. Instead, measuring whether objectives have or have not been met allows adapting project work plans and prioritizing future work.

Specific comments on points that could improve the outcomes of this project include:

1. Although quantitative objectives for westslope cutthroat trout abundance after brook trout removal are not possible for the reasons given, the expectations reported by the proponents are useful qualitative objectives to guide the work. These include: 1) self-sustaining populations that are 2) spawning and producing multiple cohorts, 3) occupying the majority of fish-bearing habitats, and 4) producing densities within the range expected. The ISRP requests that the proponents include these in their objectives for this component of the proposal, such as in their Biological Objective 1A and 1B.

2. The ISRP appreciates the appendix describing the MYY Brook Trout project in detail. The goals, objectives, methods, and adaptive management decision point of a 10% increase in MYY males each year appear reasonable and scientifically sound. The careful study design is important, especially if the results continue to indicate low survival of the stocked fish and low recruitment of the resulting fry produced. Establishing that a method is not effective, or requires substantial modification, is as important as establishing success of a method. Such an approach can avoid expending funds on methods that are ineffective. The ISRP looks forward to learning the results of this study and a future publication describing the efficacy of this method in Mill Creek.

3. With regard to monitoring control streams for the effects of brook trout suppression, a Before-After study design with no control cannot rule out confounding factors, as unlikely as those seem. For example, it may seem unlikely that another factor could cause westslope cutthroat trout abundance to increase even when brook trout are not removed. However, the probability that the entire sample of streams the proponents described would, by random chance, show the same effect of increasing cutthroat trout abundance (under the null hypothesis of no effect of brook trout) is low. The ISRP encourages the proponents to seek assistance from a statistician to identify a protocol to test this null hypothesis (e.g., Fisher's combined probability test is one that an ISRP member suggested, although we defer to a qualified statistician). This would add strength to the results and likely facilitate publication. The ISRP requests that this analysis be pursued and reported in an annual report.

4. The proponents argue that suppression of lake trout in Upper Priest Lake should be the major factor limiting bull trout. They report that the habitat is relatively pristine, habitat quality is increasing after a legacy of timber harvest, and access is difficult so that angling pressure is low. Proponents are collaborating in a productive way with the state agency, and it is likely that either the proponents or the agency are measuring physical characteristics of the habitat such as water temperature, spawning substrate quality, and connectivity. Increasing temperature owing to climate change is a persistent threat for bull trout (Rieman et al. 2007; Jones et al. 2014), as are the effects of loss of connectivity and reduced substrate quality. Therefore, it seems prudent to analyze multiple working hypotheses in case several factors have combined or interactive effects. For example, if bull trout distribution or abundance declines despite lake trout removal, one or more of these factors may be important to explain these changes. The ISRP encourages the proponents to pursue this type of multifactor analysis.

5. With regard to developing an overall adaptive management plan for the program, the ISRP understands the long and productive working relationship that the proponents have developed between KNRD and WDFW staff, and we commend the proponents on the annual meetings to

make decisions about each project. However, the ISRP is interested in how the set of projects is managed as a collective. We encourage the proponents to articulate how goals and objectives are set, and decisions are made about the overall program within the Kalispel Tribe's decision-making process. This information should be added to the proposal to ensure it is documented and available for the next review cycle.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The ISRP enjoyed reading the proposal for this comprehensive project and commend the proponents on their work to manage fisheries resources for the Kalispel Tribe and others.

**Responses requested:**

To help us determine if the proposal meets scientific review criteria, the ISRP asks the proponents to address the following issues in their response:

1. The scientific basis for the numerical targets is not explained for any of the objectives in the proposal or supporting documents. Please provide descriptions of the technical basis for each objective, based on quantitative models, results from similar suppression efforts in technical reports and peer-reviewed literature, or a conceptual framework developed by the project. Examples where more information is needed include:
  - a. The biological objective for eradicating brook trout in Saucon Creek identifies the intended reduction in brook trout density but does not identify the numerical target for abundance of westslope cutthroat trout. Given that recovery of native westslope cutthroat trout is the primary intent of the suppression effort, a quantitative objective for the native trout is needed.
  - b. Goal 2 is designed to protect, enhance, and restore all native fish populations, including salmonids, minnows, and suckers. The quantitative objectives for this goal do not identify targets for native fish populations. An exception is the objective for lake trout removal in Upper Priest Lake which calls for bull trout redd abundance to be maintained at, or increased above, the historical 20-year trend. This 20-year trend should be described, and the scientific basis for this objective explained. Is the 20-year trend biologically meaningful? Is the target high enough?

- c. Likewise, the biological objective for the northern pike suppression in Box Canyon and Boundary reservoirs simply states that it is designed to increase abundance of all impacted native fish species in the Pend Oreille River. The abundance of native species should be quantified, and the abundance or other targets for conserving them specified.
  - d. For  $M_{YY}$  Brook trout, it is unclear what “*stocked in proportions relative to age-1 and older Brook trout removed*” means. The biological basis for this protocol is not explained. It is unclear if a specific proportion is based on analysis of recruitment or other analyses.
2. Please provide a rigorous study design for testing the efficacy of  $M_{YY}$  male brook trout as a tool for eradicating nonnative brook trout. Testing this method in Mill Creek may be useful given that beaver ponds have created complex habitat in certain sections. However, it will be critical to ensure that the test will yield credible scientific evidence that the method is or is not effective. The test results should also be published in refereed scientific literature so that the substantial effort can inform practitioners in other locations.
  3. Please explain the current plan for piscicide use, based on the advantages and disadvantages of each method available to eradicate brook trout and the potential of each method to affect non-target species. The proponents report that brook trout were removed from Smalle Creek with piscicides, and that Goose Creek is awaiting treatment. The proponents also discuss public outreach to increase understanding of piscicide use, yet they propose not to use piscicides in Saucon or Mill creeks, despite the huge effort required for electrofishing.

The ISRP suggests that, during the next electrofishing campaign, it might be possible to remove native cutthroat trout temporarily from the segment containing brook trout, and then eradicate the brook trout using piscicides. Ongoing annual electrofishing is likely to cause added injury to the cutthroat trout and requires large commitments of time and funding. Likewise, the use of  $M_{YY}$  males is untested, and may ultimately prove ineffective after several decades of intensive and expensive work. Stocking of  $M_{YY}$  males and the ongoing brook trout invasion could also cause harm to non-target organisms, for example, by reducing insect emergence that feeds riparian animals like spiders and birds (Benjamin et al. 2011, 2013). In contrast, the use of piscicides may affect non-target organisms such as amphibians and invertebrates. These and other relevant pros and cons should be addressed in detail. For example, please provide information you

submitted in the NEPA process to address how you will identify and protect non-target organisms.

4. Biological Objective 1B: In the 2018 Annual Report, the proponents report that the downstream barrier in Saucon Creek is permeable to brook trout, based on observations that tagged fish placed downstream later ascended past the barrier. Without an effective barrier, the brook trout population will not be closed, eradication can never be completed, and the control efforts must continue indefinitely. Please specify whether the proponents have considered using the model in Kondratieff and Myrick (2006) to evaluate the barrier and then modifying it to prevent brook trout immigration. Will eDNA be used to assess whether eradication is successful?
5. The proponents reported success in eradicating brook trout by repeated annual electrofishing in West Branch LeClerc Creek Tributary and an increased abundance of westslope cutthroat trout afterwards. A similar pattern is reported in Saucon Creek, with hopes to also eradicate brook trout there. However, a rigorous experimental design will require one or more control streams to allow ruling out confounding factors. Please specify whether such controls are available.
6. The link between suppressing lake trout in Upper Priest Lake and increasing bull trout redd counts seems tenuous and requires further discussion. Please specify whether there are factors other than lake trout abundance that could explain the increase in the number of bull trout redds. Likewise, if lake trout continue to be removed but bull trout numbers do not rebound sufficiently, are there other stressors that need to be addressed simultaneously, such as increasing water temperatures, other nonnative species, or lack of connections to key habitats? Does the increase in catch rates in large mesh sizes in 2019 indicate that more large lake trout were present? Total catch, and catch of large individuals, increased during the most recent five years (see Figs. 5-7), opposite to the longer-term trends reported in the proposal. What adaptive management plan is in place to consider other alternatives, and what course of action will be taken if redd numbers do not increase, or decline, even with stable or increasing effort to remove lake trout?
7. Both lake trout and bull trout show apparent threshold responses to lake trout suppression, with decreases in lake trout catch-per-unit-effort (CPUE) and increases in bull trout redd counts only after many years of lake trout suppression. Please specify whether appropriate statistical analyses for thresholds confirm these responses. Can factors other than lake trout suppression, such as environmental factors or fishing

pressure, explain either threshold response? (See additional comments under Progress to Date below.)

8. Goal 2 is designed to protect, enhance, and restore all native fish populations, including salmonids, minnows, and suckers. The quantitative objectives for this goal do not yet identify targets for native fish populations, except the objective for lake trout removal in Upper Priest Lake which calls for bull trout redd abundance to be maintained at, or increased above, the historic 20-year trend. The ISRP supports this goal, but would like to know how the proponents plan to develop targets for the abundance and/or distribution of all native fish species, including native sculpins, minnows, and suckers?
9. In combination with the goals of suppressing abundance of northern pike, two related goals appear to be of even higher priority: (1) preventing a sport fishery for pike from developing and (2) gaining public trust and educating them to prevent long distance transport to water bodies within the anadromous zone of the Columbia River. Are more efforts planned to meet these two goals? For example, would engaging youth in a sport fishing reward program combined with education about the risk of nonnative invasions serve these purposes? This would likely require hiring a community outreach coordinator with different skills than the fisheries biologists on staff.
10. The project proposes to compare CPUE of northern pike from gill nets with the Spring Pike Index Netting (SPIN) surveys. Neither technique is a true estimate of northern pike abundance. Please specify how the proponents will collaborate with proponents of other northern pike suppression projects to develop a comparison of CPUE from gill net sampling with more rigorous estimates of the northern pike abundance.
11. There is no indication that the methods have been included and reviewed in [MonitoringResources.org](http://MonitoringResources.org). Please specify when all methods will be included in the online database to make them broadly available within the Columbia River Basin.
12. In contrast to the rapid response management approach described, please specify the adaptive management process and master plan used to guide decisions to continue or modify management actions. Further details on this request are described below under Project evaluation and adjustment process.
13. Only one of the 11 qualifications (#1 regarding SMART objectives) listed in the 2016 ISRP Review of the Box Canyon Northern Pike Suppression Progress Report has been

addressed in either the proposal or the 2018 Annual Report. Please provide responses to the other 10 items on that list.

### **Comments not requiring an immediate response**

#### **1. Problem statement**

Is there potential for illegal reintroduction of non-native fish after restoration of westslope cutthroat trout to small streams? What outreach or added safeguards (such as staging of temporary barriers upstream of the main barrier) would be prudent to address this possibility, given the large investment of time and money?

Please see item 3 in the list of responses requested above concerning the importance of careful design and implementation of the proposed project to use M<sub>YY</sub> male brook trout for eradicating brook trout. The ISRP recognizes that the project is part of an Accord and is directed primarily at managing non-native fishes to protect native west slope cutthroat trout. Therefore, it would be difficult for this project to satisfy the requirements for a designed experiment, which would include replication, randomization, and control, although sampling a suitable control stream is likely possible. Will the results from sampling a single stream provide credible scientific evidence that the method is effective? Is it possible to compare the results to a similar control stream sampled throughout the period and employ a statistical technique like Randomized Intervention Analysis, which has been used in whole-lake studies (but see Murtaugh 2002 for drawbacks)? Alternatively, is it possible to generate predictions for this stream from the model of Schill et al. (2017; cited in the proposal) and collect the data that allow a thorough comparison of the results to these predictions?

The proposal focuses on effects of nonnative species on bull trout and westslope cutthroat trout and provides no additional information after first mention of the impact on other native fish populations such as native peamouth, mountain whitefish, northern pikeminnow, and other minnows and suckers. The ISRP encourages the proponents to identify the impacts on other native fishes in future reports, the conservation of which are part of the goals and objectives of the Council's Fish and Wildlife Program. For example, which native species are likely to be impacted the most by northern pike?

A justification for suppressing northern pike to target levels in Box Canyon Reservoir and Boundary Reservoir is to reduce the potential for downstream entrainment. Is this assumption justified by scientific evidence? Even when suppressed to target levels, what is the potential for downstream dispersion given spillway design, frequency of spills, turbine designs, and other structural and operational factors?

The proponents list 3.4 km of stream (the estimated length needed to support 500 westslope cutthroat trout) as an important goal, even though only 5 of 19 populations meet this threshold. However, a threshold of 7.8 km (supporting 2,000 westslope cutthroat trout, or an effective population size of approximately 500 fish) is a more useful threshold that also buffers cutthroat trout populations against debris flows after fire, and catastrophic loss from drying or freezing (Roberts et al. 2013).

Reviewers (especially those with red-green color blindness) had difficulty deciphering the colors and legend in Figure 2, which prevented them from finding locations of streams on the map. Please see resources on the web for color schemes that are “color-blind friendly.”

The proposal indicates that non-native fish species currently constitute 64% of the fish assemblage in the basin. Does this mean that they are 64% of the species (richness) or 64% of the abundance of the total fish assemblage? The proportion of the total fish population that are non-native fish is also an important characteristic of the fish assemblage and should be specified in future reports and proposals.

## **2. Progress to date**

The success of the translocation of adult westslope cutthroat trout to Cee Ah Creek is promising and provides useful information for other projects in the region. Other than noting the increase in westslope cutthroat trout abundance following translocation, did the proponents record any factors that may have influenced the success of the reintroduction, such as habitat complexity, access to floodplains, springs or coldwater refuges, or adjacency to larger streams, ponds, or lakes?

A response is requested (item 7 in the list of above) to address the apparent threshold response by both lake trout and bull trout to the suppression efforts. Lake trout CPUE declined in 2015 after many years of suppression (since 1998) and numbers have remained at this substantially lower level since then. Likewise, bull trout redd counts remained relatively low through 2011-2013 with an apparent increase after that. Could the threshold response in lake trout CPUE be explained by environmental factors, characteristics of the lake, differences in the suppression actions, or other factors? Likewise, are there other factors that could explain the increase in bull trout redds, especially in 2014 and 2017, such as water temperature, stream flow, snowpack, bull trout migration, fishing pressure, or interactions with other fish species?

The ISRP suggests that the proponents analyze each metric (lake trout CPUE and bull trout redd counts) using spline regression or other appropriate statistical method to test for a threshold response. In addition, analysis of bull trout redd numbers as a function of lake trout CPUE (with

an appropriate lag time) and several relevant physical covariates (e.g., stream flow) in a model-selection or Bayesian hierarchical framework could provide insight into factors that either can or cannot be manipulated to aid in their recovery. The ISRP suggests contacting a qualified statistician for assistance.

The ISRP encourages the proponents to publish their results in peer-reviewed literature as soon as possible. This advice is especially pertinent given the long-term intensive effort to suppress northern pike and lake trout in lakes and reservoirs, and to provide education and outreach efforts for these native fish recovery efforts, including public meetings and disseminating information. Similarly, eradication of nonnative trout by electrofishing is rare, so if the proponents are having success, they should publish their results in a refereed fisheries journal.

### **3. Goals and objectives**

Biological Objective 1A – What year is considered the baseline for the proposed reduction of brook trout by >50%? Is the amount of habitat in Mill Creek large enough to also support a “resident” bull trout population?

Implementation Objective 1A-2, Specific predictions for Alternative Hypothesis 1 - If an adequate design can be developed for testing the effectiveness of  $M_{YY}$  males (see comments above), please clarify what “*rate proportional to their naturalized counterparts*” means. Does this mean that each type of young-of-year would be proportional to the number of adult males of that type in the population?

Would sonic tracking of “Judas fish” to identify lake trout spawning grounds, and netting fish as they stage for spawning, be an effective means of control?

On Implementation Objective 1A-2, Alternative Hypothesis 1: If all the progeny of  $M_{YY}$  males in the next generation are XY males, then will the stocked  $M_{YY}$  males become a smaller proportion of the male population each year? If so, is eradication possible by simply stocking  $M_{YY}$  males, given that mating by females with even one XY male could produce hundreds of fertilized eggs, of which approximately half will be normal XX females? This again raises the issue of whether electrofishing removals followed by piscicide treatment might be a more efficient way to remove nonnative brook trout from these streams.

Implementation Objective 1C, “*Participate in opportunities that facilitate the addition of watersheds and development of techniques that reduce or eliminate non-native fish species in Pend Oreille Basin tributaries*” is a goal, rather than an objective, and should be identified as

such. Its accompanying implementation objective 1C-1 is an appropriate implementation objective for this goal.

#### **4. Methods**

Please specify how parentage of young-of-year brook trout will be determined, if males all have XY chromosomes. It is unclear whether all  $M_{YY}$  males are genotyped, allowing parentage to be assigned. The proposal says simply that “*Genetic distinction between extant Mill Creek Brook Trout and  $M_{YY}$  Brook Trout is likely, as they originated from separate and geographically isolated gene pools (Schill et al. 2016).*” How assured is this distinction, given that interpreting the success of  $M_{YY}$  spawning depends on this assumption?

If survival of  $M_{YY}$  adults is to be assessed by recapture of adipose-clipped fish, then the estimation will need to account for capture probability since not all  $M_{YY}$  adults will be captured. The ISRP is concerned that the proposal does not demonstrate sufficiently sophisticated methods for estimating parents and progeny because the evaluation of this important project depends on these data.

How will potential bias be avoided in estimating mean lengths of trout in Saucon Creek, where only the first 25 fish captured in each sampling unit will be measured? Is there potential for bias owing to larger fish being more susceptible to capture on the first pass? Has potential bias been tested with empirical data from multiple passes?

The Leslie depletion method provides relatively crude estimates of lake trout abundance in Upper Priest Lake. Are more sophisticated models for estimating abundance and age structure available? The report issued by IDFG has minimal details, and more could be garnered from these data.

Bull trout redd counts are a coarse approximation of bull trout abundance. Will these estimates be calibrated against a better measure? Are such calibrations available from other streams in the region?

The gillnetting methods for lake trout suppression are not described in sufficient detail. For example, where and how will gillnets be placed and retrieved? Is there a systematic approach to the selecting netting sites? Are the locations of netting sites geo-referenced? The description of “net boxes” is confusing. What makes up a “gang” of netting? A sound scientific evaluation of the suppression methods for northern pike requires a more detailed description of methods.

Northern pike numbers have been reduced to relatively low levels with annual netting. Although it may seem self-evident, what steps would be taken if northern pike numbers suddenly rise above the thresholds?

How will native fish species, such as sculpins, suckers, and minnows will be identified and enumerated during brook trout eradication projects in Mill Creek and Saucon Creek? These are valuable data for a project designed for the protection, enhancement, and recovery of native fish species.

When the removal estimator in MicroFish 3.0 fails, it would be better to use the total number captured as the estimate, and interpret results based on these data with abundant caution, rather than simply throwing the estimate out. Is this what is meant by “total catch data”? Using a stopping rule for number of passes in the field can reduce the chance of having to throw the data out, and to ensure a desired level of precision. See Connolly (1996) for tables based on Zippen estimators that are easy to use in the field.

The 2018 Annual Progress Report indicates that relative weight ( $W_r$ ) indices for both westslope cutthroat trout and brook trout decline with increasing total length (Figures 7 and 10). This decline likely reflects length-related bias in the standard weight ( $W_s$ ) equations for both westslope cutthroat trout (Kruse and Hubert 1997) and brook trout (Hyatt and Hubert 2001) used in the computation of  $W_r$ . Research by Gerow et al. (2004, 2005) identifies the reasons for the length-related bias. Thus, the length-related declines in  $W_r$  depicted in Figures 7 and 10 are probably not biologically meaningful.

## **5. Project evaluation and adjustment process**

As described in item 12 in the list of responses requested, please describe the adaptive management process and master plan used to guide decisions to continue or modify management actions. The section on confounding factors states “When a priority issue arises, management agencies coordinate and determine the best course of action, adapting to address new or emerging threats.” This is a rapid response approach rather than a structured decision-making approach or adaptive management process.

Project managers and biologists meet annually to review the status, results, and future changes for projects, and the conclusions are summarized in annual reports. However, the proposal does not describe formal adaptive management process, regularly scheduled meetings of designated decision makers and collaborators (e.g., WDFW and IDFG), or open science review with the public. The proposal does not identify a master plan for the project.

What agencies/personnel make up the adaptive management team? What is the process for assessing monitoring data and potential confounding factors? How are decisions regarding project adjustments reached? It is likely that disagreements will occur regarding appropriate project adjustments. How is disagreement managed in the adaptive management process?

## **6. Potential confounding factors**

Please specify how land use confounds the implementation or success of non-native fish suppression efforts. Land use can influence recovery of focal native species, but the proposal does not clearly explain the confounding influence.

## **7. Timeline**

No comment.

## **8. Relationships to other projects**

No comment.

## **9. Response to past Council recommendations and ISRP reviews**

As noted in item 13 of the list of responses requested, only one of the 11 qualifications listed in the 2016 ISRP Review of the Box Canyon Northern Pike Suppression Progress Report has been addressed in either the proposal or the 2018 Annual Report.

In contrast to the assertion that “since 2010 the standardized relative lake trout abundance shows a strong negative trend,” for the period 2015-2019, the most recent 5 years, Figs. 5-7 all show the opposite, that total catch and catch by size class (especially of large lake trout) has increased.

Information on considering fall removal of lake trout should be moved to section on adaptive management.

The uncertainty about the relationship of pike CPUE to true pike abundance remains. How will the proponents address this uncertainty in the next phase of work?

## **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No response is required.

## References cited:

- Benjamin, J. R., K. D. Fausch, and C. V. Baxter. 2011. Species replacement by a nonnative salmonid alters ecosystem function by reducing prey subsidies that support riparian spiders. *Oecologia* 167:503-512.
- Benjamin, J. R., F. Lepori, C. V. Baxter, and K. D. Fausch. 2013. Can replacement of native by non-native trout alter stream-riparian food webs? *Freshwater Biology* 58:1694-1709.
- Connolly, P.J. 1996. Resident cutthroat trout in the central Coast Range of Oregon: Logging effects, habitat associations, and sampling protocols. Doctoral dissertation, Oregon State University, Corvallis
- Gerow, K. G., W. A. Hubert, and R. C. Anderson-Sprecher. 2004. An alternative approach to detection of length-related biases in standard weight equations. *North American Journal of Fisheries Management* 24:903-910.
- Gerow, K. G., R. C. Anderson-Sprecher, and W. A. Hubert. 2005. A new method to compute standard weight equations that reduces length related bias. *North American Journal of Fisheries Management* 25:1288-1300.
- Hyatt, M. W., and W. A. Hubert. 2001. Proposed standard-weight equation for brook trout. *North American Journal of Fisheries Management* 21:253-254.
- Kondratieff, M. C., and C. A. Myrick. 2006. How high can brook trout jump? A laboratory evaluation of brook trout jumping performance. *Transactions of the American Fisheries Society* 135:361-370.
- Kruse, C. G., and W. A. Hubert. 1997. Proposed standard weight (*Ws*) equations for interior cutthroat trout. *North American Journal of Fisheries Management* 17:784-790.
- Murtaugh, P. A. 2002. On rejection rates of paired intervention analysis. *Ecology* 83: 1752-1761.
- Roberts, J. J., K. D. Fausch, D.P. Peterson, and M. B. Hooten. 2013. Fragmentation and thermal risks from climate change interact to affect persistence of native trout in the Colorado River basin. *Global Change Biology* 19:1383–1398.

## 200724600 - Restoration of Bull Trout Passage at Albeni Falls Dam

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Kalispel Tribe

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The proponents' responses to the ISRP's request for additional information and perspective for the proposed project work was extensive, informative, and sufficient.

The ISRP's original concerns focused first on five components of the design including auxiliary water, fish entrance structure and pool, ladder, pre-sort holding and fish lock, and sorting facility. The proponent's response adequately addresses these concerns, especially those associated with the McMillan trap operations. Issues related to supply of sufficient and necessary tailrace flow appear to be addressed by design (cited in engineering documents) for the auxiliary water supply.

The response also adequately addresses the issue of lethal and sub-lethal effects of electrofishing collection and transport of bull trout. Although lethal and sub-lethal effects have not been quantified directly, other indirect information provided supports continuation of the collection and transport strategy as the least risky alternative. Moreover, direct mortality has been low, with only one death recorded.

The additional perspective on the bull trout release site at Tressel Creek adequately clarifies the rationale for selecting it as the preferred site. The site is judged to offer the best suite of conditions for survival compared with the alternative sites because bull trout can find cold deep water relatively quickly, enhancing survival. Warm surface water, an absence of cold and deep water adjacent to other candidate sites, and the need to temper transport water nearly 10°C allow conditions and holding times that may greatly improve survival.

Regarding the westslope cutthroat trout genetic monitoring, the proponent offers a number of pathways to ensure greater accuracy and precision for estimating composition in admixtures, as well as determining extent of potential interbreeding, interspecific hybridization and introgression with rainbow trout. The ISRP appreciates the proponent adding a new goal, along with three desired outcomes and extensive methods, for a comprehensive westslope cutthroat trout genetic baseline downstream of Albeni Falls Dam.

The ISRP does not need to review this proposal again during this review cycle. The ISRP encourages the proponent to revise their proposal to ensure that the additional information they provided in their response is easily accessible by the Council, BPA, and the public in a single document. A revised final proposal that includes and integrates all information will guide the project for the next five years and facilitate future project reviews.

1) The revised proposal could include the following link to full report, design drawings, and related materials for the capture and sorting facility ([link](#)).

2) The revision could include a published reference to support the statement, “[l]adder pool volumes and flows are based on energy dissipation of flow for subadult bull trout.” This statement implies that these volumes and flows are being well-established for bull trout.

3) Three manuscripts addressing the issues of tagging and monitoring lethal and sub-lethal effects have been submitted for peer-reviewed publication reflecting a high level of analysis. Pending publication, references (pre-published draft titles and co-authors) could be included in the revised proposal, and full citations should be included in annual reports as they become published.

4) The rationale for the above-dam release site at Tressel Creek is provided and well-described. This description along with brief statements linking to performance monitoring of the released bull trout could be included in an updated proposal.

5) A new goal for genetic monitoring for westslope cutthroat trout downstream of Albeni Falls Dam is provided. The Goal, Objectives, Methods and Timeline for this activity could be added to the proposal to ensure it contains the updated goals and objectives. The proponent offers a number of pathways to improve accuracy and precision of admixture modeling, as well as determining extent of hybridization and introgression with rainbow trout. Importantly, it would be valuable to briefly describe how such information on hybridization will inform any management or responsive actions. Specifically, if a low level of recent hybridization is detected, then a vigilance or sentinel-monitoring approach may suffice. Alternatively, if a more expansive hybrid swarm (multi-generational introgression) from westslope cutthroat and rainbow trout mixing is detected, what range of actions is available?

6) The ISRP appreciates that the proponent does not anticipate further mid-course adjustments, given that issues associated with the McMillan Trap have been addressed, but adaptive corrections may yet be required in the future. Developing a strategy or decision pathway for such corrections should be a part of the project planning. The ISRP encourages the

proponents to ensure that new information or changing conditions are evaluated in an adaptive management process.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The need for passage at Albeni Falls Dam is well documented and considered essential for recovery and conservation of migratory bull trout and westslope cutthroat trout. Conditions that make the temporary structure (i.e., McMillen trap) ineffective in attracting bull trout will need to be understood and ameliorated in the design and operation of a permanent facility. An important strength of the current proposal is the objective to assess the meta-population genetic structure of westslope cutthroat trout in preparation for prioritized habitat protection and restoration.

**Responses requested:**

To help us determine if the proposal meets scientific review criteria, the ISRP asks the proponents to address the following issues in their response:

1. Please provide a summary description of the USACE (2018) 35%-passage design specification along with a link or reference to the full document. It was not included in the literature cited. In addition to the adequacy of attraction flows, the fluctuation of water levels in the tailrace appeared to affect the temporary structure's effectiveness. Please provide some explanation for whether that tailrace issue will persist in the new structure.
2. As an interim measure, the proposal includes a plan to continue electrofishing as a collection method with physical transport above Albeni Falls Dam. The proponents and the ISRP need to understand the potential lethal and sub-lethal effects of this approach. Please provide data and analyses to address this issue if data are available; if not, the ISRP recommends including a sub-objective to collect data and conduct analyses to address this issue.
3. Please explain why the Trestle Creek location was chosen over acclimation and release locations elsewhere above the dam or near the Priest River. Could there be potential negative impacts to the existing bull trout population in Trestle Creek, an important stronghold for migratory bull trout?
4. Please describe a well-considered adaptive management plan that includes key decision-points for evaluating the project's progress and collecting relevant data to

inform the decision-points. As has been witnessed to date, the need for mid-course adjustments will likely persist.

### **Comments not requiring an immediate response**

#### **1. Problem statement**

The project addresses a well-established problem and is consistent with objectives and strategies in the Council's Fish and Wildlife Program.

#### **2. Progress to date**

After a decade or more of funding and work, it is discouraging that more progress has not been made on improving passage. The proposal is unclear on how lessons learned from the temporary passage structure or associated experiments will be used to inform the design of the permanent facility. For example, the Y-maze experiments indicated that cold water is an important variable for attracting fish. Yet it is unclear how this information would be used in the design of the permanent passage facility.

The ISRP encourages timely analysis and peer-reviewed publication of the results as they become available.

#### **3. Goals and objectives**

Goals and objectives are generally well defined and implementation objectives meet SMART criteria. However, the biological objectives would be more meaningful if written in terms of fish recovery rather than electrofishing events, which are a means to an end.

Goal 1: A statement is needed to explain why the Trestle Creek location was chosen over other possible acclimation and release sites above the dam or near the Priest River (as noted in the list of responses requested).

The ISRP recommends that the survival of transplanted fish be evaluated. One way to address this would be to include an Objective for assessing mortality from electrofishing. Information on survival (lethal or sub-lethal effects) following relocation to the Priest River would be an important factor in evaluating success. DeHaan & Bernall (2013) provide some evidence that bull trout successfully reproduced in the Clark Fork River after trap and haul, but it may be inappropriate to expect similar results here.

Goal 2: The proposal should discuss how genetic assessments will provide guidance on re-connecting populations. Specifically, will understanding genetic structure alter the need or the design specification of temporary or permanent passage? Or are the data intended to serve as a baseline for monitoring the effects of passage on population structure? For Objective C, the

description of the hybridization issue should include a sentence or two about the problem being addressed.

Goal 3: To provide permanent upstream passage, Objectives A (secure funding and agreements) and B (participate in design) are outside the usual scope of scientific review. Even so, they help to provide context for the other implementation objectives.

#### **4. Methods**

Aside from item 2 in the list of responses requested, the Methods are adequately described.

The ISRP suggests that it may be possible, based on genetic baseline studies of bull trout, to assign individual fish passed over the Albeni Falls Dam to a source stream population. For the same reason, it would be useful to develop a comprehensive genetic baseline for westslope cutthroat trout.

#### **5. Project evaluation and adjustment process**

This section is mostly focused on how to address confounding factors, such as including adequate statistical power. This is commendable, but the ISRP also recommends considering how statistical analyses of data will be used to assess progress towards meeting the goals and objectives, and how they will inform decision-points. For example, regarding Goal 1, the collection and transport specifications to maximize survival during passage may need to be adjusted on occasion based on updated estimates of survival. Regarding Goal 2, it is unclear if analyses to detect hybrids and estimate admixture are needed to determine if there is any basis for concern, or if the analyses will ultimately provide a means to selectively remove hybrids that are detected. If it is the latter, some description is needed on how this effort may be implemented and evaluated in real-time.

The proposal indicates that a coordination meeting is convened annually to report results and progress to partners and others involved in related projects in the subbasin. The ISRP encourages the proponents and collaborators to disseminate their findings and reports more broadly to others with related ecosystem goals and objectives.

#### **6. Potential confounding factors**

A primary confounding factor addressed in the proposal is a potential inability or delay in acquiring funds for the design, construction, and operation of a permanent passage facility. Therefore, it would be prudent to describe the urgency of the temperature risks. Is it conceivable that severe degradation or extirpation of the imperiled bull trout population may occur before permanent passage is established? A robust population estimate and analysis would inform the trend and sense of urgency.

## 7. Timeline

The timeline is complete and well organized with quarterly schedules for all objectives. The ISRP notes that Goal 3 may be beyond the control of the proponents to deliver.

## 8. Relationships to other projects

The proposal should include a concise description of how data and analyses are coordinated among projects in the subbasin. In particular, the proposal should clarify the relationship between the IDFG bull trout program and the KTI translocation program.

## 9. Response to past Council recommendations and ISRP review

The project has undergone several ISRP reviews with the most recent being in 2018. The responses to past ISRP issues, including a robust experimental design for their Y-maze study, are largely adequate.

The proposal indicates that the project collects data on relative abundance and CPUE but does not describe the entirety of the data collected, how data have been used, and whether data will continue to be collected under the new proposal. Presumably these data are curated by the proponent and are available on request.

## 10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)

No comments

199700400 - Resident Fish above Chief Joseph and Grand Coulee Dams

- Box: [Original proposal](#) and [Response and revised proposal](#)

**Proponent:** Kalispel Tribe

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The ISRP commends the four proponents for providing extensive responses and modifying the proposal to address ISRP issues. The information and details provided in the responses, along with the major modifications to the proposal, result in a scientifically sound proposal. The ISRP previously reviewed this proposal and struggled with the format and the breadth of work proposed. The proponents' responses helped the ISRP to better understand the relationships among the components of this proposal, as well as some of the relationships to other work efforts in the Lake Roosevelt system. Collectively, the suite of work efforts is addressing an

extensive set of problems created by the hydropower system, degraded habitat conditions, or non-native fish introductions.

The Decision Matrix that was provided illustrates how the various players in the subbasin interact and coordinate on research, monitoring, and evaluation. The ISRP recognizes the importance of identifying strategic priorities for information assembly and critical research needs through a rigorous process involving stakeholder input and coordinated actions. As such, it would be helpful if the proponents identify in subsequent annual reports and proposal revisions, documents or links to information about longer-term strategic research priorities and more immediate needs.

The ISRP noted the large amount of genetic testing and analysis occurring in the region. We commend this proposal overall, and WDFW in particular, for the commitment to the genetic testing, data warehousing, and analysis. This is a significant effort. The potential for better understanding redband trout population structure is important, and we encourage continuation of this work into the future.

The ISRP has no conditions for this proposal, but we do have several strong recommendations that we believe are important to the project. We would like to see them addressed, but a response back to the ISRP is not required. We also provide other suggestions to improve the science being conducted.

**Smallmouth Bass Suppression:** This proposed work is basically a predator (smallmouth bass) removal program and evaluation of the effect of removal on redband trout in the Upper Spokane River. The ISRP has several concerns about the proposed activities to remove predators and to evaluate effects of this removal. We appreciate that there is a small population of redband trout in the Upper Spokane River. The proponents hypothesize that smallmouth bass predation is a major source of redband trout mortality in the Upper Spokane River. They suggest removal of enough smallmouth bass will help increase abundance of redband trout. We recognize that studies in the literature have observed smallmouth bass can be a significant predator on a variety of fish species including salmonids (Fritts and Pearson 2006). We think, however, that removal of smallmouth bass in the Upper Spokane River needs further justification. First, we would like to see at least one year of basic diet data on smallmouth bass. What is the contribution of salmonids to the diet of smallmouth bass in this area? A thesis by McCroskey (2015) was cited in the original proposal that indicated diet data for smallmouth bass are available. Can a table of this data be included in a revised proposal or annual report? A second issue concerns spatial and temporal overlaps between smallmouth bass <200 mm and redband trout. The extent of this overlap is unclear from the information in the proponents' response. Information on diet and spatial and temporal overlap should be included in annual reports.

**Colville Data Project:** The proposal provide additional information and a description of the database project. The ISRP greatly appreciates the additional information and strongly supports developing and maintaining this database. However, the ISRP is unclear about the respective roles of this project and the Chief Joseph Kokanee Enhancement Project (199500100) in developing and maintaining the database. In addition, we are unclear how these two projects will coordinate future work activities on the database. For example, the Chief Joseph Kokanee Enhancement Project (199501100) is currently the project responsible for the development and maintenance of the Resident Fish Database. What is the role of this project? We recommend that the roles of these two projects in the database development and implementation be described in a database management plan, which could be included in the Scope of Work and included as an appendix of the proposal. The timing of the development of the new platform affords a good opportunity for both projects to establish their respective contributions to the development and implementation of the database. We commend proponents for testing the platform at a pilot level.

**Objectives for Goal 1 and data management:** No objectives are provided for Goal 1 or for reporting, publishing, sharing data or participating in adaptive management decision processes. The ISRP recommends that the proponents provide those objectives in the Scope of Work and a revised proposal.

**Project Relationships:** The ISRP requested a more detailed description of the connections and relationships with other projects outside the scope of this project (1997-004-00). Proponents provide excellent information for redband trout but do not cover any of the other relevant subjects (e.g., westslope cutthroat trout ecology, predator suppression). We recommend that the proponents add this information to the proposal so that the relationships between this project and other projects can be more clearly understood.

**Mortality factors:** The Kalispel Tribe did not provide a description of the major mortality factors that the ISRP requested. The proponents provide only a reference for Anderson (in prep), which does not address all major mortality factors. For completeness, we recommend that the proponents add the other major mortality factors to a revised proposal.

**Objectives and timelines:** In the Kalispel project, the timeline does not align with the objectives and many important activities were not included in the timeline. We recommend that proponents prepare an accurate and complete timeline that is included in the Scope of Work and proposal.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

This project comprises four separate sub-projects implemented by separate entities: the Colville Confederated Tribes (CCT), Kalispel Tribe of Indians (KTI), Spokane Tribe of Indians (STI) and Washington Department of Fish and Wildlife (WDFW). Due to its wide scope and the large number of requests that follow, the ISRP reviewed the proposal in four separate parts (i.e., as sub-proposals from each of the proponents).

We first present overall comments for the main proposal and a list of responses requested that apply to the work as a whole. Additional response requests that are specific to the individual sub-proposals are prefixed by KTI, STI, WDFW, and CCT and listed within the appropriate comment section of each sub-proposal (e.g., Methods).

**Overall Comments, Main Proposal:**

The main proposal appropriately addresses the significant challenges of restoring subsistence and recreational fisheries as well as conserving and enhancing resident fish populations in the upper Columbia River Basin. The four sub-proposals each address specific objectives that focus on species and/or water bodies that mostly differ among the sub-proposals, but they complement one another. Collectively, the suite of projects is addressing an extensive set of problems created by the hydropower system, degraded habitat conditions, or non-native fish introductions.

The ISRP previously reviewed this project and struggled with the proposal's format and the breadth of work being proposed. Unfortunately, this proposal does not effectively address some of those major concerns.

**Responses requested, Main Proposal:**

To help us determine if the proposal meets scientific review criteria, the ISRP asks the proponents to address the following issues in their response:

1. Please provide a structured adaptive management decision framework that utilizes results from all four sub-projects to inform management decisions and future project priorities. There appears to be no overarching framework that specifies how the sub-projects are coordinated to achieve the goals articulated in the main proposal. In its current form, the proposal simply reads as four disconnected efforts by four individual entities that are bundled together under one cover. Please provide details regarding how the proponents of the four sub-projects collaborate and are integrated to address overall management goals and objectives, high-level biological and management uncertainties, and monitoring and evaluation priorities. Consider using spatially explicit visual presentations to illustrate major management and biological issues and individual

project goals and objectives for the entire area above Chief Joseph Dam.

2. Please provide a more detailed description of connections and relationships with other projects outside the scope of this project (i.e., 1997-004-00). The description could be provided for the overall project or individually for each sub-project. The ISRP finds it challenging to understand how these pieces fit together and with other projects in the basin. Additional tables or graphics to show linkages would be helpful. The ISRP suggests that relationships with other projects might be presented more effectively by the following topics rather than by sub-project.
  - a. Redband trout
    - i. Stream and river
    - ii. Lake
  - b. Predator suppression
  - c. Westslope cutthroat trout ecology
  - d. Lake limnology and ecology
  - e. Habitat assessment, protection, restoration
  - f. Data management
3. Please describe how sub-project goals and objectives are established and modified over time. How is it decided what each sub-project will seek to accomplish? This description could be provided for the overall project, but we recommend that it be included separately for each sub-project.
4. Please improve the goals and objectives of individual projects. Describe goals and objectives in terms of broader fish community and ecosystem scales and in similar formats. Please ensure that the objectives meet SMART criteria. Specific comments are provided for each of the individual sub-projects.

### **Comments not requiring an immediate response, Main Proposal**

#### **1. Problem statement**

The Intermountain Province Subbasin above Chief Joseph and Grand Coulee Dams includes the main channel of the Columbia River above Chief Joseph Dam, Lake Roosevelt (and its tributaries), the Spokane River, Pend Oreille River, Coeur d'Alene River, and Kootenai River. Given the large geographic area encompassed and the multi-species focus, this project has extensive significance to the Council's Fish and Wildlife Program and other management plans. Each sub-proposal appropriately highlighted its contributions to the Fish and Wildlife Program, Subbasin Plans, Recovery Plans, Tribal and State Management Plans and guiding documents. However, the linkages to the various plans are hard to follow -- trying to keep track of and understand the relevance of the 27 objectives listed on p.11 took considerable time.

## **2. Progress to date**

See comments on the individual sub-proposals.

## **3. Goals and objectives**

The stated goal of the project is “to coordinate with regional co-managers to facilitate decisions related to adaptive management for the restoration, conservation, and preservation of resident fish species.” This statement does not appear to be accurate. The project is much broader than simply a coordination piece because it involves considerable data collection and sampling.

## **4-7. Methods; Project evaluation and adjustment process; Potential confounding factors; Timeline**

See comments on individual sub-proposals.

## **8. Relationships to other projects**

For the main proposal and the four sub-proposals, see item 2 in the list of responses requested above.

## **9. Response to past Council recommendations and ISRP reviews**

For the main proposal and the four sub-proposals see Overall Comments, Main Proposal above.

## **Kalispel Tribes Sub-Project**

### **1. Problem Statement**

#### **Response Requested**

KTI-1. Please provide an explicit problem statement for westslope cutthroat trout that explains what work is needed, the purpose of the work, and why it is needed in the lower Priest River. As best as we could determine, this sub-project primarily focuses on (1) monitoring northern pike suppression in Lake Pend Oreille, and (2) monitoring westslope cutthroat trout abundance and life history in the Lower Priest River. While the problem being addressed is obvious for northern pike, it is not clear for westslope cutthroat trout. For example, why is westslope cutthroat trout work focused in the lower Priest River? The Goals and Objectives section states “The lower Priest River has been identified as a priority data gap by the Kalispel Tribe and Idaho Department of Fish and Game.” Why is this area important and for what purpose? Is the intent

to conserve this species, or to develop and manage subsistence and recreational fisheries for the species, or some combination of both? Just knowing less about a place does not automatically justify an extensive sampling program there.

## **2. Progress to Date**

### Comments not requiring an immediate response

The ISRP compliments KNRD on achieving significant progress in the past including lake trout suppression, assessment of lake trout population dynamics in Priest and Upper Priest Lakes, evaluation of bull trout and lake trout movements, assessment of northern pike suppression efforts, and westslope cutthroat trout genetics and life history characterization. Objectives for lake trout suppression appear to have been met for Priest and Upper Priest lakes. The ISRP is uncertain as to whether suppression of this species is or will be an ongoing activity (and if so, by whom). What action will be taken if lake trout abundance starts to rebound?

The KNRD reported progress on using the Spring Pike Index Netting (SPIN) as a monitoring approach to northern pike suppression. Per previous ISRP review recommendations, the proponents indicate that they contracted biometricians to assist with the design to improve SPIN sensitivity – such guidance will greatly help to refine this monitoring tool. They report that the Northern Pike Suppression Project (2007-149-00) is achieving suppression targets. We understand that there would be some 200 nets used. Does this large effort pose any concerns for by-catch, which will require ongoing assessment and reporting?

## **3. Goals and Objectives**

### Responses Requested

KTI-2. Please revise objectives 2A, 2B, and 2C. The measurable criteria for these objectives should include a defined level of statistical confidence in the abundance estimates along with a more specific geographic scope. The value of 25% trap efficiency is not a sufficient metric. Similarly, objective 2C should define the desired level of statistical confidence in juvenile to adult return rates of westslope cutthroat trout.

KTI-3. Please clarify the description of goal 3 and objective 3A. The current description is confusing regarding the roles of this and other sub-projects in informing management decisions about northern pike suppression monitoring.

## 4. Methods

### Responses Requested

KTI-4. Please provide brief descriptions of sampling designs and subsequent analytical approaches. Current field sampling techniques are described adequately, but the proponents should reexamine their methods after revising the goals and objectives.

KTI-5. The ISRP has several concerns about the estimates of juvenile and adult abundance of adult westslope cutthroat trout that are obtained from inclined plane traps. We appreciate the detailed formulae provided, but request the proponents to:

- a. Provide more details on how the mark-recapture estimate of abundance is calculated. For example, how often are mark-recapture estimates generated and how are flow and trap efficiency being considered in the estimation procedures? Trap efficiency is not necessarily something that can be managed on a day-to-day basis. The implication that estimates will only be made at >25% efficiency is confusing. What happens if efficiency declines below 25%?
- b. Provide confidence intervals (CI) for the trap estimates. CI for fish abundance estimate from trapping throughout the upper Columbia are typically quite large when using mark-recapture estimators. These large CI suggest that the estimates are imprecise. The ISRP recommends that other estimators be explored to ascertain if CI can be improved. A flow-based estimator is often used in downstream migrant trapping situations whereby a trap efficiency-flow relationship is calculated and applied to estimate daily numbers and CI.
- c. Please clarify whether downstream migrating adult westslope cutthroat trout are using the “gap” left in the inclined plane trap for upstream migrating adults.

