The SHOSHONE-BANNOCK TRIBES

FORT HALL INDIAN RESERVATION
PHONE (208) 239-4550 (Front Desk)
or (208) 239-4551
FAX (208) 478-3986

FISH & WILDLIFE DEPARTMENT
P.O. BOX 306
FORT HALL, IDAHO 83203

Memorandum (ISRP 2010-25 Response) **August 13, 2010**

To: Independent Scientific Review Panel

From: The Shoshone-Bannock Tribes

Subject: The Shoshone Bannock Tribes response to ISRP review on ESA Habitat Restoration Project (#2008-903-00).

Please follow the attached documents from the Shoshone Bannock Tribes point by point response (1 through 9) to ISRP review comments (ISRP 2010-25) and the revised narrative (2009-903-00).

Summary of Responses to ISRP Comments
ESA Habitat Restoration Project (2008-9903-00)

Overall

The ESA-HRP proposal has been strengthened by incorporating responses to the many excellent comments provided by the ISRP. As detailed in the specific responses below, the proposal now (1) provides more site-specific details regarding actions, focal species benefits, and monitoring, (2) includes additional discussion regarding approaches to ameliorating limiting factors such as sediment and temperature, and (3) clarifies relationships and synergies with existing projects.

Specific Points

Technical Justification, Program Significance and consistency, and Project Relationships

(1) A more complete explanation as to why these specific watersheds were selected would have provided additional support for this proposal.

We have inserted a new paragraph is Section B, within the subsection titled *Location and Description of Watersheds* (begins on bottom of Page 2). This paragraph summarizes our thought process in concentrating on the UPS and MSP watersheds.

(2) The Upper Lemhi River – Acquisition (2008-601-00) project is not discussed…The Upper Lemhi Accord acquisition project was reviewed by the ISRP (2010-5), and we provided a detailed statement of the types of data that are needed for a scientific review of projects such as the ESA-HRP.

Actually, the Upper Lemhi River – Acquisition project was included in Section D, *Relationships to Other Projects*. Responses to the various comments from the ISRP bolster the information necessary for a scientific review.

(3) The proposal lacks important details regarding location of initial restoration sites, and it could have been more explicit in explaining the specific habitat benefits of the restoration activities.

Specific locations (GPS coordinates) were included for most of the initial actions in Table 4. Specific locations are now provided for all actions. Detailed information on specific benefits (miles protected, etc.) are now included in Table 4 and the new Table 6.

(4) Without knowing more about specific locations of the proposed improvements and the anticipated habitat benefits it is difficult to appreciate that the work would be implemented in the best place. Maps showing locations are needed.

Most of the specific information requested is now in tables 4 and 6. Maps for each action are now included.

(5) Addressing limiting factors such as sediment and stream temperature is problematic. For example, when and where sediment impairs fish survival and/or growth should be identified. Treatments should be specific as to how this limiting factor impacts specific life stages of target species. How much amelioration is needed and can it be accomplished by proposed actions?

New text in Section B within the subsection titled *Addressing Limiting Factors*, and also in Section F for Task 2.2, recognizes that some factors such as sediment and temperature are measured at a stream scale whereas actions are implemented at a site scale. Actions such as riparian fences serve to protect riparian areas, allowing desired riparian vegetation to grow and therefore help increase riparian function. Although it may not be feasible to measure the specific reduction in sediment or temperature associated with a specific action, it is reasonable to assume that if actions are implemented in appropriate areas, the increased riparian function will contribute to ameliorating these factors. Table 6 provides information to help determine if actions are proposed for appropriate areas.

(6) The prioritization criteria need to be strengthened by incorporating an evaluation of the spatial distribution of current habitat conditions and restoration projects. Projects applied near areas that already support high quality habitat would be expected to make a greater contribution.

This is a good point. We have added a Tier 2 criterion (Table 5) that incorporates assessments of current habitat conditions from the SHIPUSS document. We have also included information in Table 6 on current and potential conditions summarized from the draft recovery plan.

(7) One concern is the existence of other projects in the area with similar objectives. In particular, SHIPUSS , the Yankee Fork Floodplain Restoration Project, and the Restore 12 Mile Reach of Upper salmon River Project appear to have objectives nearly identical to this proposal.

We have inserted a new paragraph at the beginning of Section D, *Relationships to Other Projects*, stressing the need to maximize efficiencies while avoiding redundancies with other projects. More specific information has been inserted for each of the projects to explain how this will be accomplished.

In Section C, Rationale and significance to Regional Programs, we clarify that SHIPUSS does not actually implement any actions, but rather ranks streams through a scoring process that evaluates stream connectivity, habitat, fisheries, and non-biological factors to obtain a priority list of streams

Objectives, Work Elements, and Methods

(8) Included in the spatial description of projects should be information about the habitat improvements that are anticipated to occur, as well as projected benefits to specified life-stages of target species. Clarification to Table 5 is needed to point out what the numerical values depicting Accord and BiOp benefits represent.

The detailed information is included in the new maps and Table 6 as described above. The information in table 5 has been clarified.

(9) Some project-scale effectiveness monitoring should be incorporated into the RM&E plan to provide an indication of the respose to specific projects. These site-scale assessments would provide a much more rapid indication of the effects of a project than responses at larger scales.

New text inserted in Section D, *Relationships to Other Projects*, and Section G, *Monitoring and Evaluation*, explains that monitoring and evaluation conducted as part of the ESA-HRP will focus on site-scale implementation (administrative and compliance), and effectiveness. These site-scale assessments will focus on measuring changes in habitat conditions, water quality, etc., but will also include biological attributes in the immediate vicinity of specific actions. Table 7 provides an overview of site-scale implementation and effectiveness monitoring to be conducted as part of the ESA-HRP. Larger scale status and trend and action effectiveness monitoring will be conducted as part of the SRHE Project.

FY 2008-2009 F&W Program Accords (MOA) Proposal Review

Narrative

Project ID: 200890300

Table 1. Proposal Metadata

Project Number	2008-903-00
Proposer	Shoshone-Bannock Tribes
Short Description	ESA-Habitat Restoration Project - Implement actions to address limiting factors identified in the Upper Salmon River Subbasin, primarily in the Upper Salmon Watershed and the Middle Salmon-Panther Watershed.
Province(s)	Mountain Snake
Subbasin(s)	Salmon River
Contact Name	Theresa Tsosie
Contact email	ttsosie@sbtribes.com

Information transfer:

A. Abstract

The overall objective of the ESA Habitat Restoration Project (ESA-HRP) is to inventory, assess, plan, and implement necessary actions to ameliorate the effects of hydromodification, reduce sediment delivery, restore riparian function, improve stream temperatures, and improve passage for all life stages of anadromous and resident fish in priority areas of the Salmon River Subbasin. Actions implemented as part of the ESA-HRP will address limiting factors identified in the Salmon Subbasin Assessment, and will be consistent with approaches identified in the Salmon Subbasin Management Plan, recovery plans, the 2008 Biological Opinion, the Shoshone-Bannock Tribes (Tribes) Columbia Basin Fish Accord, and national forest plans, and by the Upper Salmon Basin Watershed Technical Team to help ensure a comprehensive, coordinated, and strategic approach to habitat restoration. A first step will be to work with co-managers, regulators, and others to use the information in the various plans and processes cited above to complete an inventory of potential actions at the stream scale to implement in the. We will then work to finalize a process to prioritize and sequence potential actions to be implemented as part of a comprehensive, coordinated, and strategic approach.

The intent of the Tribes is to continue developing a comprehensive, coordinated, and strategic approach to restoration in the Salmon Subbasin. Tribal staff has identified potential actions to be implemented in 2010 and 2011. Subsequent actions will be identified in cooperation with co-managers and partners through a logical process identified in this proposal. Specific objectives and tasks will be developed on an action by action basis. Monitoring and evaluation conducted as part of the ESA-HRP will be limited to compliance, implementation, and performance. Status

and trend, and action effectiveness monitoring will be conducted as part of the ongoing Salmon River Habitat Enhancement Project.

B. Problem statement: technical and/or scientific background

Background

Historically, an estimated 10-16 million adult salmon and steelhead returned to the Columbia River (NPCC 2009). An estimated 44% of the spring and summer Chinook salmon *Oncorhynchus tshawytscha* entering the Columbia River returned to the Salmon River (Fulton 1968). Mallet (1974) estimated 55% of all steelhead *Oncorhynchus mykiss* originated from the Snake River.

Beginning in the late nineteenth century, salmon and steelhead returns began to decline due to numerous anthropogenic and natural causes. By 1990, the majority of salmon and steelhead stocks returning to Idaho, and specifically to the Salmon River, had dwindled so far towards extinction that the Shoshone-Bannock Tribes (Tribes) petitioned to have Snake River sockeye salmon protected under the Endangered Species Act (ESA). By November 1991, NOAA Fisheries formally listed the Snake River Sockeye Salmon Evolutionarily Significant Unit (ESU) as endangered (56 FR 58619). The Snake River Spring/Summer Chinook Salmon ESU and Snake River Steelhead Distinct Population Segment (DPS) were ESA-listed as threatened in 1992 (57 FR 14653) and 1997 (62 FR 43937), respectively.

In addition to anadromous salmon and steelhead, bull trout *Salvelinus confluentus* are also listed as threatened under the ESA (64 FR 58910). Bull trout distribution, abundance, and habitat quality have declined rangewide, including the Upper Salmon River Subbasin. Several local extirpations have been documented, beginning in the 1950's. Bull trout have more specific habitat requirements than most other salmonids.

Location and Description of Watersheds

The ESA Habitat Restoration Project (ESA-HRP) will focus on actions in the Salmon Subbasin, with a focus in the Upper Salmon (UPS) and the Middle Salmon-Panther (MSP) watersheds (Figure 1). Actions in other watersheds, including the Lemhi, Pahsimeroi, and South Fork may also be undertaken. The UPS and the MSP are the two largest of the 10 watersheds identified in the Salmon Subbasin (Ecovista 2004a). The UPS watershed includes 627,577 hectares and 2,439 total stream kilometers. The MSP watershed includes 471, 292 hectares and 1,939 total stream kilometers.

Salmon, steelhead and bull trout populations throughout the Salmon River Subbasin would benefit from habitat restoration actions; however, the Tribes expect that the best course of action for the ESA-HRP Project is to concentrate a comprehensive effort within the UPS and MSP watersheds. This will allow the ESA-HRP Project to realize efficiencies and synergies, while avoiding redundancies, with ongoing tribal projects such as the Salmon River Habitat Enhancement Project (199405000). This also allows the Tribes the opportunity to collaborate with, coordinate with, and make use of previous and current efforts of co-managers and others in

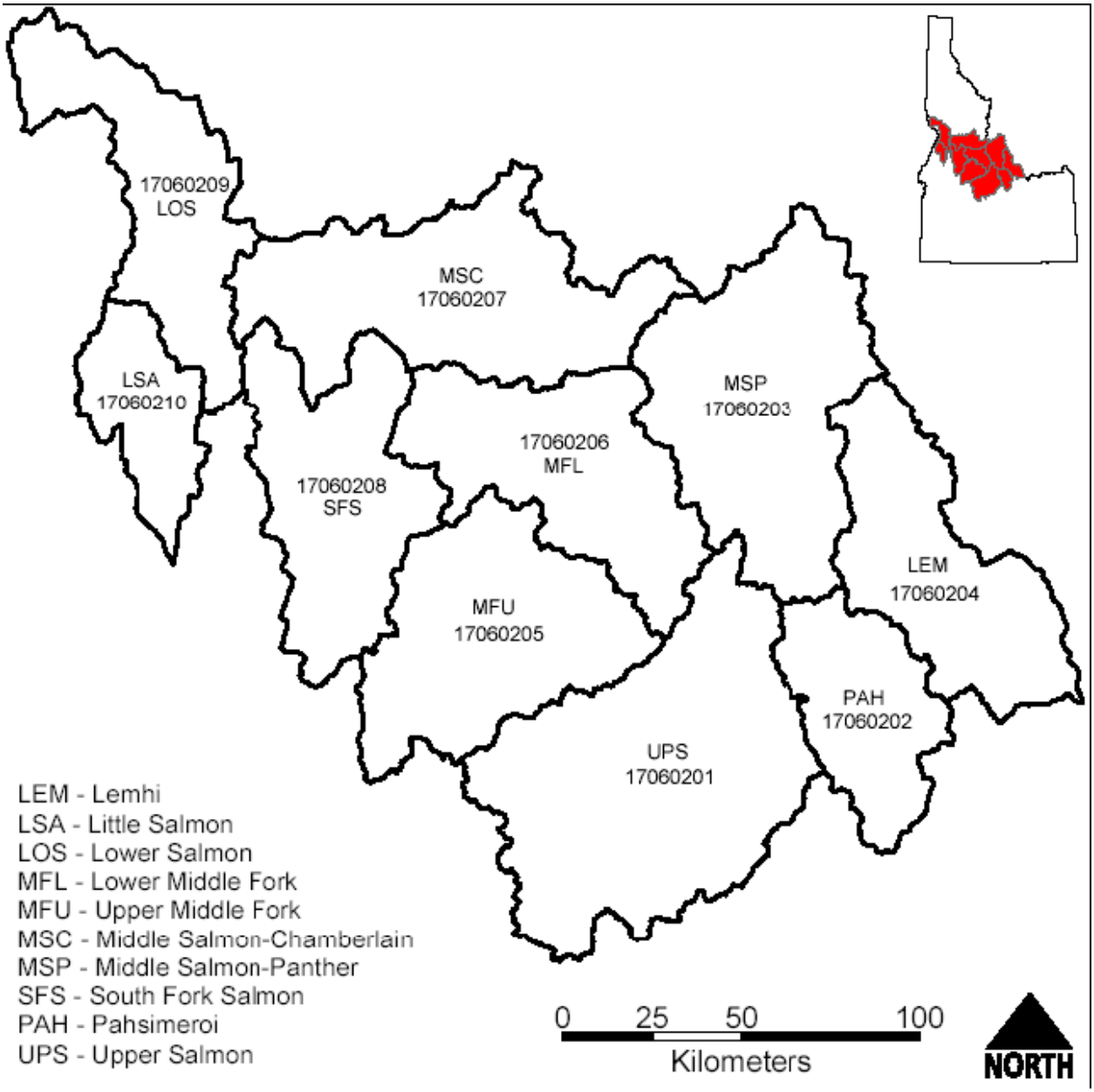

Figure 1. Location of the Salmon Subbasin showing the 10 major watersheds, including the Upper Salmon and Middle Salmon-Panther. Taken from the Salmon Subbasin Assessment (Ecovista 2004a).

these watersheds (e.g., the Screening and Habitat Improvement Prioritization for the Upper Salmon Subbasin). Although actions in other watersheds may be included on a case-by-case basis, these other watersheds are, for a large part, already home to comprehensive projects such as the Pahsimeroi River Habitat Project (200860300) and the Upper Lemhi River Acquisition Project (200860100). Finally, the Tribes realize that a relatively large number of historically independent populations of Chinook salmon and steelhead, and local populations of bull trout, will benefit from efforts concentrated in the UPS and MSP watersheds.