KTI-6. Regarding the Pend Oreille Northern Pike SPIN Sampling, would it be possible to shift northern pike monitoring to a biennial schedule to reduce bycatch?

KTI-7. Please provide more detail on the Box Canyon Reservoir standardized warm water fish surveys that are conducted jointly by WDFW and KNRD staff. What are these surveys and which project supports them? What is the protocol and what are the questions being asked? How is the survey conducted?

## 5. Project Evaluation and Adjustment Process

The proponents have done an excellent job describing the approach used to modify operations to better achieve objectives. In addition, the co-manager process used for adaptive management decisions seems to be working well and is a strength of the project.

### Response Requested

KTI-8. Please clarify the major sources of mortality for native westslope cutthroat trout populations and discuss how these sources could be managed. The proponents note that to enhance native westslope cutthroat trout populations, all sources of mortality need to be identified and addressed. The ISRP believes that this may be difficult to achieve and suggests that the proponents strive to understand and manage the major sources of mortality. Two significant sources of westslope cutthroat trout mortality were identified by the proponents in the Pend Oreille watershed: (1) high entrainment rates at Albeni Falls Dam (and no upstream passage, Andersen 2016), and (2) high mortality associated with elevated Priest River water temperatures (Andersen, in prep). The entrainment of fish at Albeni Falls Dam is not necessarily a source of mortality but is clearly a loss to the system upstream of the dam. We could not find documentation of high mortality rates of westslope cutthroat trout in the Priest River due to water temperatures. Please provide the Anderson (in prep) reference even in draft form to help us better understand this issue.

### **6. Potential confounding factors**

#### Comments not requiring an immediate response

The ISRP appreciates the proponents' assessment of the effects of confounding factors, especially flow. Several other potential confounding factors for the proponents to consider include continued effects of non-native species predation, wildfires, non-native species competition (brook trout), and land use effects throughout the basin. These have the potential to significantly affect study plans and results.

### **7. Timeline**

#### Response Requested

KTI-9. Please re-develop the timelines once the goals, objectives, and methods have been re-examined and revised.

### **Spokane Tribe of Indians Sub-Project**

#### **1. Problem Statement**

##### Response Requested

STI-1. Please provide an explicit problem statement for this work. The stated goal of this sub-project is to evaluate redband trout populations and habitat parameters that may limit populations in tributaries to Lake Roosevelt and the Spokane River. In particular, provide a rationale to why certain streams were selected for study (and not others), and how the

information will be used to inform management decisions and actions. Is the purpose to inform conservation actions or for developing harvest of redband trout, or some combination of the two? Such a well-defined problem statement can help provide guidance for what work is to be conducted (and why) into the future.

## **2. Progress to date**

### Comments not requiring an immediate response

The ISRP compliments the proponents on completing extensive redband trout assessments in tributaries of Lake Roosevelt. The proponents conclude that redband trout populations are low or declining in tributaries to Lake Roosevelt based on multiple stock assessments (Flanagan and Crossley 2016; Flanagan and Crossley 2018). How was it determined that population abundance levels are low relative to target or historical levels? Some populations may simply be low because of natural characteristics of the systems they use (e.g., poor spawning gravel, rearing habitat or flow).

## **3. Goals and Objectives**

### Response Requested

STI-2. Please revise the two objectives to meet SMART criteria. What specific aspects of redband trout life history, abundance, productivity, and distribution will be measured and assessed? Similarly, what specific metrics will be measured and assessed to quantify habitat quantity, quality and limiting factors? The overall goal is well stated and appropriate.

## **4. Methods**

### Response Requested

STI-3. Please provide complete descriptions of the methods to be used. Two protocols cited in MonitoringResources.org are unpublished. Other methods cited in MonitoringResources.org appear to be outdated or lack details on statistical sample designs and data analysis. For example, how will the habitat survey be implemented in Chamokane Creek? What parameters will be collected and where, i.e., what is the distribution of sampling sites throughout the watershed? What is the sampling frequency? How will the data be analyzed and assessed to reveal limiting factors?

## **5. Project Evaluation and Adjustment Process**

### Response Requested

STI-4. Please provide a more complete description of the project evaluation and adjustment process. For example, how often are project assessments and adjustments made? Is there a master experimental design that is being followed?

## **6. Potential confounding factors**

No comments.

## **7. Timeline**

### Response Requested

STI-5. Please re-develop the timelines once the goals, objectives, and methods have been re-examined and revised.

## **Washington Department of Fish and Wildlife Sub-project**

### **1. Problem Statement**

No comments.

### **2. Progress to date**

#### Response Requested

WDFW-1. Please clarify: (1) what has been learned? (2) what additional sampling is needed? and (3) what are the most appropriate methods to use? The ISRP appreciates the brief summary of work in Big Sheep and Onion creeks but we note that the WDFW has been conducting redband trout stock assessment work at Big Sheep and Onion creeks since 2011 and 2014, respectively. Multiple methodologies have been implemented over different time intervals in both streams to obtain stock assessment information about the two populations. Including a concise summary of past work in these two creeks in the Progress to Date section would facilitate a thorough evaluation of how work is to be conducted.

### **3. Goals and Objectives**

#### Response Requested

WDFW-2. Please propose a plan to improve coordination among projects that collect genetic data on redband trout. This proposal includes three objectives dealing with collection and analysis of genetic data, yet it is only one of many in the upper Columbia concerned with genetic data on redband trout (e.g., see 2008-109-00). The ISRP strongly recommends that

proponents of these projects collaborate to develop a master plan for collecting, analyzing, and interpreting accumulated genetics data on redband trout. The master plan should identify which streams are being sampled and why, required sample sizes, the implications of changing from microsatellites to SNPs, and which labs will do the genetics analysis. (We assume analysis will be done at WDFW's Molecular Genetics Laboratory, but please confirm.) Deciding on a standard or complementary set of markers (as was done with allozymes, mtDNA, and microsatellites in the past) is an important component of any genetic database for the species. We strongly recommend that this step be completed before additional genetics data are collected. On a longer time scale (2 years), the ISRP recommends that findings from genetic data be synthesized to address questions about the adequacy of the genetics data, which populations are highest priority to analyze, how life history traits relate to genetics data, how genetics data can be used to inform management and conservation, and how much annual variation exists within individual populations.

WDFW-3. Please explain why Big Sheep and Onion creeks are a priority for such intensive work in the Lake Roosevelt and upper Columbia River Stock Assessment, why additional data are needed, and what approaches are optimal to achieve the different objectives. Material in the Progress to Date section shows that considerable data already exists on these two systems but that continual changes in methods makes the results of this work hard to evaluate, interpret, and identify implications for future study.

WDFW-4. Please provide a rationale for sampling redband trout in the Upper Kettle River at this time. The ISRP was unable to find any rationale or justification for this work, other than that it has not been sampled in the past.

WDFW-5. Please revise the goal for the Upper Spokane River redband trout stock assessment work; it is basically the same as Objective 3. The ISRP recommends that the goal be restated to clarify a broader, higher-level outcome to be attained upon completion of Objective 3.

WDFW-6. Please provide the evidence that supports the premise of Objective 3 that predation by juvenile bass is affecting redband trout recruitment (e.g., see Fritts and Pearson 2006). Is there evidence of spatial and temporal overlap between these two species within the study area? For example, are bass penetrating into juvenile trout rearing areas, and thus, possibly preying on these fish? How will the effects of other factors on trout recruitment relationships such as density dependence, other predator species, and environmental conditions be considered and evaluated to assess the relative importance of smallmouth bass? The ISRP is concerned that this effort may have a low probability of producing benefits and thus, may not be justified.

Anthony L. Fritts & Todd N. Pearsons (2006) Effects of Predation by Nonnative Smallmouth Bass on Native Salmonid Prey: The Role of Predator and Prey Size, Transactions of the American Fisheries Society, 135:4, 853-860, DOI: 10.1577/T05-014.1

#### **4. Methods**

Organizing the methods by objective was very helpful. The methods were extensive and generally complete for field sampling activities, except those used for the habitat assessment.

#### Response Requested

WDFW-7. Please provide more detail about the methods that are not yet published. The ISRP was hampered in our ability to review the methods because most (about two-thirds) of the MonitoringResources.org citations are unpublished or in draft stage. Enhanced descriptions of the statistical basis for the sample designs and analysis would also facilitate our review of the proposed work.

WDFW-8. Please clarify the statement “PIT tagging along with differential fin clipping will be used at different spatial scales to evaluate movement and site fidelity.”

WDFW-9. Please provide additional details on how habitat assessments will be conducted, including what sites will be selected, what parameters will be collected, and how data will be analyzed and interpreted (Objective B1).

#### **5. Project Evaluation and Adjustment Process**

The ISRP commends the proponents for providing concise descriptions of how methodologies are updated and adapted to meet sampling challenges, and for including a brief description of the future use of data in adaptive management decision processes.

#### **6. Potential Confounding Factors**

Many confounding factors are identified. The proponents appear to have dealt effectively with these factors in the past, and their plans appear adequate to address future challenges.

#### **7. Timeline**

#### Response Requested

WDFW-12. Please re-develop the timelines once the goals, objectives, and methods have been re-examined and revised.

## **Confederated Colville Tribes Sub-Project**

### **1. Problem Statement**

See Overall Comments, Main Proposal

### **2. Progress to Date**

#### Response Requested

CCT-1. Please clarify what data are presently included in the database, what data will be included in the future, and if and how these data will be integrated with other (non-CCT) data sets. The proposal would be improved by adding a table showing data fields in the database, data expected to be included, associated meta-data, collecting entity, and timelines (i.e., by 2025? as the proponents suggested in their presentation).

### **3. Goals and Objectives**

#### Response Requested

CCT-2. Please modify or expand the objectives to better align with the goal of the project. The goal focuses on coordination and facilitation of management decision making whereas the current objectives address data compilation and database development.

CCT-3. For Objective 1, please clarify how much of the historical data will be incorporated each year and indicate when this task will be completed. This work requires meticulous organization, data entry, QA/QC, and testing which may take time depending on existing time commitments of personnel. Even so, some estimate of a proposed completion schedule for different data sets should be included.

CCT-4. For Objective 2, please clarify which data will be included in the database. Is the database limited to just CCT data as implied in the stated objective "Coordinate with CCT project managers to compile and enter current habitat and fisheries data collected from lakes, streams, and reservoirs into computerized database for future preservation."

### **4. Methods**

#### Response Requested

CCT-5. Please provide more detail about the methods that will be used to achieve the objectives of this sub-proposal. In addition, please clarify the responsibilities of this sub-project in relation to the other sub-projects. Other projects are described as "responsible projects" for data QA/QC and development-management of the database, but the ISRP is uncertain which sub-projects and which data are being referred to.

## 5. Project Evaluation and Adjustment Process

The process for setting priorities for data entry and database development were adequately described, and there is a good flow chart.

## 6. Potential Confounding Factors

No comments.

## 7. Timeline

### Response Requested

CCT-6. Please provide a revised timeline that shows which data are being added to the database during different phases of the project.

## 199500100 - Kalispel Tribe Resident Fish Program

- Box: [Original proposal](#) and [Response and revised proposal](#)

**Proponent:** Kalispel Tribe

**Final recommendation:** Meets scientific review criteria

### **Final comment:**

The proponents' responses to the ISRP's request for additional information and perspective for the proposed project work are extensive and informative. The ISRP appreciates that the proponent revised the proposal to include responses to critical issues raised by the review, including the following:

1) The ISRP requested clarification on how this project coordinates with other plans and efforts in the basin with an extensive group of collaborators. The response provides some basic history of the coordination and emphasizes the importance of continuity in collaboration among agencies and personnel responsible for developing and implementing the plans. The response provides examples of how this collaboration works, such as how one group responsible for prioritizing restoration actions helped identify high priority non-native suppression projects for other funding opportunities. Importantly, the response includes an established and agreed-upon list of priority watersheds. It further identifies how those priorities were based upon and align with higher-level planning efforts. Notably, the agencies meet monthly to coordinate actions, which facilitates a highly transparent process. It was noted that this project is one part of a much larger watershed restoration effort.

2) In response to the ISRP's request for information addressing how the watershed assessments will be conducted, the proponent updated the Objectives to identify which watersheds would be prioritized for assessment through 2025. Moreover, the proponent provides information on the strategy and protocol to be used. The proponent provides a reference and description of processes, including a table that indicates the objective will be primarily a large GIS analysis. The proponent describe a prioritization approach to be implemented from these assessments, including key screening metrics (e.g., addresses process impairments, cultural value, cost, certainty of project success, design and permitting difficulty, and others). The fencing maintenance is described as an ongoing annual activity that requires surveillance and minimal effort and cost for an important benefit. Additionally, the proponent indicate that it will convene an advisory group to assist with the formal prioritization process. Altogether, this approach appears comprehensive, and adequately addresses the ISRP's concern.

3) The ISRP requested the proponent to articulate which of the watershed features it will target to promote resiliency of the habitat to natural and human caused disturbances. In response, the proponent adequately address the request and will focus on processes and identifying specific targets aimed at increasing cold water refuge availability, spatial heterogeneity, and connectivity.

4) The ISRP requested some additional clarity on the Objectives for activities in Lower Harvey Creek. In response, the proponent indicate that this element of the project was eliminated from this proposal and will be funded by another agency. Although this effort will be funded with other funds, it does not eliminate the need for additional clarity and sound science for these objectives.

5) The ISRP requested additional design details for establishing the cold-water refuges. In response, the proponent provided an engineering memo from Northwest Hydraulic Consultants (NHC). It also provides a detailed response on this same topic for the proponent's project 201101800. Altogether, these responses adequately address the ISRP's questions about the technical details of the refuge designs (but, see recommended future considerations below).

6) The proponent revised the proposal to include a monitoring element to chart response and evaluate progress of the rehabilitation work.

7) The proponent provided an adequate response to the ISRP's request for information on an adaptive management framework, but several future considerations are recommended below.

8 & 9) The proponent's response to the ISRP's requests for clarity on the hatchery and fish ponds is mostly satisfactory. One question that emerged during the response loop was whether the hatchery in this proposal is the same as the one proposed by proponents in project 201101800? The ISRP is uncertain that there is a need for two facilities if these are two

separate hatcheries. Regardless, we recommend that the proponent develop, as soon as practical, a document describing production needs and how they are determined, which facilities will produce the fish, and who will pay for what.

10) The proponent's response adequately addresses the ISRP's concern, although basing the target for floodplain connectivity (25% of days) on a restored channel is not fully explained. There is considerable uncertainty whether using LiDAR flights is the most cost effective and reliable approach to detect reduction in sediment loads. Otherwise, the methods are detailed and seem appropriate.

The ISRP notes that the proponent revised the proposal to include many of its responses, thereby providing a useful and clear document for Council, BPA, and the public. The ISRP also offers a number of recommendations, however, for future consideration to improve the project and the clarity of future proposals. These include:

1) While the proponent indicates this project is part of a much larger watershed restoration effort, it was not clear whether a more formal framework or management plan exists to guide the proposed set of activities. This restoration likely addresses limiting factors identified within the Subbasin Plan or other existing frameworks. If so, the linkages should be identified. If not, we recommend the proponents to develop such a framework with its partners and document it in an annual report as soon as practical.

2) The proponent improved some of the Goals and Objectives, yet a few remain somewhat vague and are not SMART objectives. For example, Goal 3, Objective A-2. The proponent explains the hydrology implementation objective for Big Meadow but did not add detail on associated response objectives. For example, for Goal 3, Objective A-2, what does it mean to decrease the amount of sediment delivered downstream by 2025? Understanding of the current sediment loads may not be adequate for developing a valid target and whether such target is achievable. Moreover, if this restoration action is to be implemented as a collaborative objective, it may prove challenging to relate the proponents' part of the actions to a specific action and its expected outcome. Working with partners toward a consensus SMART objective with measurable benchmark will likely benefit the process and should be included in the Statement of Work.

3) While the Lower Harvey Creek Objective will be funded through other sources, the ISRP recommends that the proponent consider clarifying the objective, especially as it relates to the proposed actions in the watershed.

4) The monitoring associated with the coldwater refuge objectives need to be improved to evaluate success. Specifically, will success be based solely on temperature or will it include other attributes such as dissolved oxygen, other water chemistry parameters, juvenile bull trout

occupancy or survival, plankton availability, or others desired outcomes? Some of these outcomes are easy to measure, and others will require more extensive monitoring.

5) For the Goals and Objectives of the Kalispel Tribal Fish Hatchery and fishing pond, the ISRP recommends that outreach and education programming be structured such that it focuses on the ponds and triploid rainbow trout as recreational and subsistence fisheries rather than as a substitute for restoring native species (especially westslope cutthroat trout and bull trout) and their ecosystems. The proponent identifies the issues of planning, cost, and practicality as their rationale for suspension of the westslope cutthroat trout conservation production objective. If this objective is again adopted in the future, the ISRP recommends developing a restoration plan to conserve historical patterns and functions of meta-population diversity in extant populations of westslope cutthroat trout.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

This project has clearly completed a large number of tasks but is undergoing a major transition. Several outcomes raise questions about the vision and strategy for the program, as well as the level of technical support and review for the strategy. As a result, the proposal needs to include more information about the strategic scope of the project with emphasis on project management and processes for soliciting and responding to feedback. In short, the project needs a strong guiding strategy.

**Responses requested:**

To help us determine if the proposal meets scientific review criteria, the ISRP asks the proponents to address the following issues in their response:

1. Please provide a draft framework for how this project will coordinate with broader subbasin goals through collaboration with other agencies and stakeholders (more detailed comments are provided under "Relationships to other projects" below).
2. Please describe the strategy for conducting watershed assessments on the 12 identified priority watersheds. Completing watershed assessments (Goal 1) is a logical precursor to conservation and restoration. However, it is not feasible to complete all 12 assessments at once, so a strategy for sequencing and staging the assessments is warranted. What protocol (e.g., EDT or other) will be followed? For the fence maintenance component in the LeClerc watershed, please indicate what proportion of the total requirement can be completed on an annual basis and over the project's time horizon.

3. Please describe the key features of watershed conditions that are desired for building resilience to climate change in the future (e.g., in 30-50 years). Climate change might be expected to alter fire regimes, hydrology, aquatic temperature profiles, and upland vegetation and biota (to name a few). How do the actions proposed really confront such changing conditions?
4. Please describe how the objectives and methods (including M&E) for Lower Harvey Creek relate to a desired biological response. During the presentation, the proponents suggested the proposed actions in Lower Harvey Creek are process-oriented (*sensu* Beechie et al.).
5. Please provide more detail on establishing cold-water refuges as follows:
  - a. More detail is needed on the two sites, including geomorphic and hydrologic characteristics, as well as the anticipated responses. For example, what is the temperature of water in the existing Duncan Springs pond? If the proponents deepen the pond and increase the surface area, will temperature be affected? Is the outlet channel intended only to deliver cold water to the area downstream of the installed berm or is it expected that fish will move up to the pond? Is such movement of fish an acceptable outcome? Will the eddy behind the berm fill with sediment? If so, how much cold-water habitat will it provide? How much water is being delivered by Indian Creek, and what temperature ranges and flows will the channel experience over time? How much does the river delta change its configuration over time?
  - b. Explanation and justification of the 20% target (Objectives A-1 and A-2) is needed. Please clarify what will be increased by 20% -- available habitat area or volume of water under some specific temperature during a particular month? This objective also implies that the current amount of cold-water refuge is known. If so, the supporting data and analyses should be summarized or cited. That is, the revised proposal should include any analysis (modeling or otherwise) to support the projected 20% augmentation of cold-water refuges and an explanation of how this objective was determined. Is a 20% increase achievable and likely to deliver a desired biological response?
  - c. The mechanisms for achieving the “persistence” of a cold-water refuge needs to be explained, particularly at Indian Creek. Is the goal simply to store cold water from Indian Creek behind the rock berms? How long will cold water be extended under a high-water year? A low water year? How will turbulence-driven mixing affect the persistence of the cold water? Is there a documented example of this approach for temperature augmentation that has yielded success on watersheds of similar size?

- d. Risks of the heavily engineered approach need to be identified and justified. For example, at Indian Creek, how is the boulder wall expected to perform at high flow in a geomorphic unit (i.e., river delta) characterized as highly dynamic? How is the morphology expected to change or be maintained over time? What will the impact of the rock berms be on sediment deposition within the engineered area? What is the geomorphic analogue of this type of structure, and how is a hardened structure, which looks like an artificial jetty, consistent with restoration of ecological processes? What is the purpose of the wood accumulations, since they are not expected to alter the thermal regime? Are they intended to provide habitat or lock the channel in its current configuration? Even if the 20% benchmark is achieved and bull trout occupy these refuges, are there risks from concentrating occupancy as opposed to increasing productivity?
6. Please provide a plan for long-term monitoring to chart the progress of riparian re-vegetation. Responses may take a number of years to be realized, both in a physical way for sediment trapping, and perhaps even longer for biological responses in the fish community. For example, the Big Meadow watershed and Lower Harvey Creek riparian zone each will likely take multiple years to re-generate as a functional component of the ecosystem. The proposal would be improved by including some M&E objectives with longer time intervals (e.g., at 1, 3, 5, 10 years). During their presentation, the proponents mentioned that work at Big Meadow is constrained by surrounding landowners. Please include a description of these constraints, how they affect the project now, and how they might affect the project's long-term success.
7. Please describe how an adaptive management framework will be developed. This project has clearly evolved over its duration -- in part to reflect changing values of the KTI and direction taken by KDNR to meet those values. Even so, the ISRP recommends that an adaptive management framework be developed and applied as an explicit part of evaluation and adjustment.
8. Regarding the hatchery retrofit to increase cold-water capacity, please explain why the westslope cutthroat trout production objective has been halted at 35% completion, while the triploid rainbow trout advanced to the 100% level. The proposal mentions potentially producing westslope cutthroat for restorative re-introduction. Does the decision not to proceed to full capacity for producing westslope cutthroat trout reflect a planning obstacle (i.e., Step Review) or conditions in the watershed not being ready for receiving westslope cutthroat trout? If undertaken beyond the 35% design, there likely will be a requirement to enter into Council's Three-Step review pathway. A number of issues associated with this kind of restoration have been raised elsewhere in the subbasin that would need to be addressed in the Master Plan, including choice and

number of local brood sources to maintain meta-population structure and function, potential impacts on the source population from “mining” broodstock, how to avoid loss of genetic variation and domestication through artificial propagation, and the potential for disease transmission outside the facility.

9. Please explain the connection between providing triploid rainbow trout and “Tribal goals to restore the health of indigenous Westslope Cutthroat Trout populations basin-wide.” While triploid trout are not expected to interbreed with westslope cutthroat trout – especially if maintained or released solely into closed fishing ponds – the triploid trout are not without impact or risk (predation or disease transmission, for example). Enhancement of a subsistence fishery with such a sterile species is consistent with the Council’s Fish and Wildlife Program, as long as it does not irreversibly impact native species (i.e., bull trout, westslope cutthroat trout, or other species) and is cost-effective with a measured rate of return to creel for the released fish.
10. Please clarify how outcomes will be achieved for biological objective 1. For example, regarding restoration of the hydroperiod, is a duration of 14 days typical for a natural wet meadow? What is the point of reference for declaring this objective achieved? Also, the objective of sediment trapping was deemed to have been partially achieved based on an apparently insignificant difference (judging by confidence limits) in relative bed stability, which is also not a reliable metric of sediment trapping. Perhaps it would be better to report that this objective is still being assessed.

### **Comments not requiring an immediate response**

#### **1. Problem statement**

The problem statement is largely well-organized and presented in regard to Council's Fish and Wildlife Plan and other regional plans. A number of conceptual advances have been included, such as the need for watershed improvement yielding resilience to climate change and watershed re-connection (including lateral connectivity) as critical functional improvements to the watershed.

The proponents recognize that former objectives for largemouth bass are inconsistent with conservation aims, especially in light of problems with invasive northern pike. The project now focuses more on native fish from both a conservation and subsistence perspective. The triploid trout objective is presented as less risky because it (1) relies on sterile triploids and (2) is restricted to closed receiving waters. If continued, a Master Plan may be required with a Three-Step Review (especially if the program and hatchery were to commence producing and releasing westslope cutthroat trout for restoration purposes).

## **2. Progress to date**

The ISRP appreciates the way the proponents report progress by tracking goals, actions, implementation objectives, biological objectives, and lessons learned. Their efforts have helped to make this project review straightforward.

The inclusion of both implementation and biological objectives reflects acknowledgment by the proponents that the objectives are expected to yield biological responses as long-term outcomes in addition to implementing physical modifications to the system.

The program has clearly completed a large number of tasks. However, there are several outcomes that raise questions about the vision and strategy for the program, as well as the level of technical support and review for the strategy. The program needs a strong guiding strategy. These issues are listed under responses requested above.

## **3. Goals and objectives**

Most of the goals and objectives have timelines and quantitative targets for measuring success. However, some goals need to be clarified.

Goal 1 is forward thinking, but the proposal should include more detail about what the proponents propose to do to ensure resilience to climate change. The proposal states "The watershed work showed that the most resilient and productive aquatic habitats in the subbasin are located within unconfined valley segments (valley width > 4x channel width) and at tributary confluences." How is this known without doing the Watershed Assessments that are being proposed as part of this project? Please provide an analysis or citation indicating how this was determined.

In Goal 1, Obj. A-2, what overarching framework is prioritization of conservation and restoration actions based on? Please provide a general protocol for how the watershed assessments will be conducted, what data will be collected, how actions are to be identified, how projects will be defined, and ultimately prioritized.

In Goal 2, the relationships between Sub-Objectives A1 and A2 are not transparent. Please provide a measurable benchmark for restoring connectivity or a condition that indicates it has been achieved.

In Goal 3, please include a quantitative description of cold-water refuges. What are the target temperature ranges, extents, and seasonal durations? How will 1 to 3 additional opportunities be identified and by what criteria? Additionally, the term "Compensate" implies improvement, but has no scale or measurable benchmark. Why was the confluence of Duncan Springs and Indian Creek selected for attention?

Regarding Goal 3, Obj. A-1, A-2, B-1, B-2, it is unclear how effective the engineered designs will be in creating persistent coldwater refuges or how consistent the designs are with broader goals for the system, which raises concerns regarding the feasibility of this objective.

In Goal 4, please consider how promoting sedimentation will affect the connectivity and long-term benefits of the project. Sediment storage is one sign of a functional floodplain, but the floodplain may eventually accumulate and sequester sediment to the point that it is no longer accessed by natural or designed annual floods. This sequence has occurred at a number of floodplain restoration sites.

In Goal 4, Obj. A, provide a time frame for each of the sub-objectives. It would be appropriate to include fish-related objectives in addition to the invertebrate monitoring. Are three samples per pool sufficient to track any trends? Between-sample variability will be lost by compositing samples -- is this intended? Reference to a standard method or consultation with a biostatistician would help to justify these choices.

For Goal 5, interim objectives A-1 and A-2, is there a target metric (e.g., demand per fisher or household) or other appropriate way of measuring the level of stocking? Identifying objectives as interim implies they may be adjusted based on monitoring information. Is there any risk of Indian Creek Tribal pond flooding or realistic chance fish will be translocated to other waters?

If the hatchery retrofit design is continued beyond a 35% design for the cutthroat trout program, proponents will be required to develop a Master Plan for hatchery operations, which will trigger an ISRP Three-Step Review of that plan. If this master-planning effort is proposed, it should be included as a specific objective. See the Council's guidance documents for Master Plan requirements.

As with other projects conducting conservation aquaculture and re-introduction of westslope cutthroat trout, we recommend a risk assessment on donor stocks from removing wild fish for brood production relative to protecting those fish *in situ* be included as an integral part of planning

#### **4. Methods**

The methods section can be improved as follows:

For Goal 1, the methods for prioritization should be described in more detail; simply citing Roni et al. (2018) is insufficient. Explicit prioritization criteria for decision-making should be developed, evaluated, and ultimately used.

For Goal A-1 and A-2, methods are described for assessing the outcome, but not for changing the outcome. What are the methods for augmenting and enhancing cold-water refuges or for increasing usage by and benefits for salmonids?

For Goal 3, method A-3 (incorrectly listed as A-2 on page 28), how will “anticipated cold water refuge persistence” be assessed? Will models be used for this, and if so, under what range of conditions?

For Goal 3, method B-1, please clarify the type of temperature augmentation structures that are envisioned, the mechanisms that would lead to persistent cold-water habitats, and the long-term benefits of the structures. The presentation and subsequent construction plans submitted by the proponents added some clarity, but also raised some questions (listed in the responses requested).

For Goal 4, Obj. A-1, HEC-RAS is not well suited for the proposed modeling of sediment trapping at large wood and beaver dam analogues. LiDAR mapping or other bathymetry surveys, though expensive, are likely to be more appropriate means of evaluating sediment storage.

For Goal 4, Obj A-2, it is not common for riffles and pools to occur in wet meadows due to their low slopes. How was Upper West Branch Priest River selected as the appropriate reference for the wet meadow channel?

For Goal 5, provide some additional description of the methods for Objectives B (surplus spring/summer Chinook salmon) & C (surplus sockeye salmon). Are these surplus fish return-to-gate adults or on-site holdovers?

## **5. Project evaluation and adjustment process**

The proposal does not provide a coherent framework for evaluating success in achieving individual goals and objectives even though several objectives involve monitoring. Monitoring should be driven by questions and hypotheses, but this design feature was not evident in the proposal.

Descriptions of specific analytical methods should be included, especially what parameters will be measured and how will they be analyzed and reported.

Several goals suggest that the proponents will solicit input or engage a group of stakeholders without indicating how that solicitation or engagement will occur, or how the program will evaluate and respond to the feedback that is provided. While input is often a very positive attribute of a program, reaching consensus on goals and approaches can be challenging. A more structured approach may be needed for advising the program. Does the program have a technical advisory committee that meets regularly? If not, it may greatly benefit from one.

For Goal 3, if the temperature and population protocols indicate that the quantitative benchmarks are not being met, what is the process for adjusting the objectives or activities?

## **6. Potential confounding factors**

The proposal lists a number of confounding factors and demonstrates a basic level of contingency thinking. While it is not necessary to consider every possible obstacle to program success, it is worthwhile for the proponents and collaborators in the subbasin to periodically conduct a SWOT analysis (Strengths/Weaknesses/Opportunities/Threats) – perhaps during annual coordination meetings.

Regarding Goal 2, Objective A, the proposal states "*Confounding factors include lower than expected flows that limit the amount of anticipated lateral floodplain connectivity...*" This suggests that more consideration of flow regimes under a changing climate forecast is needed.

The confounding factors for Goal 3, Objectives A – B pertain only to project monitoring. However, several confounding factors pertain to the success of the structures, as listed in responses requested. How will they be addressed?

A subheading is missing to indicate that the last two paragraphs in this section address Goal 5.

## **7. Timeline**

The Big Meadow Restoration is envisioned as a long-term project (through 2038). Some staging and sequencing of milestones are needed to sequence actions and drive future objectives. Specifically, certain foundational outcomes must be accomplished before fine-tuning objectives are undertaken.

## **8. Relationships to other projects**

The assemblage of projects underway in the Pend Oreille subbasin are varied and complex, and it is difficult for outside observers to comprehend the possible linkages among them. Consequently, an overarching framework for the subbasin is needed to indicate how the goals and objectives of this project relate to those of other projects in the subbasin (see item 1 in the list of responses requested). Such a framework might be gleaned from the Subbasin Plan, but this project and others in the subbasin have changed significantly since the Subbasin Plan was produced. For example, the watershed assessments in Goal 1 and the temperature refuge enhancement in Goal 3 appear to overlap with projects by other agencies in the subbasin. Detailing how objectives differ among projects, or might complement one another, will be important as the projects proceed. Ultimately, developing and accepting such a framework lies outside the scope and goals of any one project, but it is important to tie actions and outcomes to it.

## 9. Response to past Council recommendations and ISRP reviews

Funding for NEPA documents need to be completed if westslope cutthroat trout are to be reintroduced into Goose Creek.

The project and its components have evolved over time from the original focus on: (1) coordinating bull trout restoration; (2) managing trout habitat and nonnative trout in tributary systems; and, (3) enhancing largemouth bass, to a new focus on: (1) increasing climate change resilience; (2) producing off-channel rearing habitat in Harvey Creek; (3) compensating for temperature impairment in Subbasin rivers; (4) restoring Big Meadows; (5) providing subsistence to KTI members; and (6) providing education and outreach on fisheries issues. Some of this change in focus has resulted from previous ISRP comments and overall program performance. It would help future managers with the KTI and others in the subbasin to provide a description of the decision points that led to these changes.

## 10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)

These sections were adequate.

### 201101800 - Pend Oreille River Basin Initiative: Land Acquisitions, Watershed Restoration, Conservation Hatchery

- Box: [Original proposal](#) and [Response and revised proposal](#)

**Proponent:** Kalispel Tribe

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The ISRP appreciates the track record of project completion and the relationships with other agencies at the tribal, state, local, and federal levels along with private and NGOs. The response contributes additional clarity to the roles of each within the subbasin at addressing challenges to robust aquatic communities and ecosystem function. The Kalispel response generally addresses the broad ISRP concerns, without tackling some of the individual questions and comments and leaving some open questions around the program prioritization. Otherwise, objectives have generally been revised in the SMART framework. Details and justification of the thermal refuge projects were provided and seem reasonable, although the benefits for the Duncan Springs project do not appear to be large. Following the Hardiman et al. (2017) approach to developing a risk assessment for re-introduction of westslope cutthroat trout is a

reasonable step. Relationships to other projects have been clarified, except for the lack of clarity around the role of the Kalispel Tribe, and this project in particular, in the reintroduction of bull trout.

However, the ISRP notes that the proponents' clarified that hatchery construction and operation-related objectives will be funded by Seattle City Light. Consequently, the Council's Step Review process required for hatcheries by the Fish and Wildlife Program will not be mandatory. However, the ISRP still strongly recommends that the new production undergo a similar process. Given the substantial and potentially irreversible risks that can be associated with hatchery fish releases, a detailed analysis that includes but goes beyond a Hardiman et al. (2017)-type risk assessment is needed. Examples include development of Hatchery Genetic Management Plans to document breeding and rearing protocols and to evaluate impacts on natural broodstock sources. In addition, analysis is needed to document how the released hatchery-produced fish fit within the overall restoration program, to examine the unintended consequences of affecting resources outside the restoration area (e.g., straying, food web, etc.). Thus, while ISRP re-iterates that the proposed risk assessments is an essential and positive attribute of the project, the risk assessment alone does not go far enough in addressing the needs for designing and evaluating an artificial production program.

On a minor note, if a hatchery is not funded through this proposal, should "conservation hatchery" be included in the project title? Or, perhaps adding "assessment" would better describe the proposal.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

This project offers cost share to support and amplify other projects in the Pend Oreille River basin and has a record of success in completing both on-the-ground projects and studies that support planning and prioritization. Justification for this project relies heavily on its past performance as an indicator of what will be accomplished in future unforeseen circumstances and opportunities. More reporting of results, especially biological responses, will be beneficial before the next the proposal period begins (i.e., 2024 or 2025).

The ISRP finds it difficult to understand how the activities supported by this project will contribute to the recovery goals for westslope cutthroat trout and bull trout. The ISRP believes this proposal requires revision to include an orderly planning process for the prioritization of actions and assessment of outcomes.

## **Responses requested:**

To help us determine if the proposal meets scientific review criteria, the ISRP asks the proponents to address the following issues in their response.

1. Please revise the goals and objectives based on the prior feedback from the ISRP, to develop a coherent program for which success in producing measurable benefits can be measured (see comments under Goals and objectives below).
2. Please provide detailed descriptions of the methods for achieving each objective (see comments under Methods below).
3. Please clarify linkages to other projects, including how the methods and activities of one project help to meet the needs of another project.
4. Please describe how cost sharing actions by this project are prioritized and selected to ensure the greatest benefit for resident fish.

## **Comments not requiring an immediate response**

### **1. Problem statement**

The problem statement should describe the limitations (i.e., resource gaps aside from cost share) that are being addressed to support resident fish. What is the central problem that guides the objectives and prioritization?

The problem statement emphasizes the ability of this project to rapidly respond to emerging cost share opportunities for “larger scale” restoration projects, but it is not clear what larger scale refers to -- spatial scale or scale of benefits? Are some projects not considered because they are too small? If so, how is the threshold for scale determined?

For example, in 2014, two culverts were replaced under a “high priority cost share” project with USFS. However, the total expanded habitat area (0.5 miles in one case and 1.7 miles in the other) was not very high. Why were these projects selected? What made these projects high priority? Otherwise, this program appears to emphasize opportunistic restoration, which tends to produce only limited benefits.

The proposal includes four pages of text to show that the proposed work is consistent with subbasin plans but does not indicate how the plans would be used in selecting or prioritizing actions.

## **2. Progress to date**

This section lists the actions that have been completed by this project since 2013. Initially, most of the actions were culvert replacements. More recent work, which has expanded in scope, has included data collection (telemetry, bathymetry), some modeling and feasibility analysis for reducing peak temperatures in the river, telemetry analysis, and infrastructure improvements at the hatchery, parks, and a barn. This collection of actions is interesting, but it seems incoherent; at least, the ISRP does not understand the vision that guides the selection. Moreover, we do not understand how a number of the activities are consistent with the project's goal to identify and implement large-scale restoration projects. It is also difficult to understand what the project has paid for and what is cost shared.

## **3. Goals and objectives**

The objectives are very general and do not meet SMART criteria. There is no timeline for expected completion, so performance will be difficult to evaluate. In addition, the proposal often includes vague wording like "significant cost share," or "restore functions" and "increase complexity" that are not measurable. What does "significant" mean in the context of this project? How are changes in complexity to be measured? Some minor wordsmithing edits were made in response to early ISRP feedback, but the proponents did not appreciably reconsider the objectives, as was needed. Thus, the objectives retain the same deficiencies identified in the first review.

In addition, particularly given that the relationships to other projects is not clear, the ISRP questioned the appropriateness of listing objectives related to work that is expected to be funded by others, particularly in the absence of the overarching framework and linkages requested previously.

In Goal 1, what does it mean to "capitalize on cost share opportunities"? In addition, how are high priority watersheds identified? Is there a sequence or order in which watersheds will be addressed (i.e., immediately or as opportunities emerge)?

In Goal 2, are objectives B-1 and B-2 missing or is there a typo? What is the source of the population and propagation targets for Goal 2? Has a breeding (or translocation) plan been developed with population sources, effective number of breeders, and so on? Does the re-introduction fit with the specifics of the bull trout recovery plan? The planned risk assessment is strong and a too often overlooked feature of this Goal, but it alone will not direct the shape, scale, and length of time necessary for brood-source selection, development, identification of candidate re-introduction sites, and other uncertainties. What does it mean to assist in the

introduction of bull trout? Who will complete a risk assessment for bull trout and how does this project relate? Objective B is very specific and seems like it should be a result of the risk assessment. Why not do the risk assessment first and then figure out how to conduct the re-introduction of bull trout based on results of risk assessment? It is also important to recognize that bull trout are voracious predators, and therefore, the proponents should expect predation on westslope cutthroat trout. Will the possible effects of predation on westslope cutthroat trout be considered when determining where to re-introduce bull trout?

In Goals 3 and 4, how extensive are the coldwater refuges expected to be? How much or how many refuges are needed to be effective? Some expected dimensions either in size, number of individual refuges in a network, or persistence of thermal reduction would demonstrate the need and likelihood of achieving progress/success.

#### **4. Methods**

No methods are presented in this proposal. Instead, it is stated that the methods are conducted through the Kalispel Resident Fish program. However, it is not clear how the Resident Fish Program methods relate to this proposal since they are organized by the objectives for the Resident Fish Program, of which only a few are similar to those in this proposal.

Furthermore, it seems that there are additional methods needed for prioritization under this program, as previously discussed in an early review of the goals and objectives for this proposal.

Finally, no methods were provided for the risk assessment and master planning of the hatchery. Based on the objectives, it appears that some important components are missing (e.g., impact on the donor population, size of brood source to avoid founder effects). Also, it was unclear who was being assisted (i.e., partner identity) and who is responsible for what tasks. The ISRP recommends that the proponents use the guidance for the Council's Three Step Process for hatchery master planning and ensure consistency with recovery plans.

#### **5. Project evaluation and adjustment process**

The Project Evaluation and Adjustment Process is focused largely on implementation and physical/hydrological features. There is no process for project evaluation or adaptive management, despite it being a core value of the project. It is expected that (1) the objectives are written in such a way that outcomes are measurable, (2) data are used to evaluate the achievement of outcomes, and (3) data are used to assess where project processes (e.g., prioritization, implementation, assessment) need to be adjusted and improved. In other words, more detail is needed on how projects are selected for funding under this project, how progress

towards meeting biological outcomes is assessed, and how adjustments will be made to improve biological outcomes when monitoring and evaluation suggest the program is not as effective as it could or should be.

At a minimum, at some point toward the end of this Project's cycle in 2024 or 2025, it would be beneficial to evaluate the biological responses to at least some of the project's actions (especially for older accomplishments).

## **6. Potential confounding factors**

The ISRP expects proposals to identify how confounding factors may impact project success. This proposal does not explain how the confounding factors for this project (non-native species and climate change) are being considered or will be addressed, aside from saying that expanding cold-water habitats are useful in climate change. For example, the proposal identifies that non-native fish are a potential problem that are being addressed in related projects. If unaddressed, some of this project's objectives might not achieve a desired biological response for bull trout or westslope cutthroat trout. How can or should this project prioritize projects to minimize the likelihood that non-native predators will neutralize the benefits of this project? Alternatively, how might temperature or flow within those refuges change with shifts in hydrology and temperature regimes? Will they still provide expected benefits? Independent of future changes, how much cold water is currently available to be directed into refuges without altering thermal regimes at the sources?

## **7. Timeline**

More information is needed on other aspects of the proposal to evaluate the timeline.

## **8. Relationships to other projects**

Rather than just summarize related projects, this section should outline how the objectives and activities in other projects align with and support the objectives in this project, and how they work synergistically to share data and achieve common outcomes/benefits. This linkage is especially important for this project because it uses methods developed for the Resident Fish Program.

## **9. Response to past Council recommendations and ISRP reviews**

No previous ISRP reviews.

## 10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)

No comments.

### 201900500 - Lake Pend Oreille/Dworshak

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Idaho Department of Fish and Game (IDFG)

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The ISRP appreciated the detailed, focused, thoughtful, and data-driven responses to our questions and comments. Like the proposal, responses by the proponents are thorough and well written. It is a strong project with a record of scientific productivity, accomplishment, and leadership. With the addition of the new information provided in the responses and incorporation of the additional methods presented into the proposal, this proposal can serve as a high-quality example for future proposal and review processes.

We appreciate that the proponents directly address all our comments. We note that the proponents provide some detailed methods that we felt were lacking in their original proposal. For example, the methods used to calculate N and P additions in Lake Dworshak are described in detail in their response. The process uses monitoring data and annual environmental factors including precipitation, water volume, and spring temperatures to determine N and P inputs. Although the exact algorithm is not provided, it appears relevant information is being used to determine the input rates annually.

The ISRP appreciate that proponents provided the needed context for walleye suppression. The proponents state that a primary justification for walleye suppression is that the Lake Pend Oreille walleye population is doubling every three years and so presents an emerging risk to fish species important to subsistence and recreational fisheries. The ISRP requested an explanation for the collapse of *Mysis*, to which the proponents responded that they do not know the cause. The *Mysis* declines observed in other lakes suggest that the *Mysis* decline in Lake Pend Oreille may be due to a warming climate. It is an important strength of the program that they are conducting an annual monitoring program to better understand the population dynamics of *Mysis*.

The ISRP requested further details for the adaptive management plan dealing with the emerging issue of intraspecific competition among young kokanee. The proponents provide a

detailed response concerning how they propose to respond to this issue by adjusting hatchery kokanee releases; their response indicated a clear understanding of kokanee population dynamics and ecology.

Extensive and detailed information is provided to address concerns related to incomplete methods descriptions for biological and implementation objectives in the Lake Pend Oreille studies. Clear linkages between the monitoring questions methods/data with the biological and implementation objectives that they inform are provided. In addition, substantial detail is provided on the analytical approaches that will be used to assess biological and implementation objectives with quantitative desired outcomes.

Little information is provided in the original proposal on the by-catch and by-catch mortality of native fishes in the lake trout removal program. A comprehensive table is provided in the response that includes all annual by-catch of bull trout, westslope cutthroat trout, and rainbow trout along with bull trout mortality. This valuable information should be regularly included in annual reports and the proposal.

Density-dependent and intraspecific competition effects of hatchery kokanee on wild conspecifics need more thorough investigation. The proponents imply that the size and scale of the release program will be modified regularly in an adaptive management strategy based on monitoring results. The proponent state that they will “continue to monitor and adjust stocking goals as needed” to dampen the cyclical nature of abundances, as well as to safeguard a brood source in case of a future collapse. As with other hatchery production projects throughout the Columbia River Basin, the objective criteria and triggers for changes to the program need to be transparent to permit evaluation and scientific review.

Recommendations for improvement include:

**Updating the proposal:** The proposal would be improved scientifically and serve more effectively as a guiding document for the project, BPA, and future reviewers if the additional information, revised objectives, and methods are incorporated into a revised proposal. The ISRP recommends the proponents revise the proposal by including the information they provided in their response.

**Smallmouth Bass:** The ISRP strongly recommends that proponents design and implement a study of smallmouth bass predation in the Lake Pend Oreille ecosystem. The ISRP is concerned about the effects of smallmouth bass in Lake Pend Oreille, particularly the level of predation on several focal species (kokanee and bull trout). Proponents acknowledge that there is little known concerning piscivory by smallmouth bass in Lake Pend Oreille. Available literature throughout the United States indicates that introduced smallmouth bass potentially affect native fish species. In some systems, smallmouth bass suppression or control has been implemented to help improve population sizes of native species. Smallmouth bass also support

an important sport fishery in Lake Pend Oreille. If smallmouth bass were found to have significant impacts on some of the key species in Lake Pend Oreille, proponents argue that control or suppression efforts would be unlikely to occur, largely as a result of resistance from anglers. Regardless of the current potential for control or suppression, we believe the potential effects of smallmouth bass on species such as kokanee and bull trout are just as important to understand as they are for northern pike, lake trout, and walleye. We recommend investigating the diet and spatial and temporal distribution of smallmouth bass to understand the potential level of predation pressure by smallmouth bass relative to lake trout, northern pike, and walleye. After completing a diet and distribution study, the co-managers can then determine whether changes in management are needed or feasible. Results of the smallmouth bass research should be included in annual reports.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

We commend the IDFG for skillfully combining two projects (1994-047-00 and 2007-003-00) into one well-organized project proposal that addresses impacts of Albeni Falls and Dworshak dams and describes the primary environmental and fishery problems associated with Lake Pend Oreille (LPO) and Dworshak impoundments. Despite the lack of detail on a few minor points, the proposal outlines a project that has had success with supporting resident fish and is expected to continue with that trajectory in this next phase.

The proposal has many strong elements and could become an exemplary proposal with a few improvements. Strengths of the project include the strong linkage of objectives to actions and data, the use of data to revise management, and publication of methods and results in MonitoringResources.org and in peer-reviewed publications. We commend the proponent's strong publication record of both peer reviewed and non-peer reviewed products.

**Responses requested:**

To help us determine if the proposal meets scientific review criteria, the ISRP asks the proponents to address the following issues in their response:

Lake Pend Oreille

1. Please provide additional context for the walleye removal/suppression program. Three of the 10 research questions presented under the section on Goals and Objectives dealt with walleye. This suggests that walleye suppression is now (or is becoming) a focus of the program. What is the background or history of this part of the project and what are management goals, targets, and plans for the next 5 years?

2. Please provide an explanation or hypotheses for why the *Mysis* population collapsed about 2012. This “event” appears to have amplified the rebound of kokanee much more than expected if just lake trout had been suppressed. Is there any monitoring of lake limnology that would help understand this phenomenon? For example, since 2011 was a dry year and *Mysis* are vertical migration feeders, how might light and temperature during lower flows play a role? Were there changes in the abundance of other lake species (predators or prey of *Mysis*) that might have occurred at the time of the *Mysis* decline?
3. The ISRP would like details on the potential adaptive management response to the emerging issue of intraspecific competition among young kokanee (i.e., what alterations will occur in the hatchery program). Since the *Mysis* collapse, intraspecific competition is limiting kokanee production. This suggests, as noted by the proponents, that releases of hatchery kokanee need to be modified to ascertain whether negative effects of density dependence can be mitigated. Please indicate what action(s) might be taken to mitigate density dependent effects.
4. Lake Trout Suppression. The proponents state that lake trout suppression will probably continue for at least another 7 years. The ISRP is uneasy that lake trout removals, as presented in Table 1, seem to have leveled off over the last 4 or 5 years. Does the leveling off reflect changes in lake trout abundance or changes in the removal methods or effort?
5. Please provide references to full reporting of all removals of key non-target species such as bull trout and rainbow trout each year since the inception of the study. The ISRP is concerned about “by catch” mortality of non-target species, notably bull trout, due to the cumulative effects of suppression efforts, fishing, and other sampling efforts. The reporting of removals should include estimates of delayed mortality (i.e., post release mortality) from gill nets and angling. In addition, we recommend adding a sub-objective to Objective 3 to test for delayed mortality from gears such as gill nets. For example, some “control” fish could be held in net pens for several weeks after initial capture to assess the level of delayed mortality.
6. The ISRP would appreciate clarification on the following statement: "*Recent genetic assignments of incidental bull trout mortalities from the predator suppression netting operations demonstrate that no tributary stocks have been captured at disproportionately high rates.*" Please explain the basis for this statement, and the comparison implicit in “disproportionately.”

7. The ISRP is uncertain about whether the shoreline substrate addition was effective. Please clarify what these results indicated and future plans for doing additional substrate additions, if any.
8. The ISRP requests that the methods section be expanded to address the incomplete (or lacking) methods descriptions for biological and implementation objectives. It is clear that results from the monitoring questions will help inform assessment of the biological and implementation objectives. In many cases they do not fully encompass the methods and analyses needed to achieve higher-level objectives. Many of the biological and implementation objectives have quantitative desired outcomes that require statistically based analyses, but the requisite statistical methods are lacking.
9. Please provide some justification for the seemingly conflicting goals related to smallmouth bass, rainbow trout, kokanee, and bull trout. The proponents and co-managers apparently want to maintain a smallmouth bass sport fishery in Lake Pend Oreille and think this goal is compatible with other objectives for kokanee and bull trout. Similarly, there is an objective to maintain rainbow trout in Dworshak Reservoir, which may conflict with kokanee and bull trout. It seems improbable that fisheries for these species and conservation of bull trout are all compatible. For example, has a diet analysis indicated that bass do not exploit target species or their forage base?
10. Are any of the fluctuations in the kokanee population in Lake Pend Oreille being driven by fluctuations in hatchery release numbers, size of fish, or timing of release? Can hatchery and wild fish be identified and categorized in surveys, analyses, and interpretation?
11. Please describe the rainbow trout studies in more detail. What are the seasonal habitat needs and primary sources of recruitment for rainbow trout? What is the age at spawning and frequency of repeat spawning for rainbow trout? While the methods here are appropriate, it is not at all clear why this study is necessary. How will the results facilitate mitigation efforts? Please provide a justification for this work in the Goals and Objectives section.

#### Lake Dworshak

12. The ISRP requests that the methods section address incomplete (or missing) descriptions for biological and implementation objectives. The biological and implementation objectives have quantitative desired outcomes that require statistically based analytical approaches. Many of the requisite statistical methods are lacking.
13. Please provide details on the strategy for adjusting fertilization rates in Lake Dworshak. Is there a strategy on how N and P additions are adjusted? As far as we can determine,

adjustments in N and P seem to be more trial and error rather than based on observed data and targets from the food web. Is this the case?

### **Comments not requiring an immediate response**

#### **1. Problem statement**

The problem statement is well defined and describes the project's significance to the Council's Fish and Wildlife Program, particularly for bull trout. The discussion of relationships to the various plans (e.g., bull trout) is complete and easy to follow. The proposal demonstrates clear justification for the work completed to date and for future work proposed in Lake Pend Oreille and Dworshak Reservoir.

On the other hand, the proposal provides little background or context on why the Lake Pend Oreille project seems to be shifting towards walleye suppression as a focus (3 of the 10 research questions dealt with walleye (see item 1 in the list of responses requested). What are the management goals, targets, and plans for the next 5 years?

#### **2. Progress to date**

This project has made substantial progress towards its objectives, which is documented with monitoring data and published in the peer-reviewed literature. Furthermore, this section illustrates how the proponents have used the monitoring data to refine their sampling and treatment strategies. The section also summarizes key successes and challenges, as well as lessons learned. The lessons learned are especially useful and an important component of the adaptive management process.

The ISRP has a few detailed questions regarding the fertilization work. What species eat the smaller *Daphnia*? Small *Daphnia* must grow into bigger, consumable *Daphnia* before they are large enough to be consumed by kokanee. When is consumption by kokanee occurring relative to reproduction of *Daphnia*? Under Objective 2 page 20, please provide confidence intervals or error bars on the data for variables such as kokanee abundance to demonstrate that differences between 2.7 and 2.4 million are measurable.

#### **3. Goals and objectives**

The project has 9 overarching goals, 19 biological objectives, 22 implementation objectives, and 45 monitoring questions. The goals are well described with desired outcomes and benefits, and the objectives meet SMART criteria and serve as steps in achieving the associated goals. The objectives relate directly to critical management issues and address overarching conservation problems in Pend Oreille Lake and Dworshak Reservoir. The proposal includes strong linkages between goals, biological and implementation objectives, and monitoring questions expressed

as hypotheses. Presentation of goals and objectives in a table format is useful. Overall, this section is well structured and demonstrates thoughtful consideration of what responses need to be examined and quantified.

#### **4. Methods**

Methods have been published on [MonitoringResources.org](http://MonitoringResources.org) and seem generally appropriate. Comprehensive descriptions of methods are provided for each monitoring question. In addition, 17 published monitoring resources protocols are cited in the monitoring methods. We note that the monitoring resources citation for Lake Pend Oreille Creel Survey is incorrect as it applies to kokanee surveys, not angler surveys.

The project's sampling strategies also appear to be statistically valid. The methods descriptions include statistical designs for sampling, data collection and data analysis. The proponents indicate on page 43 that they are only sampling phytoplankton in the epilimnion. Does the photic zone align with the epilimnion here? Do they ever see the phytoplankton in the metalimnion?

No methods are presented for any of the biological and implementation objectives. Results from the monitoring questions will help to assess progress towards achieving some of the biological and implementation objectives. However, additional methods and analyses will be needed to assess progress towards achieving some of the higher-level objectives.

#### **5. Project evaluation and adjustment process**

For both the Lake Pend Oreille and Dworshak components, the emphasis is on results of monitoring efforts and how they will influence management activities. This is a strong basis for evaluation of specific actions and progress towards biological objectives. However, the process for evaluating the project more broadly (validity of objectives, partnerships, process, etc.) was not entirely clear. For example, it appears that a broader evaluation of this project is based on the IDFG Management Plan, which was not provided and will not be evaluated until the end of this proposal period. For Dworshak, the proponents will meet with Idaho Department of Environmental Quality (IDEQ) and project partners annually to review results, which, given the extensive monitoring data, is likely adequate for assessing progress.

The Lake Pend Oreille Project has demonstrated effective monitoring and evaluation and adaptive management. The proponents did an excellent job describing potential future adaptive management decisions that will be supported by information provided from the monitoring and evaluation efforts. The process that was described for changing major elements of the Pend Oreille IDFG Fisheries Management Plan and this project for future years (2025-2029) appears well designed and functional. Similarly, the Dworshak Reservoir Project has shown consistent and effective adaptive management. Evaluation information has been used to

refine the nutrient enrichment approach and guide future actions and conclusions. Annual meetings conducted with partners and environmental regulators are effective for sharing information and developing future plans for application and evaluation of nutrient supplementation.

## **6. Potential confounding factors**

The list of confounding factors includes only ecological components (e.g., invasive predators, *Mysis* abundance rebound). Are there other confounding factors that might impact project viability? For example, since the project relies heavily on Avista for some of the netting work, monitoring data, and habitat restoration, is it worthwhile to identify how the project may respond if some of these critical relationships fall apart? One confounding factor that should be considered is the potential increase in abundance of *Mysis*. If *Mysis* abundance returns to pre-collapse levels, then kokanee production will likely be impacted. In addition, under current conditions the combined abundance of apex predators could reach levels that impact the abundance of kokanee. There are also policy-oriented confounding factors, such as management changes and changes in ESA status, that could also be considered as confounding factors.

The proponents consider future potential climate change impacts to management and evaluation of Dworshak Reservoir. Hydrograph shifts and increasing reservoir temperatures resulting from climate change were identified as potential significant factors that could influence nutrient input timing, effectiveness of nutrient inputs, and plankton community composition. The continued monitoring proposed will provide information needed to characterize these potential climate effects and inform strategies to maintain project effectiveness.

## **7. Timeline**

A comprehensive monthly timeline for the projects proposed five-year time period is provided for all of the major management and monitoring activities. The timeline could be improved by characterizing timelines for other major aspects of the project that are not sampling related, such as report and manuscript preparation, collaboration, data sharing and participation in adaptive management processes.

## **8. Relationships to other projects**

The proponents have demonstrated close coordination and cooperation with other BPA projects including the Kalispel Tribe's bull trout and Albeni Falls Dam projects. However, it was not clear if or how this project interacts with the other Lake Pend Oreille projects. The proposal simply states that they are dependent upon each other. Are data shared? Do regular

coordination meetings occur? Also, given the number of projects in the Pend Oreille system, it would have been helpful to have project numbers (or titles) listed.

#### **9. Response to past Council recommendations and ISRP reviews**

Past ISRP reviews of the two projects combined in this proposal have generally been favorable (although some additional information was requested). The proponents generally responded to previous reviews in a thoughtful way and with data (e.g., creel surveys). The project has effectively responded to Council and ISRP recommendations, including publishing a summary of knowledge gained from the Lake Pend Oreille Project and two retrospective manuscripts.

More issues have been raised with the Dworshak Reservoir Project in past reviews. The project has made a number of modifications in response to ISRP concerns and requests. The methods used to analyze factors influencing kokanee growth were improved. Creel surveys have been added to improve harvest monitoring data.

#### **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No additional comments.

## E. Coeur d'Alene

### 199004400 - Coeur d'Alene Reservation Fisheries Habitat

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Coeur d'Alene Tribe

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The ISRP thanks the proponents for detailed responses to the questions we raised. Clearly, they considered each question carefully and crafted a thoughtful response.

The ISRP commends the proponents on their success in managing a complex set of resources including land, water, and fisheries despite multiple overlapping threats and opportunities. The comments below are not intended to detract in any way from the excellent planning, monitoring, and restoration accomplished to date by this program. Rather, they are intended to help foster even greater success for the program in the future.

Specific comments on points that could improve the outcomes of this project include:

1. Justification of the index of adfluvial production was thoughtful and thorough, lending credence to the methods for enumerating westslope cutthroat trout migrating downstream. The data and text presented were helpful for understanding the richness of data being collected and the appropriateness of the assessment approach. The proponents are encouraged to continue and/or institute annual mark-recapture efforts to evaluate annual variability in first-pass catch.

The ISRP also encourages assessing the effects of age and size (as well as density effects on size-at-age) on the subsequent numbers of migrants. Mark-recapture of PIT-tagged fish should allow differentiating age-1 fish from age-2 and older fish. Finally, there is rich material here for publication, and the proponents are encouraged to continue building their long-term dataset so that additional contributions can be made to the refereed literature in fisheries science.

2. The ISRP agrees that monitoring brook trout in Benewah Creek every three years is sufficient, as long as densities remain low. Toward that end, we endorse the adaptive approach they propose, using their suppression data to inform adjustments to monitoring frequency (p. 15). We request that they include this description in future work plans, annual reports, and proposals.

The proponents state that their summer workload has increased the last five years, prohibiting this additional monitoring. The ISRP believes maintaining the quality of long-term monitoring datasets is a priority and needed to inform restoration efforts.

3. With respect to prioritizing restoration (comment 6a), the proponents state (p. 20): "The former approach is rooted in the idea of protecting the best first and expanding restoration outward from areas of relatively intact habitats and populations." However, on p. 22, the proponents state "Subbasins with the highest impairment values were considered higher priorities for restoration." These statements appear to be in conflict. Is it possible they are intended for different purposes?

Further clarification would be helpful to more fully understand the proponents' strategic approach to restoration. For example, do the proponents prioritize habitats that currently support the most important and productive life history types, and those most resilient to climate change? Likewise, do they prioritize restoration of habitats that historically supported productive life history types but currently do not? Please address this in future work plans, annual report, and proposals.

4. For comment 7i, the ISRP appreciates why the proponents prefer to employ different sampling designs in different watersheds. However, the ISRP cautions that this means the proponents will need to explain and justify this to every set of reviewers (e.g., ISRP, refereed journal reviewers) that evaluates this portion of the project in the future. Hence, in the long run it may be preferable to standardize the sampling design.

5. For comment 7j, to justify ceasing measurements of capture probabilities for electrofishing and PIT tag antennas, the proponents report: "Electrofishing capture efficiencies and HDX interrogation efficiencies have been generated in prior monitoring efforts..."

The ISRP is concerned that this justification will be insufficient to convince future reviewers, either the ISRP or those reviewing any manuscripts, that these capture and detection probabilities remained constant through time. It seems straightforward to make regular measurements of these to prevent the unfortunate outcome that an excellent set of long-term data could be called into question in the future and perhaps rejected as failing to meet scientific review criteria or rejected for publication.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The Coeur d'Alene Reservation Fisheries Habitat project proposes to protect and restore native westslope cutthroat trout through restoration of landscape processes, reducing nonnative fish competition and predation, instream habitat restoration, and barrier removal. The proposal describes major management issues and identifies a series of actions to restore geomorphological and ecological processes over the long term. The proposal provides a framework for the collective actions, and the ISRP has identified a number of issues and questions to strengthen and inform the project.

**Response Requested:**

To help us review this proposal, the ISRP asks the proponents to address the following questions in their response:

1. Has the Coeur d'Alene Tribe formally evaluated the relative costs and benefits of removing nonnative brook trout with fish toxicants from Benewah and Evans creeks, and building permanent barriers that include a weir to remove any ascending nonnative species? Would this approach be more time and cost effective than annual mechanical suppression?
2. Many relationships are presented about fish populations and their life histories, but often no statistical analyses are presented to support conclusions. In general, a large amount of information is presented, especially in the two sections that address impacts from non-native fishes and the status and trend in westslope cutthroat trout demographics, but appropriate analyses of these data to support statements made about progress towards meeting the goals is often lacking. Responses are needed for two specific cases.
  - a) Figure 20 - a novel, untested, derived "index of adfluvial production" is used to conclude that Windfall Creek "was shown to be the chief producer of adfluvial juveniles." This index is generated from two quantities that are measured with error. Please specify how this index was derived, including a refereed source if one is available, and a formal evaluation of the consequences of these measurement errors. Can these estimates provide robust support for management decisions?
  - b) Can the stock-recruitment relationship for adfluvial westslope cutthroat trout be presented, with appropriate statistical analysis, to support the statement: "Data generated from outmigrant traps have also revealed a positive relationship between spawners and the number of juveniles leaving the watershed two years later, implying that in-stream carrying capacity is under-seeded in these watersheds and

has the capability of supporting greater numbers of outmigrants than what has typically been observed"?

3. What evidence is available that fall suppression of northern pike would be more effective than spring suppression? Capturing large spawners in spring seems like the highest priority.
4. The proponents developed explicit SMART objectives and identified long-term time frames for achieving their quantitative objectives. Additionally, it will be useful to include interim milestones to indicate what the proponents plan to accomplish by the end of this funding period relative to their long-range outcomes. To what degree will each of these objectives be achieved by the end of FY 2025?
5. Rigorous sampling designs are required to generate data that can support robust management decisions. Please provide justification for why sampling of brook trout and westslope cutthroat trout abundance is being reduced to every three years. Please specify and justify the random sampling design used to assess northern pike abundance, and how it is combined with a "hunt-and-catch" approach to optimize capture rates and create an overall program to support management.
6. It was difficult for the ISRP to understand the progress made toward the goals and objectives from 2012 (Appendix B). Clear linkages between past progress and planned activities need to be described. Two examples include:
  - a. The numbers tallied for various stream improvement categories were useful, but the ISRP was unable to compare what was planned versus accomplished. A past planning activity "developed and refined a list of 96 prioritized spatially explicit project actions to meet the stated process objectives..." but it is not clear what is on the list, who developed it, nor how it was developed, and no reference is provided. The proponents refer to "process objectives" but the source of these is not documented. Reviewers need to be able to understand relevant details without having to review annual reports.
  - b. How have the array of actions contributed to the "highest priority objective" of protecting and restoring remaining stocks of westslope cutthroat trout to ensure their continued existence and ability to provide harvestable surpluses? What has been achieved over the 3 decades of this project to protect and restore of westslope cutthroat trout within the Coeur d'Alene watershed?
7. Summaries of methods often provided insufficient detail for ISRP review. The following questions require responses:

- a. What planning process has occurred during this project to set the priorities for watershed restoration actions?
- b. What is the process by which road segments were identified in 2008 for treatment to reduce sediment delivery, and how were Best Management Practices selected to apply to specific road segments?
- c. What is the process by which decisions were made for planting and managing riparian vegetation to improve riparian function, and the type and magnitude of plantings?
- d. Will large wood from local sources that will be installed in streams include the rootwads? What are the lengths of the logs relative to the width of the channel? These are often critical for stability in high flows. What ranking system was used to identify sites for wood placement?
- e. Given that storms are becoming more frequent and extreme, what safety factor will be used when calculating 100-year flood discharge for designing new road crossings that allow fish passage?
- f. What statistical analysis will be used to evaluate the effectiveness of brook trout suppression based on trends in first pass catches? Dauphin et al. (2019) recently reported that calibration relationships for single-pass estimates change over time even for standardized protocols and can cause biased estimates. In addition, inspection of trends on graphs is the only method described in the proposal, but this is not sufficient to measure success of achieving objectives.
- g. The method of random sampling to estimate pike abundance is not clear. Are the “randomly selected” sites predetermined from a GRTS sampling design, or other random sampling design? If not, then this randomization process may not be rigorous enough to be used in a population estimator, and risks wasting time and effort to generate data that are not usable for management decisions. The ISRP understands the tradeoff of the time and expense needed to generate an abundance estimate with sufficient accuracy and precision.
- h. It is not clear how “Mean catch rates will be calculated during seasonal periods when northern pike have been found to be most concentrated.” How is this metric of mean catch rate during the season of greatest concentration derived from the “randomly selected” sites?

- i. For the indices of summer rearing densities of trout, why are index sites used in one watershed, but a stratified random sampling design in the other? Will the data from index sites provide strong inferences needed to make management decisions?
- j. Why are frequent measures of capture efficiency made for screw traps, but not for detection probability for PIT-tag antennas, or for the single-pass electrofishing estimates? Each method is susceptible to variation in detection probability due to flow, temperature, transparency, crew abilities, and equipment malfunction. How will estimates of the reliability of each method be determined?
  - i. Is there a sampling plan for verifying the capture probability for single-pass electrofishing, to allow expansion to estimates of true abundance? See Dauphin et al. (2019) for potential bias.
  - ii. How will previous annual electrofishing surveys reduced to every 3 years provide sufficient statistical rigor to “describe the distribution and abundance of westslope cutthroat trout and non-native brook trout” and make management decisions?
  - iii. How will the data from PIT tag interrogators be used to derive estimates of fish passing upstream or downstream? Are frequent estimates of detection efficiency made for ascending versus descending fish and for juvenile versus adult fish? How is the uncertainty of the estimate derived?
  - iv. It appears that the “passover stationary HDX PIT array” to be installed in 2020 is a single array of side-by-side antennas stretching across the St. Joe River. What detection efficiency is expected? Discuss whether addition of a coupled second array would increase efficiency and definitively determine what direction the fish are passing (upstream or downstream). Would it allow the project to quantify the uncertainty of the estimates?

The additional questions and comments provided below are meant to strengthen the proposal and do not need to be specifically addressed during the response loop.

### **1. Problem statement**

The Problem Statement provided a very nice summary of the key ecological and management issues, including anthropogenic changes to the landscape and fish community. The focus on restoring geomorphological and ecological processes over the long term is appreciated by the ISRP, as was the summary of data on the diet and bioenergetic analyses of northern pike predation on westslope cutthroat trout.

However, it was not clear the degree to which changes in harvest of westslope cutthroat trout (historically 42,000 per year) is due to population decline or to decline in harvest effort. Can the proponents estimate the sustainable subsistence harvest today, what the demand actually is, and specify the goal for the future?

## **2. Progress to date**

Additional examples where relationships are presented but no statistical analyses are presented to support claims made include the following:

- Figure 10 – Trend analysis should be conducted to support the claim that the suppression has depressed the population of age-0 and age-1 brook trout.
- The proponents state (p. 11) that “In the Lake Creek watershed, tagged fish outmigrating later in the spring exhibited greater growth rates than those leaving earlier (Figure 23)”. Is it possible that any difference in growth might have been caused by food and temperature conditions the fish encountered after emigration? If so, more careful measurement and analysis would be needed to separate these effects.
- What was the size structure of the northern pike removed during suppression, and how has CPUE changed over the years to date? Was the increase in the number removed in 2019 owing to a strong year class, perhaps caused by reduced density-dependence after initial removals?

In Fig 16, the map shows northern pike captured in fall 2019 at many locations along the shoreline of these two lakes, but sampling at other locations is not depicted in the figure. So, the accuracy of the following statement cannot be assessed: "concentrations of northern pike were primarily limited to a few locations in Benewah and Chatcolet lakes."

Regarding age, size, and timing of downstream movement of juvenile westslope cutthroat trout, consider reviewing work by Thorpe (e.g., Thorpe, JE 1994. An alternative view of smolting in salmonids. *Aquaculture* 121:105-113) as an alternative explanation. His thesis is that emigration is the result of a stream not being able to maintain enough food or space for the emigrant. If so, might habitat improvement efforts produce the opposite effect, because increased food and space fostered residualization instead of emigration?

## **3. Goals and objectives**

The overarching goals and specific objectives were nicely crafted. Following are suggestions for improvement of the goals and objectives:

The ISRP suggests rewording the Subbasin Goal to: “Recover populations of native salmonids to sustainable, harvestable levels in watersheds well-distributed throughout the Coeur d’Alene Basin, with emphasis on promoting the adfluvial life-history to provide resilience to the populations.”

Regarding the objective to “Reduce northern pike abundance in Windy Bay and in the southern end of CDA Lake by over 80% by 2030”:

- What is the baseline of northern pike abundance from which the 80% reduction by 2030 will be measured? The ISRP suggests this goal be expressed as density or biomass (fish/100 m<sup>2</sup> or kg/ha), and a desired change in age structure.
- Assessing abundance or biomass, even with an index like CPUE, will require a repeatable sampling design, such as a GRTS design. The design to be used needs to be described.
- A substantial and likely separate effort will be needed to hunt-and-catch as many pike as possible, so please specify this strategy. How many gill nets will be deployed annually to remove northern pike, and how will the locations be selected?

What is the source of the criterion of 6 m<sup>3</sup>/100 m for wood loads?

How were the objectives for numbers of westslope cutthroat trout spawners (500 fish per drainage), percentage returns of juvenile outmigrants, and percentage repeat spawners chosen? Are these based on relevant data from other streams, or analyses based on models?

#### **4. Methods**

The Methods were presented in a logical sequence, but the details of several methods were not clear. In addition to the requests above, more explanation is warranted for the following:

- Methods need to be linked to goals and specific objectives. For example, in the Goals and Objectives section, six Biological/Physical Objectives are listed for “Increase Westslope cutthroat trout populations...” but only four subheadings are used in the Methods.
- Given space limits, recent annual reports that contain detailed descriptions of methods, as well as the 2013 Resident Fish/Coordination report, should be referenced to enable readers to comprehend some methods.
- The ISRP urges the proponents to explore options for a comprehensive analysis of their long-running dataset of westslope cutthroat trout marked and detected on returns. It is

likely that a multi-state Cormack-Jolly-Seber model of abundance and survival of westslope cutthroat trout could be fit, and could also include covariates such as flow regime, temperature, abundance of nonnative predators, or instream habitat conditions. The ISRP urges the proponents to explore these possibilities with an expert in these methods, such as Dr. Paul Lukacs at the University of Montana.

- The use of “age 1+” throughout the proposal is confusing. Please use “age 1” when that single year class is intended, and “age-1 and older” when many year classes are intended. The metric “age 1+ fish/100m” is not a density, but simply the number of age-1 and older fish caught on the first pass per 100 m and is best expressed as: “first pass catch of age-1 and older fish/100 m”.

## **5. Project evaluation and adjustment process**

This section adequately addressed collaboration with other agencies, but no formal evaluation and adjustment process was presented. The adaptive management process used to assess monitoring data and make decisions about needed adjustments to the goals, objectives, or methods should be described.

The proposal addresses evaluation of pike suppression efforts and habitat restoration actions, but not the effectiveness of brook trout suppression or the population ecology of westslope cutthroat trout assessments. How were these evaluated, and any needed adjustments determined?

## **6. Potential confounding factors**

Additional confounding factors need to be addressed:

- How likely is it that northern pike from the northern end of the lake will immigrate to the southern end?
- Are potential changes to fishing regulations or harvest levels (increase or decrease for pike, WCT, and brook trout) confounding factors? What assurance do the proponents have that these will be relatively constant during the next 5-20 years?
- The proponents discuss changing land use and re-colonization of northern pike as potential confounding factors. What of large-scale factors like wildfire and climate change, and external factors such as reduction or loss of funding?

## 7. Timeline

This section was adequate

## 8. Relationships to other projects

This section was adequate

## 9. Response to past Council recommendations and ISRP reviews

The ISRP agrees that the percentage of outmigrating juveniles that return to spawn (smolt to adult survival) and the percent of juveniles that outmigrate the next season (similar to fry to smolt survival) are important quantities. How can data be used to calculate true estimates spawner escapement and subsequent juvenile outmigration? There is error involved in each that could be estimated, such as the detection probabilities for the PIT-tag antennas. Without generating true estimates with uncertainty, the effects of these errors on management decisions are uncertain.

It is excellent news that private pond owners have been convinced to stock sterile triploid rainbow trout. Are these fish verified to be sterile by any entity?

## 10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)

These sections were adequate.

### 200702400 - Coeur d'Alene Trout Ponds

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Coeur d'Alene Tribe

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The proponents are commended on the extent of the response material and project adjustments incorporated into the response. They have thoroughly responded to the issues raised by the ISRP. The response was comprehensive and well organized. The adjustments to the proposal greatly strengthen the overall proposal and provide an excellent foundation for moving forward. The original proposal and the detailed responses indicate that the proponents

have a sound management plan for the ponds, the cultural components, and the educational dimensions of the project. The resulting project will obviously provide numerous benefits to the Coeur d'Alene Tribe. The set of Biological/Social Objectives and Implementation Objectives are well stated and can serve as examples for other project proposals. The ISRP is particularly impressed with the educational component, Smlich in Classroom. Additionally, the explanations addressing the ISRP concerns about nonnative rainbow trout potentially escaping into area waterways and causing introgression with native salmonids were especially helpful.

The ISRP offers two recommendations that the proponents are urged to consider because they are likely to substantially improve the outcomes of the project:

1. Response item 5 (Human Dimensions) – The response provides a solid starting point for assessment and evaluation of cultural and educational components of the project. However, this aspect of the project plans and documentation could be improved with more detailed descriptions of methods. For the telephone interviews, it would help to describe how a random sample of tribal members will be obtained, the questions to be asked, and how responses will be recorded and analyzed. Similarly, for the before-and-after student questionnaires, a description of the questions to be asked and how the data will be analyzed would be beneficial. Finally, the process for conducting intern interviews (i.e., questions to be asked, and how responses will be recorded and analyzed) should be planned and documented. The social sciences utilize standardized protocols for surveys, questionnaires, and interviews. The ISRP advises the proponents to seek guidance from professionals working in the realm of human dimensions (e.g., at University of Idaho or Idaho State University) to obtain guidance on the development of the specific tools for assessment of the cultural and educational components of the project.

2. Response item 8 (Adaptive Management Process) – A general description of a process is introduced in the response, but additional work is needed to refine the process. How monitoring and assessment information will be used to guide the project into the future should be planned and documented. Additional focus on the specific process and timelines for review and evaluation of annual performance and progress is needed and will be helpful not only to the proponents, but also to the ISRP, in future reviews. The excellent set of proposal objectives provides a sound foundation for project evaluation into the future.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The project is well organized and provides a variety of benefits to Tribal and non-Tribal users. The project appears to be well received by users, and there is continued interest year after

year. The Tribe is commended for moving towards a culturally relevant program of Salmon in the Classroom with subsequent release of fish. We are particularly impressed by the development of an intern program to introduce and recruit high school students to careers in natural resources.

The major weaknesses of the proposal center on: (1) providing SMART objectives that describe desired outcomes with time frames; (2) describing methods to monitor and assess the SMART objectives, and (3) describing a project evaluation and adjustment process (i.e., Adaptive Management).

**Response Requested:**

To help us review this proposal, the ISRP asks the proponents to address the following issues in their response:

1. The put-and-take fisheries component of the project is limited by the capacity of the existing facilities and availability of funding for purchasing hatchery fish. Should the objectives be modified to be more realistic given the observed constraints?
2. A response is requested that describes progress to date for each of the SMART objectives listed in Section 3, Goals and objectives.
3. The Biological/Physical Objectives and Implementation Objectives are SMART objectives with the exception that they do not include timelines. What are the timelines (i.e., specific years when objectives or milestones are to be achieved) for each of the stated objectives?
4. Provide a core set of SMART objectives that address human dimensions (e.g., anglers' use of put-and-take fisheries, participation in Cultural fisheries, involvement of students and teachers with Salmon in the Classroom, intern opportunities).
5. The proponents are asked to describe methods for attaining and measuring each of the SMART human dimensions objectives developed in response request 4.
6. For put-and-take fisheries, how are estimates derived for the number of angler visits and number of fish harvested annually from each pond?
7. In other projects, the Tribe is actively working to remove nonnative species, but nonnative rainbow trout are being stocked in this project. While triploid rainbow trout are being purchased and stocked, up to 5% of the purchased "triploid" rainbow trout may be fertile, diploid fish.

- a. Is it possible to obtain rainbow trout that are guaranteed to be 100% triploid and feminized? If native redband trout occur in this area, the Tribe should use feminized triploids because male triploids will still try to spawn with females and may reduce success of the wild trout.
  - b. How close are the four ponds to waters with native trout populations that could be impacted by rainbow trout invasion? What is the threat to wild salmonid populations in the headwaters of Hangman Creek watershed?
  - c. What forms of education are provided to users of the put-and-take fisheries about the dangers of nonnative rainbow trout to native trout populations?
  - d. Is there a plan to address the possibility that nonnative rainbow trout may escape or be translocated by anglers to other waters that contain native redband trout or bull trout of conservation concern?
8. The proposal describes an Adaptive Management process with a Natural Resources Committee composed of six tribal members serving as decision makers. However, the Project Evaluation and Adjustment section does not describe an evaluation and adjustment process for the entire project. It is not evident what kinds of information the staff will provide to the Committee to assist them in the development of meaningful project evaluation and consensus regarding any changes that may need to occur. A more organized and comprehensive description of a project-scale evaluation and adjustment process is requested.

The additional questions and comments provided below are meant to strengthen the proposal and do not need to be specifically addressed during the response loop.

### **1. Problem statement**

The problem statement is informative. The insight into the cultural importance of the project is important. The narrative provides a solid background and justification for the project.

The significance to the Council's Fish and Wildlife Program is explained clearly.

The problem statement could be improved with the following: (1) an explanation as to why the goal of a catch rate of 6 fish per angler per trip with one > 16 inches is considered to be realistic and (2) a clear statement as to if interior redband trout are native to the Hangman Creek watershed and the potential threat that rainbow trout stocking may pose to this species.

## **2. Progress to date**

There is a very complete discussion on a wide range of activities and accomplishments for the project. It appears that solid organization and a good deal of hard work has resulted in many benefits to Tribal members and the public. A wide range of accomplishments are reported ranging from angling opportunities at strategically located ponds to a range of cultural and educational programs from pre-school to secondary grade levels. It is clear that the project is being limited by the capacity of the existing facilities and funding availability.

The proponents should link project activities to specific objectives to understand progress in meeting targeted accomplishments and outcomes. For nearly all activities, no corresponding Biological/Physical Objectives or Implementation Objectives are provided to gauge progress of the project. One exception is the discussion of the put-and-take fisheries where it states that the project provides quality fishing experiences consistent with the Spokane Subbasin Plan objective for put-and-take fisheries and that the project has only met 16% of the stocking target objective identified in the Coeur d'Alene Subbasin Plan on average.

## **3. Goals and objectives**

A sound attempt at development of both Biological/Physical Objectives and Implementation Objectives has occurred. The Biological/Physical Objectives are SMART objectives with the exception that they do not include timelines. Timelines (i.e., specific years when objectives or milestones are to be achieved) are needed.

Data presented in the proposal indicate that the project has not met objectives for rainbow trout stocking in ponds or for annual total catch by anglers since the project has begun. A limitation appears to be the ability to purchase fish from suppliers. Perhaps there are additional limitations such as water quality and potential fish die offs due to water quality limitations. Is there a need to modify the objectives for the put-and-take fisheries so that they are more realistic given the observed constraints?

The project would benefit from objectives that address human dimensions both benefits to anglers and students. Measurable benefits to anglers may include: (1) the level of angler satisfaction with facilities at each pond and (2) the quality of overall angling experience at each pond. Similarly, benefits to students may include: (1) student satisfaction regarding Salmon in the Classroom, (2) teacher satisfaction regarding Salmon in the Classroom, (3) intern satisfaction with their program, and (4) progression of interns into natural resource education and careers. It may be difficult to create quantitative objectives for various human dimensions,

but they can provide a solid context for gauging human-related benefits associated with the project.

In other projects, the Tribe is actively working to remove nonnative species, but in this case, they are stocking rainbow trout that are not native to the watershed. Up to 5% of the purchased “triploid” rainbow trout may be fertile, diploid fish. If live diploid rainbow trout escaped or are translocated from the ponds and released in other waters, populations of rainbow trout could be established that could impact native salmonid species. Can fish suppliers provide triploid rainbow trout with greater assurance of being triploid (e.g., 99%)? Given these concerns, please indicate what steps will be taken in the future to limit the possible occurrence of diploid rainbow trout in stocked fish and their potential translocation into adjacent waters.

#### **4. Methods**

The description of methods does not provide ways to measure the project’s benefits to humans. Addition of SMART objectives addressing human dimensions should be accompanied by methods to assess these objectives.

The ISRP has several concerns with methods:

- For put-and-take fisheries, data are presented on the annual numbers of fish stocked and harvested. How are estimates derived for the numbers of anglers or numbers of fish harvested annually from each pond?  
2) For put-and-take fisheries, there is no description of methods to address human satisfaction measures. How could these be obtained?
- For put-and-take fisheries, are non-tribal members allowed to fish in the ponds, and if so, what is the goal for such angling?
- For Cultural Fisheries, there is no discussion of methods to track the magnitude of use, locations used, satisfaction, or cultural benefits. Measures to gauge improved cultural awareness or methods to obtain feedback from tribal users would be beneficial to future planning. How would the Tribe collect such information quantitatively?
- For Salmon in the Classroom, there are no methods for assessing student satisfaction, changes in interest levels among students, or understanding of ecological and cultural issues. How could information be obtained in a quantitative manner?
- For Salmon in the Classroom, it is noted that, “Data will be collected on program attrition rates and causes, as well as rates of certificate/degree completion by interns.”

These are meaningful assessment measures. Are there additional quantitative measure that could be used to assess the intern program?

There is concern by the ISRP about the proportion of diploid rainbow trout among fish stocked in ponds. Regarding this concern:

- Is it possible to obtain rainbow trout that are guaranteed to be 100% triploid fish?
- How close are the four ponds to other waterways, or to ephemeral waterways that could flood, and areas with native fish populations that could be impacted by rainbow trout invasion?
- What education is provided to tribal members about the dangers of nonnative strains of rainbow trout to native populations? No mention is made of the wild populations in the headwaters of Hangman Creek.
- Is there a plan to address the possibility that nonnative rainbow trout may escape or been translocated by anglers to other waters that contain native redband trout or bull trout of conservation concern?

For Cultural Fisheries, it is stated that adult Chinook will be stocked in a three-mile reach bounded by migration barriers. The upstream barrier is described, but not the downstream barrier. What may be the biological consequences of escapement from the bounded reach?

Relative to Salmon in the Classroom, 3-5 interns will be hired and the work that they will do is described. How the interns will be mentored and supervised is not described. Mentoring is an important component of the project if students are to be enticed to seek higher education or employment in fish culture.

## **5. Project evaluation and adjustment process**

The Adaptive Management process is described as using a Natural Resources Committee composed of six tribal members serving as decision makers. However, this section does not address the evaluation and adjustment process for the entire project. It is not evident what kinds information will be provided by staff to the Committee to assist them in the development of consensus. The current discussion is centered on approaches for managing release of adult salmon and three alternatives that have varying degrees of cultural and harvest attached to each. A more organized and comprehensive description of a project-scale evaluation and adjustment process is needed.

## **6. Potential confounding factors**

The list of confounding factors appears to be relatively thorough. Within the content of the put-and-take fisheries, there is no mention of aquatic vegetation as a confounding factor. It would be informative to know if aquatic vegetation problems have been encountered or if they are anticipated.

## **7. Timeline**

A table, displaying individual activities and their timing by season and year, is provided. It is very generalized and does not describe the timing of activities for monitoring, evaluation, and reporting for major project components. Additional detail would strengthen this section and provide improved insight into project delivery.

## **8. Relationships to other projects**

No additional comments.

## **9. Response to past Council recommendations and ISRP reviews**

The proponents address an ISRP concern regarding assurance of triploidy among rainbow trout that are stocked into ponds. A description of the assurances provided by the vendor that  $\geq 95\%$  are triploids has been provided. However, this indicates that up to 5% of the stocked rainbow trout may be diploid fish capable of reproduction. The potential consequences of diploid fish escaping or being translocated by anglers from the ponds and establishing populations within the watershed are not addressed. The potential threat of diploid rainbow trout to native salmonids in the watershed has not been addressed.

## **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No additional comments.

## 200103300 - Hangman Creek Fish & Wildlife Restoration

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Coeur d'Alene Tribe

**Final recommendation:** Meets scientific review criteria - conditional

### **Conditions:**

The proponents have made good progress in providing additional information for the project proposal. However, a remaining issue is the lack of detail regarding project-scale monitoring and evaluation, both for implementation and effectiveness. Annual activities to assess progress on various activities (walk-through assessments and drone flights) are described. Landscape scale effectiveness monitoring of vegetative restoration is being done in conjunction with UCUT monitoring for Albeni Falls. This project is located within this broader area. The proponents stated that BPA was unwilling to fund project/site scale effectiveness monitoring of vegetative restoration for this project saying it would duplicate the broader scale monitoring by UCUT. Unfortunately, the proponents have not provided a coherent plan for project level monitoring and evaluation, and one is needed to meet review criteria.

The ISRP requests that the proponents address the conditions below and respond point-by-point to each condition. The response can be a report to the ISRP with detailed answers to each of the conditions, a revised proposal with highlighted changes, or an addendum to a revised proposal. The ISRP's preference is for the proponents to revise their proposal to ensure that the additional information requested is easily accessible by Council, BPA, and the public in a single document. A revised final proposal that includes and integrates all information will guide the project for the next five years and facilitate future project reviews. Understanding the need for flexibility, the ISRP suggests that the proponents and the Council staff agree on a mutually determined date for a response, preferably by the end of 2020 or early in 2021.

**Condition 1. Methods for measuring outcomes:** The proponents should develop and describe the methods for measuring implementation accomplishments and outcomes as described in Objectives A-2 (15 acres/year and 75% grass cover and less than 5% noxious weeds) and A-3 (at least 50 acres/year and establish native Salicaceae species at a minimum density of 60 per acre). For implementation monitoring, of the proponents describe an extensive project review using drones and field "walk throughs," but there is not sufficient information provided on how observations will be made, metrics that will be computed, or how the data will be linked to implementation objectives. It seems likely that drones or "walk throughs" could be used annually or at specified time intervals to monitor the predominance of native wet meadow, herbaceous, and Salicacea species in restoration sites, as well as to identify areas where noxious weed control is needed.

**Condition 2. Desired outcomes and methods for Beaver Ponds objective:** It appears that there will be implementation and basic effectiveness monitoring tied to Objective A-4 (Beaver Ponds), but a description of desired outcomes (implementation objective) and methods for determining success for this work is needed. It appears that annual observations and measurements are planned and an effectiveness objective such as “By 2030, increase surface water area (or stored channel volume) during base flow periods by at least \_\_\_%” could be added to describe desired outcomes and evaluated based on current planned measurements.

**Condition 3. Desired outcomes and methods for channel realignment objective:** For the channel realignment (Objective A-5), the proponents should provide substantially more detail describing desired outcomes, quantitative metrics, and methods for evaluation. More detail is needed to describe post project desired outcomes, how monitoring observations are to be made, the metrics to be computed, and how monitoring data will be used to evaluate the effectiveness objective. The proponents note that a major criterion for successful realignment is to avoid scour, surface erosion and resulting lost/disturbed vegetation immediately following project work. As an example, "less than \_\_\_% of the new channel runout area has significant observable scour that removes or causes major disturbance to established vegetation" could be used in conjunction with annual planned drone flights as a performance objective to annually evaluate effectiveness of the restoration action.

**Condition 4. Project and landscape-scale monitoring:** The proponents should provide a detailed description on of how project and landscape-scale monitoring (Albeni Falls – UCUT) are linked and how M&E data are to be stored, evaluated, and reported. As noted in the initial direction for this review, *"a habitat restoration project may use data from a separate monitoring and evaluation project to measure results as long as the proposal clearly demonstrates this integration."* The current proposal does not discuss the current details of the integration that is occurring.

**Final comment:**

Response information provided major improvements in the completeness and clarity of the proposal and greatly helped in better understanding the proposal. The proponents are commended for providing generally well-conceived, sound responses to the requests of the ISRP. The proposal and responses indicate that the project is based on sound science principles and provides benefits to fish and wildlife. The extra detail describing methods provided in response to Question #2 was sufficiently thorough and helped us understand the intentions and professionalism of the proponent’s approach. This is also true of information provided regarding the Hangman Creek TMDL (Response item 4.) The response provided a good explanation of history and current status of TMDL and the Tribal role and involvement in that

process. This information was particularly informative, clarifying how the proponent engages with other entities while facing funding and jurisdictional challenges.

All effectiveness objectives need to be revised to include a timeframe for expected accomplishment. Specifically, Objectives A-1, A-2, and A-3 have been developed to identify annual accomplishments, but they lack defined timeframes for achieving desired outcomes. Objective A-4 (Beaver Dam Analogs - BDA's) describes annual planned project accomplishments but an effectiveness objective should be provided to address desired habitat outcomes. This improvement of the objectives is important and should be completed in the near future.