The UPS and MSP are two of the five most severely altered watersheds in the Salmon Subbasin (Ecovista 2004a). The two watersheds vary somewhat in dominant vegetation, condition of habitat, and factors limiting fish production. The dominant vegetation covers in the UPS watershed include big sagebrush, lodge pole pine, mixed subalpine forest, and subalpine pine. The dominant vegetation cover in the MSP watershed is Douglas fir, followed by lodge pole pine and big sagebrush.

The UPS watershed includes 2,585 points of water diversion, and the MSP watershed includes 2,250. The UPS watershed includes 216 culverts at road crossings, at least 82 of which do not allow passage of juvenile fish, and at least 42 of which do not allow passage of adults. Ninety five culverts are present in the MSP watershed, of which at least 51 do not allow passage of juvenile fish and at least 44 do not allow passage of adult fish. The UPS watershed has been identified as having excess sedimentation and warm stream temperatures due to grazing impacts. Twelve percent of the streams in the UPS watershed are considered sediment impaired, compared to only 1.5% in the MSP watershed.

Status and Recovery of Salmon and Steelhead Populations

Both watersheds are home to populations of Chinook salmon and steelhead listed as threatened under the ESA (Tables 1 and 2). Five individual populations of Snake River spring/summer Chinook salmon have been identified in the UPS watershed, including Upper Mainstem, Valley Creek, Yankee Fork, East Fork, and Lower Mainstem (shared with the MSP watershed). Populations of Chinook salmon in the MSP watershed include Panther Creek (extirpated) and North Fork, as well as the shared Lower Mainstem and Lemhi populations.

Two steelhead populations have been identified in the UPS watershed, including the Upper Mainstem and East Fork populations. The MSP watershed contains or shares four populations, including the North Fork, Panther Creek, Pahsimeroi, and Lemhi populations.

Initial recovery planning recommendations for the spring/summer Chinook in the Upper Salmon Major Population Group (MPG) include restoring the Upper Mainstem, Lemhi, and either the Lower Mainstem or East Fork populations to viable status (NOAA Fisheries and Idaho Office of Species Conservation 2006). One additional population must also become viable. To fully address Chinook salmon abundance and achieve recovery, the smolt-to-adult return rate will need to improve considerably from current levels. Improvements in populations will rely primarily on improvements in out-of-subbasin survival; however, in addition to out-of-subbasin effects, most populations are also limited by habitat and water quality degradation. Primary among these within-watershed threats are water diversions, agricultural practices, and mining.

Table 1. Recovery status for spring/summer Chinook salmon populations within the Upper Salmon and Middle Salmon-Panther Creek (NOAA Fisheries and Idaho Office of Species Conservation 2006; Interior Columbia River Basin Technical Recovery Team 2008; CBFWA 2010). All populations are within the Upper Salmon river major population group. The Panther Creek population is considered extirpated.

Watershed	Population	Abundance		Productivity		Current Risk		Viability
		Threshold	Recent Geomean	Threshold	Recent Geomean	Abundance	Spatial Structure & Diversity	
Upper Salmon	Upper Mainstem	1,000	268	1.45	1.47	High	Medium	Low
Upper Salmon	Valley Creek	500	35	1.90	1.08	High	Medium	Low
Upper Salmon	Yankee Fork	500	13	1.90	1.08	High	High	Very Low
Upper Salmon	East Fork	1,000	169	1.45	1.18	High	High	Very Low
Upper Salmon and Mainstem Salmon-Panther	Lower Mainstem	2,000	123	1.20	1.25	High	Low	Low
Upper Salmon and Mainstem Salmon-Panther	Lemhi	2,000	80	1.20	1.08	High	High	Very Low
Mainstem Salmon-Panther	North Fork	500	--	1.90	--	High	Low	Low
Mainstem Salmon-Panther	Panther Creek	750	--	1.60	--	--	--	Extirpated

Table 2. Recovery status for steelhead populations within the Upper Salmon and Middle Salmon-Panther Creek (NOAA Fisheries and Idaho Office of Species Conservation 2006; NOAA Fisheries 2008; CBFWA 2010).

Watershed	Population	Abundance		Productivity		Current Risk		Viability
		Threshold	Recent Geomean	Threshold	Recent Geomean	Abundance	Spatial Structure & Diversity	
Upper Salmon	Upper Mainstem	1,000	--	1.20	--	Medium	Medium	Medium
Upper Salmon	East Fork	1,000	--	1.20	--	Medium	Medium	Medium
Upper Salmon and Mainstem Salmon-Panther	Pahsimeroi	1,000	--	1.20	--	Medium	Medium	Medium
Upper Salmon and Mainstem Salmon-Panther	Lemhi	1,000	--	1.20	--	Medium	Medium	Medium
Mainstem Salmon-Panther	North Fork	500	--	1.40	--	Medium	Medium	Medium
Mainstem Salmon-Panther	Panther Creek	1,000	--	1.20	--	Medium	High	Low

Channel alterations have reduced access to floodplains and cause tributary erosion. Historic dredge mining has left unconsolidated dredge tailings, which may contribute toxic chemicals and constrict stream channels. An effective strategy for increasing life-cycle survival would therefore include implementing actions to address both within and out-of-subbasin survival.

Initial recovery planning recommendations for the Salmon River MPG of steelhead include restoring the Upper Mainstem and one additional population to viable status (NOAA Fisheries and Idaho Office of Species Conservation 2006). Other populations targeted for viability are outside the UPS and MSP watersheds. Although increasing returns of steelhead also depends on reducing out-of-subbasin impacts, there are also substantial opportunities to improve the quality and quantity of habitat for some populations. The major influences on habitat condition for the Upper Mainstem population have been agricultural practices, which have reduced flow and altered channel morphology. In the Yankee Fork (Upper Mainstem Population), historic dredge mining has left unconsolidated dredge tailings, which may contribute toxic chemicals and constrict the stream channel. The East Fork population has been impacted by dispersed recreation, grazing, and mining. The North Fork population has been negatively impacted by mining, logging, and channelization. Steelhead in Panther Creek have been impacted severely by mining activities. An effective strategy for restoring each of these populations would include implementing actions to address both within and out-of-subbasin survival.

Status and Recovery of Bull Trout Populations

Both watersheds are considered core areas for bull trout *Salvelinus confluentus* listed as threatened under the ESA (U.S. Fish and Wildlife Service 2002). The Upper Salmon River Core area includes 18 local populations, including one (Kinnikinic Creek) considered essential for recovery. The Middle Salmon River-Panther Core Area includes 20 local populations. Recovery plan recommendations call for a minimum of 5,000 adult bull trout in the Upper Salmon River Core area, and 3,000 in the Middle Salmon River-Panther Core Area. Current abundance and trends in abundance of most bull trout populations is currently unknown (CBFWA 2010). Local bull trout populations have been affected by the same factors discussed briefly above for salmon and steelhead. Recovery of bull trout will depend mostly on implementing actions to address within subbasin survival.

Addressing Limiting Factors

The Salmon Subbasin Assessment (Ecovista 2004a) indicates the UPS and MSP watersheds have been impacted by mining, hydroelectric development, residential development, roads, culvert placement, grazing, timber harvest, and altered hydrologic regimes. Limiting factors identified within the UPS and MSP watersheds include hydromodification (including water quantity), fine sediment delivery, riparian function, water temperature, and migration barriers (Ecovista 2004a). The ESA-HRP will implement actions to address limiting factors by: reconnecting off-channel habitats to tributaries, consolidating diversions to increase stream flow, re-aligning or decommissioning roads to decrease sedimentation, planting riparian vegetation to improve water quality, replacing culverts and/or bridges to provide fish passage, improving fish spawning and rearing habitat, and acquiring conservation easements to protect fish habitat. Target populations include the Yankee Fork, East Fork, Valley Creek and Panther Creek populations of Chinook

salmon, and the Upper Mainstem population of steelhead. In addition, various local populations of bull trout will benefit. Additional actions targeting other watersheds or populations may also be identified as a priority.

Hydromodification

Hydromodification is widespread in the Salmon Subbasin due to efforts to capture, control, store, and divert water (Ecovista 2004a). Hydromodifications in the UPS and MSP include water diversions, channelization, and channel modifications. Dams and diversions change upstream and downstream habitats, water temperatures, water quality, and sediment movement. The proper operation and regulation of water diversions for use by multiple irrigators, along with adequate screening and passage for anadromous fish, can improve in-stream flow, decrease temperatures, decrease sediment delivery and reduce entrainment.

Channelization and channel-modification include activities such as straightening, widening, deepening, or relocating stream channels, usually resulting in more uniform channel cross sections and steeper gradients. These activities often deprive wetlands of enriching sediments, change the ability of the system to absorb hydraulic energy and filter pollutants, and cause interruptions in different life stages of aquatic organisms. Consequences include diminished suitability of instream and riparian habitat, increased temperatures, and increased movement of nonpoint source pollutants. The UPS and MSP watersheds are among the most severely altered by channel modifications in the Salmon subbasin (Ecovista 2004a).

Addressing past hydromodifications as highlighted in the 2004 Salmon Subbasin Management Plan (Ecovista 2004b) could provide sufficient results that properly address system limitations and provide long term benefits to ESA-listed fish. The ESA-HRP efforts will be coordinated with landowners, the Idaho Department of Water Resources, and other agencies to clarify and follow the current water-rights ordinances to develop the best approach to meet the needs of landowners and fish populations. Projects will include addressing the limiting factors to improve the dynamics of instream flows, improve passage, re-vegetate riparian areas, improve channel width/depth ratio, supplement instream nutrients, and restore channel/floodplain sinuosity.

Fine Sediment

Activities on public and private lands such as livestock grazing, mining, channelization, road building, timber harvest and diversion have influenced and altered sedimentation processes in both the UPS and MSP watersheds. Increased loads of fine sediments result in cobble embedding, which leads to an alteration of hydrologic regimes, changes in temporal and spatial function of streams, changes in habitat quality, and ultimately reductions in the resilience in various life stages of salmonids. Numerous studies have documented the adverse effects of high levels of sedimentation on the survival of salmonid embryos, fry, and juveniles (Tappel. et al. 1987; Lisle et al 1992; Minns. et al. 1996; Suttle 2004).

Nine streams in the UPS Watershed and three streams in the MSP Watershed are considered sediment impaired (Ecovista 2004a). Sediment in these streams has impacted focal species habitat quality and quantity and impaired spawning success. Actions to decrease fine sediments

encompass addressing various components of natural and human degradation. Actions will include but not be limited to: cattle exclosure fencing, bank sloping, re-vegetation, placement of large woody debris (LWD) instream, consolidation or removal of diversions, decommissioning roads, and instream work to increase channel/floodplain sinuosity. Although factors such as sediment are usually scaled to whole streams and not individual areas, it is reasonable to expect that site-specific actions implemented in appropriate areas will contribute to improvements in stream-scale conditions. Working with federal, state, and other partners, ESA-HRP actions, whether on private or public lands, will be evaluated and analyzed utilizing protocols of habitat assessment (i.e. Bureau of Reclamation: Tributary Assessment) to provide the best approaches for rehabilitation of stream reaches.

Riparian Vegetation and Complexity

Altered riparian habitat function caused by livestock grazing, road building and timber harvest is a primary limiting factor in portions of the UPS and MSP watersheds. Natural in-stream structures are a component of a functionally healthy stream; providing sediment entrapment, promoting desired hydrologic routing, promoting the accumulation of debris, and helping to establish woody species (point bar formation or nurse logs; Beschta 1994). Klein et al. (2007) studied holistic approaches to watershed restoration, linking hydrologic and biologic components between river, riparian, groundwater and terrestrial systems. Based on previous management programs and implementation (i.e. Bear Valley restoration) sponsored by the Tribes Salmon River Habitat Enhancement (SRHE) Project, instream dynamic work resulted in ideal outcomes and were successful in guarding the environment for fish species, providing pool development, healthy stream banks or adequate migratory channels.

Fundamentally, measures of ecosystem health have a series of natural interaction between the complexities of hydrologic, geomorphic and biotic features. Features of hydrologic components consist of high and low flows, water quality, transport of fines and hyporheic conditions, leading proposed projects to addressing limiting factors associated with hydromodification, the maintenance of natural hydrologic disturbance regimes and past and present management of channel alteration. Geomorphic components consist of soil composition, streambank stability, channel gradient, substrates and floodplain conditions. The features of biotic composition consist of invertebrates, vertebrates and vegetation. Improvements to address limiting factors associated with geomorphic and biotic features may include but not be limited to streambank vegetation, placement of LWD, improvements to channel/floodplain sinuosity, and fencing. The ESA-HRP will coordinate actions on public and private lands with various agencies and landowner to address limiting factors.

Temperature

Increased water temperature exacerbated by decreased flows and degraded riparian function is a primary concern in the MSP watershed. In all aspects of salmonid life history, an optimal thermal regime generally coincides with ideal growth, reproduction and fitness. (Vannote and Sweeny 1980) Changes in the thermal regime can occur from changes in vegetation, land use, hydrologic characteristics, morphology, geography and climate. The intrinsic variables in a thermal regime include: shade, percent surface, subsurface, base flow condition, groundwater

levels, solar, heat transfer, conduction (evaluated by channel geometry), spatial patterns, drought, and headwater conditions. Unfavorable temperatures can change community structures at individual, population, or community levels, overall affecting the behavioral (i.e. low fecundity) and physiological development (i.e. decrease survivorship; Dallas 2008).

Similar to increased sediment, increased water temperature is often scaled to whole streams and not individual areas. However, it is well known that increased temperatures are exacerbated by relatively easily identifiable factors such as withdrawals, degraded riparian condition, channel widening, etc. It is therefore reasonable to expect that site-specific actions implemented in appropriate areas will contribute to improvements in stream-scale temperature conditions. Some of the tributaries identified as potential projects with temperature as a limiting factor will be addressed by various means such as planting riparian vegetation, minimizing stream widening by stabilizing banks, and increasing flows by consolidating diversions. Some ongoing projects within the subbasin implemented by state and federal agencies have established temperature monitoring programs, many of which differ in objectives (i.e. water transaction and fisheries), but nonetheless compile useful temperature data. The ESA-HRP will be coordinated with these other projects and implement new actions to address limiting factors.

Migration Barriers

Barriers to fish movement are present in both the UPS and MSP watersheds. Barriers include those that impede upstream or downstream migration, and those that impede access to and from tributaries. These are a concern because fish may use tributaries as thermal refuge when temperatures increase. In addition to road crossings previously summarized, some diversions may serve as partial or full barriers, or may not be adequately screened. Barriers to migration are the primary concern in some areas of the MSP watershed.

The ESA-HRP will coordinate actions on public and private lands with various agencies and landowners to address limiting factors. Actions will include addressing the limiting factors to improve the improve passage, re-connect tributaries to the mainstem, and restore channel/floodplain sinuosity.