Finally, in the original submittal of goals and objectives for ISRP review and assistance, the proponents included a goal and related objective for involving students to increase their interest and support for the project. This appears to be an important activity for the project, but it is not included in the current proposal. We hope this was an oversight and information on planned activities and associated objectives will be incorporated in the future.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The project is well organized and has shown numerous accomplishments. The proposal is concise and easy to read. Restoration work uses a process-based approach, starting upstream and moving downstream and has already begun to show improvements in lowering summer stream temperatures. The goals and objectives provided are focused primarily on project implementation. They are generally in line with SMART objective criteria and are good examples for others to follow.

**Response Requested:**

To help us review this proposal, the ISRP asks the proponents to address the following questions in their response:

1. Additional details are needed to describe how the project will determine if Implementation Objectives A-2 through A-4 are completed as desired and if intended outcomes are achieved. Additionally, it will be useful to include interim milestones to indicate what the proponents plan to accomplish by the end of this funding period relative to the target date of 2031.

Although the objectives are generally adequate describing implementation activities, they do not indicate the metrics that will be used to judge their completion and success. For example, Implementation Objective A-2 addresses removing 150 acres of

land from agricultural production and re-seeding with grasses. It would be useful to have an objective that describes the desired outcomes of these activities in measurable terms such as percent ground cover and/or percent of the area with a minimum ground cover level of the desired grasses. For Implementation Objective A-3, similar detail describing the plant density expected at the end of the 5 years and as well as the desired plant community characteristics within 5 to 10 years would be useful. For Implementation Objective A-4, additional description of the placement of beaver dam analogs and desired outcomes is needed. As an example, “Establish at least a specific number of beaver dam analogs through the project area with a general spacing of 200 meters between each” and “Increase base flow, channel surface area, or volume by a specific proportion through beaver dam analog placement.” Finally, since substantial effort goes on annually to control weeds, mow grasses, maintain fences, these activities should be reflected in an implementation objective.

2. Additional detail is needed for monitoring protocols to determine if implementation objectives are being achieved. Currently the methods are not very rigorous or data based. For example, Implementation Objective A-2 is to be monitored by a “simple walk through” to assess wetland vegetation. Will the project assess the status of this wetland vegetation in a more systematic manner that provides monitoring data that can be stored and assessed over time? Establishment of photo points could be a simple monitoring tool. Similarly, for Implementation Objective A-4, beaver dam analogs are to be inspected annually, but there is no mention of what specific observations or measurements may be made at each site to yield monitoring data. Again, photo points could be a simple monitoring tool. Further, for Implementation Objective A-5, drones and walking tours will be used, but there is no mention of what kinds of monitoring data may be obtained. The project should describe the methods more thoroughly.
3. Provide additional details regarding how monitoring data will be used to evaluate biological and implementation objectives in the adaptive management process. The proposal states that the project is evaluated through staff meetings and communications among various levels of management within the Tribe’s natural resources program. However, the proposal provides no indication of a more formal adaptive management process that includes evaluation of monitoring data and decisions to adjust approaches to the problem. The 2018 annual report includes as section on lessons learned indicating that some form of adaptive management is taking place. Please clarify the process and how it operates.

4. Currently it appears that coordination of the Hangman Creek Total Maximum Daily Load agreement is handled by another Tribal department, and the primary benefits have been through receipt of EPA grants. It appears that there is substantial room to expand the level of coordination and partnership with the TMDL agreement and to contribute directly to Tribal fish and habitat objectives for Hangman Creek. Please provide additional discussion addressing the potential benefits of the agreement in helping to achieve project objectives, especially regarding management and restoration of adjacent private lands in the watershed.

The additional questions and comments provided below are meant to strengthen the proposal and do not need to be specifically addressed during the response loop.

### **1. Problem statement**

The proposal clearly defines two related projects: Project #200103300 to address the landscape management issues that could not be addressed by focusing on in-stream and near-stream habitats within the Hangman Watershed and Project #200103200, which focuses on the protection and expansion of native resident redband trout in Hangman Creek as substitution for anadromous fish losses. The problem statement provides comprehensive background on the history and need for the project and its significance to the Fish and Wildlife Program and other regional plans and related projects. The proponents did a good job of stating the questions and problems, and relating their proposed project to the Fish and Wildlife Program.

Additional information on the abundance of redband trout under current conditions versus under various levels of proposed restoration actions would be useful. The same is true for the potential anadromous salmonid population, when and if they gain access to the restored streams. How large of an adult run could be accommodated with various levels of restoration? While these targets or estimates from modeled predictions may be developed by the related fisheries enhancement project for Hangman Creek, including these numbers in this proposal would provide a context for the restoration project.

Finally, while the document, "Priority Area Selection within the Hangman Watershed Coeur d'Alene Reservation," by Green et al. (2011) is referenced, the proposal would benefit from a more thorough summary of how the priority process was conducted and how it is being applied currently. It is unclear how current activities are associated with the priority list.

### **2. Progress to date**

The description of progress to date is quite comprehensive. A number of lessons learned were presented along with some discussion of how they were applied to improve project implementation. Unfortunately, the discussion is not linked to past objectives that would provide context to what was done versus what was planned (e.g., percent completed) and the

extent to which desired outcomes were achieved. This context should be provided to improve clarity and completeness of the proposal. Also, it is noted in the proposal “The 2011 Project Submittal defined four deliverables that would contribute to the restoration of a natural hydrologic cycle in the Project Area. Accomplishments since 2011 are presented according to each of those deliverables.” The proposal could clarify whether the project has had the same four deliverables every year since 2011 or if those categories are a convenient way of summarizing accomplishments.

Finally, it appears that the terms beaver dam analogs and reinforcement of beaver dams were used synonymously, which created some minor confusion. A more complete description of each treatment method would clarify the two treatments.

### **3. Goals and objectives**

The goals and objectives provided generally meet SMART objective criteria. They are primarily implementation objectives and additional biological objectives are needed to link to the current set of implementation objectives and describe desired outcomes. The proposal should explicitly describe the relationship of specific implementation objectives to the biological objective (increasing shallow groundwater levels).

The ISRP commends the project for identifying the long-term timelines for achieving their biological and implementation objectives. It would also be useful to indicate to what degrees these four objectives are planned to be achieved by the end this funding period. Identifying milestones for achievement for this funding interval makes it possible to measure success toward project deliverables and thus contribute to an adaptive management process. Proponents are encouraged to report quantitative estimates of progress toward each biological and implementation objective in their annual reports.

### **4. Methods**

The description of methods links implementation objectives to the planned work activities to be done. Methods provided for Implementation Objectives A-1 to A-4 generally do not provide the detail needed to describe methods for determining success (who, where, when and how?). For example, when discussing methods for counting acres planted with a certain planting density, the proposal should describe the planting methods, when they will be applied, and who will likely do the work. Also, it would be useful to also identify basic measures of effectiveness (e.g., survival, plant densities) at critical stages after planting and describe the techniques employed to do that. If the references provided contain such information, it should be noted in the proposal.

Finally, there are several questions about the five implementation objectives. These are:

#### Objective A-1:

Acquisitions, easements, conservation leases, and landowner agreements are all mentioned as means to achieve the objective. However, there is no mention as to how these various means will be approached. It is recognized that when dealing with potential real estate matters, that confidentiality must occur; however, it is not clear if there is a plan/strategy for achieving this objective.

#### Objective A-2:

The steps to be followed in removal of agricultural lands from production are not evident. What are specific plans for the near future? For example, what are the details of the partnership being developed with the USFWS for *Howellia* protection and associated wetland management?

#### Objective A-3:

The plans and methods regarding planting for native deciduous vegetation are described in a very general manner. What are the specific plans for the near future? Information about these plans and methods in the proponents' 2018 annual report should be included in the proposal.

#### Objective A-4:

The ISRP infers from the proposal that beaver dam analogs will be constructed in the watershed beginning in 2020, but no detail is provided. What is the plan for this work? What is the design of beaver dam analogs that will be used? If the reference cited in the objective provides this information, it would be helpful to summarize the pertinent information. Finally, an explanation of how the completed installation will be evaluated is needed.

#### Objective A-5:

Ditch A will be decommissioned in 2021, and its flow will be redirected. However, the scope and benefits of this action are unclear. Some insight is provided in the 2018 annual report, but additional explanation is needed in the proposal.

### **5. Project evaluation and adjustment process**

The proposal states that project evaluation is achieved through staff meetings and communications among various levels of management within the Tribe's natural resources program. However, a more explicit adaptive management process that involves evaluation of monitoring data and decisions to adjust approaches to the problem is not evident. A key question is whether there are sufficient, formal feedback loops that promote needed changes in approach, methods, or intensity? The 2018 annual report includes a section on lessons learned indicating that some form of adaptive management is taking place.

Most of the monitoring protocols to determine if implementation objectives are being achieved are not very quantitative. As an example, see the second response requested at the beginning of this summary for more detail.

#### **6. Potential confounding factors**

Although mentioned, the proposal was quite general in addressing how climate change could impact this project. More thought should be given to factors that could potentially confound the project and how they might be addressed.

#### **7. Timeline**

A table is provided that illustrates dates and general activity types. It would be very useful to have more detail addressing the timing of important activity elements by project, such as timing of project design, implementation, and monitoring.

#### **8. Relationships to other projects**

An insightful description of relationships to other projects is presented.

#### **9. Response to past Council recommendations and ISRP reviews**

The response addresses a single question from the 2012 Resident Fish/Coordination review, and the proponents provide an adequate answer.

#### **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No comments.

### **200103200 - Coeur d'Alene Fisheries Enhancement-Hangman Creek**

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Coeur d'Alene Tribe

**Final recommendation:** Meets scientific review criteria - conditional

#### **Conditions:**

The response provided by the proponents improved the ISRP's understanding of the details and direction of the project. Many responses sufficiently address ISRP concerns; however, details are needed on a number of remaining areas for the proposal to fully meet scientific criteria. The ISRP requests that the proponents address the conditions below and respond point-by-point to each condition. The response can be a report to the ISRP with detailed answers to each of the

conditions, a revised proposal with highlighted changes, or an addendum to a revised proposal. The ISRP's preference is for the proponents to revise their proposal to ensure that the additional information requested is easily accessible by Council, BPA, and the public in a single document. A revised final proposal that includes and integrates all information will guide the project for the next five years and facilitate future project reviews. Understanding the need for flexibility, the ISRP suggests that the proponents and the Council staff agree on a mutually determined date for a response, preferably by the end of 2020 or early in 2021.

**Condition 1. Detection of changes in redband trout and westslope cutthroat trout**

**populations:** A number of metrics are identified to assess changes in redband trout and westslope cutthroat trout populations, but the proponents do not explain how the metrics will be used to evaluate responses of fish populations to restoration treatments. Metrics to be used to assess fish populations, objectives that incorporate these metrics, and monitoring methods from which the metrics will be computed need further clarification.

**Condition 2. Quantitative assessment of responses to restoration treatments:** The proponents state "that a tributary-wide population estimate conducted every 5 years is sufficient" to track changes in abundance of redband trout. Without context of annual variability associated with region-wide factors (i.e., drought, floods, heat and cold waves) and without context of variability in redband trout populations in untreated streams in the area, this low level of sampling effort is unlikely to adequately detect responses. It is good that the proponents are using a "stratified-randomized sampling design to select sites" for mark-recapture efforts, but the following items need additional clarification: a) what constitutes a stratum (e.g., delineation metrics) and a site (e.g., size of sampling unit), b) how many sites are to be sampled within various strata. While a sampling approach can reduce error of the estimation, it is unclear what level of precision is targeted. The ISRP requests more complete descriptions of the efforts to PIT-tag fish entering tributaries and obtain recaptures of PIT-tagged fish in the mainstem, as well as the extent of summer electrofishing sampling.

**Condition 3. Quantitative implementation objectives to reduce summer stream**

**temperatures:** (Response item 4) Clear, quantitative implementation objectives describing planned restoration activities to reduce summer stream temperatures and detailed monitoring protocols are needed along with to assess progress toward the project's full completion. The response provides five "objectives" for a variety of general restoration outcomes (increase overbank flows, riparian vegetation, floodplain-stream channel connectivity and habitat complexity and also promote beaver populations) that are described as actions to reduce summer stream temperatures. However, there are no actions and associated implementation objectives to describe the process to achieve these outcomes. Also, the current "objectives" do not provide quantitative measures (except the first Objective) or time frames, and do not meet SMART criteria. Monitoring protocols to assess progress toward achieving the objectives are

also needed. Finally, an associated effectiveness objective describing expected stream temperature outcomes should be developed. The objectives could be evaluated with data from the planned thermograph network to monitor stream temperatures. A potential effectiveness objective could be something like, "There will be less than \_\_\_ days (during the time period June 15 to September 15) where maximum stream temperature exceeds 68 degrees F."

**Condition 4. Information on restoration implementation objectives:** Additional details are needed for restoration implementation objectives to allow determination of their successful implementation. Although much information is provided about the restoration treatments and their general location, no objectives are provided that will guide evaluation of these activities (implementation monitoring). An exception is the description for barrier removals which is adequate for this purpose. However, implementation objectives are needed for large wood placement, instream structure placement, and floodplain treatments. Implementation objectives do not have to be complicated, but they need to provide enough detail to determine if an activity is completed as planned in the expected timeframe. For example, for large wood placement it is noted, *"Large woody debris will continue to be placed within the active stream channel in upper Indian Creek upstream of stream kilometer 4.0 to increase pool habitat and promote gravel sorting for spawning habitat. Similar efforts in Indian Creek between stream kilometer 2.0 and 3.5 proved to be successful in achieving the same objectives."* A potential implementation objective for this work could be "By 2025, at least \_\_\_ pieces of large wood (length exceeding \_\_\_ ft) will be placed in the active channel of upper Indian Creek between Km 4.0 and Km 5.0."

**Condition 5. SMART objectives:** The proponents should develop additional SMART objectives that describe the desired physical habitat outcomes for activities designed to restore aquatic habitat (Response item 6.) There are no objectives that describe desired habitat outcomes at the site and watershed scales. While the proponents mention that they have "gathered physical habitat baseline data" to identify habitat limitations during the pretreatment phase, the response narrative was not explicit about the metrics that would be used to assess success after restoration actions, except for assessment of riparian plant survival. The proponents state, *"Although we agree that monitoring the effectiveness of our restoration on additional physical habitat metrics is important, we feel the effort outlined in the two concurrent proposals is sufficient in order to assess the effectiveness of restoration."* The current response describes five "objectives" for restoration of specific physical habitat components in Response item #4 and could provide the foundation for habitat outcome objectives. The five current objectives need to be improved to provide for quantitative descriptions of various individual outcomes and include expected timeframes for accomplishment. While a general method of post-treatment observation was stated (i.e., photo documentation by drone flights), there is a need to describe the details of the monitoring design, sampling methods, and metrics

to be used to assess objectives. While a "before and after" habitat restoration sampling design is mentioned, the proponents do not explain the design and discuss the analytical approach.

**Condition 6. Integrated restoration plan:** The proponents should more thoroughly describe the overarching plan to guide prioritization and implementation of restoration treatments (i.e., in-stream structures, large woody debris additions, floodplain treatments, riparian treatments, and barrier removals) during the 2021-2025 timeframe. The restoration effort appears to be a collection of site-specific actions applied in a highly opportunistic fashion and supported by very limited effectiveness monitoring. Currently, there is no description of an integrated plan or comprehensive design for the project. General information on two basic restoration approaches that are being used to guide the current work is provided. The two approaches could provide the foundation for an overall approach/plan, but additional work needs to integrate the two approaches into a more comprehensive plan that guides the project and helps to prioritize the type, location and design of various restoration treatments. It appears that the proponents have most of the information to complete a comprehensive restoration plan for the watershed.

**Final comment:**

The proponents responded to all the ISRP requests. The time and energy to do this are much appreciated. The responses help the ISRP better understand the proposal. Unfortunately, information for many of the responses but does not fully address ISRP questions. The proponents appear to have a solid vision for the project but have not fully explained the steps that need to be taken to attain the desired end product. The proponents need to develop and finalize a comprehensive set of quantitative objectives that are time bound and provide a foundation for development of monitoring and assessment methods that apply to each of the objectives.

It appears that an effectiveness objective for base flows could be created and use existing streamflow gauging data. It is noted that lack of sustainable base flows is a key limiting factor influencing redband trout presence and survival. It is also noted that one of the objectives of restoration is to increase the water table in the floodplain and increase summer base flows. Currently, stream flow is continuously monitored at the USGS gauging station (funded by the Coeur d'Alene Tribe Fisheries project 200103300) directly downstream of the study area. The proponents could develop objectives for desired minimum increases in base flows and their timing. Support for continued operation of the gauging station for the duration of project is proposed in the solicitation. An implementation objective for operation of the gauging station during the desired base flow period could also be developed.

Other items that are also not conditions but where additional attention would improve the overall proposal include:

1. While the project proponents are conducting numerous activities to restore riparian and aquatic habitat and benefit native westslope cutthroat trout and redband trout, an overarching strategic plan to guide treatment types and project prioritization, location and timing would be beneficial. Strategic planning has not been addressed in any detail in the proposal or response.
2. In response to the first ISRP request, the proponents have provided SMART objectives with milestones. However, the 3rd objective is confusing: "generate a mean survival rate of PIT-tagged fluvial redband trout rearing in the mainstem of Hangman Creek from 2021 to 2025 of 25% with annual rates to exceed 15%." Modification of this objective is needed.
3. Implementation and biological objectives for genetic purity need better definition. Although genetic purity of westslope cutthroat trout is being monitored, there are no biological or implementation objectives that address genetic purity. The desired outcomes and how to achieve them need to be better defined.
4. Consider alternatives for a system stream for the Westslope Cutthroat Trout Suppression Project in Nehchen Creek. The proponents' response to this original suggestion is, "There are no known reference reaches to compare as upper Nehchen Creek is the only location that supports non-native WCT." It is suggested that a reference stream does not have to be one that has nonnative westslope cutthroat trout, but rather one that 1) has a fish population that they consider to be a healthy redband trout population or 2) a system physically similar enough to allow gauging the variability of fish response to abiotic factors (e.g., drought, floods, severe cold or heat waves). For example, if severe drought hits the area and the westslope cutthroat trout population drastically declines for two to three years running, would they falsely ascribe the decline to their suppression efforts? Conversely, if the westslope cutthroat trout population increases in spite of their suppression efforts, is it because their efforts are not working, or were there highly favorable abiotic factors that allowed the westslope cutthroat trout population, and other populations in similar streams nearby, to increase?

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

This is a well-run project that has a record of consistent accomplishment. The current proposal provides a set of goals, biological/physical objectives, and implementation objectives that are a good example for other projects to follow.

**Response Requested:**

To help us review this proposal, the ISRP asks the proponents to address the following questions in their response:

1. The proponents developed explicit SMART objectives and identified long-term time frames for achieving their quantitative objectives. Additionally, it will be useful to include interim milestones to indicate what the proponents plan to accomplish by the end of this funding period relative to their long-range outcomes. To what degree will each of these objectives be achieved by the end of FY 2025?
2. Please explain why current frequency and locations for fish population sampling are adequate to adequately quantify the responses to treatments. The ISRP suggests that an increase in fish population sampling to an annual frequency and looking at more sites/streams, including reference sites/streams, would better track fish response to treatments than the approach that is currently proposed.
3. Fish populations in the treatment streams will change in response to multiple factor, including the restoration actions. Please identify additional metrics derived from the fish monitoring data that will improve the ability to detect changes in the populations of redband trout and westslope cutthroat trout that are related to the restoration actions. Please indicate if there are potential reference reaches that can be incorporated in the design to better assess these changes in populations.
4. Provide Physical/Biological and Implementation Objectives that address summer stream temperatures. The proposal noted that high summer temperatures are a limiting factor. Temperature monitoring is described in the 2018 project report. Additional objectives are needed to better describe this activity.
5. Provide Physical/Biological and Implementation Objectives for water quality parameters that may be limiting to redband trout. Monitoring of water quality parameters is mentioned in the 2018 project report, but there is no mention of water quality issues or monitoring in the proposal or its objectives.
6. Provide additional objectives that describe the desired physical habitat outcomes for activities designed to restore aquatic habitat. Current monitoring objectives focus on redband trout distribution, abundance, and population dynamics but do not address desired changes in physical habitat from a range of restoration activities. Adaptive management will benefit from understanding which treatments are contributing to desired habitat changes.

7. Provide additional details in implementation objectives to better describe restoration activities (e.g., the numbers of each treatment design, installation locations and general design, and expected effectiveness). An array of instream structures (i.e., artificial riffles, beaver dam analogs, engineered log jams) and floodplain/riparian treatments (i.e., large woody debris placement, dike removal plantings) are described in the Methods and are being applied in the watershed. Additional detail would be useful to fully understand restoration activities.
8. Provide additional detail about the comprehensive design or plan for initiation of restoration treatments (in-stream structures, large woody debris additions, floodplain treatments, riparian treatments, and barrier removals) during the 2021-2025 timeframe of this proposal. How does the work during this time period add to the array of previous treatments in the watershed?
9. Provide biological and implementation objectives for redband trout genetic purity, and methods for monitoring and assessment of the objectives. Non-native fish suppression (i.e., westslope cutthroat trout and westslope x redband trout hybrids) is proposed to continue 2021-2025. Biological/Physical and Implementation Objectives are described relative to a target (i.e., density) for westslope cutthroat trout and hybrids in Nehchen Creek. However, the goal to enhance redband trout genetic purity is not addressed.
10. The goals and objectives of the “90% design” need further discussion. Within the Assessment and Data Management section, a subsection on Restoration Design is included. It is mentioned that a “90% design” will be generated for a reach of Hangman Creek during the duration of this proposal. The goals and objectives of the “90% design” are not explained. Have similar “90% design” plans been developed previously for other stream segments in the watershed? If so, a description of their application would be beneficial.
11. Provide additional detail to describe the research design for trout population monitoring. Monitoring and Evaluation Methods include descriptions of migrant trout trapping and marking, and PIT detection, but the design of the research is not evident.
12. Describe the project planning and design activities that will occur during the 2021-2025 time period. Are all of the restoration actions described in the proposal planned to be implemented during 2021-2025?

The additional questions and comments provided below are meant to strengthen the proposal and do not need to be specifically addressed during the response loop.

## **1. Problem statement**

The proposal clearly defines two related projects: Project #200103300 to address the landscape management issues that could not be addressed by focusing on in-stream and near-stream habitats within the Hangman Watershed and this project (Project #200103200), which focuses on the protection and expansion of native resident redband trout in Hangman Creek as substitution for anadromous fish losses. The problem statement provides comprehensive background on the history and need for the project and its significance to Fish and Wildlife Program and other regional plans and related projects. The proposal would benefit from additional detail regarding integration of the two projects and synergism that integration provides.

Additional detail on the abundance of redband trout under current conditions and what the goals are in terms of future numbers or distribution would be useful. The same is true for discussion of the anadromous salmonid population, when and if they gain access to the area. A key question is how large of population or adult runs could be expected with various levels of restoration? These numbers, if available or readily obtainable, would provide a useful context.

## **2. Progress to date**

The description of progress to date is quite comprehensive. It would be useful to link those accomplishments to past objectives and describe the extent to which desired outcomes were achieved. The listing of completed projects and the numbers of stream kilometers and hectares of habitat improved sound impressive. It would also be informative to describe how much was accomplished relative to what was planned and funded.

It is difficult for the reader to comprehend the full spatial scope of the project and the full array of accomplishments since 2001. The proposal focuses on 2012-2019. This longer-term view should be provided to improve clarity and completeness of the proposal. The proposal noted that the 2011 Project Submittal defined four deliverables for restoration of a natural hydrologic cycle in the project area. Has the project had the same four deliverables every year since 2011 or have additional deliverables been developed?

The array of progress reports is helpful in understanding progress to date as they provide substantially more detail than is presented in the proposal. The reports provided a number of lessons learned along with some discussion of how they were applied to improve project implementation. The most recent report in CBFISH is the January 2018 report, which summarizes work for 2014 to 2016. A 2020 report that summarizes 2017 to 2019 is referenced in the proposal but is not included in CBFISH. Please provide a link to that report.

In the discussion under Tracking Trends and Status of Redband Trout Demographics and Population Structure, metrics used in Figure 1 and 3 (# fish/100 m) and Table 1 (% survival) lack

expressions for the error of the estimate (e.g., standard error, confidence interval). Sampling conditions and probability of capture and detection vary among sites and within and between years. The error of the estimate for these kinds of data is clearly important. Is it possible to derive these estimates under the existing or proposed sampling plan? If not, what additions to the sampling plan would allow deriving the error of these estimates?

### **3. Goals and objectives**

The proponents have developed an array of both Physical/Biological and Implementation objectives that provide a solid foundation to guide and assess this complex project. In general, SMART objectives are provided; however, there are several limitations, many of which are addressed in the list of requested response items in the overall comments.

It is good to see that the Implementation Objectives for stream improvement activities have explicit timelines for achieving their outcomes. Some objectives have longer-range outcomes, such as the 2030 target date for tree and shrub planting. It would be useful to describe the degree to which the project anticipates the objectives will be achieved within this funding period as well.

### **4. Methods**

While it is good to see that proponents use multiple antennas (arrays in this case) to enable deciphering of direction of movement of PIT tagged fish, it is unclear if the proponents intend to derive the very important metric of probability of detection and the error of its estimation. This can be critically important to track within and between seasons and years as environmental conditions change (e.g., flow, depth) and as the integrity of the detector array changes (e.g., broken antenna, detection ability). Are there plans to derive these additional metrics?

Regarding “Estimating Tributary-Wide Abundances of Redband Trout in Indian Creek” where it is stated that “Abundance estimates will be calculated every five years beginning in 2021 in Indian Creek using summer electrofishing protocols,” it is unclear why this method is limited to Indian Creek and limited to only once every 5 years? Would it not be beneficial to use this methodology in more streams, including reference streams, and in each year during the project in order to track changes in redband trout through time as a measure of action effectiveness?

Regarding the tracking of stream temperature trends in the mainstem of Hangman Creek, it would be useful to know if there are sites that represent reference reaches either upstream of the restoration reaches or in nearby streams that will not undergo restoration treatments? These reference sites/reaches represent an opportunity to account for influences due to large-scale environmental conditions (e.g., drought, region-wide climate factors) independent of restoration/enhancement actions.

The Methods section includes brief descriptions of instream structures, large woody debris additions, floodplain treatments, riparian treatments, and barrier removals being applied in the watershed. The proponents should also describe of what specific treatments are proposed for the 2021-2025 time period is needed. Also, a brief summary of how work during 2021-2025 adds to the array of previous treatments in the watershed would provide additional context for the planned work.

The Assessment and Data Management section indicates that survival of plantings will be assessed at five-year intervals via ground and drone. Detailed descriptions of a sampling design, sampling methods, and metrics to be obtained are not included, but are needed to assess the proposal.

Research Monitoring and Evaluation Methods include descriptions of migrant trout trapping and marking, and PIT tag detection, but the sampling design is not evident. Some insight is derived from Map 5 and information in the 2018 report, but these are not sufficient to comprehend the design for proposed monitoring efforts.

There is a section addressing Spatial and Temporal Temperature Trends. Substantially more detail of the methods is needed to enable a scientific review.

## **5. Project evaluation and adjustment process**

There is a discussion of a process to evaluate and adjust goals, objectives, actions, and monitoring which is conducted at two-year intervals. However, the process for utilization of monitoring and assessment data, as well as decision making relative to project adjustments, is not explained. The proposal needs an expanded explanation of the project's adjustment/adaptive management process.

## **6. Potential confounding factors**

Only two potential confounding factors, adjacent land use and climate change, are discussed. It is possible that additional confounding factors could impact the project, such as spread of westslope cutthroat trout or westslope x redband trout hybrids within the watershed, introduction of additional non-native fish species (i.e., diploid rainbow trout), spread of non-native plants, or cuts in funding. The proponents should more thoroughly describe possible confounding factors and potential actions to ameliorate their effects.

## **7. Timeline**

A table is provided that displays dates and general activity types. It would be very useful to have more detail or linkages describing the timing of important activity elements by project, such as timing of project design, location, implementation, and monitoring.

## **8. Relationships to other projects**

The relationship of this project to Coeur d'Alene Tribe's sister project in the Hangman Creek watershed, Project 200103300, is described briefly. The proposal would benefit from an expanded description of the integration of the two projects and the synergism that is attained. It is likely that some of the questions regarding objectives, methods, and monitoring for this proposal are addressed in Project 200103300.

## **9. Response to past Council recommendations and ISRP reviews**

The proponents provide reasonable responses to four concerns expressed in past reviews: use of MARK, use of single-pass electrofishing to index trout abundance, lack of major channel reconstruction, and lack of temperature data.

In the 2012 Resident Fish/Coordination review, a concern is brought up regarding the integration/design of the PIT tagging locations, recapture of tags, placement of PIT antennas, and electrofishing survey activities. This was not addressed and should be included in the current proposal.

## **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No comments.

## F. Libby and Hungry Horse

### 199500400 - Libby Reservoir Mitigation Restoration and Research, Monitoring and Evaluation (RM&E)

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Montana Fish, Wildlife and Parks (MFWP)

**Final recommendation:** Meets scientific review criteria - conditional

**Final comment:**

The ISRP greatly appreciates the proponents' efforts in responding to our wide-ranging concerns. This is a complex project with many essential components that, collectively, are needed to mitigate for the construction of Libby Dam. Some responses provided clarity on the mitigation activities and justifications for them, but not all concerns were fully addressed, and the responses raised a few additional questions. As a result, several issues require further resolution.

The ISRP requests that the proponents address the conditions below and respond point-by-point to each condition. The response can be a report to the ISRP with detailed answers to each of the conditions, a revised proposal with highlighted changes, or an addendum to a revised proposal. The ISRP's preference is for the proponents to revise their proposal to ensure that the additional information requested is easily accessible by Council, BPA, and the public in a single document. A revised final proposal that includes and integrates all information will guide the project for the next five years and facilitate future project reviews. Understanding the need for flexibility, the ISRP suggests that the proponents and the Council staff agree on a mutually determined date for a response, preferably by the end of 2020 or early in 2021. If additional clarification is needed, the proponents are encouraged to request a follow-up meeting with the ISRP.

**Condition 1. Desired future conditions:** The project needs an overall framework or management plan that provides a program-scale strategy for specific mitigation and monitoring activities that target the primary stressors to attain clearly identified desired future conditions. In other words, one is needed that is directly related to the [1998 loss assessment](#) or the [2004 Kootenai Subbasin Plan](#), but also offers quantitative time-specific milestones to gauge progress. Without that program-scale framework or plan, Libby Dam mitigation appears to be a collection of relatively independent activities rather than a coherent, integrated, and directed effort to mitigate for losses associated with the dam.

The justification for this recommendation is illustrated by the current decision-making process. While a structured decision-making process has been developed for each goal incrementally, details about how adjustment decisions are made for the overall mitigation for Libby Dam, and how often, remain vague. If such a guiding plan exists, it should be clearly articulated in the proposal. If none exists, development and peer review of such a plan is critically needed.

**Condition 2. Justification for the limited spatial scope of some activities:** Some projects have only a limited spatial scope, but the general issues are pervasive throughout the subbasin. For instance, activities planned for Rainbow Lake are very specific and spatially limited whereas the general issues associated with the presence of nonnative Yellowstone cutthroat trout interacting with native redband trout appear to be widespread. The Rainbow Lake activities require better justification, especially if the central issue of Yellowstone cutthroat trout and redband trout abundance is manifested at a landscape scale. The ISRP asks that the proponents scientifically justify how the spatially restricted activities will have significant beneficial effects at a larger spatial scale.

This concern also applies to Goal 4: “Protect and enhance aquatic habitat quality, diversity, and connectivity for resident focal species in the Kootenai Subbasin.” All activities planned for the project period are highly specific and spatially limited, and it is not clear how they will be integrated to address habitat quality, diversity, and connectivity for the subbasin. The proponents should explain why these activities were selected and why they would have the greatest benefits at a larger spatial scale. For instance, if inventories of strategically critical habitats requiring protection or restoration guide the proposed activities, then it becomes clearer that these are next steps in a broader approach.

**Condition 3. Climate and land use change:** Using realistic climate scenarios is vitally important for this project. The project should also incorporate information on ongoing land use changes in the upper basin (including British Columbia) and evaluate how they may affect the lake and river. While the proponents state that they will look into the utility of climate models, the ISRP would feel substantially more confident if they actually identified and used them, or added collaborators to help with “climate” and landscape change processes. The ISRP requests that the proponents prepare a statement outlining specific details on how they will incorporate climate and land use change into their restoration planning and, as part of that process, identify and add the appropriate expertise to aid with climate and land use change issues, if needed.

**Condition 4. Fertilization facility:** Since it is highly likely that a new facility will operate for several decades at considerable costs, the ISRP has a responsibility to review the overall management plan before the site is selected and construction begins. The management plan should describe the criteria for the fertilization site and the reference site, explain why the specific sites were chosen, evaluate the physical characteristic of the reach to be fertilized and any factors that will affect dosing rates (e.g., hyporheic exchange), and state in quantitative

terms the desired outcomes. The ISRP requests that implementation planning for a new fertilization facility be postponed until an overarching plan and adequate supporting data to support the fertilization actions are provided and found to be scientifically justified by the ISRP.

**Condition 5. Donor stock selection:** The proponents indicate that local stocks will be targeted for westslope cutthroat trout reintroduction into Rainbow Lake, but no candidate sources have been identified and risks to donor stocks or downstream populations have not been assessed formally. Even though program design specifications for desired population attributes are presented to some extent in the response to ISRP Question 4, a more comprehensive strategy or design specifications for Rainbow Lake’s westslope cutthroat trout restoration is requested. For example, the proponents provide some density targets for release and a three to five-year timeframe, but it was not clear how these targets were determined. Moreover, since the response suggests an assessment of the “genetic makeup of the [donor?] population,” the ISRP expected to see a completed analysis of subbasin population genetic structure and the potential for hybridization with non-native species. Will this be completed prior to collecting brood? This is an instance where a clear description of methods would strengthen the proposal. The ISRP requests that the proponents consider risk assessment processes, such as Hardiman et al. (2017) and Warnock et al. (2016), which were discussed in the review of the UCUT Reintroduction Report ([ISAB 2019-3](#)). Finally, has a spawning and rearing facility been selected and adequately outfitted along with a well-designed breeding protocol to produce a robust and localized stock of westslope cutthroat trout? The ISRP asks the proponents to thoroughly describe the risk assessment process, which would include information on the donor stock, numbers to be released and monitoring activities, and provide the outcome to the ISRP prior to reintroducing westslope cutthroat trout.

**Final comment:**

The ISRP has an additional concern that should be addressed but does not require reporting back to the ISRP. We emphasize that this is an important aspect of the project and encourage the proponents to work with the funding agency to address it.

**MonitoringResources.org:** The ISRP acknowledges the time and effort required to publish methods in MonitoringResources.org. Since the 2012 Resident Fish Review, the ISRP has strongly recommended reporting of monitoring methods through the online database, which has steadily improved. Published methods described in MonitoringResources.org can provide greater detail for specific applications and serve as resources for other projects. The proponent lists a lengthy set of documents, including several in the peer-reviewed literature and reports available through Pisces, which we applaud. However, assigning a specific method to an objective is not obvious without a description or linkage. The ISRP expects the proponents to publish their methods in MonitoringResources.org and report their progress to BPA in their annual report.

## References Cited:

Hardiman, J.M., R.B. Breyta, C.A. Haskell, C.O. Ostberg, J.R. Hatten, J.R. and P.J. Connolly. 2017. Risk assessment for the reintroduction of anadromous salmonids upstream of Chief Joseph and Grand Coulee Dams, northeastern Washington: US Geological Survey Open-File Report 2017–1113, 87 p. <https://doi.org/10.3133/ofr20171113>.

Warnock, W.G., D.H.P. Stroud and J.E. Merz. 2016. Donor stock selection of Chinook salmon for reintroduction to the Transboundary Reach of the Columbia River. Report prepared for Canadian Columbia River Inter-Tribal Fisheries Commission, December 2016.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

## Overall comment:

This ambitious project aims to redress losses to fish and wildlife from the construction of Libby Dam. While many of the activities individually have merit, the project as a whole lacks coherence. This is evident in the large number of species targeted, the wide range of activities proposed, and a lack of clarity on how they are all related.

## Responses Requested

To help us review this proposal, the ISRP asks the proponents to address the following questions in their response:

1. The ISRP asks for a detailed description as to how all the parts of the proposal are connected into a broader, long-term mitigation strategy. The lack of coherence is especially evident in the Project Evaluation and Adaptation section. Each goal has a different (or no) process for evaluation. At the end of the project period, is this work simply a collection of its parts? Are there any interactions between the different activities that might provide some cumulative benefits (or unintended consequences)? Is there some broader strategy that was used to identify and prioritize these activities as the most important for recovering resident fish? This information will provide some confidence in the overall outcome.
2. Several of the objectives need to be re-stated as SMART objectives. It is important that the objectives explicitly state that the outcomes from the specific actions will be quantified rather than simply implemented, estimated or reduced. For instance, Objective 2a could be improved by stating that the risk of downstream hybridization will be reduced, but to a quantifiable target (i.e., the measurable objective). Likewise, Objective 3a (and several others) could be improved by saying that the relative

abundance, species composition and mean size of fishes annually in Libby Reservoir will be quantified. The words estimate, reduce, increase, and protect are not precise in terms of what will be accomplished by the proposed actions, and the use of those words (and the lack of SMART objectives) preclude effective project evaluation in the future.

3. The ISRP has three concerns about the methods:
  - a. It does not appear that any of the methods are published in [MonitoringResources.org](http://MonitoringResources.org). The proponents should provide a description of the methods that will be published in this online database and a timeline for completing the documentation.
  - b. There must be an impressive data management system in place, but it is not described in this proposal. A summary of the data management system, including data storage, QA/QC, and data availability, is needed.
  - c. For Objective 2b, it is uncertain whether Montana's westslope cutthroat trout conservation broodstock housed at Anaconda State Fish Hatchery is sufficiently specific to the phylogeographic history of the Rainbow Lake watershed. ISRP requests additional information about the complementarity of the brood with the recipient watershed.
4. There seems to be an adaptive management or structural decision-making process in place for each goal. However, the details remain vague about how adjustment decisions are actually made and how often. For instance, while data collected for each goal (via monitoring) are summarized annually (but not always analyzed), it is not clear if adjustment decisions are related to the SMART objectives and how decisions are actually made. The ISRP requests a response detailing the evaluation and adjustment process.
5. Since the benefits for mountain whitefish and rainbow trout were mixed and confounded by other factors in the Idaho portion of the Kootenai, it is not clear why the proponents believe that they will be successful with phosphorus additions. The rationale for phosphorus addition needs to be more fully examined and justified before implementing the proposed experiment.
6. The ISRP would appreciate learning more about potential changes to operations at Libby Dam that may result from Columbia River Treaty negotiations or the implementation of alternative operating strategies outlined in the ongoing Columbia River System Operations EIS. As well, the ISRP was surprised that climate or land use (in BC or otherwise upriver) induced changes were not discussed as confounding factors or

uncertainties. The proponents should provide some justification for their understanding that operational changes are not important, even if beyond their direct control.

7. While the timeline Table provided a good overview of the goals and objectives, there is no time allotted to overall syntheses and analyses, or periods devoted to retrospective analyses and preparation of peer-reviewed publications. These oversights need to be addressed in a response.

The additional questions and comments provided below are meant to strengthen the proposal and do not need to be specifically addressed during the response loop.

### **1. Problem Statement**

The problem is briefly, but well stated. Significance to the 2014 Fish and Wildlife Program, the Kootenai Subbasin Plan, and the 2017 Critical Uncertainties is articulated by the limiting factors and by the RM&E products produced. Following the 2012 ISRP Resident Fish Review of the program's outcomes and results, the Project focused its reporting of progress around four restoration "objectives" (riparian habitats, fine sediment, channel stability, in-channel habitat diversity).

### **2. Progress to Date**

Progress (FY2013-present) was organized around previous objectives. These objectives were vague (e.g., restore tributary riparian habitats), so it is hard to assess progress toward the objectives. It was also hard to understand how some of the original list of objectives (page 3) related to some of the objectives presented later in this section (e.g., page 6). However, the project completed many tasks oriented to those objectives, through several productive partnerships. These tasks include stabilization of streambanks and reduction of fine sediment loads, maintenance and monitoring of previous projects, screening projects, study of N:P on nuisance diatoms and macroinvertebrates, statistical analysis of factors affecting rainbow trout growth, factors influencing burbot decline, use of genetic markers to identify distributions of redband trout and hybridization of cutthroat. This broad collection of completed tasks, impacting a range of species, illustrates the productivity of the project and the benefit of the many collaborations that contributed to this work. However, it was not always clear how this diverse set of tasks were related under a broader strategy.

The project analyzed effects of prior habitat projects focused on modifying channel morphology (e.g., increased pool frequency) for the goal of increasing abundance of resident fish. The monitoring data indicate a range of responses for bull trout, redband trout, brook trout, and westslope cutthroat; specifically, some increased in abundances at some locations but not

others. A post-project flood event and ecological interactions were cited as the cause for the variability, but no evidence was provided to support these findings.

The conclusion that the proponents reached is that it is difficult to link responses in fish abundances to restoration activities and that further monitoring of the projects will not continue. While the decision to discontinue monitoring those particular projects may be reasonable, the conclusion that monitoring cannot detect the effects of restoration actions is problematic. Instead, the proponents might design a restoration program that directly targets specific limiting factors (rather than simply meandering channels and making more pools) and uses targeted methods and metrics for evaluating specific fish responses. That is, the restoration activities should be based on an experimental framework that links limiting factors (e.g., rearing habitat) to particular actions (e.g., side channel reconnection) and specific fish responses (e.g., size and density of juveniles). It is expected that the work identified in this proposal addresses this limitation.

In addition, it was not clear whether and how actions are contributing to the objectives. For example, for some of the RM&E tasks, what are the implications of the results for managing the various species? This may be a result of the vague objectives and the nature of the collaborations that did not emphasize the objectives of this project. In reviewing this section, the ISRP was left with the sense that the project was spread across many species and many tasks, without necessarily making measurable progress on some of them.

### **3. Goals and Objectives**

In general, the ISRP feels that the goals and objectives for this project represent an important improvement over the prior proposal, with objectives that are generally time-bound and measurable and are directly mapped to recovery of resident fish (with some limitations, noted below). The goals are ambitious, including monitoring and restoration efforts within, upstream, and downstream of the reservoir and across species (rainbow trout, redband trout, cutthroat trout, bull trout, and white sturgeon). However, additional clarity on some specific goals and objectives are needed.

For Goal 1, is there a N:P ratio that the proponents are trying to target? Establishing a more direct objective for the fertilization will separate out the controllable (e.g., N:P ratios) responses from those that will be influenced by other factors in the system (e.g., invertebrate densities).

Objective 2b: How will a self-sustaining population be identified and at what level? For example, viability analyses (PVA) often portray in terms of short-term v. longer-term persistence and viability.

Objective 3e: It was not clear why this is needed. Is there a major sediment source upstream or extensive bank instability? Is there some reason to suspect that trout eggs and fry are already harmed by fine sediment?

Goal 4: The ISRP wonders if the reported increase in Brook Trout in Therriault Creek may warrant consideration of an objective aimed at a suppression effort of this non-native species. Objective 4b: “Woody vegetation” needs to be defined, and the proposed “increase” in distribution and abundance specifically identified.

#### **4. Methods**

The proponents are generally using appropriate and modern methods. They appear to be fully aware of emerging technologies that can be used to address the objectives. Nevertheless, the ISRP noted some concerns:

- Objective 1a: The methods need to be further developed to provide basic information about feasibility and approach. For example, will the proponents conduct the work, or hire a consultant? How will pre-fertilization monitoring data be used to establish the effectiveness of treatments? Is it reasonable that fertilization at a single location (as indicated by Objective 1b) will be effective, or will P need to be distributed along the reach? Have proponents communicated with IDFG about their fertilization work at Dworshak to understand the lessons learned there on this complicated and controversial restoration technique?
- Objective 1b: Is there a range of treatments (nutrient loads) that have been modeled to produce the predicted desired effects?
- Objective 1d: The correlations are not convincing that this metric will reliably detect an effect of P fertilization.
- Objective 2a: Proponent might consider the addition of an eDNA monitoring following YCT suppression in and downstream from Rainbow Lake. This approach is being implemented as a sentinel monitoring approach elsewhere in the Flathead Subbasin and might offer lessons-learned regarding design and other features.
- Objective 2c: Are pedestrian surveys the most efficient approach for the habitat assessments (page 18)? How will those habitat surveys be used? Are the bathymetric surveys used only to estimate treatment volumes? If so, is there a reason why existing topography cannot be used for estimating this?

- Objective 4b: It is unclear if a lowered floodplain can be stabilized by willow stakes and seeding. If fine sediment is a concern in this system, a more aggressive approach to stabilizing the exposed sediment is probably warranted. Also, is it possible that something else is impeding woody vegetation other than unusually thick grasses (page 23)?

## **5. Project Evaluation and Adjustment Process**

While the proposal includes a general description of a review process for MFWP as an agency, the text that follows under each goal should include details of how each activity supporting the goal are assessed and adjusted. Unfortunately, the text does not explain that process. For example, under Goal 1, reporting results to BPA in annual reports does not, on its own, constitute project evaluation and adjustment. Goals 2 and 3 seem to have no process for evaluation and adjustment, beyond the environmental review period, where decisions are made by a regional manager or technical staff.

Additionally, there does not appear to be a coherent plan for evaluating the effectiveness of the project as a whole. If this is instead treated as a collection of individual projects, then each project needs a more comprehensive strategy for evaluating its effectiveness.

## **6. Potential Confounding Factors**

The proposal identifies the likely critical confounding factors (e.g., changes in reservoir operations permitting) but does not really indicate how the project might respond to them.

Other potential confounding factors were not discussed. The improvements in Therriault Creek appear to have enabled brook trout to increase. This does not negate the need or value of riparian habitat and sediment remedies, but rather suggests need for additional steps to benefit native species such as a targeted suppression effort. Also, issues of brood source for westslope cutthroat trout re-introduction were identified in the review. While this may not be an issue of grave concern within Rainbow Lake itself, any escapement or further distribution into nearby areas that have remnant westslope cutthroat trout population might lead to unwanted mixing of divergent populations.

The westslope cutthroat trout targeted for re-introduction in Objective 2b are identified as coming from Anaconda SFH. Is this source relying on the M012 westslope cutthroat trout or has a drainage specific set of brood sources been developed (similar to the approach used in the South Fork Flathead)? If not, there may be a loss of local lineage diversity.

## **7. Timeline**

The ISRP found the timeline to be generally adequate.

## **8. Relationships to Other Projects**

There appears to be excellent cooperation. This section lists a number of projects with whom proponents are collaborating by serving on committees and working groups. This indicates that personnel are being shared across projects, and in one case project cost was shared, but it was not clear if or how data or other information were being shared across the projects for the work proposed herein. Are data collected by the proponents made available to the other cooperators and colleagues on a regular basis? If so, what are the mechanisms for data/information transfer?

## **9. Response to Past Council Recommendations and ISRP Reviews**

The proponents responded to prior ISRP comments, though additional progress could be made. For example, the concern around the previous stream restoration project remains, and the proponents could have articulated what lessons they learned from those activities and how those lessons are being applied within this project. The ISRP does have persistent concerns about the work not being submitted for peer-review publication, particularly since this project lacks a technical advisory team or other mechanism for between-proposal review of project results and their impacts to management.

## **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

The ISRP feels the key personnel are well experienced. As well, the Appendices, especially the maps and tables of population conditions, provide a valuable context for the proposed actions.

While the budget is reasonable, it did not specify funds for the implementation of the nutrient addition facilities. The ISRP would expect additional costs associated with meeting this objective.

## 199101903 - Hungry Horse Mitigation Habitat Restoration and Research, Monitoring and Evaluation (RM&E)

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Montana Fish, Wildlife and Parks (MFWP)

**Final recommendation:** Meets scientific review criteria - conditional

### **Conditions:**

While the proponent has made good progress on framing the Goals and Objectives, additional information is needed to clarify several issues. The ISRP requests that the proponents address the conditions below and respond point-by-point to each condition. The response can be a report to the ISRP with detailed answers to each of the conditions, a revised proposal with highlighted changes, or an addendum to a revised proposal. The ISRP's preference is for the proponents to revise their proposal to ensure that the additional information requested is easily accessible by Council, BPA, and the public in a single document. A revised final proposal that includes and integrates all information will guide the project for the next five years and facilitate future project reviews. Understanding the need for flexibility, the ISRP suggests that the proponents and the Council staff agree on a mutually determined date for a response, preferably by the end of 2020 or early in 2021. If additional clarification regarding our review is needed, the proponents are encouraged to request a follow-up meeting with the ISRP.

**Condition 1. Metrics for thermal, flow, and biological benefits:** For Goal 1, the proponent highlights the need to formalize a Hungry Horse Dam operation memorandum with the US Bureau of Reclamation to attain thermal, flow, and biological (zooplankton and macroinvertebrate) benefits. The specific metrics for assessing these benefits are not articulated in the proposal or response. Therefore, the ISRP requests the proponents to identify the desired benchmarks for these benefits and report final negotiated targets in the subsequent annual report as the standard against which the response will be evaluated.

**Condition 2. Linkage between goals/objectives and limiting factors:** The ISRP requests the proponents to present the explicit linkages between the proposal's goals/objectives and the limiting factors caused by the dam's operation as the basis and need for the proposal's activities. As part of its response to the ISRP's request for linkages between the proposal's goals/objectives and the limiting factors caused by the dam's operation, the proponent provide a long list of documents and publications. The ISRP appreciates the commitment to publication, but the connection of these publications to specific limiting factor(s) is not obvious in many cases.

**Condition 3. Priority of Martin Creek:** The ISRP requests an explanation of the criteria used to select the Martin Creek watershed as the focus of suppression over other watersheds within the subbasin. Under Goal 2, Martin Creek is singled out for non-native trout suppression. Is this a priority because of its former status as a core population for westslope cutthroat trout or is it the next or highest priority on a list developed in a previous assessment? Additionally, will piscicide be used for suppression throughout Martin Creek or applied in select reaches? How will rainbow trout and Yellowstone cutthroat trout be prevented from migrating back into the creek? No fish passage barrier is planned as in Objective 2b.

**Condition 4. Non-native rainbow trout suppression assessments:** The ISRP requests the proponents to explain how the project is assessing priorities for suppression of non-native rainbow trout the mainstem Flathead River, North Fork, and Middle Fork tributaries. The proponents could provide evidence for the need for suppression and for the relative priorities of the different reaches. It is not clear whether these assessments are a continuation of previous assessment in the South Fork tributaries or another assessment process. Additionally, under Objective 3a, the response states “Longitudinal sampling at a minimum of two reaches per stream will be conducted to inform conclusions on the number of populations present in a given stream.” The ISRP is unsure what the proponents mean by “to inform conclusions.” We request additional description of the study design, statistical methods, the analytical power, and how it will be used to determine fish population abundance.

**Condition 5. Priority of Wounded Creek:** The ISRP requests the proponents to explain the criteria used to select the Wounded Creek watershed as the focus for estimating life-history parameters over others within the subbasin. We also request some additional description and reference on the utility of the underwater videography at identifying sex and other life history parameters. For Goal 4, why is Wounded Buck Creek singled out for “vital life-history parameters”? Has such information been gathered for other populations, or is this a high priority on a list for a known reason? Additionally, how will the information on vital life history parameters listed in Objective 4a be used? Will the information be quantitative or just “estimated” from video clips?

**Condition 6. SMART Objectives:** The ISRP requests that the proponents reexamine and revise their objectives (where necessary) to ensure they are SMART objectives. Many of the objectives do not meet SMART objective criteria. For example, for Objective 1a, specify the fish benefits to be achieved by the Memorandum of Understanding to maximize fish benefits from optimizing outflow water temperature, which will be verified in a later program review. For Objective 3a (and others, where needed), provide quantitative details on what biological and physical benefits will be achieved through the Memorandum of Understanding in terms that can be evaluated by the year 2025. For Objective 5c, what metrics will be used as a quantitative measure or benchmark of success? Ultimately, the SMART format permits evaluation against

expected benchmarks for adaptive modification of program activities and assessment in future reviews.

**Final comment:**

Additional recommendations: The ISRP offers four additional recommendations for consideration but are not Conditions requiring reporting back to the ISRP.

**1. MonitoringResources.org:** The ISRP highly recommends publishing standard methods in MonitoringResources.org. The ISRP acknowledges the time and effort required to publish methods in MonitoringResources.org. Since the 2012 Resident Fish Review, the ISRP has strongly recommended reporting of monitoring methods through the online database, which has steadily improved. Published methods described in MonitoringResources.org can provide greater detail for specific applications and serve as resources for other projects. The proponent lists a lengthy set of documents, including several in the peer-reviewed literature and reports available through Pisces, which we applaud. However, assigning a specific method to an objective is not obvious without a description or linkage. The ISRP expects the proponents to publish their methods in MonitoringResources.org and report their progress to BPA in their annual report. We emphasize that this is an important aspect of the proposal and encourage the project to work with the funding agency to address it.

**2. Framework for addressing limiting factors:** The ISRP highly recommends the proponents to quantitatively assess the relative importance of limiting factors in light of current and emerging conditions as an amendment to the 1991 Loss Statement and 1993 Mitigation Implementation Plan. In our questions, the ISRP was seeking additional perspectives on how limiting factors have impacted resident fish and the relative importance of each in a quantitative sense. The proponents' response does not describe a plan to conduct a "quantitative, landscape-scale analyses" as requested or indicate whether such analyses exist. Rather, the proponents simply point the ISRP to the 1991 Loss Statement. This Loss Statement is a good starting point, but the relative importance of the limiting factors and the restoration priorities for each likely have changed over the last three decades. For example, the distributions and abundances of non-native species likely have increased. Our recommendation is consistent with the ISRP's recent recommendations in the Review of Hungry Horse Mitigation Retrospective Report ([ISRP 2016-10](#)): "An overall, long-term strategy would provide a structured approach for accomplishing protection and restoration of habitat and ecological processes and effectively linking activities occurring among the three primary limiting factors (Impoundment and Hydro Operations, Physical Habitat Alterations, and Non-native Species Introductions)."

**3. Nutrient loading:** The ISRP recommends the proponents to provide additional information in the nutrient load discussion by presenting plots of the monthly values, rather than means across the four years (2011-2015) and to identify the upstream/downstream locations of the

nutrient data collection. The proponents provide data to explain that the Flathead River system has a lower nutrient load due to underlying geology and they present data intended to indicate the dams are discharging elevated nutrient loads “during most of the year.” However, the data table in their response indicates that SRP is higher in the unregulated reference site (Middle Fork Flathead River) than in the dam releases during critical summer months (April through August). The differences are not large (~ 1 microgram/L) and may not be biologically significant, but it does not indicate that the reservoir is creating elevated SRP concentrations in the Flathead River downstream of the dam during summer. Altogether, these observations raise uncertainties about the justification provided for the objective.

**4. Confounding factors:** The ISRP recommends an ongoing consideration of how subbasin and mitigation activities will respond to changes in climate, land use, and social characteristics of the basin.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP’s questions; see response link and final review above.)*

**Overall comment:**

This longstanding project is a collection of actions and objectives associated with mitigation from Hungry Horse Dam and impoundment. The proponents propose varied Goals and Objectives ranging from coordination through a Memorandum of Understanding , eradicating nonnative trout to assist restoring westslope cutthroat trout, understanding nonnative species biology as a precursor to suppressing nonnative northern pike and trout species, assessing bull trout ecology as a precursor to restoration, and habitat maintenance in several tributaries.

The ISRP commends the proponents and their collaborators (including a large group of co-authors from academia, state, tribal and federal agencies) on an extensive record of publication in peer-reviewed outlets. Such publication provides an enhanced level of rigor, credibility, and value to the underlying science and its application in other areas.

**Response Requested:**

To help us review this proposal, the ISRP asks the proponents to address the following questions in their response:

1. The ISRP requests a quantitative summary (perhaps in a comprehensive Table) to support the statement that there are three primary limiting factors: 1) impoundment and hydro operations, 2) physical habitat alterations, and 3) non-native species introductions. How have each of these factors directly impacted fish communities and riverine ecosystem functions in the Flathead Basin, and what are the root causes of each? For instance, are the root causes social, cultural, or managerial? Based on these

quantitative, landscape-scale analyses, describe if the proposed activities will address the most important issues in substantive ways. A quantitative analysis of what was lost or significantly modified – in ecological terms – would assist in shaping program activities (goals and objectives).

2. A response is requested that describes the linkages between the goals/objectives and the primary limiting factors (see problem statement) that are not fully transparent in the proposal. For instance, food webs below the dam are severely impacted by cemented cobble, altered temperature regimes, and nutrient stripping from the reservoir. Yet, remedying these are not included in the goals/objectives. Describe how (or if) the actions will address the impacts of the dam on the mainstem river as well as the tributaries.
3. Several of the objectives should be revised as SMART objectives. The ISRP expects all objectives to be SMART.
4. During the presentation, the proponents provided an explanation as to why the nutrient trapping issues observed at Libby Dam and in the Kootenai River are not evident at Hungry Horse Dam and in the Flathead River. This explanation is an important consideration for which we request documentation (include in the proposal background).
5. The proponents appear to be using well-tested and peer-reviewed techniques. However, it does not appear that any of the methods are published in [MonitoringResources.org](http://MonitoringResources.org). The proponents should provide a description of the methods that will be published in this online database and a timeline for completing the documentation.
6. Northern pike have invaded Lake Mary Ronan, but no control measures were proposed despite the likely predation on salmonids. Can the proponents explain why research on the biology of pike is a higher priority than control efforts?
7. There must be an impressive data management system in place, but it is not described in this proposal. The proponents should describe the data management system, including data storage, QA/QC, and data availability.
8. While the introduction of non-native species is certainly important, the ISRP was surprised that climate change, land use change, and alterations to social dimensions were not mentioned as potential confounding factors. The proponents should explain why these are not included as confounding factors. If they think these are confounding factors, how will they impact their efforts and how would the proponents respond to these influences?

The additional questions and comments provided below are meant to strengthen the proposal and do not need to be specifically addressed during the response loop.

### **1. Problem statement**

The three primary limiting factors directly impact fish communities and riverine ecosystem functions in the Flathead Subbasin: 1) impoundment and hydro operations, 2) physical habitat alteration, and 3) non-native species introductions.

Because of the disparate nature of the proposed actions and objectives (both in this project and related ones), it is a challenge for a reviewer to completely grasp the overall framework and priorities for the actions undertaken in the Subbasin. This may well be understood among the participating agencies, but the proposal(s) requires an overarching framework.

Considerable literature and expertise on northern pike biology from the upper Midwest can be brought to bear on this issue. Depending on proponent's previous experience with Esocids, it may be valuable to consult experts from Wisconsin, Michigan, or Minnesota DNRs or universities to assist with understanding this species.

### **2. Progress to date**

This project and proposal has benefited greatly from a recent retrospective review and report in 2016 ([ISRP 2016-10](#) and HHM Retrospective Report). While the Progress to Date section provides a bulleted list of progress and reference to the 2016 review, a quantitative summary and a comprehensive table of key milestones would help the ISRP better understand the project's accomplishments.

The genetic swamping strategy has received attention from ISRP in previous reviews of projects associated with westslope cutthroat trout. The proponents indicate that they have data for evaluating its efficacy more fully. We encourage timely analysis and publication of these data.

### **3. Goals and objectives**

Objective 1a (MOU about on operational conditions) does not appear to support Goal 1 (Assess effects of hydrosystem operations). The proponents should modify the objective and include an expected timeframe for completion.

Goal 2 and Objective 2a would benefit from some description of what a future restored westslope cutthroat trout population would look like. A restored (meta-) population would presumably have a range of demographic, genetic, and life-history characteristics. Additional description is needed.

Objective 2b needs revision. Whether here or in the Methods section, some criterion is needed for choosing the stream to receive fish passage (greatest need, ease of implementation, largest effect, or other). It seems like there is an intermediate step of identifying which streams actually need passage, as well as some habitat and genetics work to identify priority streams? This preliminary work is needed before a passage barrier can be justified.

Objective 3a proposes to manually and mechanically remove rainbow trout from priority streams. The ISRP requests additional information on the effectiveness metrics for rainbow trout suppression.

For Objective 4e, the purpose underlying the estimates of habitat quality, while certainly desirable, also needs to be linked to actions. Presumably, candidate tributaries were selected for a reason (occupancy, condition, etc.). A brief qualifying statement would improve clarity.

Objectives 5a-c appear to be a collection of miscellaneous list of maintenance tasks that MFWP is requesting BPA to fund. What is the benefit from such tasks or conversely the risk from deferring such maintenance? Objectives 5a-c would benefit from estimates of when and how much is needed.

#### **4. Methods**

In addition to specific requested information, ISRP identified other issues for the project to consider.

- It is unclear whether the selective withdrawal structure under Method 1 is in place or planned for construction. No timeline is presented for developing the Memorandum of Understanding.
- Method 2b: Few specifics were presented in the proposal or Appendix A about how the barrier will be designed and whether barriers will be implemented on all five candidate streams (and when if this is the case).
- Method 3b: The proposal should justify why research on the biology of northern pike and their predation is prioritized over immediate actions to control them. The ISAB recently completed a report (ISAB 2019-1) that reviews the effects of pike predation on salmonids across a range of locations throughout western North America where they have invaded. Although not in every case, in most cases they are highly predaceous on salmonids. (see ISAB 2019-1)
- If general trends of abundance are needed, could eDNA be coupled with mark-recapture analysis to develop a relationship, so that this information could be obtained by this easier method in the future?

- Method 4e: The objective is written as assessing habitat quality, but the Methods indicate that egg-to-fry survival will be assessed. Is it both? Also, no Appendix F was included in the proposal.
- Method 5c: Reference is made to an annual report for methods, but no specifics or citations are presented.

## **5. Project evaluation and adjustment process**

The project has a history of effectiveness monitoring and program evaluation that is illustrated in the publication record. These efforts appear to have appropriately guided mitigation efforts. The ISRP applauds the contribution of these scientific documents to the region's resident fish programs and holds up this project as an example of what can be done through collaboration among many partners in agencies and academia.

This section outlines a reasonable approach evaluating individual projects but is too general to be evaluated. The response seemed to be specific to the ongoing project components rather than larger scale issues, such as land use change, climate change, changing social values, and the direct impacts of the dam on the Flathead River. If more important issues emerge, how are they incorporated into the activities or the key areas of focus?

For various rainbow trout or Yellowstone cutthroat trout suppression objectives, the ISRP recommends exploring the use of eDNA technologies as an effectiveness monitoring tool. If applied, a robust monitoring design will be needed.

## **6. Potential confounding factors**

Proponents discuss early detection of nonnative fishes as a critical activity for effective suppression. However, it appears that the response to northern pike invasion in Lake Mary Ronan is minimal.

The ISRP agrees that introduction of non-native species is important, but we also note that climate change, land use change, and changing social values were not mentioned as potential confounding factors.

## **7. Timeline**

Objective 1a. When is the memorandum expected to be in place?

No legend is provided for the color coding in the chart.

While the timeline table provided a good overview of the goals and objectives, there is no time allotted to overall syntheses and analyses, or periods devoted to retrospective analyses and to preparation of peer-reviewed publications. These should be addressed in a response.

## **8. Relationships to other projects**

This project states a link to Project 199101904 (Creston NFH), yet that proposal has no activities associated with this proposal (specifically, for bull trout reintroduction). Please include some discussion as to this coordination and relationship, in addition to those discussed in the proposal.

Also, there is an important linkage to Project 201900100 (Sekokini Springs Conservation Hatchery) associated with westslope cutthroat trout restoration that needs to be described. Specifically, during the presentation it was mentioned that there is now a data set available to evaluate the "Genetic Swamping" approach in the recipient lakes. In previous reviews, the ISRP has expressed uncertainty over the validity of the approach as untested or unsupported in the mainstream scientific literature. ISRP encourages timely analysis and publication of the data on this approach.

The proponents have good relationships with other projects in the Subbasin. Additional description is warranted of the complex web of cooperation with other agencies in the Flathead Subbasin (National Park Service, US Forest Service, US Fish and Wildlife Service, US geological Survey, Department of Natural Resources Conservation, BC Ministry of Environment), universities, and NGO's (Whitefish Lake Institute, Trout Unlimited, Flathead Wildlife, Inc., Backcountry Horsemen, Audubon, Flathead Lakers, etc.), especially with respect to data sharing and to leveraging cost-share opportunities to further Fish and Wildlife Program goals and objectives. This information could be provided in an appendix or summary table.

## **9. Response to past Council recommendations and ISRP reviews**

The recent retrospective (2016 HHM Retrospective Report) and evolving goals demonstrated that the project considered and responded to ISRP reviews and recommendations. The previous review had noted that there is a benefit to "evaluating how past actions and evaluations could be used to guide future directions for HHM activities. More discussion is needed on what has been learned at both project and program scales." That need persists in this proposal. How has prior work informed the proposed actions? More broadly, what strategy is leading the prioritization of work in the subbasin and this proposal?

## **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

These sections are adequate

## 201900100 - Sekokini Springs Hatchery

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Montana Fish, Wildlife and Parks (MFWP)

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The ISRP appreciates the thoughtful responses from the proponents regarding our requests for more information and clarity. The overall program supported by the Sekokini Springs (Conservation) Hatchery remains unique in its steadfast principle of maintaining native westslope cutthroat trout meta-population structure and diversity by targeting locally adapted lineages to replace eradicated non-native rainbow trout and downstream introgressed hybrid populations. The ISRP notes that the proponents' response no longer references "genetic swamping" as an approach, given its unproven benefit and performance.

The ISRP requires no immediate or further response during this review cycle, but we identify several ongoing issues and recommend that the proponent continue to address these to achieve its restoration goals.

**Recommendations:**

1) Develop and document a comprehensive breeding plan that will be used to produce young for release. At present, the details of the breeding plan focus on a 3x3 matrix spawning design, "equalizing" breeding lots (i.e., cells of the matrix), and implementing a "naturalized" rearing environment. The proponent further indicates they have no breeding protocol beyond the 3x3 matrix spawning design. The ISRP highly recommends constructing such a protocol with the aid of internal and external geneticists as soon as is practical. Such a protocol (or an updated Hatchery Genetic Management Plan - HGMP) would greatly strengthen the program's goal toward producing (and releasing) trout in a manner complementary to local and viable populations. An HGMP was included with the Three Step Master Plan but appears to have a few elements that have changed since it was written. The document should be included in the next Annual Report.

2) The ISRP recommends consolidating specifics about terminating releases of propagated trout into recipient watersheds and collection of juveniles from donor sources. The proponent responded that the release of propagated trout will cease when population demographics are similar to those before non-native and hybrid eradication and when genetic characteristics of the recipient population reflects established diversity goals. This response indicates that a

strong monitoring program for demographics and genetic variation is needed. The proponent indicates these demographic and genetic characteristics are outlined in Whitely et al. (2017), although such goals (or more appropriately numerical benchmarks with means, variances, or ranges) were not presented. Potential “stopping rules” for success or lack of success are critical elements of a breeding protocol (or revised HGMP). The proponent also provides a well-considered criterion and rationale for choosing donor sources, as well as for ceasing capture of juveniles for breeding if it is having an impact. These stopping rules may be scattered throughout the proposal, but consolidating them in a single section would improve transparency. During the presentation in March, the proponent also suggested ceasing when a population becomes self-reproducing – an ultimate goal for each recipient drainage. The proponents should provide either a link to Whitely et al. (2017) or append the document to the proposal along with any more recent information or analyses.

3) The proponents’ response raises a potential issue that needs clarification. The proponents’ response indicates there are three options following non-native and hybrid eradication in targeted waters: “1) do not replant and leave water bodies fishless; 2) plant fish from the Montana’s captive westslope cutthroat broodstock; or 3) use local, aboriginal donor populations as sources for establishing self-sustaining conservation populations.” As stated, Option 1 may imply the recipient water bodies were naturally fishless. If this is correct, additional information is required to justify the ecological risks to other native aquatic fauna such as amphibians and aquatic insects. The core principles of the Council’s Fish and Wildlife Plan calls for actions to be developed and implemented within an ecosystem context. The ISRP specifically recommends documentation of which planned water bodies were naturally fishless, which water bodies will remain fishless except for natural colonization, and how the water bodies will be monitored for range expansion. If this is an incorrect interpretation, please document the information in the next annual report. The ISRP ultimately seeks to avoid trading one kind of risk to fish for another kind of risk to other aquatic fauna such as amphibians and other members of the aquatic communities.

4) Water quality monitoring for key characteristics should be appended to the final proposal. These water quality tests and data appears extensive and appear to be collected on a routine basis. They will provide an important baseline for future comparison.

5) The linkages to M&E with other projects in the subbasin should be well documented in the proposal and in future annual reports. For example, while the proponents’ response indicates a number of good criteria addressing protection of donor stream populations, it is critical to identify who specifically is monitoring the donor populations and what methods they are using.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The Sekokini Springs Hatchery (conservation aquaculture program) is now operational after having completed Master Plan review and facilities retrofitting. The facility will propagate offspring for mitigation stocking of drainage-specific lineages of westslope cutthroat trout of the South Fork Flathead watershed. The project is closely related to other mitigation projects in the Subbasin whose goals and actions are aimed at securing the metapopulation structure of native westslope cutthroat trout. A chief benefit of the drainage-specific approach is that it alleviates a number of the risk trade-offs and concerns associated with the MFWP's potential use of the M012 captive brood line.

As a result, it is critical to ensure well-conceived breeding strategies that address disease transmission, mixing, and the erasure of meta-population architecture, domestication selection overwhelming natural selection, and allele or heterozygosity loss associated with low breeder numbers. Moreover, naturalized diets, rearing densities, and water conditions that mimic recipient waters to the extent practical – potentially lowering production in-hatchery – are expected to increase survival and adaptation to conditions in the release lakes potentially leading to self-sustaining natural production.

**Response Requested:**

To help us review this proposal, the ISRP asks the proponents to address the following questions in their response:

1. The proponents should describe the breeding protocol (beyond the 3x3 matrix description) being used that includes specifics on current and planned trout lineages that will or are being used.
2. Also, the proponents should include some consideration for “stopping rules” for the current and future recipient lakes. For example, what is the protocol if a lake achieves either a self-sustaining population or conversely fails to support trout? If these are not presently available, then consider adding an objective to convene a panel of experts from Montana Fish Wildlife and Parks, US Geological Survey, University of Montana, Montana State University, and others to develop such a protocol. A 2005 Hatchery Genetic Management Plan was included in the Three-Step Master Plan review. It requires updating to reflect the current state of knowledge about breeding genetics, meta-population characteristics, and any changes to operations not foreseen when originally submitted.

3. It appears that once developed, the brood lines are captive. Please explain if there is replacement from the wild on a rotational basis to diminish any potential domestication effects. If so, what are the decision points as to when and how many additional wild fish might be rotated into a brood line to ensure natural selection to wild conditions is the primary driver of adaptation?
4. Provide information on the disease and water quality testing protocols that are being employed. Also, include a description or tables that provide information on fish health and water quality parameters observed by the project in the past.
5. The proponents indicated there is some concern with donor stock abundance as a rationale for stopping brood removal and development. Therefore, a risk assessment and set of decision rules for population demographic and genetic impacts on donor systems associated with removing individuals for brood development is needed.
6. As the project matures, additional M&E of recipient waters will be needed. Linking this project to M&E undertaken through other Projects (e.g., projects 199101901 and 199101-03) is warranted. What biological and physical characteristics of recipient streams will be monitored?

The additional questions and comments provided below are meant to strengthen the proposal and do not need to be specifically addressed during the response loop.

### **1. Problem statement**

Project 201900100 is a new project operation of the conservation hatchery program for Flathead River Subbasin's westslope cutthroat trout. Other related projects in the basin (i.e., 199101901 and 199101903) have objectives for hybrid (westslope cutthroat trout x rainbow trout or westslope cutthroat trout x Yellowstone cutthroat trout) suppression or eradication followed by re-introduction of tributary-specific and lineages of trout to be propagated at the Sekokini Springs Conservation Hatchery.

The Problem Statement is similar and appropriate to those throughout the basin (i.e., 199101901 and 199101903) and falls under mitigation for Hungry Horse Dam installation, impoundment, introduction of nonnative species, and associated watershed habitat alterations above and below the dam. The reader learns only that conservation aquaculture is one of the tools used to mitigate for fisheries losses owing to Hungry Horse Reservoir. The problem that this conservation hatchery is intended to solve is not immediately and clearly stated up front. The proposal would benefit from stating this early in the Problem Statement.

## **2. Progress to date**

Much of the progress-to-date has been focused on facility renovation at Sekokini Springs Conservation Hatchery, which was required for securing water sources and to achieve production goals. Regarding the Facility Construction and Renovation section, a list of “completed objectives” is given, but it is not clear if objectives were not completed.

Initial broodstock development and production has focused on several lineages (including Danaher, Young's, Sullivan, and Emery creeks). For each lineage, the offspring have been analyzed/monitored for the effective transmission of genetic variation between brood and offspring. However, some additional text would clarify how these sources of wild cutthroat trout were chosen. For example, do these have distinctive life history adaptations or were they among the relatively few monophyletic/non-introgressed populations?

Also, the proposal's short description states, “To date, westslope cutthroat trout from six genetically distinct drainages are used to produce individual sources of fry to stock water bodies following piscicide eradication of nonnative trout.” This statement is difficult to reconcile with the text description solely focusing on Young's and Danaher creek lineages. Will brood lines from the other four sources be developed and propagated in the future? If so, some description of the plan is needed.

In the Fish Production section, it is stated: “Maintained the genetic integrity of the donor stock during spawning and incubation. Three males were crossed with three females to create nine crosses, thereby reducing the loss of contributions from any fish due to the failure of another to reproduce.” Can the proponent provide evidence or citation for such retrospective analyses, such as metrics, that demonstrate the effectiveness of how well that “the loss of contributions from any fish” was reduced?

## **3. Goals and objectives**

Goal 1 and associated Objectives focus on the operational integrity of the conservation aquaculture/hatchery facility. All are aimed at maintenance. Is it expected that no new facilities are to be implemented in the near term?

Goal 2 and Objectives focus on production of drainage-specific lineages for release/reintroduction into targeted lakes following hybrid or nonnative species suppression/eradication. Objectives include interrogation of offspring for allelic richness and for presence of alleles from non-native species (followed by culling hybrids). While there clearly has been some thought given to a breeding strategy, has there been an updated genetics and breeding plan beyond the 2005 Hatchery Genetic Management Plan that was appended to the Three-Step Master Plan (or perhaps as experiments)? If so, this ought to be included as Appendices.

Is the long-term plan to end fish releases to waters identified in Table 1 after 2029? What are the sources of the lineages to be introduced into different water bodies in Table 1 (a separate column, perhaps)?

Regarding Objective 2e - "Test all or, at a minimum, 60 adult spawners from each donor source for reportable fish pathogens." If disease is found in one or more of the first 60, then are all spawners tested retroactively? How many spawners have had disease problems in the past, on an annual basis? What is the protocol, if and when disease is detected?

For Objective 2f - many of the lakes are slated for stocking large numbers for all 10 years of the plan, ranging from 5,000 to 45,000 fry. If self-sustaining reproducing populations are established before the end of the current plan horizon (in 5 years, for example), will this be assessed and the level of stocking modified? During the presentation and subsequent follow-up, it was alluded to that several of the recipient lakes experience natural production and lakes that could achieve sustainable reproduction would be removed from further releases. If this is part of the decision process, please document a potential decision point.

For Objective 2g - "Raise a minimum of 60 fry in hatchery and rearing ponds (120 total) for 12 months for annual hatchery facility disease testing." Have there been disease problems in the past? A table showing annual detections of disease (type and severity of infection) would be appropriate. What is the protocol for when disease is detected in fry?

#### **4. Methods**

A documented (and externally reviewed) breeding plan appended to the document would benefit the Methods presentation. For example, the description of the spawning and incubation includes a 3x3 matrix of females to males to maximize the number of half-sibling crosses. The number of breeders that are used each year (or generation) will likely influence allele losses (drift). Therefore, including targets for the number of 3x3 matrix sets will inform whether there is any rationale for "replenishment" of brood with additional wild fish from the source.

The proposal states, "A representative genetic sample is collected from 60 fry prior to stocking to compare with the genetic data from the parents. The amount of decrease in mean expected heterozygosity and mean allelic richness between generations is the main parameter used to determine the degree of project success." How does such information trigger any change in action (adaptive response)?

A short description, a reference in [MonitoringResources.org](http://MonitoringResources.org), or an appendix of the disease sentinel protocol and the water quality protocol would benefit the proposal. Furthermore, the proposal states, "Water samples are collected from the hatchery effluent when the greatest amount of feed is used during the spring and again in the fall," which includes a number of

applicable water quality tests. A statement or short summary table of the water quality track record would be beneficial, especially if there are routine departures from desired levels.

## **5. Project evaluation and adjustment process**

As the project progresses, there might be a need for M&E of the recipient lakes, especially for population, performance, and genetic characteristics relative to expectations. These may be included Projects 1991-019-01, 1991-019-03, or other projects. If so, they should be referenced and linked in the Sekokini Springs project to allow cross-referencing.

The proposal's Short Description states, "To date, Westslope Cutthroat from six genetically distinct drainages are used to produce individual sources of fry to stock water bodies following piscicide eradication of nonnative trout." Elsewhere, four South Fork Flathead sources are identified (Danaher, Youngs, Sullivan, and Emery creeks). What are the other two lineages? Is there a goal or limit to the number of lineages that will be produced over the life of the project or other identified time frame?

The proponents report, "During the project development process, quantifiable success criteria and evaluation check points are established and used for making adaptive management decisions." However, none of these criteria are detailed in the proposal.

## **6. Potential confounding factors**

Perhaps the biggest confounding factor emerges from either incomplete eradication of introgressed hybrids from targeted waters or subsequent re-introductions of rainbow trout or other non-native trout by well-intended, yet unauthorized parties. Therefore, securing the donor sources and ensuring some redundancy of recipient waters will anticipate such hazards.

Regarding using donor sources (e.g., initially Sullivan Creek, switch to Emery Creek in 2019) as a source for fish to be raised and released elsewhere, what information is available on the strength of the donor population and whether removing fish from these sources constitutes a threat to these populations? As the program matures and progresses, potential for impacting source populations from removal for brood production (so called, brood mining) will be a potential risk trade-off that will need to be addressed.

## 7. Timeline

The project timeline appears appropriate for this segment. Table 1 shows releases through 2029. Is it the intention of the Project to transition to other sources and tributary populations waters at that time?

## 8. Relationships to other projects

As the project progresses, there might be needs for M&E of the recipient lakes, especially for population, performance, and genetic characteristics relative to expectations. These may be included in Projects 199101901, 199101903, or other. If so, they should be referenced and linked in the Sekokini Springs project.

## 9. Response to past Council recommendations and ISRP reviews

While this project has a new number since the last review and retrospective ([ISRP 2016-10](#)), it is a longstanding project and has a history through the Master Plan Three-Step review process. It would be appropriate to summarize the pertinent recommendations and responses in this proposal in addition to referring to a secondary document.

## 10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)

As the project proceeds, appending breeding, genetic, disease, and water quality protocols would be important considerations and additions to the Project.

### 199101904 - Hungry Horse Mitigation-Creston Hatchery

- Box: [Original proposal](#) and [Response](#)

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

**Final recommendation:** Meets scientific review criteria - conditional

#### **Conditions:**

Although the ISRP appreciates the proponent's effort to address ISRP's questions, the proponent's response does not adequately address the ISRP's concerns and lacks necessary scientific basis and supporting data. Much of the response largely restates the proposal's text. The ISRP recognizes the project's role is to produce trout for stocking by collaborating with tribal and state fishery departments for their use in subsistence and recreational harvest. However, its role in addressing the 1991 Loss Statement and 1993 Mitigation Implementation Plan is not reflected in the proposal or response.

As a put-grow-take production project to provide subsistence and recreation fisheries to tribal and state constituencies, several fundamental fishery science elements of the project are critical for review. Ultimately, the proponents and collaborating agencies need to develop an integrated program framework, one that includes in-hatchery, recipient water body, and user considerations.

The ISRP requests that the proponents address the conditions below and respond point-by-point to each condition. The response can be a report to the ISRP with detailed answers to each of the conditions, a revised proposal with highlighted changes, or an addendum to a revised proposal. The ISRP's preference is for the proponents to revise their proposal to ensure that the additional information requested is easily accessible by Council, BPA, and the public in a single document. A revised final proposal that includes and integrates all information will guide the project for the next five years and facilitate future project reviews. Understanding the need for flexibility, the ISRP suggests that the proponents and the Council staff agree on a mutually determined date for a response, preferably by the end of 2020 or early in 2021. If additional clarification regarding our review is needed, the proponents are encouraged to request a follow-up meeting with the ISRP.

**Condition 1. Framework for production and pond stocking:** The proponent and collaborating agencies need to document an integrated program framework for the proposed production and pond stocking. Such a framework should identify mitigation needs for the proposed trout production based on the Hungry Horse Dam Loss Statement and subbasin planning documents. Simply stating that the recipient is pleased with fish received or that those entities address monitoring and evaluation does not provide evidence for the ISRP to determine if the proposed actions meet scientific criteria. The proponent describes a feedback-loop that is solely dependent on the recipient agency's satisfaction with the product. Do the Creston National Fish Hatchery and the parent agency, US Fish and Wildlife Service, have internal criteria that must be met (e.g., conservation concerns, nonnative fish containment, disease containment) before production starts and before fish are released into a body of water? The ISRP requests the proponents to answer these questions, including criteria by which they will be evaluated, in a revised proposal or report to the ISRP.

**Condition 2. SMART Objectives for in-hatchery production:** The ISRP requests the proponents to provide SMART objectives for in-hatchery production (see original Council proposal guidance for how these are structured) but also to describe their recommended performance metrics for trout harvest and angler-use after distribution and release into ponds and their plan for summarizing these outcomes in annual reports after they receive information from recipient agencies. Ultimately, these need to address what specific characteristics are used to evaluate the overall program success and identify when and if adjustments to program activities are needed.

**Condition 3. Quantifiable objectives for triploid rainbow trout production:** The proponents should provide specific quantifiable objectives for triploid rainbow trout production. For example, when will it be implemented, what will be the source of tested and certified eggs, and what standard of certification for triploidy will be used (e.g., >99%?). This change in the hatchery policy is a logical time to revise objectives. Also, provide additional information on the source and strain of the westslope cutthroat trout.

**Condition 4. Retrospective analysis of stocked fish performance:** In cooperation with agencies that receive fish from the Creston Hatchery, the proponents should include a retrospective analysis on the performance of distributed and stocked fish for the next annual report. The ISRP recommends that this report include estimates of the numbers of fish produced, survival rates in the hatchery from egg to stocking size, stocking numbers in individual ponds, survival rates and number to catchable size, harvest estimates, total catch or catch per effort of catchable size on an annual basis (and any hold-over fish from previous years), and estimates of cost-to-creel. In the absence of such data and analysis by the receiving agencies, the proponents and collaborating agencies should describe specific objectives and monitoring methods to assess performance during production and after release in the revised proposal or report submitted to the ISRP.

**Condition 5. Fish health screening methods:** The proponents should provide additional details on fish health screening, such as what health tests are conducted. The ISRP requests the proponent to provide links to entries in [MonitoringResources.org](http://MonitoringResources.org) or references for standard fish health methods and hatchery guidelines. Statements such as "Fish health is monitored on a daily basis. Annual fish health exams are performed on an annual basis. All disease tests come back negative" provide little scientific information (e.g., what fish health exams are being conducted daily and annually), no data or analysis, and little indication of what health screening is being conducted and what performance criteria are used for evaluation.

**Condition 6. Bull trout production:** The ISRP requests the proponent, with assistance from receiving agencies, to describe the details for the bull trout production at Creston National Fish Hatchery in a revised proposal or report. The ISRP requests information on current donor source(s), breeding/spawning protocol or design (e.g., single pair spawning vs. a matrix spawning vs. gamete pooling vs. other). If this information is more appropriately described and included in a different program's proposal, it should be reported there but cited by this program.

**Condition 7. Angler-use assessment:** The ISRP requests that the proponents collaborate with receiving agencies to assess angler-use. Angler preference and motivation surveys are relatively straightforward assessments that should be conducted and informed by the recipient agencies to address the assumption that pond fisheries relieve fishing harvest pressure on native fishes in the wild. The proponent provides no data or scientific references to support this assumption,

especially for fisheries in the Rocky Mountain region. Simply referring to a statement on the Ontario Ministry of Natural Resources website, with no linkage to the website or analysis to support the claim, is insufficient evidence to justify the proposal. The proponent should develop a justification for producing trout for a put-grow-take fishery as part of the Hungry Horse Dam Loss Statement and mitigation response based on quantitative information collected by the project and its collaborating agencies.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

In general, the proposal is well written and describes a stocking program to provide angler opportunity and reduce negative effects on native fish stocks. The proponents need to explain how their project is coordinated with Project 1991-019-04 and describe the justification and linkages of the project within a broader mitigation framework for Flathead River Subbasin. It needs to demonstrate that it is consistent with both providing fishing opportunity and conserving and restoring native assemblages. As presented, the rationale, justification, and evaluation for the project are not sufficiently supported with analysis and results based on science.

**Response Requested:**

To help us review this proposal, the ISRP asks the proponents to address the following questions in their response:

1. The current proposal describes few results of past reintroduction efforts. The proposal lacks a logic path for deciding the choice of species produced, their source and disease status for eggs, or the targets for production based on objective criteria.
2. The proponent and its collaborators need to develop a more complete presentation of analysis and results (originally requested in the 2012 Resident Fish Review). In the Hungry Horse Mitigation Retrospective Report (HHM) (see pp. 61-2), they suggest that the data and analysis are being collected or may exist already for within-hatchery and after-stocking performance. The proponents should provide this information if it is published or indicate how they will produce this analysis and synthesis if it does not exist.
3. Elements are missing, such as objective measures of 1) performance (e.g., disease and mortality on an annual basis) and 2) whether the fish stocked are meeting the intended objective of providing angler opportunity and reducing the effect of angling on conservation stocks. Although the receiving agencies, MFWP and CSKT, may be responsible for evaluating such things, it is the responsibility of the proponents of this

proposal to explicitly show that this project is critical to achieving goals and objectives in the Subbasin and that a robust evaluation of effectiveness will be in place. Such analyses and results reporting, along with specific M&E methodologies was absent from the current proposal (including links to documents, cited references, and MonitoringResources.org entries). Please provide these in a revised proposal.

4. The proponents hypothesize that pressure on sensitive stream populations is reduced by directing fishing and harvest opportunities at fishing lakes. The ISRP requests a summary of existing data or literature based on empirical data that demonstrates the extent of this change in fishing pressure.
5. Justify the inconsistency of producing and stocking nonnative rainbow trout in a Subbasin where agency biologists endeavor to eradicate nonnatives and hybrids and prevent new invasions. Also justify using the M012 captive brood source rather than drainage-specific westslope cutthroat trout brood source. If such stocking is part of a broader strategy, please provide a linkage and a succinct summary.
6. The proponents should provide details on the planned production of bull trout for restoration in Glacier National Park and other locations in the Subbasin. For example, Project 191-0199-04 (Goal 4 Objective) indicates that Creston National Fish Hatchery will be responsible for producing a bull trout brood stock to produce fish for reintroduction in waters under purview of Confederated Salish-Kootenai Tribes. No mention of this action/objective is mentioned in this proposal.
7. Stocking of nonnative rainbow trout and genetically mis-matched M012 westslope cutthroat trout in the Subbasin is inconsistent with the goals of eradicating nonnative trout and preventing hybridization. Any stocked fish that are not sterile represent a risk if they escape or otherwise are translocated illegally. The proponents should describe these risks and how the management policy is protects native fish.

The additional questions and comments provided below are meant to provide context to our response requests and to strengthen the proposal and do not need to be specifically addressed during the response loop.

### **1. Problem statement**

The Problem Statement provided is a basic-level description of watershed modification due to construction and operation of Hungry Horse Dam; impacts to the native fish community associated with introduction of nonnative species; and mitigation for loss of fisheries opportunities to tribal and recreational fishers. Ultimately, justification is absent for why producing hatchery trout (half of which are non-native rainbow trout) is a suitable substitution for the opportunity that a viable native species assemblage might provide.

This project has been partly justified as one that redirects fishing pressure away from native fishes of conservation interest (i.e., bull trout and westslope cutthroat trout) as a mitigation strategy for native fish loss from Hungry Horse Dam's construction and operation. As stated in the proposal, "The primary intent is to redirect recreational fishing pressure and harvest away from populations of conservation or restoration interest." The ISRP has consistently sought some evidence for this claim as strategy. What evidence is there from this project or from the literature that creating fishing for stocked rainbow trout in ponds has any effect on angler effort in rivers and streams supporting native trout?

As indicated by other projects in the Flathead River Subbasin, considerable effort and focus are now being directed at recovering bull trout and conserving remnant westslope cutthroat trout. Building sustainable and fishable populations is consistent with the Fish and Wildlife Program; however, stocking of non-native (in the case of rainbow trout) or genetically mismatched (in the case of M012 westslope cutthroat trout) fishes has widely been recognized for its impacts to native assemblages. Would this not create another source of nonnative trout risk in proximity to populations of native trout? Would it also not reinforce desire by anglers for a nonnative species known to be problematic elsewhere in the Subbasin and encourage illegal spread?

## **2. Progress to date**

In its 2012 review of Project 199101904 (including preceding reviews), the ISRP requested additional information about the program's M&E including a summary of performance for the produced fish in the hatchery and for stocked trout out in the receiving waters, respectively. In its 2016 review of the HHM Retrospective Report (see [ISRP 2016-10](#)), the ISRP deemed that the "qualification" for monitoring the program was "satisfied" because collaborating agencies (CNFH, MFWP and CSKT) indicated that they were collecting information about the program and that analyses were being undertaken.

This judgment was based, however, on the expectation that a more complete analysis and set of findings (in consultation among the collaborators) would be reported in subsequent proposals and reviews. However, such analyses and results reporting, along with specific M&E methodologies were absent from the current proposal (including links to documents, cited references, and MonitoringResources.org entries). Please provide these in a revised proposal.

## **3. Goals and objectives**

Two primary operational objectives are provided: 1) produce 100,000 rainbow trout for stocking into fishing ponds and 2) produce 100,000 westslope cutthroat trout for stocking into non-core westslope waters.

As with all artificial production objectives, the ISRP routinely evaluates the rationale for proposed production levels. Is the level proposed to meet some survival, return-to-creel, or

other criterion, or is this a set of numbers that can be produced with given raceway capacity? If and when this hatchery cannot meet production targets, are there other hatchery facilities that can provide fish for stocking? If so, do these other hatchery facilities have similar protocols and commitments to provide similarly robust and disease-free fish? Is there a set of protocols to deal with this potential issue?

Stocking of nonnative rainbow trout and genetically mis-matched M012 westslope cutthroat trout in the Subbasin is inconsistent with the goals of eradicating nonnative trout, preventing hybridization, and conserving the population genetic architecture of native species. Any stocked fish that are not sterile represent a risk if they escape or are otherwise translocated illegally. Has this risk been quantified? What plans have been made to address it if escapes occur?

The word “optimal” is used a number of times, such as “provide optimal fish health and rearing conditions to produce quality trout”, and “Ensure the quality of released fish is optimal.” Are there measurable levels of what constitutes optimal and less than optimal? If not achieved during a given year, is there a protocol for no release or for culling fish if they do not meet standards?

#### **4. Methods**

The source of the rainbow trout eggs is not provided, nor is the disease-free status of that source provided.