C. Rationale and significance to regional programs

Northwest Power and Conservation Council Fish and Wildlife Program

The NPCC's Columbia River Basin Fish and Wildlife Program (Program; NPCC 2009) is intended to integrate ESA requirements, Northwest Power Act requirements, and the policies of the states and Indian Tribes of the Columbia River Basin into a comprehensive program grounded in a solid scientific foundation. The NPCC recognizes that the Tribes have vital interests directly affected by activities covered in the Program and that the United States has a trust obligation to preserve and protect the natural resources reserved by or protected in treaties, executive orders, and federal statutes. The NPCC also recognizes that significant interaction and cooperation with the Tribes as co-managers of affected fish and wildlife resources will be necessary to fully implement the Program and its goals, objectives, and strategies.

The Program identifies the Northwest Power Act directive to protect, mitigate, and enhance fish and wildlife (and associated habitat) of the Columbia River and its tributaries. The Program identifies dramatic declines (from an estimated 10-16 million annual adult return to contemporary returns of approximately 1-2 million) of salmon and steelhead populations in the Columbia River Basin as a result of degraded habitat, intensive harvest, and variable ocean conditions. In addition, past Programs have specifically recognized that the "proportion of the decline attributable to the construction and operation of hydroelectric dams in the Columbia River Basin is, on average, 5 million to about 11 million adult fish (NPPC 2000). The current Program recognizes that "significant losses of fish, wildlife, and their habitats have occurred due to the development and operation of the Columbia River Basin hydropower system. Consistent with the Northwest Power Act, these losses establish the basis for population objectives."

A specific objective in the Program is to significantly increase the total adult salmon and steelhead runs in the Columbia River Basin, especially those that originate above Bonneville Dam, in a manner that supports tribal and non-tribal harvest and complements regional harvest management agreements, such as the Columbia River Compact, the *U.S. v Oregon Management Agreement*, and the Pacific Salmon Treaty. Efforts to increase abundance must also be consistent with achieving recovery of ESA-listed populations and preventing additional ESA listings of species. The above mentioned declines in anadromous returns and the Northwest Power Act directive to mitigate adverse effects of the hydrosystem provide significant rationale and support for the proposed project.

The ESA-HRP is directly applicable to the Habitat Strategies section of the Program:

"*This Program relies heavily on protection of and improvements to inland habitat as the most effective means of restoring and sustaining fish and wildlife populations. As an offset for hydrosystem-caused losses, the Program also may call for improvements in spawning and rearing habitats in tributaries, the lower river, and estuary. By restoring these habitats, which were not damaged by the hydrosystem, the Program helps to compensate for the existence of the hydrosystem*."

"*Subbasin plans have been developed for most of the subbasins in the Columbia River Basin, including sections of the mainstem Columbia and Snake rivers and the estuary. Subbasin plans include assessments of current physical and biological conditions and also identify factors that limit the productivity and capacity of focal species in priority reaches. Subbasin management plans respond to the habitat improvements that are needed.*

Actions implemented as part of the ESA-HRP will be consistent with the following specific strategies expressed in the Program:

- *Restore ecosystems, not single species*

Restoration efforts will focus on restoring habitats and developing ecosystem conditions and functions that will allow for expanding and maintaining diversity within and among species.

- *Habitat protection and improvement activities to address biological objectives*

All actions are intended to be consistent with the Program's biological objectives and also with objectives and strategies contained in the Salmon Subbasin Management Plan (see details below). Actions will also be consistent with habitat restoration strategies and actions identified in the draft recovery plan.

Salmon Subbasin Management Plan

Actions implemented as part of the ESA-HRP address the Salmon Subbasin Plan's Guiding Principles, specifically:

1. Protect, enhance, and restore habitats to sustain and recover native aquatic and terrestrial species diversity and abundance with emphasis on the recovery and delisting of Endangered Species Act listed species.
2. Enhance species populations to healthy levels that support Tribal Treaty and public harvest goals.

This project is consistent with and implements many of the aquatic objectives in the Salmon Subbasin Management Plan (Table 3). Because of the large number of objectives addressed by this project, they are not described in detail here. More detailed descriptions taken from Table 7 (pages 34, 35, and 38) and Table 15 (pages 127-130) of the Salmon Subbasin Management Plan (Ecovista 2004b) are provided in Appendix A.

The planned actions address limiting factors for focal species (Chinook salmon, steelhead trout, and bull trout) within the UPS and MSP watersheds described in Section 3 of the Subbasin Assessment. For example; channel structure (floodplain, pool/riffle ratio, and large woody debris) and chemicals ranked as highest priority in the Yankee Fork Salmon River (Table 3-2, page 3-13). In the section from the East Fork to the headwaters, hydrology, sedimentation, water quality and riparian were each rated as highest priority (Table 3-3, pg 3-14). In Panther Creek, chemicals were identified as highest priority (Table 3-15, page 3-31). In the Upper Salmon tributaries (Slate and Smiley Creek), sediments, barriers, and hydrology (discharge, low flow, peak) are listed as the highest priority (Table 3-2 page 3-13). Other high priority work will also be accomplished within the Salmon Subbasin through participation in the Upper Salmon River Basin Watershed Project Technical Team.

2008 Biological Opinion

The 2008 Biological Opinion for the FCRPS (NOAA Fisheries 2008) identified habitat as a critical component of successful salmon recovery. The overall habitat objective is to protect and improve tributary and estuary habitat to improve fish survival. The first habitat strategy is to protect and improve tributary habitat based on biological needs and prioritized actions.

Table 3. Aquatic objectives from the Salmon Subbasin Management Plan (Ecovista 2004b; Section 3.2.2.1) potentially addressed by the ESA-Habitat Restoration Project.

Subbasin-Level Aquatic Objectives	
Aquatic Objective 8A	Increase the number of pieces of LWD in reaches currently deficient, to volumes consistent with PFC ratings
Aquatic Objective 8B	Improve pool:riffle ratios to properly functioning conditions
Aquatic Objective 9A	By 2010, complete stream reach-specific designations (and maintenance) of streamflows that are adequate for life history stages of focal species and that are sufficient for providing channel maintenance.
Aquatic Objective 10A	Starting in important habitats, reduce instream sedimentation to levels meeting applicable water quality standards (e.g., TMDLs) and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019.
Aquatic Objective 11A	Reduce concentrations of non-organic chemicals to levels consistent with IDEQ beneficial use criteria.
Aquatic Objective 12A	Rehabilitate connectivity where it will benefit native fish populations, with emphasis on bull trout.
Watershed-Level Aquatic Objectives	
Upper Salmon	
Aquatic Objective 13A	Mimic the shape and timing of the natural hydrograph in the mainstem Salmon (from the East Fork confluence to the headwaters).
Aquatic Objective 14A	Reduce potential losses of fishes that enter screened irrigation complexes.
Aquatic Objective 14B	Improve connectivity of tributaries that are currently intercepted by irrigation complexes.
Aquatic Objective 15A	Reduce instream sedimentation to levels meeting applicable water quality standards and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019.
Aquatic Objective 16A	In Upper Mainstem reaches where stream temperatures have been defined a high priority limiting factor (i.e., from the 12-mile section to the headwaters), rehabilitate instream temperatures to levels that support designated beneficial use criteria.
Aquatic Objective 17A	Improve pool:riffle ratios to properly functioning conditions (*refer to* Appendix F—PFC Metrics).
Aquatic Objective 17B	Improve bank stability to properly functioning conditions
Aquatic Objective 17C	Improve floodplain connectivity and access to side channel habitat to help offset losses of pool habitat
Aquatic Objective 18A	Rehabilitate water quality in affected reaches to conditions suitable to support designated beneficial use criteria.
Aquatic Objective 18B	Reconnect the mainstem Yankee Fork with adjoining floodplain area.
Aquatic Objective 19A	In the next 10 years, reduce and prevent impacts of brook trout × bull trout interaction.

Table 3. Continued.

Upper Salmon	
Aquatic Objective 20A	Where stream temperatures have been defined a high priority limiting factor, rehabilitate to levels that support current IDEQ designated beneficial use criteria.
Aquatic Objective 26A	Rehabilitate or mimic natural hydrographs of tributaries to the Upper Salmon River (from Pahsimeroi to headwaters).
Aquatic Objective 27A	Starting in critical habitat areas, reduce instream sedimentation to levels meeting applicable water quality standards and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019.
Aquatic Objective 28A	Within the next ten years (by 2014) improve connectivity of at least half of all tributaries that are currently considered to be disconnected from the mainstem Salmon (upstream of the Yankee Fork) due to water diversions.
Middle Salmon - Panther	
Aquatic Objective 41A	Rehabilitate natural hydrographs in key anadromous and resident tributaries to ensure for adequate base flows, channel-maintaining peak flows, and normal flow timing.
Aquatic Objective 41B	Improve connectivity and access to habitat currently blocked by manmade barriers.

As stated in the Reasonable and Prudent Alternative (RPA) Table of Actions in the 2008 Biological Opinion, "*The Action Agencies will provide funding and/or technical assistance to implement specific habitat projects to achieve specified habitat quality improvements listed in Table 5*." Included in Table 5 of the RPA Table of Actions are estimates of required habitat improvements for populations specifically targeted by ESA-HRP actions. Prioritization of potential actions to be implemented will take into account inclusion in RPA Table 5.

Implementation of the ESA-HRP will coincide with addressing the Planning Actions, RPA 35 (the process of tributary habitat enhancement identification), and others such as RPA 15, and RPAs 53-57, for water quality and fish population modeling. In addition, addressing RPA 34, the implementation of habitat improvements of various conditions, incorporates the evaluation of effectiveness of habitat improvements in RPA 35.

Columbia Basin Fish Accord

In 2008 the "Federal Action Agencies" (Bonneville Power Administration (BPA), the U.S. Army Corps of Engineers (USACE), and the U.S. Bureau of Reclamation (USBR)) and the Tribes signed the Columbia Basin Fish Accords Memorandum of Agreement (MOA) between the Tribes and FCRPS Action Agencies (The Accord). The Accord addresses direct and indirect effects of construction, inundation, operation and maintenance of the Federal Columbia River Power System (FCRPS) and the USBRs Upper Snake River Projects, on the fish and wildlife resources of the Columbia River Basin. The Accord includes requirements that funded habitat

actions are linked to biological benefits based on limiting factors for ESA-listed fish, and that actions be consistent with recovery plans and subbasin plans.

The ESA-HRP is specifically included as a project to be funded as part of The Accord. The Accord specifies that the goal of the ESA-HRP is to inventory, assess, plan and implement necessary actions to improve connectivity to critical habitat, to provide adequate water quantity and quality, and restore native vegetation to riparian areas for all life stages of anadromous and resident fish in the Salmon River Basin. The Accord also provides estimated benefits to primary limiting factors from habitat actions by population and watershed, for estimated species benefits from proposed actions.

State of Idaho Fish Accord

In 2008 the BPA, USACE, USBR and the State of Idaho also signed an MOA to provide a long-term agreement to address (1) legal mandates for the FCRPS and Upper Snake River Projects and mutual concerns for certainty and stability in the funding and implementation of projects for the benefit of fish and wildlife. Specific projects listed in the MOA include (1) Upper Lemhi River Acquisition and Habitat Restoration, (2) Lower Lemhi River Habitat Restoration, and (3) Pahsimeroi River Habitat Project. These projects will include specific actions designed to meet the limiting factors and survival improvements for the Lemhi and Pahsimeroi watersheds identified in Table 5 of the 2008 Biological Opinion Reasonable and Prudent Alternative.

Because of the MOA described here, the ESA-HRP will concentrate actions in the UPS and MSP watersheds. Habitat restoration actions implemented as part of the ESA-HRP will combine with those conducted under the State of Idaho's MOA to form a comprehensive restoration program in the Upper Salmon River Subbasin. Habitat important to threatened populations of Chinook salmon, steelhead, and bull trout will be protected and restored in the four uppermost watersheds of the Salmon River Subbasin.

Draft Salmon and Steelhead Recovery Plan

Although a recovery plan for Snake River salmon and steelhead has not been completed, it is clear that the number of naturally-spawning fish in the Salmon River Subasin remains far from that needed for recovery. Draft recovery plan recommendations call for a minimum of 5,500 natural spawning Spring/Summer Chinook salmon in the Upper Salmon River, and a minimum of 6,000 naturally spawning steelhead in the subbasin (NOAA Fisheries and Idaho Office of Species Conservation 2006). None of the salmon or steelhead populations are considered viable. In concert with reducing out-of-subbasin limiting factors, restoration through projects such as the ESA-HRP is needed to increase natural production. Populations being targeted by the ESA-HRP that are also recommend for viability in the draft recovery plan include East Fork spring/summer Chinook salmon and Upper Mainstem steelhead. Specific actions implemented as part of the ESA-HRP will be consistent with habitat restoration strategies and actions identified in the draft recovery plan.

Draft Bull Trout Recovery Plan

The Salmon River Recovery Unit is one of the 22 recovery units designated for bull trout in the Columbia River Basin (U.S. Fish and Wildlife Service 2002). Five bull trout core areas have been designated within the Salmon Subbasin, including the Upper Salmon River Core area with 18 local populations, and the Middle Salmon River-Panther Core Area, with 20 local populations. Recovery plan recommendations call for a minimum of 5,000 adult bull trout in the Upper Salmon River Core area, and 3,000 in the Middle Salmon River-Panther Core Area. The upper Salmon River Core Area includes one population, Kinnikinic Creek, considered "essential" for recovery. Specific actions implemented as part of the ESA-HRP will be consistent with habitat restoration strategies and actions identified in the draft recovery plan.

Screening and Habitat Improvement Prioritization for the Upper Salmon Subbasin

The Screening and Habitat Improvement Prioritization for the Upper Salmon Subbasin (SHIPUSS) produced by the Upper Salmon Basin Watershed Project (USBWP 2005) was developed to address fish conservation needs on/or adjacent to irrigated agricultural and livestock ranching lands. It is a guide for individuals or groups working on screen and habitat improvements in the Upper Salmon Subbasin. SHIPUSS does not actually implement any actions, but rather ranks streams through a scoring process that evaluates stream connectivity, habitat, fisheries, and non-biological factors to obtain a priority list of streams. Streams were ranked as Priority I (highest priority), Priority II (intermediate), or Priority III (lowest). Priority I streams are those that have the potential to realize immediate, tangible benefits to fish if improvements are directed there.

The SHIPUSS products will be used extensively in the selection process for actions to be implemented as part of the ESA-HRP. SHIPUSS has provided an important component of this process, and therefore save the ESA-HRP considerable time and effort. Actions will be limited to streams considered Priority I, and for which the benefits were considered at least "medium" relative to cost. A list of Priority I streams in the UPS and MSP watersheds is provided in Appendix B.