The source of the westslope cutthroat trout eggs is not provided (although, the HHM Retrospective Report indicates that they are secured as M012 captive brood – presumably from Washoe L./Anaconda State Fish Hatchery).

Regarding the objective: “Receive as eyed eggs from disease free certified facility.” Provide a link to a protocol or plan for the case where the formerly disease-free provider facility has an emergent disease issue or fails its disease-free status.

Regarding the objective: “Rear up to 100,000 rainbow trout and 100,000 westslope cutthroat trout fingerlings in appropriate rearing units to stocking size,” how adaptable and willing is the hatchery to decrease these numbers during any one year to ensure that what fish are raised meet requested size and condition?

#### **5. Project evaluation and adjustment process**

Absent is any adaptive decision loop for shaping (size, species, demand, and so on) the production program. The fate (for example, catch-rate, return to creel, and overall catch efficiencies) for produced trout is absent. Therefore, sizing the production does not appear to be driven by demand-side metrics, but rather by production-side capacity. Beyond the decision

to abandon producing kokanee, little evidence is presented that the program has changed in response to management needs or demands, nor how such alterations might be decided.

## **6. Potential confounding factors**

As identified in previous reviews, production and release of nonnative rainbow trout in the subbasin poses the risk of their escape and hybridization with native westslope cutthroat trout. Although acknowledging the rainbow trout produced by Creston NFH are targeted for stocking in closed basin lakes and waters outside the core areas for westslope cutthroat trout, is there a risk of accidental escape or illegal translocation? What evidence can be provided that the risk has been addressed by management biologists, and is very low?

Regarding the statement that: “There are no limiting factors to discuss at this time that have negatively impacted or may reduce future success for this project,” does not the reliance of production planned by this project depend on receiving a specific numbers of eggs, from a disease-free facility, constitute a potential confounding factor in that it is not under the internal and direct control of this project?

## **7. Timeline**

Disease testing and monitoring is not shown on the timeline. Is disease monitoring a regular part of this project?

## **8. Relationships to other projects**

Project 19901901 (see Goal 4; Objective suggests that Creston NFH will be responsible for producing a Bull Trout brood for re-introduction in waters under purview of CSKT. No mention of this action/objective is mentioned in this proposal.

The ISRP has requested in past reviews that a comprehensive plan or overview be provided or developed. No such document has been provided, nor is there evidence that this effort has been undertaken.

## **9. Response to past Council recommendations and ISRP reviews**

In its 2012 Resident Fish Review, ISRP requested:

“The ISRP requests that proponent provide:

A copy of, or a link to, the specific plan used by the cooperators to monitor and evaluate the program’s progress. See comments below for specific information requested in the plan. In the event such a plan is not presently available, the ISRP will recommend to the Council that such a plan be jointly developed among cooperators within 12-18 months.

A copy of, or link to, the summary report of the program's results to date for the metrics identified in the plan such as production characteristics including size, numbers, and health assays, as well as an historical accounting of lakes that received stocking, post-stocking performance such as growth and survival, and angler-use and harvest characteristics, for example angler effort, total catch, CPUE, percent return to creel, or others as appropriate.

Evidence to evaluate the hypothesis that by directing fishing and harvest opportunities at fishing lakes, pressure on sensitive stream populations is reduced. Evidence might be data-driven analyses or a literature review of empirical data that demonstrates the extent of this redirection."

As a result, during the 2016 HHM Retrospective Report and Review ([ISRP 2016-10](#)), some additional information was provided. The ISRP deemed the qualifications were satisfied with the expectation that more detailed analysis and results reporting would be included in future proposals and reviews.

Issues raised in previous reviews were not fully addressed in the current proposal. Rather, the proposal states, "Both MFWP and CSKT feel the sampling they do of the closed basin fishing lakes under their management is adequate to meet fishery objectives. They perform random fish sampling and checks to determine species composition and survival and make creel census to determine angler use, catch rate and fishing preference." As such, there will be data and analyses from CSKT and MFWP to support this contention. These should be documented or appended to a revised proposal. The ISRP recognizes CNFH staff may not possess data directly relating to performance of stocked fish, but according to HHM Retrospective Report, these are available. (Also see CBFish reports for the history of ISRP requests; [https://www.cbfish.org/Project.mvc/Display/1991-019-04#Contents\\_AccordionIDAssessments](https://www.cbfish.org/Project.mvc/Display/1991-019-04#Contents_AccordionIDAssessments)).

#### **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No references are included to the citations in the text (e.g., Ducharme 2000; Fredenberg et al. 1999; NWPPC 1984; MFWP/CSKT 1990, 1993). Moreover, there are relevant documents that should be cited or appended that are more recent than 2000.

## 199101901 - Hungry Horse Mitigation/Flathead Lake Restoration and Research, Monitoring and Evaluation (RM&E)

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Salish and Kootenai Confederated Tribes

**Final recommendation:** Meets scientific review criteria - conditional

### **Conditions:**

The proponents are commended on their system-wide approach to conserving native fish in the Flathead basin and its tributaries, and on their persistence in promoting and achieving a long-term management plan to acquire habitat, manage native cutthroat trout in tributaries, and suppress lake trout despite initial opposition from many stakeholders. Their work is truly unique, and the ISRP conditions and comments that follow should not detract from the substantial body of excellent work conducted to date.

The ISRP requests that the proponents address the conditions below and respond point-by-point to each condition. The response can be a report to the ISRP with detailed answers to each of the conditions, a revised proposal with highlighted changes, or an addendum to a revised proposal. The ISRP's preference is for the proponents to revise their proposal to ensure that the additional information requested is easily accessible by Council, BPA, and the public in a single document. A revised final proposal that includes and integrates all information will guide the project for the next five years and facilitate future project reviews. Understanding the need for flexibility, the ISRP suggests that the proponents and the Council staff agree on a mutually determined date for a response, preferably by the end of 2020 or early in 2021. If additional clarification regarding our review is needed, the proponents are encouraged to request a follow-up meeting with the ISRP.

**Condition 1. Statistical analyses:** The ISRP understands that the proponents undertook suppression of lake trout as a result of management decisions made in 2014 that were based on modeling, as well as effects of lake trout measured in other oligotrophic lakes in the Northwest. However, the response does not adequately address concerns regarding how data and their analyses are used in supporting decision making. The ISRP does not agree that it is prudent to defer all statistical analysis until the target of 143,000 lake trout removed annually is reached.

The proponents should provide a basic interim statistical analysis of the trends in the data collected and presented so far, which are needed to support specific claims made in the proposal and the proponents' response. Such ongoing analysis is straightforward, and a fundamental requirement to allow effective planning and management.

Specific statements that require support from statistical analysis of the trends presented in figures include the following. These are to be based on time series that include the most recent data from 2019 and presented as an additional brief appendix to the proposal.

*From the proposal:*

1. p. 8 – *“No data are currently available indicating these early reductions in Lake Trout biomass are resulting in commensurate increases in native trout, but Bull Trout have not undergone further decline, although several anecdotal indicators suggest that a measurable increase may be imminent.”* The ISRP recommends that the trend in the four metrics of bull trout abundance in Appendix B (see Figs. 6, 7, 8 and Table 4) be analyzed to support these statements.

2. p. 8 – *“At the time a directional rather than quantitative goal to increase native fishes was sufficient.”* The ISRP recommends statistical analysis to establish whether or not the trend of increase in native fishes is occurring. In addition to the analyses above for bull trout, the ISRP recommends a regression of the time series of data for westslope cutthroat trout in Fig. 9 of Appendix B.

3. p. 8 – *“Through research, modeling and public scoping we developed the following series of sequential and quantifiable objectives: 1) annually harvest 143,000 lake trout (arrived at through population estimation, modeling, public input and Tribal Council decision following NEPA analysis), 2) achieve a reduction in abundance of adult Lake Trout (8 years and older) of 75% relative to 2014 levels, and 3) achieve a 90% increase in Bull Trout abundance (as measured by redd counts) by 2030.”* The proponents address the annual harvest of lake trout, and their progress in meeting their goal. The ISRP recommends analysis of trends in abundance to assess whether lake trout are declining and bull trout increasing. The analysis for bull trout is described in #1 above. For lake trout, the ISRP recommends regression of the time series in Figs. 11, 12, 13, 21, and 22. In addition, the ISRP recommends reporting the statistical significance of the non-linear trend fit in Fig. 14. Finally, the ISRP expects objective #3 to be framed for the period through 2025 as an interim demonstration of progress, in addition to the current target of 2030, because this is the period covered by the proposal.

4. p. 14 – *“We monitor 27 metrics of native and non-native species abundance that range from catch rates to growth rates (See Appendix B). These metrics are measured and reported annually in an effort to comprehensively gauge success of suppression and preemptively identify potential unintended consequences.”* The ISRP notes that statistical analysis is required to “comprehensively gauge success” from these metrics. Visual inspection of trend lines is not sufficient as scientific support for management decisions. Please complete analyses in #1-3 above.

5. p. 16 – *“Evaluation of success of electrofishing as a suppression tool will be determined based on an increasing trend in the ratio of Cutthroat Trout to Brook Trout in Magpie and Skidoo*

*creeks.*” The ISRP notes that although this work has not been completed, when it is, this trend will also require statistical analysis.

*From Appendix B:*

6. p. 57 – *“None of the indices of bull trout abundance indicate a clear change in abundance over the last ten years.”*

*“We conclude there is no downward trend in abundance of bull trout in the near term, or over the last 10 years.*

See #1 above for analysis required to support these statements.

7. p. 58 – *“This metric provides no evidence of an upward or downward trend in abundance of westslope cutthroat trout in Flathead Lake.”* See #2 above for analysis required to support this statement.

8. p. 70 – *“We conclude that the current harvest level has reduced the abundance of adult lake trout to an extent sufficient for biological adjustments to be taking place, primarily among lake trout age 8 and older.”* See #3 above for analysis required to support this statement.

9. p. 79 – *“An increasing trend in Mysis density is evident from 2004 to 2014...”* The ISRP recommends statistical analysis of the trend in Fig. 32 to provide support for this statement.

*From the response by the proponents:*

10. p. 2 – *“Critics also contended that Mysis would greatly increase, and monitoring has confirmed their abundance to be variable, but not increasing.”* See #9 above for analysis required to support or refute this statement.

11. p. 2 – *“In the intervening time we will continue to monitor a suite of metrics, which to date show promising trends (see Appendix B of proposal).”* The analyses requested above are required to support or refute this statement.

Two additional points are important here:

A. The ISRP considers these regression analyses to be a critical for the current and proposed activities. These analyses do not require complex analyses or modeling. Rather, the ISRP anticipates they can be completed in an Excel spreadsheet. For example, a right click on the data series in an Excel graph brings up a menu that allows fitting a trend line (linear or curvilinear), and the menu within that allows fitting an equation to the relationship and displaying a measure of its precision ( $r^2$ ). In a second step, analysis of the regression from the

table of data (under Data, Data Analysis) will provide a measure of the statistical significance of the relationship.

B. The ISRP is not requesting additional “independent randomized sampling” as assumed by the proponents. Instead, we are requesting analyses of the data collected so far.

These analyses are needed to assess the current management and to support decisions to continue lake trout suppression at current levels or modify it. They are also needed to address how to modify other management activities and to increase confidence in the conclusions reached and reported by proponents. In addition, such analyses are a key to the evaluation process in the cycle of adaptive management.

**Condition 2. SMART objectives for bull trout:** A more formal statement of the SMART objective for bull trout is needed in the revised proposal. Please see the original proposal guidelines for guidance on preparing SMART objectives. The proponents provide a logical explanation in their response #3, including the two objectives of a sustained positive trend in four metrics, and a positive log response ratio. Given this, what specific, measurable, achievable, and relevant objectives can the proponents develop for bull trout during this proposal period to 2025?

**Condition 3. SMART objectives for Magpie and Skidoo creeks:** The additional information provided for Magpie and Skidoo creeks allows the ISRP to understand that brook trout densities are low in Magpie Creek, so electrofishing removal may be successful. In comparison, brook trout densities are high in Skidoo Creek, especially downstream, so a goal is to reduce their numbers greatly and allow cutthroat trout to increase. Given this, the ISRP requests that the goals presented in the response for these two streams be formalized as SMART objectives in the revised proposal.

For example, for Skidoo Creek this might be: Remove brook trout from Skidoo Creek by multiple pass removal electrofishing to achieve an assemblage dominated by native cutthroat trout by 2023, and cutthroat trout abundance of at least 50 fish in the 152-m lower sample section by 2025.

A similar SMART quantitative objective for cutthroat trout density is requested for Magpie Creek, with the understanding that cutthroat trout are at greater abundance there, and brook trout are at low abundance.

**Condition 4. Cutthroat trout stocking:** With regard to stocking hatchery cutthroat trout in Mission Reservoir, the ISRP requests that the proponents formalize the objective and the timeframe under which the multiple steps will be completed. Information in the response about the inability of the inflow stream to support a spawning population is highly relevant. In light of this, the ISRP finds justified the second option suggested by the proponents in their response: “Identify and establish a Westslope Cutthroat population and plant sterile sport fish

in the reservoir to satisfy recreational demand, while addressing issues of competition between the two.” Engaging an external group of experts can help the proponents scope potential issues. The ISRP requests that the proponents describe their final plan for stocking, including demographic targets, release numbers, genetic characteristics, and who will produce the fish in their revised proposal or report to meet the conditions before producing and releasing fish.

**Additional comments:**

1. Regarding our Question 4 (*What strategy will be used to meet the goal of removing 143,000 lake trout?*), we apologize for our error in summing numbers of angling versus gillnet catches. Even so, it was difficult to reconcile the proposal with Appendix B, because numbers in the proposal were not labeled as being from 2019. As such, the reviewers could not reconcile them with the 2018 data in Appendix B.

Overall, the proponents report that an increase in gillnetting effort of 85% will be required to reach the suppression goal for lake trout. Is this objective realistic, given constraints on funding from this project and others? Here again, ongoing iterative statistical analysis will allow the proponents to evaluate whether lake trout are decreasing, and bull trout increasing, in future years at levels of suppression even below the 143,000 goal.

2. Regarding our Question 6 (*If use of YY males is selected, please provide a rigorous design for the treatment and evaluation of the outcome...*), the ISRP requests that if the timeframe or any of the key program elements change for the implementation of the YY-male BKT strategy, the design specifications be submitted for review to assist in ensuring a scientifically supportable approach.

3. Regarding our Question 15 (*Please provide timelines for data analysis and synthesis, public outreach, and preparation of peer-reviewed publications...*), the ISRP reiterates the importance of peer-reviewed publications as an avenue for reinforcing analytical rigor, as well as professional information sharing. While the research, monitoring, and mitigation efforts by the proponents are primary priorities, the ISRP believes that proponent-led peer-reviewed publications add great value. As stated in our preliminary review, “As in the past, the ISRP encourages continued collaboration with others who can help disseminate the results of this unique program to a wide audience. Toward that end, publication in peer-reviewed journals is important to provide legitimacy to the results and provides an avenue for the learning that the broader community must undertake to improve management of similar resources in the future.”

**Preliminary ISRP report comments: response requested** (*Provided as a record of the review process. The proponents addressed the ISRP’s questions; see response link and final review above.*)

**Overall comment:**

The ISRP commends the proponents for a well-integrated proposal, and a well-written summary of a project that has evolved significantly over many years.

**Response Requested:**

To help us review this proposal, the ISRP asks the proponents to address the following questions in their response:

1. The proponents report in Appendix B that “there is no downward trend in abundance of bull trout in the near term, or over the last 10 years” [Appendix B, p. 57], and for westslope cutthroat trout catches that “This metric provides no evidence of an upward or downward trend in abundance of westslope cutthroat trout in Flathead Lake” [Appendix B, p. 58].

In many cases for such data presented in Appendix B on bull trout (Figs. 6-8), cutthroat trout, and lake trout, no estimates of variance or confidence intervals of values are presented, no analysis of trends are conducted, and no significance of these trends is presented.

The proponents report, “We conclude that the current harvest level has reduced the abundance of adult lake trout to an extent sufficient for biological adjustments to be taking place, primarily among lake trout age 8 and older.”

The proponents should provide statistical analyses to support these conclusions because they provide important evidence to support the proposal.

2. Overall, the data presented do not support the final conclusion that “Current indications are that suppression is effectively reducing adult lake trout abundance at harvest levels well below modeled targets.” A more robust statistical analysis of the data collected and presented, including presenting measures of variance and the significance of trends, is needed to help support or refute this finding.

Given that key management decisions are being made based on these data and their trends (See Tables 5 and 6 in Appendix B), careful and appropriate statistical analyses of these data are essential. If not already sought, the proponent may consider seeking expertise from outside scientists or analysts in the region, such as Dr. Michael Hansen who reviewed Appendix B.

3. What metric of bull trout abundance in 1990 will be used to measure the outcome of Goal 1? Will this be based on redd numbers for 1990 only, a mean over some period centered around this date, or another metric?

4. What strategy will be used to meet the goal of removing 143,000 lake trout? Increasing lake trout harvest to meet this goal will apparently require increasing gillnet harvest by more than three times, compared to 2018 values (i.e., 22,000 in 2018 to 77,000 in future years). Is this realistic, and if so, what strategies will be used to meet this goal? Gillnet catch is not expected to be linear but rather require greater effort as densities decrease. In addition, the numbers reported for lake trout harvested in Table 2 of Appendix B and the text apparently were not summed correctly.
5. Please provide an objective analysis of the tradeoffs between suppression methods in terms of time, cost, and unintentional environmental damages. This analysis should include a) the cost of long-term electrofishing to suppress or collapse brook trout populations in Magpie and Skidoo creeks, b) the potential for electrofishing injury to fish, c) the uncertain success of using “trojan” YY males, and d) the effectiveness and unintended impacts of piscicide treatments. Piscicide treatments may require removing native cutthroat trout from sections where the species are sympatric, and holding them elsewhere temporarily, and this should be included in the analysis.
6. If use of YY males is selected, please provide a rigorous design for the treatment and evaluation of the outcome, including description of reference reaches and statistical analyses, so that the ultimate success or failure of this method can be assessed and documented.
7. Develop quantitative objectives for Goal 4 for Magpie and Skidoo creeks with specific, measurable, and time-bound objectives that meet the criteria for SMART objectives. To what level of density or abundance will brook trout be removed annually, or is extirpation the goal? What date is this expected to be complete?
8. Especially for habitats where no barrier will block nonnative trout from invading again, please provide an adaptive management plan for when nonnative trout either reappear owing to ineffective treatment or are introduced by anglers or others, as often happens.
9. What source of native bull trout will be used for reintroduction into Mission Reservoir and Creek after removing nonnative brook trout? How does stocking hatchery westslope cutthroat trout align with goals of the Fish and Wildlife Program?
10. The proponents report that bull trout reintroduced to Mission Reservoir will be selected from a “nearest neighbor” population, but no information about which population was provided. Will it be based on watershed connectivity, phylogenetic relatedness, or another metric? Please indicate which populations are candidates and the process by which one or more will be selected. If an expert panel will be convened, as indicated in the presentation by proponents, please document this in the proposal.

11. The Project 199101900 referred to in the proposal does not identify production of a bull trout conservation brood stock as one of its activities. Please indicate whether this has been successfully negotiated and the terms for this activity. The expert panel should examine the relative risk on donor populations from relocating bull trout to a hatchery for brood development versus direct translocation to the vacant waters.
12. Stocking hatchery-reared westslope cutthroat trout to provide a short-term fishery in Mission Reservoir will create a new nonnative fish population that will affect the genetic integrity of any other native lineages of westslope cutthroat downstream or in adjacent drainages to which these fish could gain access. This appears to be at odds with fundamental goals of the Fish and Wildlife Program. Please clarify why the native lineage is not proposed for introduction.
13. Please explain the apparent lack of publishing any of the methods in [monitoringresources.org](http://monitoringresources.org). The ISRP encourages this documentation for future evaluation of this project and for the benefit of other similar projects.
14. Regarding potential confounding factors, discuss how the project will account for the effects on projects caused by changes in land use, wildfire regimes, and climate, which can alter temperatures, flow regimes, winter icing conditions, and stream substrate characteristics?
15. Please provide timelines for data analysis and synthesis, public outreach, and preparation of peer-reviewed publications, all of which are vital activities for successful programs.

The additional questions and comments provided below are meant to provide context to our response requests and to strengthen the proposal and do not need to be specifically addressed during the response loop.

### **1. Problem statement**

The problem is well defined. The problem statement justifies the proposed work and articulates specific ways in which this project relates to and benefits other programs in the basin.

The following are suggested improvements for future proposals:

- The background on blockage of the South Fork Flathead River to native adfluvial trout by Hungry Horse Dam and subsequent introduction and invasion by nonnative lake trout was not fully sufficient. What publications or data support the claim that bull trout redd counts have declined by 50%, and to what locations does this refer? What is the current status of the lake trout suppression efforts?

- Likewise, the background on the habitat degradation of other stream and lake habitats is not adequately described. What are the main sources of habitat degradation, what is their extent, and which are to be addressed by this proposal?
- Examples of the peer-reviewed literature published from this project need to be highlighted in this section.

## **2. Progress to date**

The ISRP commends the proponents on significant progress in developing a co-management plan (with MFWP), the completion of NEPA/EIS requirements, and satisfactory negotiation of lake trout suppression as a core strategy for native fish restoration.

The following are suggested improvements for future proposals:

- The program of habitat acquisition is impressive (67 purchases adding 38 km of stream and 3800 acres of riparian habitat). The proposal would be strengthened by providing estimates of the remaining high-quality habitats available and the long-range target for acquisition.
- The progress to date for management of Flathead Lake to increase abundance of bull trout is described in a clear chronological order. However, little quantitative information is provided, and the data and reports that support key statements are often not referenced or are referenced only in the appendices. The ISRP understands that the proponents sought to present a succinct summary, but sources of data need to be cited in the body of the proposal.
- Likewise, what reports support the statement that total harvest in the gillnetting that started in 2014 was increased by an additional 50%? Is this explained in Appendix B, which was not cited here?
- A better summary of the information about, and context for, restoring critical fish habitats is needed in this section, rather than only in the appendices. Likewise, a useful summary of the status of westslope cutthroat trout on the Flathead Indian Reservation is needed here, rather than only in Appendix A.
- Six key questions in Appendix B about the objectives of the lake trout removal program in Flathead Lake need to be summarized in this section, so that reviewers can understand the scope and objectives of the program to date without reading all past reports.

As summarized above, trends in data for bull trout, cutthroat trout, and lake trout in Flathead Lake are not analyzed in Appendix B. A few additional examples include:

- The trend for decline in catch rates of lake trout during suppression gill netting appears clear (i.e., a 69% decline), but no analysis was made of it, nor were error bars provided of the catch rates in Fig. 16.
- The upward trend in relative weight of lake trout (Fig. 17) suggests density-dependence, but no measure of the significance of this trend was presented. The same is true for the curvilinear trend for length at 50% maturity (Fig. 19).
- No information was given about how the fishing mortality rate (F) for lake trout (Fig. 18) was calculated, such as from a catch curve or other equation, so conclusions based on these data cannot be evaluated.
- If angler participation is a key metric for participation by the MFWP co-manager, then does it make sense to measure it more accurately in the future?

### **3. Goals and objectives**

Overall, the goals and objectives are quite clear and, in many cases, SMART. In addition to the points for which a response was requested above, the following should be addressed in current and future proposals.

Goal 1: What is the projected catch per effort, total effort, and fishing mortality expected to achieve harvest goals?

Goal 2: Has a total amount of fencing replacement needed to achieve intended results been approximated? Is one mile of replacement per project cycle likely to achieve desired objectives?

Goal 5: The source of a re-introduced population(s) of westslope cutthroat trout for Liberty Creek is important. Please describe the collaboration with CSKT, MFWP, and academic geneticists to select this source.

### **4. Methods**

Additional clarification is requested for the following goals:

Goal 1:

The proponents' reported gill net catches are inconsistent (51,726 in Appendix B, not >55,000) and angling catches (21,511 in Appendix B, not >30,000). Likewise, in Methods (Section B) the proponents report that annual harvest of lake trout by anglers is about 60,000 fish, but even if the estimated 25,000 fish in the recreational fishery are included, the total is roughly 46,000, suggesting that there may be errors in the numbers reported.

If annual gillnet catches total about 52,000, then a 50% increase might bring that total to about 78,000, which when added to about 47,000 caught by anglers totals 125,000, still far short of the 143,000 target. Again, the numbers do not appear realistic, and no information is presented on strategies that will be used to increase either angler catches or gillnet catches.

No information is presented about how the 27 metrics calculated for native and non-native trout will be analyzed to support conclusions about whether goals are being met, or how the program could be modified to meet them in the future.

#### Goal 2:

Although protection of acquired lands from grazing and restoring ecological function are reasonable goals, no information is presented about how these activities will increase habitat for fish and wildlife on these lands.

### **5. Project evaluation and adjustment process**

The following need to be addressed in this and future proposals.

- Project evaluation is structured by individual goals, but it is not clear how the collection of projects under this program will be evaluated. How will the proponents know if the objectives, relationships, and/or process are impeding their success?
- Regarding Goal 4, evaluation of the success of brook trout removal for increasing populations of westslope cutthroat trout should be based on the increase in abundance of westslope cutthroat trout, increasing recruitment and survival, and body condition, not on the ratio with brook trout. This ratio could be increased simply by reducing brook trout, even with no change in abundance of westslope cutthroat trout, for example.
- Regarding Goal 5, to be successful, rotenone treatments often require repeated efforts in subsequent years. A clearer protocol is needed for this in Liberty Creek, as well as the other streams where it is planned. As for Goal 3, consider using eDNA to monitor effectiveness for Goal 5 also, and if so, develop the design and methods carefully to ensure that confidence can be placed in the results.

### **6. Potential confounding factors**

Additional points to consider for this and future proposals include:

- The proposal identifies important ecological factors that may confound the project, but generally does not identify how the proponents will respond to them. It also does not

identify non-ecological factors, such as changes in funding or relationships with project partners.

- The proponents' claim that "predation is clearly the dominant factor controlling bull trout abundance," but this was not established in the background information provided in this proposal. What diet data and modeling support this conclusion?
- Is there a risk of invasion by northern pike in the Flathead River and Flathead Lake, and if so, how will it affect bull trout and westslope cutthroat trout?

## **7. Timeline**

The timeline needs to be organized by goals or objectives, so it is easier to understand the relationships among activities and identify missing tasks. The timeline does not address Goals 3-5 at all, so please include these.

## **8. Relationships to other projects**

The proponents have close working relations with several projects and agencies. However, there is no information provided on responsibilities of each project and cooperating agency, and a summary of responsibilities would improve the proposal.

## **9. Response to past Council recommendations and ISRP reviews**

As in the past, the ISRP encourages continued collaboration with others who can help disseminate the results of this unique program to a wide audience. Toward that end, publication in peer-reviewed journals is important to provide legitimacy to the results and provides an avenue for the learning that the broader community must undertake to improve management of similar resources in the future.

## **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No additional comments; all sections are adequate.

## 200200300 - Secure and Restore Fish and Wildlife Habitat in Montana

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Salish and Kootenai Confederated Tribes

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The proponents provided a thoughtful and comprehensive response that adequately addressed the ISRP's concerns. As a result, the ISRP has a much better understanding of the program and Tribal expectations for success. The response effectively articulates why it is unreasonable to expect to document a quantitative fisheries response to acquisition of riparian areas. The response cites literature to support the philosophy, structure, and evaluation of the program. In addition, they address confounding factors for the Jocko River basin. Finally, they emphasize the need for BPA to develop and fund a plan for long-term stewardship, an issue that the ISRP emphatically agrees should be a priority for the Fish and Wildlife Program.

While the ISRP appreciates the inherent difficulties in specifically ascribing the purchase of individual parcels to fish and wildlife responses, the ISRP encourages the proponents to work toward further articulating what the program is protecting. These may include things like documenting migratory corridors, food resources, thermal refuges for fish, and bird and amphibian habitats in the riparian zones and uplands protected by the program. The Upper Columbia Salmon Recovery Board has a good example of habitat protection and restoration results reporting for the public and funders (see [2014 habitat reports](#)). In addition, the proponents could potentially partner with other groups to document ecological values being protected, such as the Audubon Society and federal agencies who conduct annual breeding bird surveys. The aim would not be to achieve statistical quantification of population-level response to the acquisitions but instead to provide some ecological currency for documenting and justifying the program in a way that is meaningful for the public and funding agencies.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

First, we commend the proponents on a well-written proposal. Second, while we recognize that this project is generally an important asset to the Fish and Wildlife Program, the ISRP requests additional information.

## Response Requested:

To help us review this proposal, the ISRP asks the proponents to address the following questions in their response:

1. How will success of this program be evaluated, particularly in terms of response by fish and wildlife populations, and how will those successes be maintained over the long term?
2. The ISRP is uncertain about the responsibility for biological evaluation among the collaborators, but the proponents should identify who is responsible for this effort and describe the plan for evaluation and site maintenance.
3. The proponents evaluate acquisitions on the front end with their scoring system, but there is no plan in place to evaluate whether this strategy and scoring system “worked.” This leads to concerns regarding Project Evaluation and Adjustment. How is the program evaluated, and how will it respond to those evaluations? Have past decisions effectively protected significant fish/wildlife abundances or resulted in significant improvements in terrestrial, riparian, and aquatic habitats?
4. It is not clear what exactly is being achieved with the work to Secure and Restore. How do the proponents know what benefits are being produced from it?

For example, this could be addressed by articulating, in quantitative terms, why the proposed actions are important. The project could quantify what may be achieved biologically in the future (e.g., by what percent are fish densities expected to increase by 2025?), and link land acquisitions and conservation to direct quantifiable improvements in fish populations and environmental quality.

5. For Goals and Objectives, please clarify whether post-acquisition monitoring will be conducted to determine if goals and objectives were achieved. Under implementation objectives, describe the target for how many landowners will be contacted in priority watersheds. In addition to the target length of stream to be protected, please indicate whether there is an associated target acreage.
6. Are the cumulative properties enough to have a positive impact on overall fish abundance and productivity in the Jocko River? The protection of 64 km of stream, as well as thousands of acres, is impressive. However, it is only a small percentage of available stream kms and riparian acreage in the Basin.
7. The proponents should describe how the program anticipates and plans for confounding factors and what the long-range plans are for managing the properties. How is long-term maintenance planned and funded? How will upstream changes in land use (e.g.,

wildfires, forest harvest) potentially impact acquired lands? Discussion with project proponents during the presentations did not address this question and emphasized the need for an overarching strategy.

The additional questions and comments provided below are meant to strengthen the proposal and do not need to be specifically addressed during the response loop.

## **1. Problem statement**

The Problem Statement was a useful synthesis of the issue that the proposal intends to address. Protecting fish and their habitats, and mitigating impacts of Hungry Horse (HH), through land acquisitions and easements in an exurbanizing catchment is well justified. The project is of significance to several programs, including Hungry Horse mitigation, the Flathead and Jocko subbasin plans, and the Fish and Wildlife Program.

However, a recurrent theme throughout the review of the proposal is a lack of description of what biological outcomes (e.g., improvement in environmental quality, fish populations) proponents aim to achieve through this project, and how these will be measured.

## **2. Progress to date**

The proposal clearly spells out progress in quantitative terms (e.g., 64 km of resident fish habitat) as well as discussion on the impacts eliminated (i.e., remove grazing, prevent development, remove floodplain infrastructure) and processes protected/restored (i.e., shading, in channel habitat). The proposal also identifies how changes in budget and relationships with project partners have impacted their progress, an important context when thinking about the lack of a reported plan for Project Evaluation and Adjustment.

In Appendix A, Criterion 1 for biological attributes needs clarification. It seems that Part d should be modified to “Protects primarily non-native fish habitats that can eventually be restored to native fish,” otherwise, should the score be zero?

The ISRP offers the following feedback for the proponents but does not require a response to these comments:

- No data are presented to support the discussion on processes protected, which may be a concern for Project Evaluation and Adjustment, as discussed in Section 5 of this review.
- It would be helpful to see a table of km and acres protected, along with a table of HGM values, to more directly document and communicate the tangible results of the project.

- For reference, we point proponents to papers by Saunders and Fausch (2007, 2012, 2018) support the claims about effects of unrestricted riparian grazing on food webs that support trout.

Saunders, W. C., and K. D. Fausch. 2007. Improved grazing management increases terrestrial invertebrate inputs that feed trout in Wyoming rangeland streams. *Transactions American Fisheries Society* 136:1216-1230.

Saunders, W. C., and K. D. Fausch. 2012. Grazing management influences the subsidy of terrestrial prey to trout in central Rocky Mountain streams (USA). *Freshwater Biology* 57: 1512-1529.

Saunders, W. C., and K. D. Fausch. 2018. Conserving fluxes of terrestrial invertebrates to trout in streams: A first field experiment on the effects of cattle grazing. *Aquatic Conservation: Marine and Freshwater Ecosystems* 28:910-922.

### **3. Goals and objectives**

Goals and objectives are well written and appear to be feasible, with three points for which responses are requested in the Overall Comments section.

### **4. Methods**

The scoring criteria hit the highlights regarding the relevant processes needed to restore habitats, including groundwater, additional attributes (i.e., wetland, spring, adjacent land condition, and so forth). In addition, there are provisions for monitoring every five years using the HGM assessment.

However, it would have been helpful to have a table with all of the selected project scores and to get a sense of how many properties are being considered simultaneously. Are there an abundance of available properties? Or is there a struggle to find enough high priority parcels? On page 12, it is noted that there are a limited number of willing landowners. Does this mean that the project is forced to acquire properties that are not the highest priority just to meet with 2km/yr objective?

### **5. Project evaluation and adjustment process**

There does not appear to be a strategy or plan for project evaluation and adaptation. The proposal summarizes how the program has adapted in the past but does not articulate what data are collected, who reviews them and when, and how decisions are made to adjust the

program. While the program relies on subbasin plans, an evaluation and adjustment strategy is especially important in a program like this one, which is subject to a number of confounding factors, discussed below.

Thus, the proponents need to develop a project evaluation and adjustment process (e.g., structured decision making – for after acquisition evaluations) Have past decisions produced significant abundances or improvements?

As part of an initial plan, it seems like the HGM data might be one way of assessing impact of passive recovery over time. An HGM assessment every five years is useful. However, quantifying biological responses by fish and wildlife over time remains an unmet need. It is not clear whether this task should be the responsibility of the proponents. However, along with the plans for long-term maintenance and stewardship of these lands, a strategy for evaluating outcomes is needed.

## **6. Potential confounding factors**

The proposal did not identify some of the most important factors that confound the success of this project (e.g., changes in project relationships, rising property values). For example, history has already demonstrated that BPA decision-making introduces uncertainty into this program. There was also nothing stated about the long-term maintenance of these sites, such as invasive plant or animal (e.g., fish) species. In consideration of this point and the lack of an evaluation and adaptation strategy, this project is subject to unrecognized uncertainties that may inhibit the project's success at acquiring the habitat and the recovery of the habitat over time.

## **7. Timeline**

The proponents were realistic in saying that timelines are hard to predict. However, it would have been helpful to see some interim activities, including those listed under the objectives, in the timeline to understand the relationships among different tasks.

## **8. Relationships to other projects**

The relationships to other projects are strong and demonstrate a collaborative focus. As one example, the proposal summarized activities on a property adjacent to the National Bison Range, for which this project funded acquisition. This type of project showcases how strategic and collaborative acquisition and restoration can address many stressors (i.e., irrigation returns, transportation impacts) and reflects a broader strategy of focusing long-term protection on areas prioritized by other groups and activities.

## **9. Response to past Council recommendations and ISRP reviews**

The proponents adequately responded to the 2012 ISRP review. However, it was unclear whether the proponents had responded to a follow up request by the ISRP in 2013 regarding the criteria used to score properties under consideration.

## **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No additional comments.

## G. Southern Idaho and Southeast Oregon

### 200717000 - South Fork Snake River Yellowstone Cutthroat Trout Recruitment and Survival Improvement

- Box: [Original proposal](#) and [Response and revised proposal](#)

**Proponent:** Idaho Department of Fish and Game (IDFG)

**Final recommendation:** Meets scientific review criteria

**Final comment:**

We thank the proponent for their effort to provide a comprehensive and sound set of responses to all seven ISRP issues and for preparing a revised proposal that provides more focused objectives and enhanced methods. Using the ISRP adaptive management framework to guide development of objectives, desired outcomes, monitoring questions, and performance indicators generally improved the clarity and intent of the habitat restoration and eyed-egg outplant efforts planned for Rainey Creek.

This is a long-term productive project that has contributed substantially to the knowledge base for management and conservation of Yellowstone cutthroat trout. The project has made major contributions to effective adaptive management decisions that have enhanced the status of the species. The consistent and sustained publication record is commendable.

The program is currently at the end of its last five-year adaptive management cycle and the beginning of a new cycle and accordingly, the proponents are actively reviewing the South Fork Snake River Yellowstone cutthroat trout project as part of the program review cycle. This process is expected to help redefine goals, strategies, and objectives, as well as define new and improved desired outcomes and performance indicators for the next five-year cycle. It will be critical that this work result in a comprehensive set of new and revised objectives for the project that reflect changes in project direction, activities, and priorities and are consistent with both SMART criteria and ISRP recommendations.

The implementation and evaluation of habitat restoration and eyed-egg outplanting in Rainey Creek are major new initiatives for the project. The proposed habitat restoration work appears justified given the degraded habitat conditions that were documented from past habitat assessment efforts (Bureau of Land Management [BLM] protocols and habitat suitability analysis). Although much new information is provided for this proposed work, some aspects of the proposal remain unclear and lack adequate detail. Despite improvements, the proponents need to develop a full set of SMART objectives with sound methods. These are critical for

providing a long-term foundation for the project. Although the project proposal meets ISRP scientific criteria, it should be improved with the following changes and additions to the current description of objectives and methods.

We highly recommend the proponent address the following issues in the next Statement of Work, future annual reports, and/or modifications to the proposal (specified below).

1. Although the proponent provide desired outcomes for new objectives 3 and 4, there were no quantitative aspects specified. Specific quantitative outcomes are an essential element of SMART objectives and serve as an important basis for assessing success and for effective adaptive management decisions. The proponents should develop quantitative targets for desired outcomes including temperature, reduction in channel width, increases in depth, changes in carrying capacity, increase in productivity, and increase in abundance for Objective 3 and targets for increase in genetic variation, juvenile production, and fluvial adult production for objective 4. They should include this information in the FY 2021 annual report.

2. The response includes substantial new information related to the habitat assessment and restoration objectives and methods for Rainey Creek. However, important uncertainties remain for the overall strategic restoration approach, the site-specific methods, application of habitat assessment data, and ultimate development of a restoration plan for the project. Regarding habitat assessments, past assessments were conducted using BLM protocols and habitat suitability indices; however, there is no reference or discussion regarding methods and protocols for this work. There is no description of how these data will be used for reach-scale or site-specific restoration designs. Also, it is unclear how new habitat assessment information will be gathered and used to update the BLM information and inform future restoration actions. Additional habitat data from the subbasin TMDL (2019) and the proposed drainage-wide assessment will provide new and updated information that will be available to improve the detail and scope of Rainey Creek habitat assessment and serve as an excellent basis for development of a strategic restoration plan. The proponents should provide a more complete description of the drainage-wide assessment and how new information from this effort and the TMDL will be integrated into the restoration planning process.

The process for assessing site-specific conditions and developing restoration actions appears to be in the initial stages of development. The proponents state “Subcontractors will draft restoration designs after multiple cross sections are measured.” Please provide additional detail on variables that will be measured and derived from the cross-sectional surveys. How will this information be used to guide selection of site-specific actions? This information should be included in the 2021 Statement of Work and in a future annual report.

3. The proponents should fully describe and define the types of restoration treatments along with metrics for quantities (e.g., number of sites, numbers of structures, pieces of wood, acres

of riparian planting, etc.) and a description of the location of treatments, such as a river mile indicator. We recognize this level of detail can only be developed following the completion of site-specific and reach-scale restoration plans. Thus, we request that this information be included in future annual reports. The project would benefit from development of implementation objectives for both the habitat restoration and egg outplant efforts. These objectives should describe the specific steps needed to achieve the biological objectives and the timeframe. Well-stated implementation objectives serve as a roadmap to guide the actions that will be implemented on a specific schedule.

In summary, this is an important project that serves as a foundation for monitoring and management of Yellowstone cutthroat trout, and it should continue. We encourage the proponent to update the project proposal at some time in the near future to incorporate all modifications to the objectives and methods. This will guide the project during the next five years and ensure that future reviews will build from a scientifically sound final proposal.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

This is a well-managed and productive project. We compliment the proponents on an excellent proposal and the substantial progress that has been achieved since the project was initiated. The project has made major contributions to the preservation of genetic integrity and population viability of Yellowstone cutthroat trout. The project has undertaken a variety of rainbow trout removal actions, monitoring, evaluation, techniques development and eyed-egg outplanting. Effectiveness of rainbow trout removal has increased substantially from 40-50% up to 90% with the improved weir designs and improved techniques to differentiate rainbow trout and rainbow x cutthroat trout hybrids.

**Responses requested:**

To help us determine if the proposal meets scientific review criteria, the ISRP asks the proponents to address the following issues in their response:

1. Please modify and expand Objective 3 to develop specific research, monitoring and evaluation (RM&E) questions with alternative hypotheses and predictions as specified in the proposal instructions. The redrafted objectives should provide a sound basis for developing appropriate methods to evaluate the success of eyed-egg outplanting and habitat restoration in Rainey Creek (see more detailed comments under Goals and objectives below).

2. Please describe the methods that will be used for habitat assessment and development of the habitat restoration plan. Too little information is presented in the proposal for us to understand how these objectives will be accomplished (see more detailed comments under Methods below).
3. Please describe the methods that will be used to develop dynamic rate functions described in Objective 1. No methods are presented for this effort in the proposal.
4. Please describe the experimental design, including statistical sampling and analytical approaches to guide evaluation of eyed-egg outplanting and habitat restoration in Rainey Creek. The brief description of habitat restoration evaluation in the proposal includes only one control reach and no explanation of the basis for the number or location of treatment and control sites (see more detailed comments under Methods below).
5. Please describe the potential impacts on the productivity and diversity of the donor population that could result from removing broodstock (see more detailed comments under Methods below).
6. Please describe the structured decision framework and adaptive management process that will be used. Guidance and reference documents are provided in the proposal instructions.
7. Please modify the timeline to cover new biological, implementation, and RM&E objectives that are developed in response to item 1 above.

### **Comments not requiring an immediate response**

#### **1. Problem statement**

The problem statement is quite detailed and complete. The authors present a convincing and well-supported conclusion that non-native rainbow trout and degraded habitat conditions in spawning and rearing tributaries of the South Fork Snake River are key threats to the persistence and viability of Yellowstone cutthroat trout. The South Fork Snake River remains one of the few strongholds that exist for Yellowstone cutthroat trout. The Yellowstone cutthroat trout population appears to be the only population that expresses all life history strategies for large river systems and represents a relative stronghold for the fluvial life history form. It is critical that the integrity and viability of Yellowstone cutthroat trout in the South Fork Snake River be maintained and enhanced to reduce extinction risk and support the viability of the species within its native range.

The overall goal of the project from its initiation is ambitious but appropriate: "preservation of genetic integrity and population viability of Yellowstone cutthroat trout." Future plans for the project include continuation of ongoing objectives and actions with the addition of one major new objective to restore impaired stream and riparian habitat in Rainey Creek. The project contributes to the Northwest Power and Conservation Council's Fish and Wildlife Program resident fish goals related to research, native species protection and non-native species control.

One potential weakness is a lack of discussion regarding land ownership and management on the four tributary streams that have been a major focus of the project (along with the recent habitat restoration focus in Rainey Creek). It is not mentioned but appears likely that much of the drainage area is on National Forest land. If this is true, it creates major opportunities to focus efforts on land management practices that are in alignment with the project and to address watershed scale issues, particularly upslope factors such as roading and accelerated sediment (an identified issue in Rainey Creek) and risk of wild fire, which is an increasing concern in these refuge streams.

One additional important and outstanding question that needs to be addressed is: how long does this current level of effort need to continue to adequately manage the threat posed by rainbow trout? Is there any level of additional effort that could eliminate this threat, or do we assume that rainbow trout will continue to be a threat and warrant a continuous suppression effort?

## **2. Progress to date**

Significant and impressive progress has been demonstrated on the two primary project objectives: (1) protect genetic integrity and long-term viability of Yellowstone cutthroat trout and (2) increase survival rate of Yellowstone cutthroat trout in the South Fork Snake River. The projects publications are commendable with numerous manuscripts that have covered a variety of topics.

One weakness is the lack of discussion on the likely duration and probable success of the project. Based on material that is provided, it appears that it will require funding long into the future to be successful. Such a long-term view is not discussed. Brown trout were not mentioned except in tables as a species caught in screw traps (Table 4) and as a species included in the radio tagging and tracking effort (Table 3). Was the tagging and tracking effort a part of this study? Are brown trout removed or let go when they are trapped? What threat do these brown trout pose to Yellowstone cutthroat trout in terms of competition and predation?

### **3. Goals and objectives**

The proposal needs better implementation and effectiveness objectives to cover the current scope of work (see item 1 in list of requested responses). The new objectives build from the results and uncertainties of prior work. The objectives would be improved if new objective 3 was split into multiple objectives including biological, implementation and RM&E components that could each be developed to meet SMART criteria as described in the proposal instructions.

The two new management actions, egg outplanting and habitat restoration, are well suited for RM&E. Evaluation of these two major management strategies will be accomplished more effectively if specific RM&E objectives, alternative hypotheses, and specific predictions are developed. The re-drafting of this objective into multiple objectives will facilitate the description of methods, which require detailed statistically based experimental designs for sampling and analyses. The proponents should examine the possibility of placing egg boxes in locations that might provide information about the differential rates of survival among reaches in Rainey Creek. Brown trout are not mentioned as target species in this section. Does that mean nothing will be done with them beyond counting at weirs and traps, or will additional data or actions be taken? It is unclear if brown trout being managed as a nuisance competitor or as a sport fish?

### **4. Methods**

The methods could be improved (see items 2 - 5 in the list of requested responses). For Obj-1, the measure of weir efficiency (i.e., rate of capture) which is accomplished by assessing catch of marked versus unmarked large Yellowstone cutthroat trout above the weirs, appears problematic, considering the length of the stream, the mobility of adults, and possible non-random mixing of tagged and untagged individuals. Are there enough previously PIT-tagged, returning adults to justify pairing a PIT-tag detector just upstream at one or more or all of the weirs as a corroborative method to assess efficiency? No methods are described for the dynamic rate functions.

For Obj-2, the proposal states "Straying rates will be calculated by dividing the number of fish identified in a different tributary than which it was tagged, by the number of fish encountered in the tributary at which it was tagged." Is it possible that temporary use of the stream by an adult Yellowstone cutthroat trout for food or refuge could be mistaken as straying? If so, how could the methods or straying metric be refined to exclude this possibility?

For Obj-3, the proposal states "To evaluate the success of this project, we will capture Yellowstone cutthroat trout fry (N=100; < 80 mm) from Rainey Creek using backpack

electrofishing (spot shocking) in the fall. Genetic samples from fry as well as the adults used for brood, will be analyzed at the Eagle Genetics Lab using Parental Based Tagging (PBT) techniques to identify fry produced by eyed-eggs stocking.” How can “spot checking” be an adequate technique to assess the success of this effort? If the spot-checking method is not random enough, not stratified enough, and/or not spatially explicit, it is likely to lead to inaccurate estimates of egg-to-fry success.

Insufficient detail is provided for the RM&E associated with both management strategies described in objective 3 as well as the habitat restoration planning and implementation. A concise description of the experimental design, including statistical sampling and analytical approaches should be added. Selection of the number and location of both treatment and control reaches is a quantitative process requiring demonstration of adequate correlation in control and treatment reaches. The specific number of years of treatment and post-treatment data collection is dependent on the statistical design and data variability. A considerable number of deficiencies exist in the proposed habitat restoration and fish response evaluation in Rainey Creek. No description or statistical rationale is provided for selecting one control reach. The methods to evaluate effectiveness of stream restoration (i.e., one-pass electrofishing within one year before and after project, covering “all available habitats”) are inadequate.

It would be much more informative if these surveys were conducted using a pre- and post-treatment approach, stratified by habitat type and random sampling of habitat units (e.g., pools, runs, riffles). Fish abundance and assemblage are not likely to be good stand-alone metrics. Other metrics such as growth rate by age, age structure, density, biomass, condition, survival, and percent emigrating or residualizing should be considered for assessing success. The proponents should describe in more detail the methods that were or will be used for habitat assessment and development of a habitat restoration plan.

In addition, there is no description of the potential productivity and diversity consequences of removing the broodstock from the source population. The eyed-egg outplant evaluation needs to include an estimate of the proportion of the source population that is being taken for broodstock and a performance metric to determine the ratio of adult offspring produced from the outplants to the number of adults collected to spawn to produce the eggs (adult progeny/adult collected). If the ratio is well below 1.0, then further considerations should be given to the impacts of broodstock removal from the population relative to the production and knowledge produced. If the ratio is well below 1.0, then further the impacts on the donor population resulting from removal of broodstock probably exceed the benefits of natural production from the outplants and the knowledge gained from evaluation.

## **5. Project evaluation and adjustment process**

The proposal provides some useful examples of how information generated from the monitoring and evaluation was used to adapt approaches and techniques. These examples include completing entrainment studies at diversions that demonstrated acceptable impacts without implementation of expensive screening and adapting weir designs and improving methods for differentiating rainbow trout from Yellowstone cutthroat trout.

However, there appears to be no formal, regular process for review and reporting of RM&E results and adjustment of management approaches. The proposal does not discuss the need to address watershed scale land use issues, especially upslope factors impacting streams such as roads (sediment source), as part of successful tributary habitat restoration. The proposal should include a more formalized decision process including discussion of responsibilities, key components, reporting, RM&E, and project information sharing (see item 6 in the list of requested responses).

## **6. Potential confounding factors**

The proposal includes only limited discussion about confounding factors, mainly focused on climate change issues. The discussion would be improved by considering factors such as land use/land management in tributary drainages, the possible role of pesticides from agriculture lands and possibly accumulated in the reservoir, or possible conflicts with invasive aquatic species, particularly linked to boating and recreational use of the reservoir. Also, it is not clear what the importance of the current and future role of public interest and support is in the project.

The proponents state very generally without providing specific reasons why: "The combined effects of increased water temperatures and winter floods are predicted to be less detrimental to Rainbow Trout *O. mykiss* and Rainbow Trout × Cutthroat Trout hybrids (collectively rainbow trout) than Yellowstone cutthroat trout, given environmental conditions that rainbow trout prefer (Wenger et al. 2011)." If this is true, how might habitat changes as a result of future human use or climate change impact the project's success? The proponents should also clarify what they mean by the statement on p.21 "tributaries will benefit from future water temperatures in the main stem."

## **7. Timeline**

The timeline appears adequate for objectives 1 and 2 and associated activities. Additional timelines will be needed once objective 3 and methods are improved for the egg-outplant and

habitat restoration actions and evaluations. A more complete description of habitat restoration, including locations, treatments and timing would be useful.

## **8. Relationships to other projects**

This project is not coordinated with other BPA projects. However, the proponents do collaborate and partner with other IDFG projects, USFS, BOR, Trout Unlimited, and most recently the South Fork Initiative. We would encourage interaction with other habitat restoration and evaluation projects in the region in the development of the Rainey Creek habitat restoration and evaluation. The proposal should include some discussion of the possible benefits of an expanded role with management on National Forest lands and opportunities for upslope restoration work to reduce sediment and fire risk and other restoration and land management. The Targhee National Forest has been supportive of this project because the project's goals to protect the genetic integrity and viability of native Yellowstone cutthroat trout are well aligned with the goals of the Targhee National Forest Management Plan.

## **9. Response to past Council recommendations and ISRP reviews**

Past ISRP reviews were highly complimentary of the accomplishments and adaptive management application. The proponents have responded by adapting approaches, adding objectives, and addressing critical uncertainties.

## **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No comments.

### **199201000 - Fort Hall Habitat Restoration**

- [Project proposal in Box](#)

**Proponent:** Shoshone-Bannock Tribes

**Final recommendation:** Pending. The proponents were granted a time extension to address the ISRP's preliminary recommendation for a response and revised proposal. The ISRP met by teleconference with the project proponent in July 2020 to discuss an approach to the response.

**Preliminary ISRP report comments: response requested** (*We suggest a conference call with the proponents to discuss the major changes needed in this proposal.*)

**Overall comment:**

This is a long running project that reflects a great deal of sustained commitment and hard work by the proponents. There have been numerous accomplishments and continued development of an understanding of fish life history, limiting factors, and restoration needs. The restoration of native runs of Yellowstone Cutthroat Trout faces daunting challenges including adjacent agricultural land and associated land-management practices, hybridization and competition with rainbow trout, climate change, and hydrosystem/reservoir operations. It appears that the project is making a major transition towards larger scale projects with increased sophistication in design and more complex demands for successful implementation. There have also been promising products from a partnership with Idaho State University.

The current proposal does not meet scientific review criteria. Responses to many items in the template provided by the ISRP for this review are incomplete or missing. The proposal does not adequately address the review questions, and it needs improved focus and organization. Proposal sections needing the most attention include: Goals and Objectives, Methods, Program Evaluation and Adjustment Process, Timeline, and Response to Past Council Recommendations and ISRP Reviews.

Given the substantial changes needed for this proposal, it is suggested that a conference call be arranged between the proponents, ISRP, and Council Staff to discuss a strategy for future work on the proposal. This should likely occur prior to the field season. This call could serve as a first step in initiating communications among the proponents, ISRP, and Council Staff to assist in development of a proposal that meets scientific review criteria. It may help to ensure the most efficient use of time and energy by project personnel in the development of a revised proposal. This approach appears to be in line with a request made by the proponents (Response to past Council recommendations) that “we would like to open a channel of communication with the ISRP to ensure that we fully understand and are adequately addressing all of the ISRP’s comments.” Given that a good deal of hard work and commitment have gone into this project and personnel appear highly motivated and want to see successful implementation, the chances for improving the proposal seem good.

**1. Problem statement**

The problem statement is sufficient to comprehend the general problem with spring streams on the Fort Hall Bottoms. It provides information addressing the major focus and some key questions for the project. However, the problem statement does not focus on main elements of information requested in the ISRP’s format for the section.

Despite the fact that this project has been going on for more than 20 years, there is little information provided to clearly describe a strategy and related activities, including general timing and location, to move towards meeting project goals for Yellowstone cutthroat trout (YCT). It is also not clear if there is a reasonable chance of meeting the goals of the project given significant outside factors that are discussed such as climate change, reservoir operations, hybridization, and competing land use activities. There is no indication that provisions have been made to change the focus of the project if current measures are not successful within an established time frame. Such provisions could guide the project towards general ecological restoration of riparian and aquatic habitat with specific benefits to local Yellowstone cutthroat trout populations.

The proposal does not adequately describe connections with other valuable programs and plans within the Region. There is a reference to the 1994 Fish and Wildlife Program but not to the updated 2014 version.

## **2. Progress to date**

Copies of reports and assessments are cut and pasted into this proposal, but synthesis is needed to show overall progress or accomplishments. Discussion is needed of previous objectives to indicate to what extent they were accomplished. Progress is discussed in very qualitative terms. A comparison between the accomplishments to date and the total program of work and general schedule of implementation is needed to determine how much progress has been achieved. For example, it is not clear how completed tasks compare to what was originally planned (such as, percent of the buffalo fence enclosure completed relative to that planned for Clear Creek). Also, there is no real narrative to connect individual accomplishments into a comprehensive summary of progress to date or to provide linkage to the broader plans and schedules for the project.

It should be noted that over the life of the project, there has been a good deal of M&E and subsequent adjustment to the focus, scale, and approach for restoration projects. There has been progress in the evaluation of past work and examination of trout populations and their life histories, distribution, genetics and densities. This has been achieved largely through a partnership with Idaho State University (ISU). There have been important changes in approach and procedures to design and build restoration projects. Also, it is noted that an Assessment Report framework for Project implementation (2014) was completed and each stream reach was prioritized and sequenced for future restoration.

Early work in the 1990s is described reasonably well. A summary list of specific accomplishments for the Project is provided for the time frame 1992 – 2005. Beyond this, there

are some descriptions of individual additional project activities, but it is difficult to identify what has occurred since 2005. A summary of accomplishments from 2005 to the present is needed.

Since 2010, it appears that five activities have been conducted. Very generalized descriptions of three habitat improvement actions conducted in about 2010- 2014 are provided, but no assessment of the benefits of these activities to Yellowstone cutthroat trout are provided. Diggie Creek Enhancement Project was conducted and involved streambed, bank, and floodplain elements. It was completed in 2017. The description of the project is very general with no assessment of resulting habitat quality or of the Yellowstone cutthroat trout population response. A habitat enhancement project similar to Diggie Creek is slated for construction in 2020, but no details are provided.

### **3. Goals and objectives**

The proponents have not followed the guidance provided by the ISRP to develop SMART Biological or Physical Objectives nor SMART Implementation Objectives. Development of a complete set of project Goals and objectives meeting SMART criteria are needed to provide a solid foundation for project future project implementation and evaluation.

One overarching goal is provided, but it is not found in the Goals and objectives section of the proposal. The proponents state, *“The eventual goal of habitat restoration, enhancement, and protection is to provide conditions for self-perpetuating populations of native Yellowstone cutthroat trout.”* Goals and very general objectives are from a previously prepared document, and it is not evident as to what is planned for 2021-2025. A figure, taken from the Bottoms Assessment, summarizes the approach to project implementation. Unfortunately, the figure lists general actions and desired products, but descriptions are very limited and qualitative without time frames for accomplishment. The proposal needs a description of specific and measurable actions planned to achieve desired outcomes with milestones and end dates.

There is an additional section “Objectives and Hypotheses” that discusses past assumptions and project work approaches. While interesting, the section does not clearly identify plans for the near future (2021-2015).

### **4. Methods**

The Methods section needs to be revised to address methods used to achieve quantitative objectives. The lack of clearly stated objectives makes current development of a Methods section difficult. Once a set of SMART biological/physical Objectives and associated SMART

Implementation objectives, with quantitative targets to enable assessment of effectiveness are developed, the activities planned for 2021-2025 may be identified.

The current discussion of restoration methods is directly cut and pasted from a consultant report. It states *“Implementation - We can gain insight to the methods of implementation taken directly from the Assessment framework below. These are general but outline the approach for enhancement which are then further refined to concept based on the funding levels.”*

Information is not included but is needed regarding habitat enhancement plans for 2021-2025. A more complete description is needed of monitoring and evaluation (M&E). Study objectives, design, and approach are cut-and-pasted from a 2019 report. It is not clear if this project extends into the 2021-2025 period or how it is related to *“the eventual goal of habitat restoration, enhancement, and protection is to provide conditions for self-perpetuating populations of native Yellowstone cutthroat trout.”*

A section of a Baxter et al. (2019) report is provided, which possibly indicates that some biological evaluation will continue to be conducted in FY2021-2025 by this group, but it is very unclear as to if, what, and how it will occur. There are unanswered questions that include: Will there be continued assessments of invertebrates, trophic relationships, and fish metrics under this proposal funding? Will fish, particularly Yellowstone cutthroat trout responses to the restoration actions be evaluated? If so, what, when, and how?

## **5. Project evaluation and adjustment process**

A good deal of valuable M&E work has been done, resulting in improved understanding of the site and resource characteristics and functions. Lessons learned have been documented, and the project’s approach has changed as a result. Evaluation and adjustment work is primarily driven by findings from contracted studies. A number of clearly written and informative reports are provided in the proposal package.

A generalized figure describing adaptive management has been included in the proposal. The process described in the proposal appears to be directly copied from the Bottoms Assessment document, but a more detailed and clearly stated approach for adaptive management is needed, including a better-defined link between evaluation and periodic, project scale review and adjustment.

## **6. Potential confounding factors**

There is a brief summary of confounding factors regarding restoration of Yellowstone cutthroat trout and their habitat components summarized from Baxter et al. (2019). A more coherent

summary is needed discussing factors such as climate change, hybridization, land use conflicts, and negative impacts from reservoir operations, especially focused on how they relate to the restoration of viable populations of Yellowstone cutthroat trout. Although there has been a good deal of hard work and on-the-ground accomplishments, these factors represent a daunting challenge to the successful accomplishment of the project's goal for *"self-perpetuating populations of native Yellowstone cutthroat trout."* In fact, the confounding factors may be of such magnitude that a critical review and re-orientation of project goals and objectives are needed at a pre-determined time in the future. This may lead toward more general, broad-scale ecological restoration and away from a specific focus on preserving viable populations of Yellowstone cutthroat trout.

While confounding factors are discussed, it is not clear what steps will be taken to counteract these confounding factors. The proposal states that: *"multi-agency negotiation and collaboration between the Tribes and other state and federal agencies (e.g., with Idaho Department Fish and Game, Bureau of Reclamation) will be required to improve management of native and nonnative fishes as well as ensure the future of water resources."* Are there existing plans to negotiate and collaborate? If so, they should be stated in the proposal.

## **7. Timeline**

Timelines for 2014-2017 are provided but not for future work. The timeline needs to be updated, with more details and specific clarity as to what would be planned for completion under proposed funding through FY2025.

## **8. Relationships to other projects**

A discussion of relationships to other projects is needed. The proponents state, in Section 1, that: *"This project is linked to the Crystal Springs Hatchery facility which will provide seed stock to re-establish native Yellowstone cutthroat trout in Fort Hall Reservation streams (Project 2008-90-600), and the Yankee Fork Salmon River Dredge Tailings Restoration Project #200205900,"* but they offer no other verbiage to explain the relationships among these projects (e.g., collaborative efforts among proponents, sharing resources for efficiency, sharing and use of information).

## **9. Response to past Council recommendations and ISRP reviews**

Text from a 2016 letter from the Tribes to the Council, which generally agrees to address past ISRP review comments, is provided. It is not clear which review the proponents may be responding to in the letter, but it is assumed to be the 2012 Resident Fish/Coordination Review.

There is indication that some progress is occurring through various sections of the report. It lists proposed actions and some time frames for their response to ISRP comments and qualifications. The Tribe's letter states, *"the Tribe is currently addressing the points enumerated by the ISRP. The final product of this effort will be a technical supplement to the Strategy which will be in the format (editable MS Word doc, or similar) requested by the ISRP. The technical supplement to the Strategy will be delivered to the ISRP with a cover letter that addresses point-by-point responses to each of the ISRP concerns."*

It is important to note that the proponents have sought more active assistance from the ISRP. It is stated, *"As an important step in this process (responding to past ISRP input) we would like to open a channel of communication with the ISRP to ensure that we fully understand and are adequately addressing all of the ISRP's comments. We request that the ISRP provide a point person to facilitate this dialogue."* A conference call among the proponents, ISRP, and Council Staff as suggested in the Overall comment would be a first step in responding to the request to improve communication and understanding and assist in development of a revised proposal that meets scientific criteria.

#### **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

References and use of peer-reviewed literature are very limited in the proposal. The 2019 ISU report (Baxter 2019) is not included in the references. Several references do not match the authorship and year published provided in the proposal text (e.g., Moser 1997, Moser 1998, and Baxter et al. 2016 cited in text do not relate to that provided in the Reference section).

Budget information is provided for 2019-2022, but not for 2021-2025. Only total budget figures are provided with no breakdown of the budget components.

### **199701900 - Evaluate Life History of Native Salmonids in Malheur River Subbasin**

- [Project proposal in Box](#)

**Proponent:** Burns-Paiute Tribe

**Final recommendation:** Meets scientific review criteria

**Overall comment:**

This is a well-organized and clearly written proposal that could serve well as a model for other projects. It reflects on a very productive and successful effort over multiple years. The proponents present a strong argument supporting the conclusion that brook trout presence in

the Malheur River Subbasin provides a serious and primary threat to recovery and persistence of bull trout populations. The set of goals and objectives serve as a positive example to other projects. Previous work has provided essential information on distribution, abundance, movement, and genetic structure of bull trout and brook trout, as well as distribution and abundance of redband trout. A stepwise progression of new work built on the findings and uncertainty of previous work has resulted in data and results relevant to the goals and objectives.

The project actively involves multiple partners and continues to adjust activities based on lessons learned. It does a good job of anticipating issues and planning to address them. There is a strong demonstration of adaptive management with extensive collaboration. The project provides significant contributions to the Bull Trout Recovery Plan, Bull Trout Conservation Strategy, Council's Fish and Wildlife Program and local watershed teams. The recent addition of eDNA to the monitoring efforts provided additional brook trout detection sensitivity. The project proposes to enter Phase 2 of the brook trout removal effort utilizing piscicide treatments in High Lake and Lake Creek. This is an appropriate transition supported by abundance and distribution information and the demonstrated ineffectiveness of mechanical removal. The proposal appropriately includes extensive outreach to educate the public and gain support for the proposed piscicide treatment.

The ISRP suggests there may be potential long-term benefits to be had by taking advantage of USFS Malheur Forest land management's direction to provide strong impetus for protection and restoration of aquatic and riparian habitat. It appears that the vast majority of bull trout and redband trout habitat, as well as current distribution, occurs on National Forest lands. Close coordination with the USFS for land use allocations and management direction could help ensure protection and restoration of bull trout strongholds in the subbasin.

## **1. Problem statement**

1A. There is a complete discussion of relationship to other plans. A good historical discussion of issues and geographical context is provided. The discussion provides a good summary of factors adversely affecting native salmonids, specifically bull trout and redband trout. The proponents present a solid scientific basis supporting the conclusion that the presence of brook trout within the Malheur River Subbasin provides a serious and primary threat to the recovery and persistence of bull trout populations in the subbasin. The importance of this problem is highlighted further in the USFWS Recovery Plan and the Malheur Subbasin Plan. The well thought out and properly sequenced project steps and accomplishments over the past two decades have provided relevant high-quality information resulting in well-founded adaptive management decisions and strategies.

Determining abundance and distribution of bull trout and brook trout along with demonstrating the ineffectiveness of mechanical removal were essential for informing the collaborative decision to enter Phase 2 of the removal effort utilizing piscicide treatments in High Lake and Lake Creek. The proponents acknowledge that additional recovery actions will be needed to maximize the likelihood of bull trout recovery (i.e., passage improvements to reestablish population connectivity). However, it is clear that eradication of brook trout is the first essential step that must be accomplished prior to passage improvements. Enhancement of the proposal to elaborate on problems associated with redband trout would be insightful.

1B. The project has demonstrated strong significance to the Fish and Wildlife Program and especially to the Bull Trout Recovery Plan. The network of collaborators and management teams is impressive and effective. One area that is not fully discussed is the land ownership pattern for the project and the potential additional opportunities for protection and restoration of habitat on National Forest lands, given that nearly all spawning and rearing habitat is on National Forest lands. Fully noting the potential benefits of collaboration with the Malheur National Forest Plan, including riparian and aquatic habitat protection and restoration, would benefit the project.

## **2. Progress to date**

There is an extensive and impressive chronological presentation of project accomplishments from 1999 to 2019. The discussion is not directly tied to specific objectives but clearly documents significant progress in obtaining background information on native and non-native salmonid life histories and limiting factors in two populations comprising the Malheur Recovery Unit (the Upper Middle Fork and North Fork Malheur). Previous work provided essential information on distribution, abundance, movement, and genetic structure of bull trout and brook trout. More recent work has added knowledge about redband trout distribution and abundance. Much of the information has been published in reports and manuscripts. What is particularly impressive is the relevance of the data and results to the goals and objectives of the project, and the adaptive management application. A stepwise progression of new work built on the findings and uncertainty of past work is evident in the history of the project.

## **3. Goals and objectives**

The goals, objectives, and milestones are very well articulated and show a strong thread of connectivity from the goal statements through the objectives and milestone descriptions. Six goals and twelve objectives are presented. These goals and objectives cover all aspects of the project including coordination and outreach. The objectives appropriately represent a mix of ongoing work along with new work. Most of the objectives meet SMART criteria, and they are

organized in logical order. This section of the proposal can serve as a positive example of Goals and Objectives for other projects. The proponents are commended. One area where some minor adjustments would be beneficial are objectives dealing with coordination and involvement of others in the project (Objectives 5.1, 5.2, 5.3, 5.5 and 6.1). The language could describe more specific activities. For example, objective 5.1 states, *“Coordinate with TAC and partner organizations to implement aquatic species and habitat monitoring throughout the Upper Malheur Watershed through 2025.”* This could be improved by adding something like, *“at a minimum, conduct monthly coordination meetings to review and discuss planning and accomplishment of work activities and any conflicts to meeting planned objectives or timelines.”* A similar approach could be used for the other objectives to better describe “must do” coordination. Several objectives would benefit from further consideration to meet SMART criteria by including quantitative outcomes. Objective 6.2 is not quantitative. Desired outcomes could be stated for the number of various types of documents/publications that will be produced, thus providing a quantitative metric.

#### **4. Methods.**

Methods are presented for each goal and objective combination, as well as most milestones. Methods are organized to align directly with the goals and objectives, which provides useful direct connectivity between objectives and methods. The level of detail is adequate, and methods are appropriate for all objectives. The recognition of the importance of outreach and the detailed outreach objectives and milestones will serve the project well in garnering support and understanding from the public and other agencies.

#### **5. Project evaluation and adjustment process**

The project has demonstrated a strong and effective evaluation and adaptive management process. Extensive connectivity to numerous committees and decision processes were highlighted. The project uses the Technical Advisory Committee as the primary vehicle to drive evaluation and management action adaptive changes. The overall process is founded in the Malheur River Technical Advisory Committee which *“meets regularly every year with the intent of providing updates on relevant projects, recent occurrences and changes that may affect operations, updated reasoning and recommendations behind potential modifications in priorities.”* The current approach appears to be consistent, generally well-planned, and effective. It is supported by a strong suite of clearly written goals and objectives that likely assist in the efficient operation of the project. A number of examples of how lessons learned have altered project direction, activities, and RM&E are provided. The participation in the Technical Advisory Committee has been valuable for sharing data and facilitating effective

management decisions. The formal processes described to incorporate new knowledge and changes in plans, objectives, priorities, and schedules, as well as to share data, are sound.

## **6. Potential confounding factors**

Major confounding factors were identified, including some factors outside of project control (i.e., analysis for use of piscicides). The proponents have been proactive in identifying factors that could negatively impact project progress and timelines. Identification of the importance of outreach and the extensive plan to guide outreach activities represents an excellent example of the proponents' commitment to identifying and solving problems and roadblocks. A more complete discussion of the NEPA challenges and potential impacts to project implementation would be beneficial.

## **7. Timeline**

The timeline is organized well, following the structure of goals, objectives, and milestones. All timeframes seem reasonable and appear to be sequenced in a way that facilitates a logical stepwise progression of activities.

## **8. Relationships to other projects**

The proposal has demonstrated effective relationships to other projects and programs, particularly those within the Malheur Subbasin. A review of the literature from similar projects involving eradication of brook trout with piscicides in high-elevation lakes and small headwater streams, as well as suppression of brook trout by means of electrofishing, would be a worthwhile addition to this section. We strongly encourage project personnel to coordinate with the Bull Trout Status and Abundance on Warm Springs Reservation BPA Project to share relevant information. The Warm Springs Tribal project is at an early state of implementing very similar objectives and would greatly benefit from sharing experiences and knowledge gained by the Malheur work.

## **9. Response to past Council recommendations and ISRP reviews**

Past ISRP reviews have been primarily complimentary and supportive of the project. This proposal includes a detailed and clear discussion of key issues and recommendations from past reviews. The project was rated as "Meets" in the last 2012 review, with no major qualifications. However, ISRP concerns included slow growth of riparian vegetation, the need to work more closely with BPA projects, and improvement in the design of redband trout genetics studies.

The few ISRP recommendations provided in past reviews appear to have been adopted and integrated into the project.

#### **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No additional comments.

#### **199501500 - Duck Valley Reservation Reservoir Fish Stocking Operations and Maintenance (O&M)**

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Shoshone-Paiute Tribes

**Final recommendation:** Meets scientific review criteria – conditional

#### **Conditions:**

The proponents need to revise substantially the current proposal following the ISRP's proposal template before their work plan and SOW for 2021 are finalized and approved. The ISRP recommends that the proponents should submit the revised proposal to the ISRP for review. To facilitate an ISRP review, it is particularly important that the proponents use the ISRP's proposal template and follow the guidance for the development of goals and objectives. Additional discussion with the ISRP is encouraged as the proponents develop a revised proposal, especially in the development of SMART Physical/Biological/Social Objectives and Implementation Objectives that are needed to guide the development of methods (i.e., management activities), monitoring and evaluation, and a timeline for the project.

The proponents provided information in the original proposal and responses to the ISRP requests that contribute detail to the first two sections of the template: 1. Introduction and Problem Statement and 2. Progress to Date. It is clear from the original proposal and the responses to ISRP requests that the proponents are actively managing the trout fisheries in the three reservoirs on the Duck Valley Reservation and providing benefits to both Tribal members and non-tribal anglers. However, a more complete description of progress from project initiation in 1995 through 2019 is needed. The project has a long history of accomplishments that the proponents need to document and use in identifying future direction. While the three reservoirs are providing significant trout fisheries, the fisheries are being limited by high summer water temperatures, low summer dissolved oxygen concentrations, and increasing

populations of introduced fishes that compete with trout or prey upon trout. Goals and objectives for future actions that address these limiting factors are needed. The proponents need to go beyond the current routine management actions and develop plans for additional actions to address potential factors that may limit the fisheries in the future.

Substantially more development of the following sections is necessary in the revised proposal: 3. Goals and Objectives, 4. Methods, and 5. Project Evaluation and Adjustment Process.

Within the Goals and Objectives section, the proponents need to state clearly the project goals. Given recent project documentation there appears to be four goals: (1) enhance Tribal subsistence fishing opportunities to mitigate lost harvest resulting from construction and operation of the Federal hydrosystem; (2) provide quality recreational fishing opportunities for Tribal and non-tribal anglers; (3) educate the Tribal community and other regional constituents of the importance and value of maintaining quality fishing opportunities, improved lake water quality, and climate change impacts; and (4) evaluate the feasibility of developing a hatchery to meet trout stocking needs.

A major focus of the proposal revision should be the development of a sound set of SMART Physical/Biological/Social Objectives and Implementation Objectives associated with each of the stated project goals. Each SMART objective needs to be specific, measurable, achievable, realistic, and time bound. Specific directions regarding SMART objectives are provided for the proponents in the ISRP guidance to project proponents that was made available at the initiation of this review process. Metrics that enable tracking of progress toward achievement of each objective need to be clearly stated within each SMART objective. For example, a SMART biological objective might be to achieve a catch rate of one rainbow trout per hour or higher in each of the three reservoirs by 2025. A SMART implementation objective associated with this biological objective might be something like this -- to stock 50 triploid rainbow trout per acre of 20-25 cm total length annually in each reservoir from 2021 through 2025. Similarly, an example of a SMART social objective might be to achieve an average satisfaction rating for the trout fishery in each reservoir of 4+ (on a scale of 0-5) among tribal members who fish the reservoirs by 2025.

The Methods section needs to describe the specific management actions to be conducted for each SMART implementation objective. For example, the description of methods associated with the annual fish stocking objective may include the source of fish; assurances of triploidy, lengths of fish, and fish health at stocking; how fish are transported; the stocking schedule; and how water temperatures in the hauling tanks are tempered prior to release of fish into the reservoirs. Methods for monitoring the SMART physical, biological or social objectives, as well as implementation objectives, need to be described. For example, if a SMART biological objective is to achieve a catch rate of one rainbow trout per hour or greater in each of the three reservoirs by 2025, a creel survey could be conducted to determine if the catch rate objective is

achieved. The creel survey methods need to be described and include the sampling design, the procedure for obtaining data from anglers, how data are stored, and the analytical procedure for deriving estimates of catch rates.

The Project Evaluation and Adjustment Process section needs to describe how monitoring data associated with the SMART Physical/Biological/Social Objectives and Implementation Objectives will be used in both evaluating achievement of the stated objectives and making project adjustments. For example, if creel survey estimates indicate that the catch rate objective is not being achieved, how will decisions be made to adjust management activities? A structured process for evaluating progress toward achievement of each SMART objective needs to be described along with how decisions will be made to adjust the project if individual SMART objectives are not achieved.

Section 7 of the template, Timeline, should include a flow chart describing specific planned activities and when they will be conducted. These activities should be linked to SMART physical/biological/social objectives and implementation objectives for each year from 2021 to 2025.

Without a substantially improved proposal that follows the ISRP's template and is based on SMART objectives, methods to address the objectives, and monitoring and assessment protocols for each objective, the ISRP cannot determine whether the proposed actions meet scientific criteria.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The effort that the proponents have invested in providing this proposal is greatly appreciated. It is recognized that there has been recent turnover in personnel managing this project and personal tragedy among personnel directing the Tribal fish, wildlife and parks program.

This project has a strong record of on-the-ground accomplishments. This project has clearly provided consistent benefits to the Tribal community through the offering of a range of activities, many in addition to the central goal of providing enhanced subsistence fishing opportunities for Tribal members. The project appears to have consistent interest and use by both local tribal members and non-tribal members who travel to the reservoirs to fish and camp.

**Response Requested:**

To help us review this proposal, the ISRP asks the proponents to address the following questions in their response:

1. The project should describe the problem(s) being addressed by the project more comprehensively. The problem statement may include language such as this, the project is to “partially mitigate for the loss of anadromous fishes in the Duck Valley Reservation...” with a full description of what is being mitigated. Additionally, the project is providing economic development opportunities. What are the economic problems being addressed?
2. Based on monitoring results and overall findings, provide a description of the progress that has occurred through the implementation of the project.
3. Based on what is presented in the proposal, there appear to be three primary goals: (1) enhance Tribal subsistence fishing opportunities to mitigate lost harvest that resulted from anadromous and resident fish impacts resulting from construction and operation of the Federal hydropower system, (2) provide quality recreational fishing opportunities on the reservation for Tribal and non-tribal anglers, and (3) educate the Tribal community and other regional constituents of the importance and value in maintaining quality fishing opportunities, lake water quality, and climate change impacts. Develop clear statements of the project’s goals.
4. The proponents should provide objectives for each project goal. The objectives should follow the ISRP guidance for SMART objectives that is provided in the instructions for proposals. The objectives should include public education and public outreach components of the project.
5. Describe the methods to achieve each of the SMART Biological/Physical/Social Objectives and associated Implementation Objectives. This response should include monitoring actions and specific metrics that will be used to evaluate each objective.
6. Describe the process for project evaluation and adjustment using monitoring data for each of the SMART objectives.
7. The proponent should provide a complete timeline for planned, annual accomplishments by objective for 2021-2025.

The additional questions and comments provided below are meant to strengthen the proposal and do not need to be specifically addressed during the response loop.

## **1. Problem statement**

The proposal does not include a section labeled, Problem Statement. Instead, there are two headings, Introduction and Significance, that provide information on the overarching problem and need that the project addresses.

The overarching problem of lost Tribal fishing opportunities resulting from construction and operation of the Federal hydropower system dams is well articulated. In addition, the importance of developing and maintaining recreational fishing opportunities for Tribal and non-tribal members is highlighted.

Overall, project purposes are not clearly described. At one place, the primary goal of the project appears to be to “facilitate resident fish populations under the Duck Valley Reservation Fish Stocking O&M project in order to protect, restore and/or maintain the three reservoirs as it partially mitigates for the loss of anadromous fishes in the Duck Valley Reservation.” However, later in the proposal the primary purpose of the project is stated as “enhance subsistence fishing opportunities for Tribal members.” A clear statement of the project goal(s) is needed.

In addition to providing tribal members access to subsistence fisheries, the project is providing economic development opportunities. What are the economic development opportunities that have been realized? What are planned? Recent annual reports indicate that the proponents purchase booths at regional events to promote fishing opportunities to non-tribal members. These marketing activities indicate project activities extending beyond tribal-member subsistence and cultural purposes.

A substantial focus of the description of the project is on Lake Billy Shaw (LBS) Reservoir. A hint of a quantitative objective is provided with the stated objective of having the annual biomass of the total catch biomass exceed the annual total biomass of stocked fish. This is a reasonable objective for put-and-take fisheries, but there is no further mention of such an objective within the proposal or how such an objective is or may be assessed for any the three reservoirs.

No information was provided related to significance to the Council’s Fish and Wildlife Program.

## **2. Progress to date**

A substantial description of past activities is provided. This allows a general understanding of past direction, accomplishments, and challenges. Unfortunately, the objectives used to frame the project are goal statements. They do not provide a quantitative, time-bound descriptions of what was planned compared to what was accomplished.

A comprehensive summary of the progress since the beginning of BPA funding in 1995 is not presented in the proposal. The ISRP identified the need for a comprehensive summary in the

2013 review of the project. Assessment of progress to date is dependent on describing the full history of the project accomplishments.

A description of project history should include information on fish stocking, harvest, population monitoring, and water quality, particularly water temperature and dissolved oxygen, which may be limiting factors. Many management actions have been tried over the course of the project. It would be helpful to know which ones worked to enhance or maintain the fisheries and which ones did not work. Topics related to these questions currently discussed in the proposal include termination of a juvenile rainbow trout stocking program based upon findings from a tagging study; introduction of grass carp in 2011 and 2018 for the control of milfoil; and identification of dissolved oxygen and water temperature as the two main limiting factors for rainbow trout in the three reservoirs. The project history should also include information on trends in angler use and harvest, as well as assessments of angler satisfaction over the course of the project.

Much of what is presented in the methods section of the proposal related to fishery monitoring results should be presented in the Progress to Date section, including total fish stocked, return rate to creel, exploitation rates, total harvest, and catch rates. It should address what percent of the years have the objectives for harvest (biomass stocked versus biomass caught) and stocking numbers been met?

### **3. Goals and objectives**

Overall, the section fails to identify project goals. It is stated that the “project is an ongoing resident fish program designed to enhance subsistence fishing opportunities for Tribal members.” However, the desired outcomes are unclear. Goals describe in qualitative terms, the ultimate desired outcomes of a project, and the proponent’s aspirations for overall benefits to fish and wildlife. Based on what is presented, there appear to be three goals: 1) enhance Tribal subsistence fishing opportunities to mitigate lost harvest that resulted from anadromous and resident fish impacts resulting from construction and operation of the Federal hydropower system, 2) provide quality recreational fishing opportunities on the reservation for Tribal and non-tribal anglers, and 3) educate the Tribal community and other regional constituents of the importance and value in maintaining quality fishing opportunities, lake water quality, and climate change impacts.

As with goals, the objectives of the project are not clear. A number of general activities for the project are described, but these activities are not described as quantifiable objectives. Eight key activities are identified in the proposal: 1) fish tagging to determine angler use and harvest level, 2) ensuring safe access to the reservoirs, 3) campground maintenance, 4) hosting of celebrations and events, 5) presentations to community groups, 6) distribution of surplus hatchery salmon and steelhead to tribal members, 7) hiring, and 8) mentoring of youth

workers. The activities may provide a framework for development of several SMART implementation objectives for the project.

SMART objectives should include the following characteristics: 1) Specific and clearly defined, 2) Measurable (quantifiable), 3) Achievable and testable, 4) Relevant and applicable to the Program with benefits to fish and wildlife, and 5) Time-bound with clear milestones and end dates. An example of a SMART biological might be to achieve a catch rate of one rainbow trout per hour or more in each of the three reservoirs by 2025. Similarly, an example of a SMART social objective might be to achieve an average facility satisfaction rating of 4+ (on a scale of 0-5) among tribal members for each reservoir by 2025.

The project has developed substantial cultural, education, and outreach actions. SMART objectives for these project components are needed.

#### **4. Methods**

Methods do not adequately address the full set of apparent objectives, as well as monitoring and evaluation of the objectives. Most of the section content is a description of past results, which should be included in the “Progress to Date” section. The methods need to be revised after an adequate set of goals and SMART objectives are developed. Proponents need to develop methods for achieving each objective, as well as statistically based sampling and analytical approaches for monitoring and evaluating the success of activities associated with each objective.

Creel census, fish population monitoring, and temperature monitoring activities are discussed, but the presentations are insufficient to enable scientific assessment. There is no discussion of methods for public engagement or assessment of user participation/satisfaction.

A creel survey is conducted annually. Data presented in recent annual reports indicates that the survey is not a stratified, random-sampling design that can yield annual estimates of harvest and catch rates for each reservoir, but only “spot checks” of anglers. The design of the creel survey needs full explanation. A rigorous creel survey involving all three reservoirs is needed if the proponents desire to determine if total catch biomass exceed stocked biomass as they indicate in the Introduction to the proposal. Linkage of the creel survey to assessment of SMART objectives for the project is needed.

Annual gillnetting is conducted to assess fish stocks. A description of the sampling design, sampling intensity, and computation of summary statistics is not found in the proposal or recent annual reports. Once again, linkage of the annual gillnetting to assessment of SMART objectives for the project is needed.

Water temperature is being monitored. The spatial and temporal design of temperature monitoring needs to be described along with the summary statistic to be obtained. Additionally, explanation as to how water temperature data will be assessed relative to SMART objectives addressing water temperature limitations is needed.

## **5. Project evaluation and adjustment process**

It appears that the proponents were confused regarding the intent of this section. There is a need to describe a project evaluation and adjustment process (i.e., adaptive management process). It is apparent that the proponents track the implementation and effectiveness of a number of activities, but there does not appear to be a formal process to evaluate and adjust project activities. Lessons have been learned. Evidence of evaluation and adjustment of management actions includes: 1) elimination of juvenile rainbow trout releases, 2) introduction of grass carp, 3) modification of population monitoring approaches including tagging efforts, and 4) increase in educational and public outreach and education efforts.

The proponents need to develop and describe a formal process for project evaluation and adjustment. A process involves SMART Biological/Physical/Social Objectives and SMART Implementation Objectives, monitoring to ascertain progress toward objectives, and a formal procedure for evaluating monitoring data and making decision regarding project adjustments.

## **6. Potential confounding factors**

There is a brief description of potential climate change effects, but no other potential confounding factors were discussed. It is obvious from information in the proposal and annual reports that the proponents face many potential confounding factors. These may include: 1) the “quality” of the rainbow trout being obtained from a private hatchery (i.e., disease, body condition, percent triploidy) and their future cost; 2) potential for high summer water temperatures to impact survival of stocked fish; 3) mercury in harvested fish and human health risk; 4) effects of high suspended sediments from the Highline Canal headcut on fish survival and catchability; 5) impacts of potential fish and mussel invasions; 6) water availability; 7) toxic chemicals in the water supply and runoff into the reservoirs; 8) aquatic vegetation and algae issues, particularly cyanobacteria; and 9) challenges for education and outreach.

## **7. Timeline**

The timeline is incomplete and only addresses a few of the planned activities. This section includes a simple figure describing a three-year timeline with only a couple general implementation/monitoring objectives for each year. A more detailed timeline describing anticipated progress toward both SMART Biological/Physical/Social Objectives and SMART Implementation Objectives is needed for each year of the project from 2021 to 2025.

## 8. Relationships to other projects

No content was provided for this section of the proposal. The proponents need to describe similar projects involving stocking of triploid rainbow trout in small impoundments are taking place as part of the Council's Fish and Wildlife Program. Lessons could be learned from the experiences of other projects.

## 9. Response to past Council recommendations and ISRP reviews

The proponents provide a brief, incomplete description of how they have responded to past Council reviews. A clear summary of major ISRP recommendations and review findings would be useful to facilitate review of the project.

## 10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)

Previous reports mention a Fisheries and Reservoir Management Master Plan that was finished and finalized on January 31, 2014. What is the status of that plan? Where is it available? Was this plan developed in response to the ISRP's 2012 review qualification?

The Year-end Progress Report, Mar. 1, 2018-Feb. 28, 2019, mentioned that a new study design and methods were completed. Is that document available?

These documents would inform the ISRP review of this proposal.

## 199701100 - Duck Valley Reservation Habitat Enhancement

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Shoshone-Paiute Tribes

**Final recommendation:** Meets scientific review criteria – conditional

### Conditions:

The proponents need to revise the proposal following the ISRP's proposal template before their work plan and SOW for 2021 are finalized and approved. The ISRP recommends that the proponents should submit the revised proposal to the ISRP for review. It is particularly important for an effective review that the proponents use the ISRP's proposal template and follow the guidance for the development of goals and objectives. Additional discussion with the ISRP is encouraged as the proponents develop a revised proposal, especially in the development of SMART Physical/Biological/Social Objectives and Implementation Objectives needed to guide the development of methods (i.e., management activities), monitoring and evaluation, and a timeline for the project.

Revisions of the Problem Statement, Progress to Date, Goals and Objectives, Methods, Project Evaluation and Adjustment Process, and Timeline sections are needed for the proposal to meet scientific criteria. The proponents are asked to follow the ISRP guidance for proposal format and to utilize the examples provided for the development of the problem statement, goals and objectives, and timeline that was provided at the initiation of this review process. Within the Goals and Objectives section, the proponents need to describe clearly the project goals and develop a sound set of SMART (i.e., specific, measurable, achievable, realistic, and time-bound) Physical/Biological/Social Objectives and Implementation Objectives. Metrics that enable progress toward achievement of each objective need to be clearly stated. Objectives need to be time bound with a focus on outcomes for 2021-2025. The Methods section needs to describe the specific management actions that will be conducted to address each of the SMART implementation objectives.

Aspects of the project that are in particular need of additional development in the revised proposal include:

**1. Problem Statement:** The response to the ISRP's request discusses the problems associated with livestock grazing and backcountry roads, but the detail is insufficient to ascertain the magnitude and severity of the problems on the Reservation. This need could be addressed with a focused, more detailed discussion that includes data on the magnitude of livestock grazing, backcountry roads, numbers of springs impacted, lengths of streams impacted, numbers of road crossings, and similar data. The assessments completed for the East Fork Owyhee River, Blue Creek, and Reservation wetlands likely provide information for development of a more detailed description of the issues and their extent and severity. Identification of the number of sites, their locations, and the areas that require protection or restoration is needed to provide understanding about the scope of the project.

**2. Progress to Date:** The response indicates that a number of springs and segments of riparian areas have been protected since the initiation of the project. However, the magnitude and effectiveness of the work that has been accomplished is not explained. How many springs have been protected in some manner? How many more are being impacted or threatened by livestock grazing and need protection? How much fencing has occurred in riparian areas? How much more riparian area needs protection? How many road crossings have been improved? How many more need improvement? These are the kinds of data that should be included in the revised proposal. Using information on the number, locations, and areas of sites that require protection, a summary of progress to date can be provided in the revised proposal. Discussions and photographs showing individual restoration treatments provide insight, but they are not sufficient to describe the extent of protection and restoration that has been accomplished to date.

**3. Goals and Objectives:** Goals are discussed for several aspects of the project in both the proposal and the responses to the ISRP requests, but they are not sufficiently described. What are the overarching goals for habitat on the Reservation? What are the specific goals for springs, riparian areas, backcountry roads, wetlands, etc.? The response does not include objectives specific to individual goals. The ISRP's guidance for the review provides directions to project proponents for the development of both Physical/Biological Objectives and Implementation Objectives for each project goal. A full suite of SMART Physical/Biological Objectives and Implementation Objectives is needed. Some objectives have been provided in the proposal and response, but they do not meet the need to be measurable and with a time frame for completion.

While not intending to direct the project, an example of a possible progression from a stated goal, to a physical objective, to implementation objectives, methods, and monitoring could be:

Goal: Protect and enhance springs on the Reservation being impacted by cattle grazing in order to enhance stream habitat for redband trout.