Model Watershed Plan

The Model Watershed Plan (MWP) was established in 1995 as part of the NPCC plan for salmon recovery and tasks included: (1) identify actions within the watershed that are planned or needed for salmon habitat, and (2) establish a procedure for implementing habitat improvements. Model Watershed Project Areas include the Lemhi River, Pahsimeroi River and the East Fork Salmon River. Prioritized goals and actions for the East Fork Salmon River Watershed include: (1)) establish vegetation (60% density) along critical habitat areas to provide cover and reduce high water temperatures, (2) increase spawning success and fish productivity by reducing sediment levels in spawning gravel, (3) increase the number and quality of rearing and resting pools, (4) reduce the number of physical barriers hindering fish migrations, and (5) increase instream flows (flow is not a limiting factor but increasing flows would help meet need for additional flows in the Salmon River and would help reduce water temperatures). We will work with the Model Watershed Plan to help identify potential habitat actions for the ESA-HRP.

Sawtooth National Forest Plan – Management Direction – Chapter III

The Continuous Assessment and Planning (CAP) section of Chapter III of the Sawtooth National Forest Plan (U.S. Forest Service 2003) provides a proactive approach to ecosystem management with an adaptive strategy to move toward and maintain higher ecological integrity and social and economical resiliency. New information accumulates over time through monitoring that indicates planned objectives are not being met or research indicates a need for change. This plan provides direction for seven streams proposed for implementation of instream/habitat enhancement work: Smiley Creek, Slate Creek, Basin Creek, Beaver Creek, Elk Creek, Warm Springs River, and Upper Main Salmon River. Relevant details on the objectives pertinent to the ESA-HRP are provided in Appendix C. These objectives will be considered in the process for selecting actions to be implemented.

Challis National Forest Plan – Management Direction – Chapter IV

The Management Direction supplemented under the Challis National Forest (U.S. Forest Service 1987) provides an integrative approach on multiple-use of resources utilizing adaptive management goals and direction for desired measure of response. The plan provides goals and objectives to secure forest-wide fish and wildlife management areas. Identified goals include: (1) provide habitat to ensure viability and recovery of threatened and endangered or Forest Service Sensitive plants and animals, (2) maintain or improve the current productivity level of wildlife and fish habitat, and (3) emphasize anadromous fish habitat management on the Challis National Forest. Forest-wide adaptive management incorporates planned objectives for fish & wildlife management areas. Objectives include (1) emphasize habitat improvements for threatened and endangered, Forest Service Sensitive, and economically and socially important species, (2) prohibit or mitigate activities that will, or have a potential to, increase sediment in spawning gravels 2% over existing levels or to a maximum of 30%, whichever is lower, and (3) protect anadromous fish spawning areas from disturbance by livestock and other activities. Relevant details on the objectives pertinent to the ESA-HRP are provided in Appendix C. These objectives will be considered in the process for selecting actions to be implemented.

Salmon National Forest – Management Direction - Chapter IV

The management direction provided for the Salmon National Forest (U.S. Forest Service 1988) includes a number of goal statements, which include (1) manage classified threatened and endangered species habitat to maintain or enhance their current status, and (2) maintain aquatic habitat capability at a level sufficient to meet state water quality and species production goals for both resident and anadromous fisheries. Salmon, steelhead, and trout are listed as management indicator species. Relevant details on the objectives pertinent to the ESA-HRP are provided in Appendix C. These objectives will be considered in the process for selecting actions to be implemented.

U.S. Bureau of Land Management Resource Management Plan

Some actions will likely be implemented in areas under the jurisdiction of the Bureau of Land Management (BLM). The BLM RMP (1999) goals and objectives are complementary to the ESA-HRP. Relevant details on the objectives pertinent to the ESA-HRP are provided in Appendix C. We will work closely with the BLM to ensure complete cooperation and collaboration, and to maximize efficiency.

D. Relationships to other projects

A number of projects currently underway in the upper Salmon River Subbasin provide opportunities for synergies with the ESA-HRP project. Some of these projects are being implemented by the Tribes, but others are implemented by co-managers or other entities. It is imperative that potential synergies are realized to the fullest extent possible while maximizing efficiencies and avoiding redundancies.

Shoshone-Bannock Tribes Projects under the Fish and Wildlife Program

Ongoing and new projects implemented by the Tribes comprise a coordinated suite of actions designed to help restore and enhance fish and fisheries in the Salmon Subbasin, consistent with the Salmon Subbasin Management Plan and the draft recovery plan. The ESA-HRP will be an integral component of this suite of projects. The projects most closely related to the ESA-HRP include (1) Yankee Fork Floodplain Restoration Project (200205900), (2) Salmon River Nutrient Enhancement Project (200890400), (3) Shoshone-Bannock Tribes Supplementation Program (200890500), and (4) Salmon River Habitat Enhancement Project (199405000).

<u>Yankee Fork Floodplain Restoration Project</u>

The goal of the Yankee Fork Floodplain Restoration Project is to restore natural river channel characteristics, floodplain function, hydraulic and sediment regimes, and aquatic habitat within the dredged reach of the Yankee Fork. The focus is to address impacts to the Yankee Fork population of spring/summer Chinook salmon. The project also benefits the Upper Mainstem Salmon population of steelhead as well as bull trout.

One priority of the ESA-HRP is to augment the Yankee Fork Floodplain Restoration Project. The ESA-HRP will develop, plan, assess, and implement habitat restoration actions with clearly defined habitat objectives to address limiting factors and be consistent with the subbasin management plan and draft recovery plan. Any actions implemented within the Yankee Fork will be distinct from the actions implemented by the Yankee Fork Floodplain Restoration Project. However, actions will be coordinated between the projects to ensure maximum efficiencies, from both administrative and effectiveness perspectives. Actions coordinated so that they are near or result in areas restored to high quality may have the greatest relative contribution to productive fish populations.

Salmon River Nutrient Enhancement Project

The Salmon River Nutrient Enhancement Project mitigates marine-derived nutrient loss by supplementing target streams with nutrients and carbon-based compounds. Projected benefits included increased freshwater productivity with corresponding increases in juvenile salmonids growth rates and survival.

Actions implemented by the ESA-HRP are directly related to and should have a synergistic effect with those from the Salmon River Nutrient Enhancement Project. Improvements to physical habitat conditions and water quality are likely required to realize the full benefits of nutrient enhancement. Combined effects of the two projects will be needed to help recover the target populations.

Shoshone-Bannock Tribes Supplementation Program

The Tribes supplementation projects under the Shoshone-Bannock Tribes Supplementation Program are designed to increase abundance, distribution, and diversity of naturally spawning populations through the use of various artificial propagation methods for both spring/summer Chinook salmon and steelhead. The program is designed to help increase abundance of target populations to assist in achieving draft recovery plan and subbasin plan goals.

Actions implemented by the ESA-HRP are directly related to and should have a synergistic effect with those from the Shoshone-Bannock Tribes Supplementation Program. The draft recovery plan (NOAA Fisheries and Idaho Office of Species Conservation 2006) recognizes that an effective strategy for increasing life-cycle survival would include implementing actions to address both within and out of subbasin survival. As part of a strategy to address diversity impairments, a supplementation and genetics plan can guide the use of hatchery fish to promote local adaptation of natural recruits.

Salmon River Habitat Enhancement Project

The Salmon River Habitat Enhancement (SRHE) Project supports the ESA-HRP and the Yankee Fork Floodplain Restoration Project through monitoring of Chinook salmon and steelhead populations and evaluating responses to habitat actions in the Salmon Subbasin. The SRHE Project monitors physical and biological characteristics and evaluates the effectiveness of habitat actions to address limiting factors. Information from the Salmon River Habitat Enhancement Project can be used to facilitate adaptive management regarding habitat actions implemented as part of the ESA-HRP. The ESA-HRP will include site-scale implementation and effectiveness monitoring to provide relatively rapid assessments, but responses at larger scales will be evaluated by the SRHE Project. This will help ensure efficiencies in monitoring and evaluation.

Other Projects under the Fish and Wildlife Program

Projects implemented by the Tribes are coordinated with or compliment other projects in the upper Salmon Subbasin that are funded under the Fish and Wildlife Program. The most pertinent of these projects include (1) Pahsimeroi River Habitat (200860300), (2) Upper Lemhi River

Acquisition (200860100), (3) Upper Salmon Screen Tributary Passage (200739900), (4) Idaho Watershed Habitat Restoration-Lemhi (200739400), (5) Idaho Watershed Habitat Restoration-Custer (200726800), and (6) Restore 12 Mile Reach of Upper Salmon River (199901900). These projects are related to the ESA-HRP because they all implement actions to protect, improve, or restore habitat quality and quantity, water quality, or water quantity in the upper Salmon Subbasin. The most closely related project may be Restore 12 Mile Reach of Upper Salmon River (199901900), because it includes habitat restoration actions implemented within the UPS Watershed. The project includes purchasing conservation easements, restoring geomorphic diversity, reducing bank erosion, decreasing water temperature and improving critical fish habitat. Actions are limited, however, to the section of the Salmon River known as the 12-Mile Reach. Any ESA-HRP actions implemented within this reach will be closely coordinated with the 12-Mile Reach Project to maximize efficiency. Any such action will likely be highly beneficial because actions combining to form high quality habitat would be expected to make a greater contribution to restoring populations than comparable isolated projects. Synergy between the two projects should also be realized because together they help form a comprehensive program of habitat restoration in the UPS watershed.

Projects in other watersheds, such as the Pahsimeroi and Lemhi, combine with the ESA-HRP to help form a comprehensive strategy of habitat restoration in the Upper Salmon River Subbasin. Actions implemented as part of the Pahsimeroi River Habitat project occur in the lower Pahsimeroi River and Patterson/Big Springs Creek. These actions enhance streams by increasing flow, reestablishing habitat connectivity, consolidating diversions, or improving for fish passage at diversions. The Upper Lemhi River Acquisition project targets acquisition of land for habitat conservation in the upper Lemhi watershed. The Upper Salmon Screen Tributary Passage project provides management and operational support for a capital construction program designed to protect anadromous fish at water diversions, improve passage of juvenile and adult anadromous fish at diversions, and improve stream flow conditions where possible. The Idaho Watershed Habitat Restoration projects address fencing, instream work, vegetation planting and acquiring easements.

Projects or Programs outside the Fish and Wildlife Program

Projects implemented by the Tribes are also coordinated with or compliment other projects in the upper Salmon Subbasin that are funded outside of the Fish and Wildlife Program. The most pertinent of these projects include ongoing and recently completed efforts supported by the Pacific Coast Salmon Recovery Fund (PCSRF). Ongoing efforts include work to reconnect side channels, restore instream resting and rearing habitat, restore riparian areas, and reduce side channel sediment in a 12-mile reach of the Salmon River (PCSRF – 001-08 SA). A number of projects to restore spawning and rearing habitat, reestablish riparian vegetation, increase water quantity, and provide riparian fencing in the Lemhi watershed were recently completed. These projects are related to the ESA-HRP because they all implement actions to protect, improve, or restore habitat quality and quantity, water quality, or water quantity in the upper Salmon Subbasin.

E. Project history (for ongoing projects)

The ESA-HRP is a new project, to be funded through The Accord. Actions implemented as part of the ESA-HRP will support the Fish and Wildlife Program's goals and objectives in the Mountain Snake Province, and more specifically, in the Salmon Subbasin. Actions will also support and facilitate recovery of anadromous and resident salmonids listed as threatened under the Endangered Species Act.

F. Proposal biological/physical objectives, work elements, methods, and metrics

Objectives

The Tribes stress the importance of initiating efforts to restore the Snake River system and affected unoccupied lands to a natural condition. Article IV of the Fort Bridger Treaty of July 3, 1868, reserved the right to hunt on the unoccupied lands of the United States and the Tribes work diligently to ensure the protection, preservation and enhancement of those rights for future generations. The Tribes management policies generally allow for supporting federal proposals which will improve or restore resource conditions. The Shoshone-Bannock Tribes' Policy for Management of the Snake River Basin Resources states:

> *The Shoshone Bannock Tribes (Tribes) will pursue, promote, and where necessary, initiate efforts to restore the Snake River systems and affected unoccupied lands to a natural condition. This includes the restoration of component resources to conditions which most closely represents the ecological features associated with a natural riverine ecosystem. In addition, the Tribes will work to ensure the protection, preservation, and where appropriate-the enhancement of Rights reserved by the Tribes under the Fort Bridger Treaty of 1868 (Treaty) and any inherent aboriginal rights.*

The overall objective of the ESA-HRP is to inventory, assess, plan, and implement necessary actions to ameliorate the effects of hydromodification, reduce sediment delivery, restore riparian function, improve stream temperatures, and improve passage for all life stages of anadromous and resident fish in the Upper Salmon Subbasin. It is currently not possible to assign specific biological outcomes (e.g., increases in abundance or productivity of fish populations) to specific habitat actions; however, it is appropriate to include in the overall objective the expectation that actions implemented will contribute to the recovery of targeted populations, and where such information is available (e.g., the Accord and the 2008 BiOp), contribute to estimated increases in survival and productivity over a specified time frame.

The intent of the Tribes is to continue developing a comprehensive, coordinated, and strategic approach to restoration in the Upper Salmon Subbasin. Actions implemented under this project will be identified through reach assessments and address limiting factors identified in the Salmon Subbasin Plan for the UPS and MSP watersheds. These actions will be consistent with objectives from the Salmon Subbasin Plan, the draft recovery plan for Snake River salmon and steelhead, recovery objectives for bull trout in the Salmon Subbasin, and other relevant agency management plans. In addition to the objective of contributing to increases in fish survival and

productivity, actions will have specific objectives regarding implementation (e.g., feet of riparian area fenced, cfs restored, etc.).

Some information to be used in reach assessments is already available to help prioritize and sequence actions to be implemented as part of the ESA-HRP. Habitat objectives and strategies are provided in detail in Section 3.2.2.1 of the Salmon Subbasin Management Plan. Specific actions are not described; however, priority areas are listed for some subbasin-level strategies. The Subbasin Management Plan also provides some objectives and strategies at the watershed or population level, including both the UPS and MSP. Population-specific objectives in the draft salmon and steelhead recovery plan were generally taken directly from the Subbasin Management Plan. The draft recovery plan for bull trout in the Salmon Subbasin includes a list of actions necessary for recovery, and specifies priority areas. The SHIPPUS document identified priority streams for habitat improvement and screening projects (USBWTT 2005). Finally, expected benefits of suites of actions in some areas have been provided in The Accord and in the 2008 Biological Opinion.

Objective 1. Inventory potential actions to address limiting factors in the UPS and MSP watersheds.

Task 1.1. Develop a "master list" of potential actions (primarily at a stream scale) to be implemented in the UPS and MSP watersheds, based on priorities of the Tribes, priority areas from the SHIPPUS document (USBWPTT 2005), Subbasin Plan objectives and strategies, recovery plan objectives and necessary actions, pertinent Forest Service or Bureau of Land Management (BLM) Plans, the Accord, the Biological Opinion, and existing or planned monitoring strategies. We will work with co-managers, partners, and regulators to ensure that the list is thorough and as complete as possible. A partial list, to serve as an example, is provided as Table 4. A more thorough list will serve as the basis from which to select potential actions to implement.