One possible physical objective associated with this goal could be: Achieve late-summer maximum water temperatures of 55° Fahrenheit or less for 20 spring streams (or whatever may be the number of springs in need of protection) at the point of discharge into receiving streams with redband trout by 2025.

Two possible implementation objectives associated with this physical objective could be:

1. Maintain fencing and watering troughs at 10 spring sites (or whatever the current number may be) already protected from 2021-2025; and
2. Protect 10 additional spring streams (or whatever the need may be) with fencing and watering troughs from 2021-2025.

Methods would include detailed descriptions of fencing and water trough installations and routine maintenance needs.

Monitoring of the physical objective could include measuring late-summer water temperatures in spring streams following protection/enhancement. Hobo temperature monitors are inexpensive devices that could be placed in all or a representative sample of the spring streams during late summer to measure water temperatures.

Evaluation could be conducted using the monitoring data to determine if the physical objective is being achieved following protection/enhancement of springs.

The ISRP strongly encourages the proponents to follow the logic of this example in the development of the goals, Physical/Biological/Social Objectives, Implementation Objectives, methods, and monitoring components of the revised proposal.

**4. Methods:** Very little information has been provided in the proposal or response regarding the methods being used to protect or enhance habitat on the Reservation. There is a need to describe in detail the specific management activities being used to achieve specific SMART implementation objectives, as well as methods to assess responses to the implementation actions and achievement of Physical/Biological/Social Objectives.

**5. Project Evaluation and Adjustment Process:** This aspect of the project was not addressed in the proposal or the response to the ISRP request. There is a need to describe how each Biological/Physical Objective and Implementation Objective will be monitored and progress will be assessed. Further, the proposal should identify a structured decision-making process through which needed modifications to the project may be identified and implemented.

**6. Timeline:** Each of the SMART Biological/Physical Objectives and Implementations Objectives should have a defined temporal endpoint stated in the objective. A detailed timeline showing planned times for starting, conducting, and finishing of individual objectives is needed. Timelines should include planning, implementation, monitoring, and evaluation components. Timelines for activities to be conducted each year from 2021 to 2025 should be considered as a definition of milestones for each objective during the five-year interval.

**Final comment:**

The proponents have provided insight into the problems being addressed and the management actions being conducted, but they have not succeeded in developing a comprehensive proposal for habitat enhancement on the Reservation. It is clear that the proponents understand major issues, techniques for protection and restoration of habitat, and appropriate activities and treatments that are needed. Also, it is evident that the proponents are interested in improving their effectiveness for protection and restoration, as well as expanding working partnerships for the program. However, the proposal and responses to ISRP requests do not fully address the material requested by the ISRP in the requested format for proposals. Substantial effort is needed to develop a comprehensive revised proposal that will enable the project to be identified as meeting scientific criteria.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The effort that the proponents have invested in providing this proposal, under difficult working conditions, is greatly appreciated. The ISRP understands the challenges created by recent staff changes and the tragedy experienced by the program director.

This project has a consistent record of on-the-ground accomplishments for the restoration of redband trout habitat. There appears to be a strong commitment for obtaining successful results. The past work is relatively limited in scope but provides a foundation for more comprehensive efforts in the future. It appears that the project is in transition and is moving forward with a broader set of goals and objectives. A good deal of effort is needed to develop a more comprehensive, well-rounded proposal to achieve these goals and objectives. Additional information is needed.

**Response Requested:**

To help us review this proposal, the ISRP asks the proponents to address the following questions in their response:

1. Please provide a comprehensive presentation of the primary problem(s) being addressed by the project. The problem statement include language such as this, "The primary problem is land use practices, such as livestock grazing, unimproved roads, and irrigation withdrawals, have degraded fish and wildlife habitat in the East Fork Owyhee River Watershed." Since the project included community outreach and youth education dimensions, a problem statement for this component of the project is also needed. It could be something such as, "Awareness of the effects of land use practices on fish and wildlife habitat and support to protect, restore, and enhance habitat is limited among tribal members, especially youth, on the reservation."
2. Please provide a description of progress to date using overall findings and monitoring results.
3. Please provide clearly stated goals for the project. There appear to be two primary goals embedded in the proposal: (1) Protect, restore and enhance fish, wildlife, and their habitats on Duck Valley Indian Reservation and other Tribal Lands, and (2) Educate and inform the community, especially the youth, of the value and importance of protection, restoration and enhancement of fish and wildlife habitat. If this is correct, incorporate them into your stated goals.
4. Provide quantitative objectives associated with each of the project goals. The objectives need to meet criteria for SMART objectives and follow the guidance for proposal provided by the ISRP. Please refer to the Goals and objectives section of this review for specific guidance and examples.

5. Develop descriptions of methods specifically linked to each of the SMART biological, physical, or social objectives and associated SMART implementation objective. Please refer to the Methods section of this review for examples.
6. Describe how progress toward the SMART biological, physical, or social objectives and associated SMART implementation objectives will be monitored and assessed. Monitoring of progress should involve systematic measurements and maintenance of data. Please refer to the Methods section of this review for examples.
7. A complete timeline for each objective for each year from 2021 through 2025 is requested.

The information requested could be incorporated in the proposal document to help create a management plan for future use in guiding the project into the future, development of annual reports, and preparation of future proposals for the ISRP and Council.

The additional questions and comments provided below are meant to strengthen the proposal and do not need to be specifically addressed during the response loop.

### **1. Problem Statement**

The proposal indicates that the project goal is “to address the most important habitat concerns associated with red band trout,” and that it is “designed to enhance and protect critical riparian areas, natural springs, streams, and rivers.” However, linkages to redband trout habitat needs are not identified. It appears that the project is more focused on mitigation of fish and wildlife habitat damage associated with land use practices on the reservation.

The proposal does not indicate an overall plan or landscape/watershed scale strategy for the habitat work. The primary problem appears to be land use practices, particularly livestock grazing and unimproved roads, which have degraded fish and wildlife habitat in the East Fork Owyhee River Watershed.

The proposal does not include a description of the spatial scale and relative priorities of the habitat work. Numerous questions arise. How broad is the area that is degraded and what kinds of treatments or changes in land management are needed to mitigate the degradation? How have locations for treatments been identified and prioritized? How have appropriate treatments been selected?

The problem statement could be stated more directly as: land use practices, such as livestock grazing, unimproved roads, and irrigation withdrawals, have degraded fish and wildlife habitat in the East Fork Owyhee River Watershed.

Climate change will likely result in additional habitat impacts in the future.

The proposal should clearly state the overarching land use and habitat problems and why mitigation of these problems are important to fish and wildlife on the reservation.

The project includes community outreach and youth education dimensions, but the purposes for these components of the project are not described. Are Tribal members, especially youth, on the reservation aware of the effects of land use practices on fish and wildlife habitat? Do they support the protection, restoration, and enhancement of habitat and native fish communities?

There is no description of how the project contributes to the Council's Fish and Wildlife Program.

Development of several major components would strengthen the project in the future:

- A strategic, landscape-scale restoration approach that clearly identifies current goals and objectives, prioritizes locations needing restoration, identifies best-available treatments to meet objectives, and develops methods for monitoring and assessing restoration activities.
- A comprehensive restoration plan for reservation watersheds that includes cultural and education goals, objectives, and methods for their attainment.

## **2. Progress to date**

The project has completed numerous restoration projects since initiation, but there is no description of the cumulative array of accomplishments and their benefits to fish and wildlife. For example, details on work completed (the number of riparian area fencing projects, the length of fencing and areas protected by each project, the number of upslope water troughs constructed, and the number beaver dam analogues constructed) compared to what was planned would provide insight into the actual progress to date. A large amount of work on fish and wildlife habitat restoration has been completed since 1997 for which the proponents should be proud and upon which they should provide additional context and detail.

The table listing various actions in the Timeline section of the proposal is an example of what could be included in this section of the proposal. The table could be expanded to identify when each action was initiated, the success at maintaining it, and the habitat response(s) that have been observed.

Monitoring data apparently exist that describe habitat responses to some treatments. For example, it is stated "Graphs depicting each enclosure and each non-enclosure monitoring site are presented along with a narrative to explain changes that have occurred over the six-year evaluation period," and "All data are available upon request, for those interested." These data

need to be summarized and depicted in a manner that demonstrates habitat changes that have resulted from the various management actions.

### 3. Goals and objectives

A clear statement of project goals is not found in the proposal. Clearly stated goals are needed for habitat protection, restoration, and enhancement, as well as community outreach and youth education and outreach on the reservation.

The proposal indicates that the project goal is “to address the most important habitat concerns associated with red band trout,” and that it is “designed to enhance and protect critical riparian areas, natural springs, streams, and rivers.”

The stated objectives indicate that the goals (1) extend to fish and wildlife habitat across the reservation and tribal lands, and (2) include education and community outreach components, especially for youth on the reservation. The proponents provided three “objectives” that were reasonable goals and four sub-objectives for the project. If these were put in into a format of SMART objectives, it could be a good start toward development of quantitative objectives for the project. Clear goals/objectives related to the education and community outreach components of the project are also needed.

The objectives that are presented do not follow the ISRP guidance for development of quantitative objectives. The guidance is:

*B. **Objectives** describe steps needed to implement the project and describe desired outcomes. They must be **SMART**: (1) **Specific and clearly defined**, (2) **Measurable (quantifiable)**, (3) **Achievable and testable**, (4) **Relevant and applicable to the Program with benefits to fish and wildlife**, and (5) **Time-bound with clear milestones and end dates**.*

*1) **Quantitative biological, physical, or social objectives** describe the expected outcomes needed to achieve the goals and provide the metrics for effectiveness monitoring.*

*2) **Quantitative implementation objectives** describe specific steps needed to achieve the quantitative biological, physical, or social objectives, and hence, the overall goal.*

An example set of SMART objectives associated with habitat could be:

Assuming that a goal may be to enhance redband trout habitat in the East Fork Owyhee River, a SMART biological objective could be to enhance habitat for redband trout by increasing the surface area of pool habitat greater than 0.6 m deep during baseflow

conditions by at least 50% by 2025. The objective would be based on baseline data for pool habitat prior to initiation of mitigation activities.

SMART implementation objectives associated with this physical objective could be:

- (1) to enhance riparian habitat for beaver by creating a specific length of kilometers of habitat protected from livestock grazing through fencing by 2025, and
- (2) to create a specific area of beaver pond habitat through natural colonization by beaver, transplantation of beaver, and (or) construction of beaver dam analogs by 2025.

Similarly, an example set of SMART objectives associated with youth education could be:

Assuming that an intern program is maintained, a SMART social objective could be to introduce a specific number of teenage tribal members to the field of natural resource management each summer from 2021 through 2025.

A SMART **implementation objective** associated with this social objective could be to conduct an annual summer intern program for a specific number of teenage tribal members during which they work on habitat restoration projects and receive instruction from professional fish and wildlife habitat biologists each year from 2021 through 2025.

Methods for monitoring pool area would be described in detail in the Methods section.

The ISRP understands the challenges created by recent staff changes and other factors affecting staff. We intend the responses that we request to make their efforts more effective and help them use their resources more efficiently. If the proponents have questions about any of the requested responses, they should feel free to contact Erik Merrill for additional help or clarification.

#### **4. Methods**

The ongoing habitat work is not related to clearly stated goals and objectives. Information is provided describing methods for building water troughs, moving beavers where over population is occurring, and installing beaver dam analogs, but these activities are not linked to specific objectives. Similarly, fencing of riparian areas, placement or replacement of culverts, efforts to reduce erosion of roadbeds are described as planned restoration activities, but their ties to specific objectives are unknown and there is no discussion of methods provided for them.

Numerous activities are being conducted concerning community outreach and education of youth on the reservation. Objectives for youth education and community outreach are not stated, nor are plans (methods) for achieving such objectives.

There is a need to develop descriptions of detailed methods specifically linked to each of the SMART biological, physical, or social objectives and associated SMART implementation objective.

- For example, the methods for the SMART physical objective may be a description of the process for selection of sites for exclosures and their locations, the kind of fencing to be installed or maintained, and the procedures used to install new exclosures and maintain existing ones.
- A similar example for the SMART social objective of introducing teenage tribal members to the field of natural resource management may be to provide a detailed description of how the intern program is conducted.

There also needs to be a description of how progress toward the SMART biological, physical, or social objectives and associated SMART implementation objective. Monitoring of progress should involve systematic measurements and maintenance of data.

- For example, to monitor the SMART physical objective of increasing the surface area of pool habitat greater than 0.6 m deep during baseflow conditions, an annual late summer stream survey may be needed to measure pool habitat meeting the specified metric. Details regarding how the survey will be conducted would be described.
- A similar example for the SMART social objective of introducing teenage tribal members to the field of natural resource management may be to simply keep detailed records of the numbers of intern in the program each summer.

## **5. Project evaluation and adjustment process**

The proposal does not address this section of the proposal. The proponents need to describe an adaptive management process for assessing their progress toward achieving objectives and adjusting the project as needed.

## **6. Potential confounding factors**

Three potential confounding factors are discussed: introduction of smallmouth bass, maintenance of genetically pure populations of redband trout, and climate change. However, the proposal provides no information on actions to deal with these factors.

## **7. Timeline**

No timeline is provided for the project. A Gantt chart for activities from 2021 to 2025 would illustrate the timeline for specific activities more effectively than the pie chart.

## **8. Relationships to other projects**

The proposal collaborates with three other projects. Additional detail on how the projects collaborate to accomplish common goals and objectives is needed.

There are many other projects in the basin dealing with similar riparian/aquatic habitat protection and restoration issues that could provide useful information for the proponents of this project.

## **9. Response to past Council recommendations and ISRP reviews**

There is no discussion of past ISRP reviews of this project. Several graphs illustrate water temperatures on mainstem and tributary streams in late summer and fall for habitat conditions in the East Fork Owyhee River, but they are not pertinent to past recommendations or reviews.

Past ISRP reviews (FY 1999, 2003, 2007-09, and 2012) consistently advised the proponents to provide more detail about the purpose of the project, priorities for management activities, methods, and evidence of concrete accomplishments.

## **10. Miscellaneous Section 10-13 (references, key personnel, appendices, budget)**

No comments.

## H. Clearwater

### 199501300 - Nez Perce Trout Ponds

- Box: [Original proposal](#) and [Response](#)

**Proponent:** Nez Perce Tribe

**Final recommendation:** Meets scientific review criteria

**Final comment:**

The ISRP is impressed with the pond management program that has been established, as well as the many educational outreach components of the project. We compliment the proponents for providing a complete and sound set of responses to the ISRP's requests and numerous associated questions.

The proponents provided a new set of goals and objectives to address concerns that the original objectives did not meet guidance for SMART objectives and lacked connectivity between goals and objectives. This new section is much improved, and the new objectives have SMART characteristics with quantitative desired outcomes. New goals and objectives are added to guide the public and educational outreach efforts, which are important parts of the project. The number of fisheries events, educational outreach days, and other gatherings planned annually along with the diversity in participants is impressive. The new set of goals and objectives will serve to guide the project effectively for the next five years. This revised set of goals and objectives should be added to the proposal replacing the originals.

As suggested by the ISRP the proponents reduced their annual harvest goals overall and for each pond. The goal is reduced from 4,750 kg annually to 2,500 kg in the near term and 2,960 kg after the Elk Lake Pond is completed (2021). The new goal is reasonable as it represents the level that has been achieved in the most recent five years.

Limited work has been completed at Elk Lake due to funding constraints, but further planning for site modification is warranted. Updated plans and timeline for site completion are provided in the response as Objective 2.7 indicating modifications and road construction planned for completion in 2021 and the first trout stocking in 2021.

The ISRP requested additional information regarding the methods for eight specific topics and the proponents provided adequate responses. The response includes a more complete description of the creel survey methods and associated metrics including the approach for determining confidence intervals for catch, harvest, and effort data. The ISRP's concerns about diploid rainbow trout escapement and translocation risks are addressed by demonstrating that

only a few diploid trout are present in Mud and Talmaks ponds at any given time and no fish can escape from Tunnel Pond. The methods described for determining stocking rates appear sound using water quality and exploitation rates to adjust the standard maximum rate of 227 kg/hectare. Additional monitoring of cyanobacteria will be included to the routine water quality monitoring, thus providing a quantitative method to warn the public when levels become too high. Additional justification for the ammonia, phosphorous, and coliform bacteria monitoring is provided, and the sampling rationale is clarified. Educational outreach activities and approaches planned for the future are clearly articulated with appropriate objectives, methods, and desired outcomes. Given the challenges with land use and habitat conditions above Talmaks Pond that create poor water quality inputs along with the failure of the settling ponds, the proposed conversion of the settling ponds into bio-filter swales appears to be a sound approach. The responses to the methods issues should be added to the methods section in the proposal.

The proponents provide a much-improved description of the evaluation and adjustment processes. They add a higher-level review and adjustment plan for every three to five years that uses input from Nez Perce Tribe science managers and BPA. In combination with the annual review process they currently undertake, the management decision framework should function more effectively than in the past. The revised evaluation and adjustment process should be added to the proposal.

While the project meets scientific criteria, the ISRP provides the following recommendations for project improvement into the future:

1. Some additional modification to the Biological/Physical/Social Objectives and Implementation Objectives would improve clarity. A clear distinction between implementation objectives and desired outcomes (i.e., biological/physical/social objectives) is important.

For Goal 1, Objective 1.1 is a well-stated biological objective (outcome). The remainder of the objectives (1.2-1.3 and 1.3.1-1.33) are implementation objectives.

For Goal 2, there is no social objective. A SMART social objective could be stated as, “Annually provide 10 or more interactive learning events involving a total of more than \_\_\_ people from 2021 through 2025.” The effectiveness of this social objective could be monitored by maintaining records of actual counts or estimates of the number of people attending each event. Data on the demographic composition of event participants (i.e., age composition, proportion of Tribal members, nature of group visits, etc.) would strengthen reporting and emphasize the cumulative benefits of the events. Objectives 2.1-2.6 become implementation objectives to support Goal 2 and the social objective.

Objective 2.7 does not fit well under Goal 2. It is probably better to include it as an implementation objective (Objective 1.4) under Goal 1.

2. An area of continuing concern is the occurrence of cyanobacteria and the health and safety of pond users and their dogs. While difficulties in finding a laboratory to evaluate the samples are appreciated, the human health risk potential for this often-deadly toxin should not be underestimated. Cyanotoxins can remain in water after a visible bloom is gone, and exposure can take place both through ingestion of toxins and dermal contact. The proponents should incorporate procedures for determining when cyanobacteria may be present and alerting the public and pond users of the risks involved. Some suggestions for addressing this concern include:

(1) Coordinate with the Idaho Department of Environmental Quality to identify access to laboratory assistance.

(2) Contact the [King County Environmental Laboratory](#) in Seattle, Washington for assistance in evaluation of samples; instructions for sampling toxic algae can be found at [nwtoxicalgae.org](#).

(3) Contact the [US Environmental Protection Agency](#) for guidance regarding in situ testing for cyanobacteria and their toxins and remotely sensed testing and applications.

**Preliminary ISRP report comments: response requested** *(Provided as a record of the review process. The proponents addressed the ISRP's questions; see response link and final review above.)*

**Overall comment:**

The proponents provide a good history of the project. It is evident from the proposal that the pond management program is providing measurable benefits to tribal members and specific user groups. The scope of the project has expanded to involve community and educational outreach components, which is commendable.

**Response Requested:**

To help us review this proposal, the ISRP asks the proponents to address the following questions in their response:

1. The proponents are asked to follow the guidance provided by the ISRP and develop appropriate Biological/Physical/Social Objectives and Implementation Objectives. The proposed objectives are not SMART objectives (Objective 1.1 is an exception, but it lacks a timeline for achievement). Addition of SMART objectives relevant to Goal 2, which addresses community/outreach elements of project, is needed.
2. Develop more reasonable stocking and harvest objectives for each pond. There is a need to redefine the original goal (actually an objective) of an annual 4,750 kg trout harvest

among the three ponds. Both stocking and harvest objectives are not being met and are unlikely to be met in the future.

3. The proposal indicates that a fourth pond (Elk Lake) is likely to be added to the project. What has been done to include Elk Lake into the array of managed ponds, and what are the plans for future management of Elk Lake?
4. We request additional information regarding several aspects of the methods:
  - a. How are estimates of total harvest and total angler effort (angler days, total hours fished) derived? Can confidence intervals for these estimates be computed?
  - b. What is the percentage of diploid rainbow trout that may be present among stocked fish? What is the threat that diploid rainbow trout may pose if they escape or are translocated by anglers to nearby waters?
  - c. What are the procedures to determine stocking rates of rainbow trout in ponds? How is overstocking prevented?
  - d. Is the current design for monthly monitoring of dissolved oxygen and water temperature sufficient during the summer or winter months to enable management actions if dissolved oxygen depletions occur?
  - e. Toxins from cyanobacteria are a threat to human and animal (i.e., dogs) health. Are cyanobacteria being monitored?
  - f. What are the reasons for sampling ammonia, total phosphorous, and fecal coliform in some ponds?
  - g. Seining is conducted to assess the trout populations in each pond. Information in the 2017 and 2018 annual reports indicates that sample sizes are insufficient to assess the rainbow trout populations in some ponds during some sampling periods. What can be done to rectify this shortfall?
  - h. An element of work is to “Coordinate Educational Outreach Activities.” What are the specific activities being conducted to coordinate educational outreach? What are the metrics and methods for monitoring outreach objectives?
5. Land use activities have led to poor water quality in Talmaks Pond. A proposed mitigation action is “to use bioengineering principles...to entrap and filter sediments.” What are the bioengineering principles and the specific activities being planned to entrap and filter sediment?

6. What is the evaluation and adjustment process for this project? A systematic process for monitoring and assessment of data, and making decisions regarding management activities, is needed for the project. The process needs to consider performance over a long time period and requires routine revisiting of goals, objectives, methods, and priorities.

The additional questions and comments provided below are meant to strengthen the proposal and do not need to be specifically addressed during the response loop.

### **1. Problem statement**

The problem statement for this project is detailed and clearly described.

### **2. Progress to date**

The proposal states that the objective of the Resident Fish Substitution Policy is met by “administering and increasing opportunities for consumptive and non-consumptive resident fisheries for native, introduced, wild, and hatchery-reared stocks” but it does not address ceremonial activities and environmental education activities, which seem to be on the increase. Quantitative objectives regarding cultural activities and environmental education are not found in the proposal.

Figure 1 indicates that both stocking and harvest objectives are not being met. There is a need to redefine the original goal of an annual harvest of 4,750 kg trout given the current state of the project and facilities.

The harvest statistics provided in Table 1 are useful for tracking project success; however, specific objectives and targets for these metrics should be developed (only catch rate has a current target of 1.0 fish/hour) and used to compare with observed performance to assess success. Table 1 provides information on annual use, catch rate, and harvest for all three ponds combined from 2000 to 2018. The proposal could be enhanced with inclusion of these data for each pond. The table is formatted in a manner that is difficult to comprehend. The column headings could be more explicit and rearranged to represent progression for data to estimates of harvest. The table would be more informative if estimates of biomass harvested were included as biomass is stated in the original project goal.

The proposal indicates that a fourth pond (Elk Lake) is to be added to the project. The proposal would benefit from a more complete description of the efforts to date to include Elk Lake into the array of managed lakes and the projections for future management of the pond.

### **3. Goals and objectives**

Goal 1 of the proposal is specific to the three existing ponds; however, it is actually a quantitative objective. The initial program goal (objective) was to provide an annual 4,750 kg harvest of trout among all three ponds. Figure 1 indicates that both stocking and harvest objectives are not being met. It would be more appropriate to identify a reasonable stocking and harvest objective for each of the three ponds

The project appears to be contributing substantially to cultural, community, and educational outreach. Goal 2 focuses on outreach. Additional quantitative objectives should be added to Goal 2 that include metrics for monitoring and assessing the array of outreach efforts. Objectives could include types of outreach, number of events, number of participants, and targeted demographics (i.e., youth, tribal members, etc.) of participants.

The proposal does not provide a full set of Biological/Physical/Social Objectives and Implementation Objectives. The proposed objectives are not SMART objectives. The proponents should follow the guidance provided by the ISRP and develop appropriate SMART Biological/Physical/Social Objectives and Implementation Objectives that can guide the project into the future. Objective 1.1 is quantitative and measurable. The remaining objectives, 1.2, 1.3 and 2.1 through 2.4, are goal statements and are not consistent with the SMART format. Additionally, most of the objective statements are focused on implementing activities. Methods are being confused with objectives in the current lists of objectives.

It is understood that the project is operating under an Operation and Maintenance mode and that things do not change much from year after year, but SMART objectives for ongoing work would assist in more clearly identifying both accomplishments and future work needs.

Inclusion of a fourth pond (Elk Lake) is in the planning stages. It seems that it would be appropriate to include a goal for the inclusion of that pond and what the pond may add toward achieving the overall project objectives.

### **4. Methods**

Detailed information is provided regarding pond management methods including discussion of operations, activities, and procedures. Substantial information is provided to describe water quality, fish health, angling effort, and angler success. There are six separate types of activities linked to "Coordinate Educational Outreach Activities," but they are not directly tied to SMART objectives.

Numerous questions regarding the methods were identified. These are listed as requested responses in the Overall Comments.

Relative weight ( $W_r$ ) is being used to assess condition of rainbow trout in the ponds. This is an accepted tool among fisheries managers, but a warning is given to the proponents regarding their likely use of the standard weight ( $W_s$ ) equation developed by Simpkins and Hubert (1996). This equation has a substantial length related bias whereby the computed  $W_r$  values of sampled of rainbow trout appear to decline with increasing length. The source of the bias has been described by Gerow et al. (2004 and 2005). This potential bias should be considered when evaluating body condition estimates for samples from the three ponds.

#### References:

Simpkins, D. G., and W. A. Hubert. 1996. Proposed revision of the standard-weight equation for rainbow trout. *Journal of Freshwater Ecology* 11:319-325.

Gerow, K. G., W. A. Hubert, and R. C. Anderson-Sprecher. 2004. An alternative approach to detection of length-related biases in standard weight equations. *North American Journal of Fisheries Management* 24:903-910.

Gerow, K. G., R. C. Anderson-Sprecher, and W. A. Hubert. 2005. A new method to compute standard weight equations that reduces length related bias. *North American Journal of Fisheries Management* 25:1288-1300.

It is unclear from the Methods how the addition of Elk Lake will affect management activities into the future. How a decision will be made to move forward on development of Elk Lake is unknown. Will Elk Lake have a higher priority than the currently managed ponds, so that funds and management actions for operating Mud Springs and Talmaks ponds are reduced? Given the challenges with Mud Springs and Talmaks ponds, a benefit/cost analyses may provide guidance regarding investment in Elk Lake verses the Mud Springs and Talmaks ponds.

#### **5. Project evaluation and adjustment process**

It is clear that some form of project evaluation and adjustment process is occurring based on information presented in both the proposal and annual reports. There is sustained effort for regular review of activities and general assessment of successes and failures. In most cases, there does not appear to be quantitative objectives to guide the project, but perhaps there are clear understandings of expectations by long standing personnel. The current process includes things such as, encouraging “creativity and unstructured thinking,” to approach issues in an

innovative manner, and to “think outside the box” by trying new and novel approaches to problem solving. It is also noted that a series of annual meetings are held to plan these programs where evaluation and adjustments are made each year based on community needs, available resources, and weather forecasts.

The first step in an adaptive management process is to have reasonable goals with SMART objectives. Establishing a full set of SMART Biological/Physical/Social Objectives and Implementation Objectives is needed to facilitate the evaluation and adjustment process. A long-term process needs to consider performance over a longer time period and should be used to revisit goals, objectives, approaches and priorities. A systematic process for evaluating data and making decisions regarding management activities is needed. A more formal reporting of lessons learned and adjustments made to program activities and/or approach would also be useful.

Cost efficiency should be considered, and the evaluation and adjustment process could be improved with some form of cost efficiency or benefit/cost analyses.

## **6. Potential confounding factors**

The proponents provide a discussion of potential limiting factors that primarily addresses the near term. Marginal habitat (i.e., water quality) is identified as a confounding problem in Mud Springs and Talmaks ponds. The project would benefit from identification of potential solutions to the marginal habitat issues and costs to alleviate the problems at a watershed scale. Without such information, long-term solutions are unlikely to be initiated.

While climate change is mentioned as a potential confounding factor, there is no discussion of the possible impacts on the trout pond program into the near-term or long-term.

## **7. Timeline**

The project is primarily in an Operations and Maintenance mode and entails routine tasks that are annually repeated according to the yearly schedule detailed in a Gantt chart. This chart would benefit from improved header labels and consistency between the stated dates for activities and those shown in a yearly table. There are no data headings for the un-numbered timeline.

Given the possible addition of Elk Lake to the array of ponds being managed, the annual amount of work is likely to change. The timeline does not define the changes that may occur.

## **8. Relationships to other projects**

The proponents state, "this project has no relationships to any other BPA projects." That is not correct. The Coeur d'Alene Trout Ponds Project (2007-024-00) is very similar. There may be others that are funded by the BPA or cooperating agencies (FWS, BOR). It would be wise for the proponents to identify similar projects in the general area and share "lessons learned" with them.

It appears that this project does get support from other BPA funded projects, including LSRCP hatchery produced trout. A description of this and similar relationships is needed.

## **9. Response to past Council recommendations and ISRP reviews**

In 2012, the ISRP raised questions about sites, their maintenance, and habitat issues. The proponents provide a very limited response in this proposal. The proponents direct the reader to a 2003 report (Appendix H) for information regarding ISRP questions. A more detailed description of the proponents' response to the 2012 review is needed.

There is also a question regarding maintenance of the sedimentation ponds at Talmaks Pond and planned sediment removal activities. It appears that the land use and watershed activities that have led to poor water quality remain significant issues. Extensive levees and stream flow reconstruction are needed for Talmaks Pond; however, funding is inadequate to conduct these improvements. The alternative action proposed "to use bioengineering principles...to entrap and filter sediments" is not developed to an adequate level to determine if it is a viable option. Additional information is needed to fully understand how much influence current conditions are having on project success and what the future outlook is with and without funding to conduct the levee and stream flow work. In addition, is habitat restoration planned in the watershed above the pond?

## **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No additional comments.

## I. Warm Springs

### 200715700 - Bull Trout Status and Abundance on Warm Springs Reservation

- [Project proposal in Box](#)

**Proponent:** Confederated Tribes of Warm Springs

**Final Recommendation:** Pending. The proponents were granted a time extension to address the ISRP's preliminary recommendation for a response and revised proposal.

**Preliminary ISRP report comments: response requested**

**Overall comment:**

This is a long running project that has provided valuable information advancing the understanding of bull trout abundance and life history on the Warm Springs Reservation. The project has been successful in developing important long-term datasets essential for monitoring status and relative abundance of bull trout and brook trout.

The current proposal is not clearly organized and is difficult to evaluate because it lacks background, justification, clear goals, SMART objectives, and detail regarding methods. There is little continuity between the ISRP's proposal content guidance and this proposal.

The proposal describes a major expansion of activities including additional objectives to advance the understanding of bull trout ecology, establish a bull trout population in Mill Creek, conduct a brook trout removal program, and evaluate the response of bull trout in the Warm Springs River while continuing ongoing monitoring of status and trends. This transition is not clearly presented nor is there discussion of challenges to staffing, budgeting, or implementation planning associated with it.

The lack of complete and appropriately stated Goals and Objectives is of major concern, as these should serve as the foundational elements for most all components of the proposal.

The new objectives and proposed activities for future work may be logical and important next steps for the project; however, there is too little information presented to evaluate the proposed work.

### **Response Requested:**

To help us review this proposal, the ISRP asks the proponents to address the following questions in their response:

1. Provide a more complete description of the insights and conclusions from prior work instead of a summary of sampling accomplishments and data collected.
2. Develop clearly articulated goals and objectives for both ongoing and new work. Follow the proposal preparation guidance to develop SMART biological/physical/social objectives and related implementation objectives that link directly to a specific goal. Similarly, research hypotheses in the form of alternative hypotheses with predictions are needed to facilitate development of methods and data analysis protocols.
3. Develop adequate method descriptions that align directly with goals and SMART objectives.

There is a substantial need to justify the translocation of bull trout into Mill Creek. Expanded background information, justification, and a benefit-risk assessment are needed. The rationale that has been provided lacks consideration of some very important factors (see the list below). There needs to be better justification because of the uncertainty of whether bull trout ever existed in Mill Creek and the risk of removing adults and juveniles from Shitike Creek. Information on benefits and risks needs to be compiled and considered in a structured decision process such as the Council's three-step hatchery master planning process. Development of sound justification for translocation might best be addressed by making it a SMART biological objective with associated implementation objectives and methods for a benefit-risk assessment. Concerns and important questions to be considered in the structured decision process include:

- a. Was Mill Creek part of the historical range of bull trout? Is Mill Creek designated as an independent population or just a production area in the Warm Springs River population and is it identified as critical habitat? If there was historical bull trout production in Mill Creek, was it a large contributor to production and sustainability of the Deschutes Subbasin bull trout populations and the DPS? Is the reintroduction into Mill Creek identified as a high priority action in the Recovery Plan?
- b. What are the factors that led to extirpation and have they been improved enough to provide conditions suitable for sustainable natural production and expression of full life history diversity?
- c. What is the predicted productivity and diversity impact to the Shitike Creek population resulting from removal of adult and juvenile bull trout? Is the potential

production in Mill Creek from transplanted bull trout worth the risk of removing individuals from Shitike Creek?

- d. No data on the genetic composition of the trout in the Warm Springs River or Shitike Creek are presented, but it is likely that introgression has resulted in fish that range from “pure” brook trout to “pure” bull trout. This issue needs to be addressed.
  - e. What is the coordination and collaboration process that will be used to gain consensus with co-managers and the Bull Trout Working Group about the proposed translocation?
- 4. Describe a structured adaptive management framework that can guide the project priorities and illustrate how project information is used in decision processes for recovery and habitat restoration.
  - 5. Describe the monitoring, analyses, and data sharing that will be conducted to accomplish the new objective "to advance the understanding in bull trout ecology in the lower Deschutes Subbasin."

The additional questions and comments provided below are meant to add context to our requests above and strengthen the proposal but do not need to be specifically addressed during the response loop.

### **1. Problem statement**

The proposal provides considerable background information regarding ESA bull trout listings, status, and population structure. The initial overarching question, which focused on status and trends of bull trout on the Confederated Tribes of the Warm Springs River Reservation, is well described. The project has been successful in developing important long-term datasets essential for status and trends monitoring. However, the presentation does not provide a very clear explanation of the habitat or brook trout problems within the reservation. The presentation is confusing because it is a blend of descriptions of the watershed, bull trout monitoring program objectives, and monitoring methods.

The project proposes to expand the original focus from status and trends monitoring to include advancing the understanding of bull trout ecology and re-establishing a bull trout population in Mill Creek. Although not presented in the problem section, the proponents are also proposing to initiate a brook trout removal program including evaluation of the influence of removal on bull trout in the Warm Springs River. It appears that the project is at a point of major change in the emphasis of work. Unfortunately, the current problem statement focuses on past efforts and does not fully address additional goals. The Introduction notes, “we strive now to apply our findings in order to bolster bull trout populations on reservation.” The Goals and Objectives

section of the proposal states, “now we want to shift into a more adaptive management and hypothesis testing oriented project while still maintaining some monitoring in order to determine the efficacy of our treatments as well as informing other relevant projects of important data.” These statements identify additional set of problems not really discussed in the proposal. Since this appears to be a major change in course for the project, the proposal should fully describe the new problems to be addressed.

Although the proposal indicates that bull trout were extirpated from Mill Creek, the supplementation white paper referenced in the proposal indicates that there is no historical documentation of bull trout presence. There is little or no description of the magnitude of the problem that resulted from extirpation of bull trout in Mill Creek. It is unclear if re-establishment of a population in Mill Creek is required for delisting and/or if it will reduce extinction risk substantially. Was Mill Creek identified as an independent population or a production area within the Warm Springs River population? The proponents should describe why it is important to conduct reintroduction into Mill Creek. Similarly, there is little quantitative information on the likely impact of brook trout. It appears the proponents have concluded that brook trout presence has substantially influenced productivity and capacity of bull trout. If so, then a description of the magnitude of impact of brook trout should be articulated to justify the brook trout removal objective. It appears the new objectives are appropriate logical next steps for the project; however, there is too little information to decide.

The proponents have highlighted advancement of understanding in bull trout ecology as a new high priority; however, there is no description of what specifically will be done to accomplish the objective.

Figures 1-3 are referenced in the section, but the Figures are not numbered in the document. In addition, Figure 1 was not included.

The proposal describes the significance of this project to Council research themes, recovery and subbasin plans, and the Council’s MERR. The authors failed to describe specifically how the project results contribute to assessing program effectiveness or viability status and recovery plan action effectiveness. There is no presentation of how project information is used in decision processes. This type of information is essential for understanding project significance.

The ISRP encourages the proponents to coordinate with the Burns-Paiute Tribe’s regarding their project, Evaluate Life History of Native Salmonids in Malheur River, as they have valuable knowledge, experience and information conducting very similar suppression and monitoring efforts with significant success.

## **2. Progress to date**

Although it is apparent that substantial progress has been made, the discussion is not clearly organized and is difficult to follow. It is organized under headings with no labels or explanation. The narrative appears to be cut from other reports and does not provide a summary that addresses proposal guidance questions nor is it coherent and concise. There is no linking to stated project objectives. The objectives in this section do not align with objectives in section 3. This is confusing when trying to determine the direction of the project. There are three numbered lists provided; however, there are no labels indicating what the lists represent, thus we assumed that Section A. includes previous goals and objectives, Section B. includes accomplishments, and Section C. includes findings/lessons learned. It would make review easier if the lists were labeled. Tables are not labelled or described but appear to support discussion of the seven findings.

The accomplishments in Section B are mostly a compilation of tasks completed, not results and findings that are requested in the ISRP's proposal guidance. The authors should state what they learned from monitoring the status and trends, migration patterns, distribution, and abundance. There were no conclusions provided for the project, which are essential for demonstrating progress. There are many lessons learned. However, there is little description of the importance or application of what was learned. Throughout this section there are numerous references to actions that "may be" or "could be" implemented, thus leaving the indication that decisions on what will be done in the future to implement lessons learned are highly uncertain. It would be far more informative to describe what will be done, not simply what might be done. Overall, the section needs major revision with better organization, headings, and more relevant and complete descriptions.

## **3. Goals and objectives**

Organization and content of this section needs additional work. The goal statements are difficult to interpret. The proponents state that, "we want to shift into a more adaptive management and hypothesis testing oriented project while still maintaining some monitoring in order to determine the efficacy of our treatments as well as informing other relevant projects of important data." It appears that the proponents have two primary goals: "to bolster bull trout populations on the Warm Springs Reservation" and "to support bull trout populations by having a significant brook trout eradication effort on reservation." The organization of the goals is not sufficiently direct to enable the reader to identify future direction of the project. There is little continuity between the goals and the objectives, nor is there consistency with the proposal guidance. Goals need to be redeveloped as desired outcomes in terms of benefits to bull trout and bull trout management. For example, the goals could include: (1) Enhance bull

trout populations on Confederated Tribes of the Warm Springs Reservation, (2) Provide information needed to assess status and trends in bull trout and their habitats, (3) Establish a self-sustaining natural bull trout population in Mill Creek, and (4) Provide information to inform and facilitate wise decisions for management and restoration.

There are only two unique objectives provided, and neither are specific or relatable to the goals. There are no objectives related to the status and trends monitoring or other ongoing objectives. There appears to be significant confusion on the difference between biological/physical/social objectives and implementation objectives. The biological objective “to provide a measurable population of bull trout in Mill Creek” is not quantitative, and it is not clear as to what is intended. An implementation objective, “To increase the relative densities, when compared to historical averages, of bull trout to brook by 15% by 2025 in current locations on the Warm Springs Reservation where both are knowingly present,” is a clearly written biological objective. There is a lack of implementation objectives, which capture the full suite of planned work, restoration, eradication, and continued research and monitoring. This includes an item in the most recent annual report that relates to a data management activity where the “objective is to organize, safely store, and visualize data to facilitate use by managers and others for decision making.”

The objectives need to be re-developed following completion of appropriate goal statements. There should be, in most cases, both SMART biological/physical/social objectives and SMART implementation objectives associated with each goal. Currently the “Research Questions,” “Alternative Hypotheses,” and “Specific predictions” do not connect to experimental designs described in the Methods. It is not entirely clear how the RM&E relates to the full suite of work being proposed.

#### **4. Methods**

The methods section is disorganized and difficult to understand. It begins with a series of maps and charts that are not labelled or described. These are followed by a discussion of methods with links to [MonitoringResources.org](http://MonitoringResources.org) that appear to link to the maps. There is no clear link to any of the project objectives. There are six types of monitoring and enhancement actions (some may be objectives) listed in Section A without any methods descriptions.

In Section B, there are brief and incomplete method descriptions with [MonitoringResources.org](http://MonitoringResources.org) citations for a few methods for four of the past status and trends monitoring actions described in Section A. Unfortunately, the methods for some of the sampling (i.e., snorkeling, redd counts) are not sufficiently complete.

Section A should include sampling methods as well as sampling designs. Section B should describe the methods used to measure effects of management activities or metrics evaluated in

sampling programs. The brook trout removal and evaluation methods should be expanded since it is a new objective without prior published methods. The methods description for the bull trout introduction (including the supplementation white paper) appears more fully developed but is still incomplete. It is difficult to evaluate methods without clearly stated objectives and connection between objectives and methods.

Within the context of both brook trout reduction and bull trout introduction, a significant issue needs to be addressed regarding hybridized brook trout x bull trout. No data on the genetic composition of the trout in the Warm Springs River or Shitike Creek are presented, but it is likely that introgression has resulted in fish that range from “pure” brook trout to “pure” bull trout. Morphological features are unlikely to facilitate accurate identification of “pure” bull trout, which is critical relative to the methods suggested for both trout reduction and bull trout re-introduction. The proponents must address this issue in future development of a revised proposal.

## **5. Project evaluation and adjustment process**

It is clear that this project has provided new understanding and insights regarding bull trout abundance and life histories on the Warm Springs Reservation. There is lengthy discussion regarding methods for evaluating brook trout eradication and evaluating bull trout reseeding efforts. The evaluation and adjustment processes described relate primarily to sampling and methods. There is no description of processes used to evaluate and adjust goals, objectives, actions, and priorities. Unfortunately, this section does not provide a description of an actual evaluation and adjustment process for the project nor are there any stated links to objectives or research questions for the project. This section is confusing and does not clearly address the review questions provided. The content of this section must be preceded with substantially more information related to Goals, SMART Biological/Physical/Social Objectives, SMART Implementation Objectives, and detailed methods in order for this section to be adequately presented and reviewed. It would be useful to provide some examples from the past illustrating how information from this project was used in adaptive management decisions.

## **6. Potential confounding factors**

The proponents have misinterpreted the purpose of the section, which is to identify factors that may confound the bull trout re-introduction, brook trout eradication, and/or monitoring methods that are planned. Confounding factors, such as changes in climate that may affect discharge and water temperatures, unanticipated water quality issues, re-introduction of brook trout by natural or human means, are the kinds of things that should be discussed. This section could be improved by describing how the confounding factors might influence the project and

results. There is no information provided to understand the magnitude of potential influence or relative importance of any given factor. More specific descriptions of how factors will be detected are needed. There are many descriptions of actions that "could be" taken and few descriptions of actions that were taken or will be taken to address confounding factors. They mention that contaminant sampling was conducted in 2018 and 2019, but the samples have not yet been analyzed. There must be some concern about contaminants in the watershed. This concern or problem should be discussed.

## **7. Timeline**

A very general table showing planned field activities with a general timeline is provided. The timeline does not provide any detail on proposed new activities (i.e., bull trout introduction and brook trout removal), discussion of monitoring and evaluation activities, or reporting of results. Objectives for information/technical transfer products (reports, publications), data analysis, information transfer and decision process support should be included. Given the major expansion of activities for the project, the timeframe should be revised once a new complete set of goals and objectives are developed.

## **8. Relationships to other projects**

The proponents briefly describe relationships to three other projects funded by BPA and one project funded by PG&E. All of these are focused on bull trout restoration on the Warm Springs Reservation. The description does not include other bull trout re-introduction or brook trout eradication projects that are going on in the region. Much could be learned from a review of related projects and collaboration with those doing the work. The proponents should include relationships to the Recovery Plan and the USFWS status assessments to illustrate how the data are used in these processes. The proponents should coordinate with the Burns-Paiute Tribe who are successfully implementing similar management actions and evaluations.

## **9. Response to past Council recommendations and ISRP reviews**

The proponents provide very detailed responses to the 2012 ISRP concerns, which were very similar to concerns raised in this review. However, most of the information provided in the responses was not included as improvements to this project proposal. In addition, four qualifications were provided in the final 2012 review that were not addressed in the current proposal.

Qualification #1 - bull trout life history framework: The proponents need to more appropriately frame their work and all future annual reporting into a bull trout life history framework, including hypotheses and how the data are to be used in hypothesis testing.

Qualification #2 - seek assistance with the data analysis and model development: The ISRP recommends that the proponents seek assistance with the data analysis and model development, using this long term and valuable bull trout data base, from Dr. John Skalski who is under contract to BPA or a scientist with similar expertise.

Qualification #3 - develop a plan to assess bull trout response: The ISRP also recommends that the proponents develop a plan to assess bull trout response to habitat restoration and other management actions.

Qualification #4 - collaborate to a greater degree with other researchers: In addition, the ISRP suggests that the proponents collaborate to a greater degree with other researchers in the Pacific Northwest, including academics and agencies. Such collaboration might include the development of their data sets for publication in refereed journals.

#### **10. Miscellaneous Sections 10-13 (references, key personnel, appendices, budget)**

No additional comments.

## V. Index of projects and page numbers

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