Objective 2. Assess the potential for and identify potential actions to be implemented.

Task 2.1. Work with co-managers, partners, and regulators to finalize a strategy for prioritizing and sequencing potential actions.

We will work with appropriate parties to ensure the best information available is used to select potential actions (at a stream scale) to be implemented. We will continue to develop a method based on available information that separates ranking criteria into two tiers. Tier 1 will include criteria that proposed actions **must** meet to be considered. Tier 2 will include criteria to help prioritize or sequence actions that meet all Tier 1 criteria. It is not our intent to provide a system that ranks various potential actions in specific order based on a numeric score or other ranking system. The detailed level of information required to make this type of ranking meaningful does not exist. Instead, we plan to separate potential actions that fit into a comprehensive, coordinated, and strategic approach from those that may not.

The draft criteria to be further developed include:

Tier 1Criteria – Proposed actions must meet all to be considered

- The proposed action will be implemented in a stream considered "Priority I" (biological factors only) by the SHIPUSS document (see Appendix B for list of Priority I streams in the UPS and MSP watersheds)
- The expected benefit:cost rating for the stream (SHIPUSS) is at least "medium".
- The proposed action addresses one or more limiting factors described in the Salmon Subbasin Assessment (Section 3, pages 12-18 and 29-32) and summarized in Section B of this proposal.
- The proposed action is consistent with one or more aquatic objectives described in the Salmon Subbasin Management Plan (Section 3.2.2.1, pages 41-55, 55-63, and 69) and summarized in Table 1 and Appendix A of this proposal.

Tier 2 Criteria – Prioritization and sequencing aids

- The proposed action is in an area considered a priority by the Tribes and is complementary to the Tribes Tribal Resource Management Plans (TRMP) by improving fish habitat and promotes harvestable fisheries in selected Major Population Groups.
- (A) The proposed action is consistent with strategies to address one or more subbasin-level problems and objectives as described in Section 3.2.2.1 of the Salmon Subbasin Management Plan (pages 41-55); (B) the site of the proposed action is considered a "priority area" or "area to initially focus efforts".
- The proposed action is consistent with strategies to address one or more problems and objectives specific to the UPS or MSP watersheds as described in Section 3.2.2.1 of the Salmon Subbasin Management Plan (pages 57-63 and 69).
- The proposed action is prescribed in the pertinent U.S. Forest Service Plan if applicable.
- (A) The proposed action is consistent with "actions needed" as described in the draft bull trout recovery plan; (B) the site of the proposed action is considered a "priority area".
- The proposed action contributes to a suite of actions described in The Accord for which a survival benefit has been estimated. If so, provide the estimated 25-year benefits for Chinook and steelhead.
- The proposed action contributes to estimated habitat quality improvements described in the 2008 Biological Opinion (RPA Table 5). If so, provide the estimated improvement predicted for 2007-18 actions for Chinook and steelhead.
- The target population and area are considered priorities by the Tribes.
- The target population, stream, or watershed is included in a current or soon to be implemented monitoring strategy.
- The proposed action is near areas that already support high quality habitat (either natural or restored); these actions would be expected to make a greater contribution than comparable actions in areas of degraded habitat.

Table 4. Potential actions under the Endangered Species Act – Habitat Restoration Project proposed for 2010 and 2011, indicating how each meets Tier 1 criteria. Proposed actions must meet all Tier 1 criteria to be considered: (1) stream priority must be "I" and the benefit:cost ranking must be at least "medium", (2) at least one limiting factor with impact rated "moderate" or "greatest" must be addressed, and (3) at least one aquatic objective must be addressed. Any cell highlighted in red indicates failure of a potential action to meet criteria.

Action No.	Stream, (Watershed)	Specific Location	Potential Action	Stream Priority[a]	Benefit: Cost[a]	Limiting Factors Addressed[b]		Aquatic Objectives[c]
						Altered Component	Relative Impact	
1	Panther Creek (MSP)	N: 44°59'20.30" W: 114°20'36.94" 3,600 ft.	Riparian fence exclosure	I	High	Pool/riffle ratio Large woody debris Riparian function	Functioning (Little impact) Functioning (Little impact) Moderate	-- -- 8A; 8C; 9A
2	North Fork Salmon (MSP)	Hughes Creek; N: 45°51'97.8" W: 114°03'39.3"	Culvert replacement	I	Medium	Sediment Barriers	Functioning (Little impact) Functioning (Little impact)	-- --
3	Beaver Creek (UPS)	N: 43°54'47.95" W: 114°48'56.46" 4,654ft	Riparian fence exclosure	I	Medium	Riparian function Sediment Temperature	Moderate Greatest Moderate	8A; 8C; 9A 10A 8D
4	Valley Creek (UPS)	N: 44°16'51.48" W: 115°00'29.42". 10,560ft	Riparian fence exclosure	I	High	Sediment Temperature	Moderate Moderate	10A 8D
5	Challis Creek (UPS)	N: 44°33'47.05" W: 114°15'51.26"	Fish passage and diversion consolidation	I	Medium	Barriers	Greatest	12A
6	Elk Creek (UPS)	N: 44°17'24.80" W: 115°01'42.17"	Diversion removal	I	Medium	Barriers	Greatest	12A
7	Mainstem Salmon (UPS)	12-mile Reach; Pennal Gulch N: 44°32'34.31" W:114°10'51.72" 5,462ft	Improve instream fish habitat	I	High	Pool/riffle ratio Riparian function	Greatest Greatest	8B 8A; 9A

[a] As summarized in the SHIPUSS document (Upper Salmon Basin Watershed Project Technical Team 2005).
[b] From the Salmon Subbasin Assessment (Ecovista 2004a); Section 3.1.1 for the Upper Salmon; Section 3.16 for the Middle Salmon-Panther.
[c] From the Salmon Subbasin Management Plan (Ecovista 2004b); Section 3.2.2.1.

Task 2.2. Based on results from tasks 1.1 and 2.1, select potential actions to be implemented.

Potential actions from the "master list" will be selected every year, with the intent to select actions approximately two years prior to implementation. This will provide time for thorough assessments to select specific locations and to determine if actions can indeed be implemented (see Objective 3), or if necessary to substitute alternative actions.

Specific tasks will be developed for each action on an action-by-action basis, and will be identified through a thorough assessment of each potential action (see Objective 3). Where specific habitat actions have been identified in subbasin plans, the draft recovery plan, or The Accord, these actions will be implemented consistent with adaptive management principles described in the Fish and Wildlife Program.

Results from Tasks 2.1 and 2.2 will direct the long-term selection of potential actions; however, completion of these tasks will likely allow for selection of potential actions to be implemented beginning in year 3 of the ESA-HRP (2012) and beyond. We have therefore developed a list of actions that could be implemented in years 1 and 2 (2010 and 2011). These first potential actions are provided for specific locations rather than at a stream scale (Table 4). Maps showing specific locations of each potential action are provided in Appendix E. Information provided in Table 4 indicates how each of these potential actions does or does not meet all draft Tier 1 criteria. For those potential actions meeting all draft Tier 1 criteria, Table 5 summarizes how the actions could be sequenced or prioritized using the draft Tier 2 criteria.

The potential actions described in Tables 4 and 5 are by design site-specific, and are expected to have commensurate site-specific effects on limiting factors. Some actions, however, may contribute to ameliorating limiting factors at a larger scale. For example, reducing barriers allows easier access to habitat away from the site. Actions such as riparian fences serve to protect riparian areas, allowing desired riparian vegetation to grow and therefore help increase riparian function. This increased function contributes to ameliorating factors measured at a larger scale such as sediment and temperature.

The potential actions will likely benefit spring/summer Chinook salmon, steelhead, and bull trout to varying degrees. This benefit is partially described by SHIPUSS (USBWPTT 2005). In most of the target streams, the current expression of life history forms is considered medium (may support expected species, but certain life stages or histories are not being expressed), and the potential expression is rated high (supports all expected life stages/histories and species). Exceptions for current status include anadromous salmonids in Valley Creek (currently rated high), and bull trout in Beaver and Elk Creeks, which are both currently rated as low (does not support expected species). The only exception to the potential expression being high is for bull trout in the mainstem Salmon River, which is rated medium. All actions could therefore contribute to improvements in life history expression for at least one species.

Even though each action will likely benefit multiple species and life stages, it is easiest (and still useful) to summarize the expected benefits of each potential action for a key indicator species. For consistency, Table 6 summarizes each action as it relates to spring/summer Chinook salmon.

Table 5. Potential actions under the Endangered Species Act – Habitat Restoration Project proposed for 2010 and 2011 from Table 4 (includes only actions that meet all Tier 1 criteria), indicating how each addresses Tier 2 criteria. Tier 2 criteria are intended to help determine which actions best fit into a comprehensive, coordinated, and strategic approach, as roughly indicated by the proportion of cells highlighted in green.

Action No.	Tribal Priority[a]	Subbasin Strategies[b]		Watershed Strategy[c]	Forest Service or BLM Plan Objective	Bull Trout Recovery Plan		Accord Benefit[d]		BiOp Benefit[e]		Habitat Quality[f]
		Strategies	Priority Area			Action No.	Priority Area	Chinook	Steelhead	Chinook	Steelhead	
1	Yes	8A2; 8C2 9A4	No Yes	--	Salmon NF Plan	1.36	None provided	1.29	1.76	--	--	Medium
3	Yes	8A2; 8C2; 8D4 9A4 10A1; 10A5	No Yes No	10A1 (27A)	Sawtooth NF Plan – Objectives 0248, 02157	1.32	No	1.30	1.28	1.14	1.06	Medium
4	Yes	8D4 10A1; 10A5	No Yes	--	Sawtooth NF Plan – Objectives 0255, 02157	1.32	Yes	1.23	1.25	1.01	1.06	High
5	Yes	12A1; 12A2; 12B1	Yes	--	BLM Plan	1.22;1.24 1.311	Yes	1.23	1.25	1.01	1.06	Medium
6	Yes	12A1; 12A2	Yes	28A1	Sawtooth NF Plan – Objective 0243	1.22; 1.311	Yes	1.59	1.85	1.01	1.06	Medium
7	Yes	8 A2; 8B2 9A4	Yes Yes		BLM Plan Goal 1: Objectives 2, 9, 10.	1.36	None provided	--	--	1.01	1.06	Medium

[a] Based on Tribes harvesting areas and Tribal Resource Management Plan (Shoshone-Bannock Tribes 2010).
[b] From the Salmon Subbasin Management Plan (Ecovista 2004b); Section 3.2.2.1 (pages 41-55).
[c] From the Salmon Subbasin Management Plan (Ecovista 2004b); Section 3.2.2.1 (pages 55-63, 69).
[d]. Estimates from the 2008 Columbia Basin Fish Accords Memorandum of Agreement between the Shoshone-Bannock Tribes and the FCRPS Action Agencies. Provided as a potential survival benefit multiplier over current conditions.
[e] Estimates from Table 5 in the Reasonable and Prudent Alternative Table of the 2008 Biological Opinion (NOAA Fisheries 2008). Provided as an estimated percentage habitat quality improvement of 2007-2018 actions.
[f] As ranked by SHIPUSS at the stream scale (USBWPTT 2005).

Table 6. Summary of how potential actions meeting all tier 1 criteria address limiting factors and benefit an example focal species. Most actions will likely benefit multiple species.

Action No.	Stream	Example Focal Species	Population	Potential Action	Limiting Factor/Threats Addressed	Information Summary Relating Potential Action to Example Focal Species[a]
1	Panther Creek	Summer steelhead	Panther Creek	Riparian fence exclosure	Riparian function	•Within the one MaSA for population •No current spawning •Potential for spawning and rearing is moderate •Benefits include spawning success and rearing capacity
3	Beaver Creek	Spring/summer Chinook	Upper Salmon	Riparian fence exclosure	•Riparian function •Sediment •Temperature	•Within uppermost of 3 MaSAs for population •Identified as one of tributaries "most used for spawning" •Moderate grazing pressure throughout stream •Restoring riparian function will contribute to restoring riparian function, which will contribute to reducing sediment and temperature. •Benefits include spawning success and rearing capacity
4	Valley Creek	Spring/summer Chinook	Valley Creek	Riparian fence exclosure	•Riparian function •Sediment •Temperature	•Entire stream within the one MaSA for population •Spawning and rearing potential high throughout stream •All life history stages and strategies present •Moderate grazing pressure below Elk Creek •Streambank degraded below Crooked Creek (3.6 miles) •Most of stream sediment impaired (19.4 miles) •Restoring riparian function will contribute to reducing streambank degradation, which will contribute to decreasing sediment. Restoring riparian function will also contribute to lowering temperature. •Benefits include spawning success and rearing capacity
5	Challis Creek	Spring/summer Chinook	Lower Mainstem Salmon	Fish passage and diversion consolidation	Diversions/barriers	•Within middle of 3 MaSAs for population •Moderate spawning potential throughout; current spawning/rearing in lower reach only •Numerous diversions/barriers throughout contributing to de-watering (3.4 miles) •Consolidating will improve passage and flows to spawning/rearing areas
6	Elk Creek	Spring/summer Chinook	Valley Creek	Diversion removal	Barrier	•Entire stream within the one MaSA for population •Spawning and rearing potential high throughout stream •Barrier identified in lower stream •Improve access to 12.5 miles of spawning/rearing habitat
7	Mainstem Salmon (12 Mile Reach)	Spring/summer Chinook	Lower Mainstem Salmon	Improve instream fish habitat	Habitat degradation	•Within middle of 3 MaSAs for population •Moderate spawning potential throughout •Improve rearing habitat for fish originating upstream

[a] Information summarized from draft recovery plan (NOAA Fisheries and Idaho Office of Species Conservation 2006)

The exception is Action 1, located in Panther Creek, which is described for steelhead. Chinook salmon are considered extirpated from Panther Creek.

Six of the seven potential actions for 2010 and 2011 meet all Tier 1 criteria (Table 4). A culvert replacement in the North Fork Salmon River (MPS Watershed) failed the Tier 1 criteria because both passage and sediment delivery are considered functioning, and therefore no aquatic objectives to address these factors were included in the Salmon Subbasin Management Plan (Ecovista 2004b). The remaining six actions all meet a number of Tier 2 criteria (Table 5); however, potential actions 4 (riparian fence exclosure on Valley Creek) and 6 (diversion removal in Elk Creek) meet the greatest number. Potential actions 3 and 5 also meet most of the Tier 2 criteria. Although nearby habitat quality is currently highest for Action 4, the potential habitat rating for all streams considered is high (USBWPTT 2005). In general, these actions address objectives and strategies for areas indicated as high priority in the Subbasin Management Plan, are consistent with objectives or actions included in a Forest Service Plan and/or the Bull Trout Recovery Plan, and contribute to a suite of actions described in The Accord and in the 2008 Biological Opinion. More detailed information on the likely benefits of potential actions is provided in Table 6, which may assist in helping to sequence or prioritize projects that meet all Tier 1 and most of Tier 2 criteria.

Based on the draft criteria and information presented here; therefore, potential actions to be assessed first may be riparian fence exclosure on Valley Creek and diversion removal in Elk Creek. Next may be riparian fence exclosure in Panther Creek and Beaver Creek, and fish passage and diversion consolidation in Challis Creek.

Objective 3. Assess the feasibility of implementing selected potential actions.

Task 3.1. A restoration strategy will be identified through a process consistent with a thorough tributary assessment. We will use existing information where available to document geomorphology, hydrology, and physical nature of the selected stream, and identify smaller reaches based on hydraulic controls. We will work with co-managers and partners to review the information and develop a general restoration strategy for the stream.

Task 3.2. Specific actions will be identified through a selection process consistent with thorough reach assessments. This may include the use of more detailed existing information where available, and the collection of new baseline information, including cultural surveys. We will work with co-managers, partners, and landowners as appropriate to review the information and identify specific restoration actions. Design and permitting for these specific actions will be started.

Objective 4. Implement specific restoration actions.

Task 4.1. All information obtained as part of objectives 1, 2, and 3 will be used to complete design, permitting, and implementation of specific actions. Material and labor force will be secured.

Task 4.2. Monitor and evaluate the specific restoration actions implemented. Monitoring and evaluation will be limited to compliance, implementation, and performance (see Section G of this proposal). This monitoring will be conducted at the action scale. Questions to be answered may include (1) are contractual obligations fulfilled, (2) are criteria met, and (3) is the action performing as intended (e.g., is a riparian fence excluding cattle?). Status and trend, and action effectiveness monitoring will be conducting as part of the SRHE Project (see Section G).

G. Monitoring and evaluation

Monitoring of enhancement efforts is necessary to evaluate the short-term and long-term benefits of those efforts and to facilitate adaptive management. Monitoring and evaluation of actions implemented as part of the ESA-HRP will be coordinated with those of the ongoing project, Salmon River Habitat Enhancement (SRHE; 1994-050-00). This project is implemented by the Tribes under the Fish and Wildlife Program.

Monitoring and evaluation conducted as part of the ESA-HRP will focus on site-scale implementation (administrative and compliance), and effectiveness (Table 7). Implementation monitoring will determine if actions are implemented as planned (contractual obligations fulfilled, criteria met, etc.). Effectiveness monitoring will determine if actions are performing as intended (having the desired effect on physical habitat or processes, etc.). These site-scale assessments will focus on measuring changes in habitat conditions, water quality, etc., but will also include biological attributes in the immediate vicinity of specific actions. Site-scale assessments will provide a more rapid indication of the effects of project actions than assessments at larger scales. Additional monitoring may include baseline inventories and assessments prior to implementing actions, as described in Objective 3.

Larger scale status and trend and action effectiveness monitoring will be conducted as part of the SRHE Project. The SRHE Project evaluates affects of habitat management on the ecosystem through detailed monitoring and evaluation of project enhancement efforts. The SRHE Project takes into account the ecological habitat-forming processes prior to project implementation, as called for in the Fish and Wildlife Program.

Specific deliverables for the SRHE include:

- Provide information on the distribution, size structure, and abundance of salmonids, and observation of habitat utilization based on feeding, movement and behavior in tributaries such as Yankee Fork, Herd Creek, Big Boulder Creek, Slate Creek, Smiley Creek, Elk Creek, Panther Creek and Warm Springs.
- Provide the distribution of steelhead and Chinook redds surveyed in Yankee Fork, Herd Creek, Big Boulder Creek, Slate Creek, Smiley Creek, Elk Creek, and Warm Springs to project returns of salmonids within the Salmon Subbasin.
- Maintain and monitor continuous graphical thermal regime in tributaries of interest utilized by focal species for spawning and rearing.
- Analyze snorkel count data collected in Yankee Fork, Herd Creek, Big Boulder Creek, Elk Creek, Slate Creek, Smiley Creek, and Panther Creek and interpret for results section of the report.

Table 7. Summary of site-scale implementation and effectiveness monitoring to be conducted as part of the ESA-HRP. Larger-scale effectiveness monitoring will be conducted as part of the Salmon river Habitat Effectiveness Project.

Action No	Potential Action	Implementation Metrics	Effectiveness Metrics
1	Riparian fence exclosure	•Miles of fence installed •Photo-documentation of fence and riparian zone	•Changes in ground cover •Inventory riparian plant community •Measuremnts of riparian canopy density
3	Riparian fence exclosure	•Miles of fence installed •Photo-documentation of fence and riparian zone	•Changes in ground cover •Inventory riparian plant community •Measuremnts of riparian canopy density
4	Riparian fence exclosure	•Miles of fence installed •Photo-documentation of fence and riparian zone	•Changes in ground cover •Inventory riparian plant community •Measurements of riparian canopy density
5	Fish passage and diversion consolidation	•Number of diversions removed or improved[a]	•Surveys of fish use
6	Diversion removal	•Number of diversions removed or improved[a]	•Surveys of fish use
7	Improve instream fish habitat	•Length of stream receiving treatments •Area (square meters) of habitat created or rehabilitated •Number of structures installed	•Periodic inventory of steam habitat composition •Periodic surveys of use by focal fish species

[a] Although an appropriate metric may be "No. of miles of habitat accessed", this may be subjective and vary by species. This metric is best left to effectiveness monitoring (ISRP 2007)

- Participate in the Upper Salmon Basin Watershed Technical Team providing comments for review of design, plans and partner in project implementation on private lands within the Salmon Subbasin. Utilize Upper Salmon Basin Watershed Project (USBWP) potential project listing for project implementation sponsored by The Tribes.

Many of the monitoring and evaluation methods and analyses conducted as part of the SRHE Project have been developed through the review of federal and local monitoring standards, relevant peer-review scientific literature and consultation with others in the field. A list of monitoring and evaluation methods is provided in Appendix D. Other agencies, in particular the Idaho Department of Fish and Game, sponsor monitoring and evaluation projects within the Salmon Subbasin that complement the SRHE Project.

Continued successful implementation of the SRHE Project will provide suitable monitoring and evaluation of actions implemented as part of the ESA-HRP. Past findings of the SRHE Project

have demonstrated the ability to successfully monitor and evaluate stream conditions and fish populations. Examples of these findings include:

- In Bear Valley Creek, surface fine sediment (≤8 mm) significantly decreased after restoration actions.
- In Bear Valley Creek, density of non-anadromous salmonids increased within the enhancement area after restoration actions.
- Chinook salmon production estimates for the West Fork Yankee Fork were below 10-year averages in 2008, with an egg-to-parr survival estimate of 1%.

Details regarding restoration actions, enhancement areas, metrics, statistical analyses, etc., can be found in annual reports of the SRHE project (Ray et al. 2007; Tsosie et al. 2009).

Management Approach

Specific actions implemented as part of the ESA-HRP will incorporate the Adaptive Management framework from the Draft Recovery Plan. The management approach to increase natural production through habitat restoration strategies and actions identified through ESA-HRP is consistent with The Accord, Subbasin Plan and Fish and Wildlife Program.

To assess the progress of recovering efforts in the Salmon Subbasin the project will include addressing RPA 34, the implementation of habitat improvements of various conditions and incorporates the evaluation of effectiveness of habitat improvements in RPA 35. Progress of habitat actions will be reported to the FCRPS expert panel workshop.

H. Facilities and equipment

The Tribes' Fish and Wildlife Department has office space available in Fort Hall, Idaho. The office space includes computers, faxes, copy machines, limited storage, and basic field equipment. Additional office space will be required in the USP watershed, in closer proximity to the actions to be implemented. A new biologist and staff will be hired to implement the ESA-HRP. The new staff will need office space, materials and field equipment to supplement work activities. Office supplies will include but not be limited to desks and desktop computers with software. New field equipment will include a project vehicle, ATV, camping gear, various monitoring equipment, a GPS system, survey equipment, storage devices, and hand tools.

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J. Key personnel

Theresa Tsosie, FTE-Program Manager/Biologist. ***03/08 – present 40 hours/week*.** **Shoshone-Bannock Tribes, Fisheries and Wildlife Department, Fort Hall, ID 83203**

- Develop and administer budgets, statements of work, and detailed work plans for the following Bonneville Power Administration funded projects: Salmon River Habitat Enhancement 1994-050-00
- Participate in the Northwest Planning & Conservation Council's project solicitation process including preparing proposals for ongoing projects and soliciting funding for new projects as appropriate.
- Prepare, administer, and direct work on and off the reservation in anadromous fish habitat protection and restoration projects.
- Conduct fish, macroinvertebrate, and aquatic habitat surveys.
- Supervise monitoring and restoration programs in the field.
- Provide statistical analysis of survey data and write annual reports to the funding agency.
- Work with other Tribal and agency biologists and personnel on methods of protecting and enhancing anadromous fishery resources.
- Develop Tribal comments and positions relative to regional projects and plans which affect salmon and steelhead stocks within the historical fishing area of the Tribes.
- Monitor response of biotic community (fish and macroinvertebrate) to mining activities and provide recommendations to EPA and USDAFS regarding water quality monitoring/NPDES permitting.
- Assist in coordinating, communicating and transferring information concerning projects to General Tribal membership, Fort Hall Business Council, Fish and Wildlife Agencies, other Indian Tribes, private landowners, and the general public.
- Represent Tribal interests at various regional and basin technical committees and workshops concerned with managing fishery and habitat resources, committees include; Upper Salmon Basin Watershed Project Technical Team, Upper Salmon Subbasin Assessment and Planning Technical Team, Salmon River Basin Advisory Group, Columbia River Basin Fish and Wildlife Authority Anadromous Fish Committee.
- Develop and conduct educational outreach activities with local students on watershed monitoring and evaluation.
- Supervise field crew of 3+ people and administrative staff as necessary.

Education

- BS Biology: Idaho State University, 5/2005

Previous employment

- ***Carpenter*** *10/06 - 03/08*, MBCJ Construction, Pocatello, Idaho.

- ***Fisheries Technician*** *06/06 – 10/06,* Bureau of Land Management, Fisheries, Challis Idaho.
- ***Fisheries Technician*** *05/05 – 10/05,* Shoshone Bannock Tribes, Fish & Wildlife, Fort Hall, Idaho.
- ***Lab Assistant*** *10/03 – 05/05,* Idaho State University, Fish Ecology, Pocatello, Idaho.

Technical Reports

- Tsosie, T. and K. Bacon. 2009. Salmon river habitat enhancement. Shoshone-Bannock Tribes 2007 Annual Report, Project Number 94-50, Bonneville Power Administration, Portland, Oregon 53 pages.

Current Training Courses/Certificates

- ArcGIS 9 for Fisheries and Wildlife Biology Applications (GIS-400)- Northwest Environmental Training Center
- Manage the NEPA Process Native American- Shipley Group
- Cultural & Natural Resource Management/Endangered Species Act-Shipley Group
- Backpack Electrofishing: Principles and Practices (BIO-407)- Northwest Environmental Training Center
- First Aid- American Heart Association

APPENDIX A

PROBLEM STATEMENTS, AQUATIC OBJECTIVES, STRATEGIES, PERFORMANCE MEASURES, AND EXPECTED OUTCOMES FROM THE SALMON SUBBASIN MANAGEMENT PLAN

Appendix Table A-1. Problem statements and aquatic objectives from the Salmon Subbasin Management Plan (from Section 3.22; Table 7).potentially addressed by the Endangered Species Act – Habitat Restoration Project, with reference to the pertinent section from the Salmon Subbasin Assessment.

Problem Statements	Aquatic Objectives	Assessment Sections
Subbasin Level		
Problem 8: A reduction in riparian vegetation has resulted in a loss of recruitable LWD, poor pool:riffle ratios, a decrease in streambank stability, and a decrease in stream shading. These changes have resulted in oversimplified channels, higher erosion rates, more severe flooding, and excessive stream temperatures.	Aquatic Objective 8A: Increase the number of pieces of LWD in reaches currently deficient, to volumes consistent with PFC ratings	1.7.2, 1.7.4, 2.1.2, 2.2.4, 2.3.1, 2.3.9.1,3.1.1, 3.1.2, 3.1.3, 3.1.7, 3.1.8
Problem 9: Streamflow diversion, changes to upland and riparian vegetation, modifications to floodplain function, and increases in drainage density have altered natural hydrographs in mainstem and tributary habitats	Aquatic Objective 9A: By 2010, complete stream reach-specific designations (and maintenance) of streamflows that are adequate for life history stages of focal species and that are sufficient for providing channel maintenance. Aquatic Objective 9B: Improve pool:riffle ratios to properly functioning conditions Aquatic Objective 9C: Improve bank stability to properly functioning conditions Aquatic Objective 9D: Where stream temperatures have been defined a high priority limiting factor, rehabilitate to levels that support current IDEQ designated beneficial use criteria	9A: 2.2.4.3, 2.3.9.2, 2.3.9.3, 3.1.1, 3.1.2, 3.1.3, 3.1.6, 3.1.8 9B: 3.1.1, 3.1.6 9C: 2.3.9.3, 3.1.1, 3.1.2, 3.1.3, 3.1.6, 3.1.7, 3.1.8 9D: 2.2.4.3, 2.3.9.1, 2.3.9.3, 3.1.1, 3.1.2, 3.1.3, 3.1.5, 3.1.8
Problem 10: Sedimentation from human activities limits the production potential of focal species throughout the Salmon subbasin, and particularly within batholith watersheds.	Aquatic Objective 10A: Starting in critical habitat areas, reduce instream sedimentation to levels meeting applicable water quality standards (e.g., TMDLs) and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019	2.2.4.3, 2.3.9.1, 2.3.9.3, 2.3.9.4, 2.3.9.7, 2.3.9.8, 3.1.1
Problem 11: Mining activities are limiting distribution of focal species.	Aquatic Objective 11A: Reduce concentrations of non-organic chemicals to levels consistent with IDEQ beneficial use criteria	3.1.1, 3.1.6
Problem 12: Anthropogenic migration barriers are affecting distribution, population connectivity and genetic integrity of all focal populations	Aquatic Objective 12A: Rehabilitate connectivity where it will benefit native fish populations, with an emphasis on bull trout. Aquatic Objective 12B. Implement fish screening in tributaries after dewatering and passage issues are resolved	12A: 2.2.1.3.3, 2.2.4.3, 2.3.9.4, 2.3.9.7, 3.1.1, 3.1.2, 3.1.3, 3.1.6, 12B: 3.1.3

Appendix Table A-1. Continued.

Problem Statements	Aquatic Objectives	Assessment Sections
Upper Salmon Watershed		
Problem 13: The natural hydrologic regime in the Upper Mainstem Salmon (from the East Fork confluence to the headwaters) has been altered by streamflow withdrawals. The effects from these pressures include a reduction in base flow conditions and some modifications to flow timing.	Aquatic Objective 13A: Mimic the shape and timing of the natural hydrograph in the mainstem Salmon (from the East Fork confluence to the headwaters)	2.2.4.3, 2.3.9.2, 2.3.9.3, 3.1.1
Problem 14: Fish are entering irrigation systems through irrigation turn on before screens are in place, operation of diversions and control structures, wastewater return flows and breeched (those that have structurally failed or are undersized relative to the volume of water they convey) ditches (a.k.a. 'backdoor' access). Upon entering the hydrologically unstable irrigation system, fish are subject to threats from dewatering (i.e., temperatures, reduced forage, increased predation, etc.).	Aquatic Objective 14A: Reduce potential losses of fishes that enter screened irrigation complexes Aquatic Objective 14B: Improve connectivity of tributaries that are currently intercepted by irrigation complexes	14B: 2.2.1.3.3, 2.2.4.3, 2.3.9.4, 2.3.9.7, 3.1.1
Problem 15: Sedimentation from various land-use activities has impacted focal species habitat quality and quantity in the mainstem from the East Fork confluence to the headwaters	Aquatic Objective 15A: Reduce instream sedimentation to levels meeting applicable water quality standards and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019	2.2.4.3, 2.3.9.1, 2.3.9.3, 2.3.9.4, 2.3.9.7, 2.3.9.8, 3.1.1
Problem 16: The diversion of water for irrigation and its subsequent return, combined with reductions in riparian shading represent the primary factors contributing to increased temperatures in the mainstem Salmon from the 12-mile section upstream to Challis	Aquatic Objective 16A: In Upper Mainstem reaches where stream temperatures have been defined a high priority limiting factor (i.e., from the 12-mile section to the headwaters), rehabilitate instream temperatures to levels that support designated beneficial use criteria	2.2.4.3, 2.3.9.1, 3.1.1, 3.1.2, 3.1.3, 3.1.4, 3.1.7,
Problem 17: Channel confinement and development of riparian areas, from the 12-mile section upstream to the headwaters, has caused a reduction in the pool:riffle ratio, a reduction in streambank stability, a reduction in shade, and has limited salmonid access to side channel habitat	Aquatic Objective 17A: Improve pool:riffle ratios to properly functioning conditions Aquatic Objective 17B: Improve bank stability to properly functioning conditions Aquatic Objective 17C: Improve floodplain connectivity and access to side channel habitat to help offset losses of pool habitat	17A: 3.1.1 17B: 3.1.1 17C: 3.1.1

Appendix Table A-1. Continued.

Problem Statements	Aquatic Objectives	Assessment Sections
Problem 18: Historic dredge mining has left unconsolidated dredge tailings in the lower Yankee Fork River. These tailings, as well as other mining waste, may contribute toxic chemicals to the Yankee Fork and other downstream reaches, and constrict the stream channel from interacting with adjoining floodplain areas. These problems thereby limit habitat suitability for spring Chinook (SRYFS), summer steelhead (SRUMA-s) and bull trout (UPS) populations	Aquatic Objective 18A: Rehabilitate water quality in affected reaches to conditions suitable to support designated beneficial use criteria Aquatic Objective 18B: Reconnect the mainstem Yankee Fork with adjoining floodplain	18A: 2.3.9.1, 3.1.1 18B: 2.3.9.1, 3.1.1
Problem 19: Brook trout, which occur throughout the majority of Valley Creek and occupy habitat shared by bull trout, represent a potential threat to bull trout due to displacement and/or predation	Aquatic Objective 19A: In the next 10 years, reduce and prevent impacts of brook trout x bull trout interaction	2.2.5, 3.1.1
Problem 20: Reductions in riparian shading combined with irrigation return flows, represent the primary factors contributing to increased temperatures in middle- and lower-elevation reaches.	Aquatic Objective 20A:Where stream temperatures have been defined a high priority limiting factor, rehabilitate to levels that support current IDEQ designated beneficial use criteria	2.2.4.3, 2.3.9.1, 3.1.1
Problem 26: Tributaries to the upper Salmon River are impacted by water withdrawals that alter the hydrologic regimes (primarily low flow) of the small systems	Aquatic Objective 26A: Rehabilitate or mimic natural hydrographs of tributaries to the Upper Salmon River (from Pahsimeroi to headwaters)	2.2.4.3, 2.3.9.2, 3.1.2
Problem 27: Roads, timber harvest, grazing, and changes to the hydrologic regime of the small Upper Salmon tributaries have acted alone or cumulatively to contribute excessive amounts of fine sediment to channels	Aquatic Objective 27A: Starting in critical habitat areas, reduce instream sedimentation to levels meeting applicable water quality standards and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019	3.1.2
Problem 28: To a limited extent, fish habitat in the Salmon River watershed upstream of the Yankee Fork is affected by migration barriers that water diversions create on tributary streams. This is a concern because fish use the tributaries as thermal refuge when water temperatures in the main river increase.	Aquatic Objective 28A: Within the next ten years (by 2014) improve connectivity of at least half of all tributaries that are currently considered to be disconnected from the mainstem Salmon (upstream of the Yankee Fork) due to water diversions	2.2.1.3, 2.3.9.2, 3.1.2
Middle Salmon – Panther Watershed		
Problem 41: Focal species habitat occurring in tributaries entering the mainstem, between the confluences of the North Fork Salmon and Pahsimeroi Rivers, are limited by a modified hydrologic regime, inadequate pool:riffle ratios,and structural migration barriers.	Aquatic Objective 41A: Rehabilitate natural hydrographs in key anadromous and resident tributaries to ensure for adequate base flows, channel-maintaining peak flows, and normal flow timing. Aquatic Objective 41B: Improve connectivity and access to habitat currently blocked by manmade barriers	41A: 3.1.6 41B: 3.1.6

Appendix Table A-2. Aquatic objectives, strategies, performance measures, and expected outcomes from the Salmon Subbasin Management Plan (from Section 4.3; Table 15).potentially addressed by the Endangered Species Act – Habitat Restoration Project.

Objectives	Strategies	Key Performance Measures	Biological Outcome
Subbasin Level			
Aquatic Objective 8A: Increase the number of pieces of LWD in reaches currently deficient, to volumes consistent with PFC ratings.	Protect existing riparian habitat that is currently classified as properly functioning currently classified as functioning at risk or not functioning	Adult spawner distribution; juvenile rearing distribution; adult spawner abundance physical habitat; water temperature; macroinvertebrate assemblage; fish and amphibian assemblage	Increased juvenile and adult salmonid survival, abundance, and distribution
Aquatic Objective 8B: Improve pool:riffle ratios to properly functioning conditions	Return the channel to the floodplain so as to increase channel sinuosity to levels consistent with the historic natural range of variability Compensate for transportation corridor encroachment on streams	Juvenile rearing distribution; physical habitat; stream network; fish and amphibian assemblage	Improved overwintering and summer rearing survival
Aquatic Objective 8C: Improve bank stability to properly functioning conditions	Stabilize known problem areas through riparian plantings Protect revegetation efforts from herbivory	Juvenile rearing distribution; physical habitat; stream network; fish and amphibian assemblage	Improved overwintering and summer rearing survival
Aquatic Objective 8D: Where stream temperatures have been defined a high priority limiting factor, rehabilitate to levels that support current IDEQ designated beneficial use criteria	Rehabilitate riparian vegetation to PFC (Appendix F) Rehabilitate floodplain connectivity Promote riparian development through exclusion and riparian pastures Reconnect tributaries	Adult spawner distribution; juvenile rearing distribution; adult spawner abundance physical habitat; water temperature; macroinvertebrate assemblage; fish and amphibian assemblage	Increased juvenile and adult salmonid survival, abundance, and distribution

Appendix Table A-2. Continued.

Objectives	Strategies	Key Performance Measures	Biological Outcome
Aquatic Objective 9A: By 2010, complete stream reach-specific designations (and maintenance) of streamflows that are adequate for life history stages of focal species and that are sufficient for providing channel maintenance.	Improve water conveyance systems Lease or acquire water rights Improve the irrigation efficiency Enact legislative authority to create 'Water Bank' Develop irrigation management plans with irrigators to create the most efficient program based on crop needs and soil types	Instream flow; physical habitat; stream network; passage barriers/diversions; water temperature	Increased juvenile and adult abundance, distribution, and survival
	Provide adequate flows to support spawning and rearing life history stages of focal salmonid species	Age class structure; juvenile rearing distribution; adult spawner spatial distribution; SAR; juvenile emigrant abundance; adult spawner abundance; index of juvenile abundance	Increased juvenile and adult abundance, distribution, and survival
Aquatic Objective 10A: Starting in critical habitat areas, reduce instream sedimentation to levels meeting applicable water quality standards and measures, with an established upward trend in the number of stream miles meeting such criterion by 2019	Riparian management Upland management Access management Rehabilitate floodplain connectivity and riparian function Treat legacy effects from mining-related sedimentation	Physical habitat; turbidity; macroinvertebrate assemblage; fish & amphibian assemblage; relative reproductive success; recruit/spawner (smolt per female or redd); index of spawner abundance; juvenile freshwater survival;	Increased egg:parr survival and increased juvenile condition
	Mimic the shape and timing of the natural hydrograph so as to ensure the proper transport and deposition of sediment	Instream flow; physical habitat; stream network; passage barriers/diversions; water temperature	Increased juvenile and adult abundance, distribution, and survival

Appendix Table A-2. Continued.

Objectives	Strategies	Key Performance Measures	Biological Outcome
Aquatic Objective 11A. Reduce concentrations of non-organic chemicals to levels consistent with IDEQ beneficial use criteria	Clean up and stabilize (through planting) unconsolidated tailings piles at active, inactive, and orphan sites Implement mitigation approaches such as slope recontouring, drainage rerouting, or export of waste material	Chemical water quality; adult spawner distribution; juvenile rearing distribution; adult spawner abundance physical habitat; water temperature; macroinvertebrate assemblage; fish and amphibian assemblage	Increased juvenile and adult salmonid survival, abundance, and distribution
Aquatic Objective 12A: Rehabilitate connectivity where it will benefit native fish populations, with emphasis on bull trout.	Reconnect waterways	Passage; barriers/diversions; stream network; juvenile rearing distribution; adult spawner distribution; spawner abundance	Increased abundance, survival, and distribution
Aquatic Objective 12B. Implement fish screening in tributaries after dewatering and passage issues are resolved	Increase instream flows through irrigation improvement projects. Develop experimental screen designs to be used in tributary screening (i.e., bull trout screens, resident fish screens, etc.)	Passage; barriers/diversions; stream network; juvenile rearing distribution; adult spawner distribution; spawner abundance	Increased abundance, survival, and distribution
Upper Salmon Watershed			
Aquatic Objective 13A: Mimic the shape and timing of the natural hydrograph in the mainstem Salmon (from the East Fork confluence to the headwaters)	Modify [diversions] operations	Instream flow; physical habitat; stream network; passage barriers/diversions; water temperature	Increased juvenile and adult abundance, distribution, and survival
Aquatic Objective 14A: Reduce potential losses of fishes that enter screened irrigation complexes	Structural Fixes Improve water conveyance systems and put water back into the channel Permanently secure water through either transactions or a water bank program	Instream flow; passage; barriers/diversions; stream network; juvenile rearing distribution	Reduction in salmonid mortality rates
Aquatic Objective 14B: Improve connectivity of tributaries that are currently intercepted by irrigation complexes	Structural Fixes Improve water conveyance systems and put water back into the channel	Instream flow; passage; barriers/diversions; stream network; juvenile rearing distribution	Reduction in salmonid mortality rates

Appendix Table A-2. Continued.

Objectives	Strategies	Key Performance Measures	Biological Outcome
Aquatic Objective 17C: Improve floodplain connectivity and access to side channel habitat to help offset losses of pool habitat	Control livestock access to encourage establishment of mature riparian vegetation Conduct land acquisitions and riparian conservation easements where possible	Juvenile rearing distribution; physical habitat; stream network; fish and amphibian assemblage	Improved overwintering and summer rearing survival
Aquatic Objective 18A: Rehabilitate water quality in affected reaches to conditions suitable to support designated beneficial use criteria	Build a wastewater treatment facility at the Grouse Creek mine to treat the tailing pond water and potentially contaminated groundwater	Chemical water quality; adult spawner distribution; juvenile rearing distribution; adult spawner abundance physical habitat; water temperature; macroinvertebrate assemblage; fish and amphibian assemblage	Increased juvenile and adult salmonid survival, abundance, and distribution
Aquatic Objective 18B. Reconnect the mainstem Yankee Fork with adjoining floodplain area	18B2. Reconstruct the floodplain and channel to historic conditions. This will involve restoring natural hydrologic processes including energy dissipation, deposition, etc.	Juvenile rearing distribution; physical habitat; stream network; fish and amphibian assemblage	Improved overwintering and summer rearing survival
Aquatic Objective 19A: In the next 10 years, reduce and prevent impacts of brook trout x bull trout interaction	Continue brook trout eradication efforts Target brook trout for harvest Prevent spread	Index of juvenile abundance; condition of juveniles; genetic diversity	Reduced competition, predation, and hybridization
Aquatic Objective 28A: Within the next ten years (by 2014) improve connectivity of at least half of all tributaries that are currently considered to be disconnected from the mainstem Salmon (upstream of the Yankee Fork) due to water diversions	Install fish-friendly diversions Install fish-friendly road crossings	Adult spawner distribution; juvenile rearing distribution; adult spawner abundance physical habitat; water temperature; macroinvertebrate assemblage; fish and amphibian assemblage	Increased juvenile and adult salmonid survival, abundance, and distribution

Appendix Table A-2. Continued.

Objectives	Strategies	Key Performance Measures	Biological Outcome
Middle Salmon – Panther Watershed			
Aquatic Objective 41A: Rehabilitate natural hydrographs in key anadromous and resident tributaries to ensure for adequate base flows, channel-maintaining peak flows, and normal flow timing	Manipulation of consumptive uses	Instream flow; physical habitat; stream network; passage barriers/diversions; water temperature	Increased juvenile and adult abundance, distribution, and survival

APPENDIX B

STREAMS IN THE UPPER SALMON AND MIDDLE SALMON-PANTHER WATERSHEDS CONSIDERED PRIORITY I

Appendix Table B-1. Streams in the Upper Salmon and Middle Salmon – Panther watersheds considered "Priority I" (biological factors only) by the Upper Salmon Basin Watershed Project Technical Team.

Watershed, area	Stream	Reach	Benefit:Cost
Upper Salmon			
Pahsimeroi River to East Fork Salmon River	Morgan Creek		High
	Challis Creek		Medium
	Mainstem Salmon River	12 Mile	Medium
	Garden Creek		Medium
East Fork Salmon River to Yankee Fork	Mainstem Salmon River	East Fork to Headwaters	Medium
	Slate Creek		Medium
	Yankee Fork		Medium
Yankee Fork to Valley Creek	Valley Creek	Above Stanley Lake Creek	High
	Big Casino Creek		Medium
	Elk Creek		High
	Iron Creek		Medium
	Goat Creek		Medium
Valley Creek to Headwaters	4th of July Creek		High
	Mainstem Salmon River	Above Pole Creek	High
	Smiley Creek		Medium
	Huckleberry Creek		Medium
	Pole Creek		High
	Beaver Creek		Medium
Middle Salmon - Panther			
Middle Fork to North Fork Salmon River	Squaw Creek		High
	Spring Creek		High
	Boulder Creek		High
	Indian Creek		High
	Owl Creek		Medium
	Panther Creek	Above Blackbird	High
	Pine Creek		Medium
	Moose Creek		Medium
	Panther Creek	Below Blackbird	Medium
	Colson Creek		High
North Fork Salmon River to Pahsimeroi River	Carmen Creek		High
	4th of July Creek		Medium
	Hat Creek		High

Appendix Table B-1. Continued

Watershed, area	Stream	Reach	Benefit:Cost
	Iron Creek		Medium
	Twelvemile Creek		High
	Tower Creek		Medium
North Fork Salmon River	Pierce Creek		High
	Mainstem North Fork Salmon River		Medium
	Dahlonega Creek		Medium
	Hughes Creek		Medium

APPENDIX C

OBJECTIVES FROM NATIONAL FOREST AND BUREAU OF LAND MANAGEMENT PLANS POTENTIALLY ADDRESSED BY THE ENDANGERED SPECIES ACT – HABITAT RESTORATION PROJECT.

Sawtooth National Forest Plan – (Summarized from Management Direction - Chapter III)

A.Smiley Creek Management Prescription Category

1.Resource area *soil water riparian and aquatic resources*

- ✓Objective 0248 - reduce road- and grazing-related sediment delivery within southern and eastern drainages including Smiley Creek.

2.In *rangeland resources*

- ✓Objective 02142 - reduce grazing impact to soil, water, riparian, and aquatic resources though more intensive grazing management practices and emphasizes restoration within Smiley Creek.

3.In *lands and special uses*

- ✓Objective 02159 - assist designated communities of Sawtooth City (Smiley Creek) in the development, revision, and enforcement of ordinances that are at least as restrictive as the applicable standards of the Private Land Regulation, acquire non-conforming practices within comities only as a last resort to bring property into conformance with regulation, and rely primarily on local governing bodies to enforce regulations.

B.Slate Creek Management Prescription Category

1.Resource area *soil water riparian and aquatic resources*

- ✓Objective 0330 - reduce adverse grazing effects to fish habitat and water quality from livestock grazing within Slate Creek.
- ✓Objective 0332 - restore watershed and floodplain function; improve mesic and hydric plant communities and water quality; and reduce accelerated sediment by modifying portions of roads, trails, and mine sites in Slate Creek.
- ✓Objective 0335 - restore and manage floodplains and alluvial fans within the management area in recognition and anticipation of substantial flash floods and debris flows, remove or modify facilities that alter or prevent the natural spread and dissipation of such floods, with specific emphasis in Slate Creek.
- ✓Objective 0337 - to restore fish passage for Chinook salmon, steelhead trout, and bull trout by providing sufficient instream flows or modifying irrigation structures in Slate Creek.

C.Warm Springs Management Prescription Category

1.Soil, water, riparian and aquatic resources

- ✓Objective 0327 - reduce impacts to important bull trout habitat in Warm Springs subwatershed from livestock grazing.
- ✓Objective 0339 - provide for the genetic integrity of wild native steelhead, Chinook, bull trout and westslope cutthroat trout by maintaining and restoring connectivity between local populations.

2.Recreation resources

- ✓Objective 0365 - rehabilitate or physically barrier roads or routes that are closed to vehicle or ORV use. Barriers are to be rustic in design and appearance.

D.East Fork Salmon River Management Prescription Category

1.Soil, water, riparian and aquatic resources

- ✓Objective 0330 - reduce adverse grazing effects to fish habitat and water quality from livestock grazing within East Fork Salmon River.

- ✓Objective 0331 - maintain spawning and rearing during critical spawning and incubation periods.
- ✓Objective 0335 - restore and manage floodplains and alluvial fans within the management area in recognition and anticipation of substantial flash floods and debris flows, remove or modify facilities that alter or prevent the natural spread and dissipation of such floods, with specific emphasis in East Fork Salmon River.
- ✓Objective 0337 - restore fish passage for Chinook salmon, steelhead trout, and bull trout by providing sufficient instream flows or modifying irrigation structures in East Fork Salmon River.
- ✓Objective 0342 - initiate restoration of watershed conditions and fish habitat within the East Fork Salmon River to help strengthen the bull trout populations.
- ✓Objective 0343 - improve stream channel width/depth ratios, bank stability and water tables in riparian areas that are currently not functioning appropriately. Emphasize drainages in the East Fork Salmon River.

2.Vegetation

- ✓Objective 0347 - maintain and restore cottonwood regeneration and age class diversity in the East Fork Salmon River.
- ✓Objective 0349 - restore willow composition, structure and density, and hydric forbs and grasses in riparian areas in the East Fork Salmon River.

3.Recreation Resources

- ✓Objective 0363 d- reduce impacts to soil, water, riparian, and aquatic resources associated with off-road vehicle use along the East Fork Salmon River.
- ✓Objective 0365 - rehabilitate or physically barrier roads or routes that are closed to vehicle or ORV use. Barriers are to be rustic in design and appearance.

4.Rangeland Resources

- ✓Objective 03106 - maintain or restore soil, water aquatic, and recreation resources in the Upper East Fork drainages through improved management and adjustments to livestock grazing capacities as necessary.

E.Elk Creek Management Prescription Category

1.Soil, water, riparian and aquatic resources

- ✓Objective 0252 - reduce impacts to soil, water riparian and aquatic resource in dispersed recreation sites. Emphasize restoration activities in Elk Creek.

2.Recreation Resources

- ✓Objective 0275 - reduce impacts to soil, water, riparian and aquatic resources associated with off-road vehicle use in Elk Creek.

3.Lands & Special Use

- ✓Objective 02157 - use landowner cooperation, easements, withdrawals, right of way, purchases, or administrative action to restore or maintain natural and productive aquatic habitat conditions.

F.Beaver Creek Management Prescription Category

1.Soil, water, riparian and aquatic resources

- ✓Objective 0243 - remove human-caused migration barriers and resolve instream flow and habitat quality conflicts, primarily related to the numerous irrigation diversions to assist in the restoration of depressed populations and degraded fish habitat for list species. Work cooperatively, or assert existing fee title interest, with landowners to help achieve this objective on private lands.

- ✓Objective 0248 - reduce road and grazing related sediment delivery within southern and eastern drainages.

2.Lands & Special Use

- ✓Objective 02157 - use landowner cooperation, easements, withdrawals, right of way, purchases, or administrative action to restore or maintain natural and productive aquatic habitat conditions.

G.Upper Main Management Prescription Category

1.Soil, water, riparian and aquatic resources

- ✓Objective 0248 - reduce road and grazing related sediment delivery within southern and eastern drainages.
- ✓Objective 0250 - provide riparian woody and hydric vegetation composition, age class structure, and pattern that restores or maintains stream bank stability, low width/depth channel ratios, and provides for a properly functioning condition.
- ✓Objective 0254 - remove man-made fish migration barriers ad resolve instream flow conflicts, with emphasis on the eastern tributaries of the Salmon River.

2.Recreation Resources

- ✓Objective 0282 - rehabilitate or physically barrier roads or routes that closed to vehicle or ORV use. Barriers are to be rustic in design and appearance.

H.Basin Creek Management Prescription Category

1.Soil, water, riparian and aquatic resources

- ✓Objective 0248 - reduce road and grazing related sediment delivery within southern and eastern drainages.
- ✓Objective 0250 - provide riparian woody and hydric vegetation composition, age class structure, and pattern that restores or maintains stream bank stability, low width/depth channel ratios, and provides for a properly functioning condition.

Challis National Forest Plan (Summarized from Management Direction - Chapter IV)

A.Basin Creek Management Prescription

1)Fish & Wildlife Management Direction

- ✓Emphasize fisheries inventory to identify problem areas and future projects.
- ✓Emphasize fisheries habitat management in order to reduce sediment inputs to Basin Creek Habitat project on winter ranges will have high priority.

B.Yankee Fork Management Prescription

1)Fish & Wildlife Management Direction

- ✓Inventory wildlife habitat with emphasis on riparian meadow.
- ✓Inventory fish habitat with emphasis on identification of existing conflicts and future improvement opportunities.
- ✓Improve fish habitat through coordination with minerals and range.
- ✓Emphasize habitat improvement in order to reduce sediment input to Yankee Fork
- ✓Emphasize improving stream stability.

2)Lands Management Direction

- ✓Emphasize riparian area management and resolution of elk/cattle conflicts.

3)Lands Management Direction

- ✓Pursue opportunities for land acquisition within the area.

- ✓Lands Management Direction
- ✓Provide maintenance to improvement structures as needed.

C.East Fork Salmon River Management Prescription

1)Fish & Wildlife Management Direction

- ✓Maintain or improve quality of wet meadows, springs.
- ✓Habitat improvement projects will be aimed at improving streambanks rated in poor or better condition.
- ✓Emphasize habitat management to improve stream bank cover and stability.

2)Lands Management Direction

- ✓Provide maintenance to improvement structures as needed.

Salmon National Forest Plan (Summarized from Management Direction - Chapter IV)

Management Activity
Wildlife and Fish Resource Management

General Direction Statements
Where present. the following species are management indicator species (habitat requirements for each are listed):
Anadromous Fish (salmon and steelhead) – Stream habitats with adequate sediment free spawning gravels, and channels free of migration blocks, ample Instream flow and cover.
Trout (all species combined) – Cool, clean sediment-free stream and lake habitats, ample instream flow and streamside cover

Provide National Forest portion of the habitat needed to meet regional wildlife and fish management objectives

Standards and Guidelines
Habitat for each vertebrate wildlife species on the Forest will be managed to insure viable or target populations.

Contribute to the local and State economics by providing favorable habitat for socially and economically important fish and wildlife species.

Place emphasis on improving key ecosystems including but not limited to: riparian. aspen. aquatic. snag and old growth.

Manage and provide habitat for recovery of endangered and threatened species as specified in the Species Management Plan for the Salmon National Forest.

Manage waters capable of supporting self-sustaining trout populations to provide for those populations.

Manage anadromous fish habitat to supply and maintain 90 percent or more of its inherent smolt production capability.

Challis Resource Management Plan (BLM)

Goal 1: Ensure a natural abundance and diversity of aquatic habitats to support fisheries resources in a healthy and productive condition, to provide the continued opportunity for nonconsumptive and consumptive uses, and to ensure the viability of these species.

Rationale: The BLM is responsible for management of fish habitat on the Challis Resource Area's public lands to ensure that self-sustaining, healthy populations can be maintained. The Salmon BLM's *Fish and Wildlife 2000 Plan* (1993) provides guidance for management of fish habitat.

Management Decisions Common to All Fisheries Resources:

1. The following would be priority fish species (see *Glossary*, p. 157):
Anadromous Fish Species: Chinook Salmon Sockeye Salmon Steelhead Rainbow Trout *(Oncorhynchus tshawytscha) (Oncorhynchus nerka) (Oncorhynchus mykiss)* Resident Fish Species: Bull Trout Westslope Cutthroat Trout Brook Trout Rainbow Trout Mountain Whitefish *(Salvelinus confluentus) (Oncorhynchus clarki lewisii) (Salvelinus jontinalis) (Oncorhynchus mykiss) (Prosopium williamsoni)*

2.Define crucial habitats for priority fish species to include migration, spawning, rearing, and overwintering habitats.

3.Identify and monitor crucial habitats and determine distribution of priority fish species within the RA, with special emphasis on drainages within watersheds currently sustaining special status fish populations.

4.(a) For all fish-bearing streams (see *Map* 2: *Anadromous and Resident Fisheries Occupied Habitat)*, develop management strategies and objectives through the ID team process, to maintain satisfactory condition aquatic and riparian habitats and improve 90% of nonfunctional and functional-at-risk condition aquatic and riparian habitats within riparian areas defined in *Attachment* 4, pp. 83-84 (also see *Attachment 1: Riparian-Wetland Area Function Classification*, pp. 79-80).

(b) Develop strategies, through the ID team process, to meet or exceed the minimum riparian and aquatic habitat conditions described in *Attachment* 15, p. 127.

5. Authorize population enhancement activities for priority fish species through introduction of hatchery-reared fish, only when it can be documented that the population levels and the genetic integrity of endemic wild anadromous stocks or other resident fish populations will not be adversely impacted.

6.Provide opportunity and support to the IDFG, NMFS, USFWS, USFS, BPA, appropriate Federally recognized tribes, and other partners for the cooperative management of anadromous and resident fish resources in order to promote fisheries opportunities on BLMadministered public lands, while ensuring protection of priority salmonid fish resources.

7.Maintain a "no net loss" of salmon, steelhead trout, and bull trout habitat by limiting land exchanges of salmon, steelhead trout, and bull trout habitat to like habitat of equal or greater values. Riparian, wetland, and floodplain habitat could be exchanged, but only for areas containing riparian, wetland, or floodplain habitat with equal or greater values for recreation, access, wildlife, fisheries, and biodiversity. Such exchanges would have to balance similar resource values for each individual exchange, although both tracts of land would not have to be within the boundaries of the Challis Resource Area. Where possible, land exchanges would be made to facilitate recovery of threatened or endangered species.

8.Maintain the existing riparian habitat protective exclosures on Burnt Creek, Herd Creek, Road Creek, and Corral Basin Creek as reference areas to monitor and evaluate aquatic habitat conditions.

9.Where feasible on BLM public lands, within 7 years eliminate or modify natural or artificial barriers to upstream and downstream movement of priority fish species, where it will not impact other authorized or licensed uses (ditches or diversions).

10.In cooperation with the IDFG, seek adequate streamflows for channel maintenance and to sustain riparian habitat and priority fish populations on BLM-administered streams (see Minimum Streamflow, Goal 1, p. 45).

11. On a case-by-case basis, coordinate with appropriate Federally recognized tribes on fisheries management actions that may affect tribal treaty rights. Give priority consideration in the development of activity plans and improvement projects to provide benefits to fish species traditionally used for subsistence and non-subsistence purposes by Native American groups under treaty.

APPENDIX D

MONITORING AND EVALUATION METHODS AND ANALYSES CONDUCTED AS PART OF THE SALMON RIVER HABITAT ENHANCEMENT PROJECT

Fishery

Summer densities of salmonids by species, age class for some species, and summer population size of Age 0+ Chinook salmon are estimated by snorkeling in riffle-pool sites. Snorkel sampling is conducted when the minimum criteria of Thurow (1994) for depth, water temperature, and visibility are met or exceeded. Between one and three observers, depending on stream width and visibility, count numbers of each species and estimate the length of each fish to the nearest 10 mm while moving upstream through the site. Chinook salmon and steelhead ages are classified by length. Chinook salmon are divided into two age groups: Age 0+ (< 100 mm) and Age 1+ (> 100 mm). Steelhead are categorized as Age 0+ (< 80 mm), Age 1+ (81 - 160 mm) and Age 2+ (161 - 230 mm). Ages 1+ and 2+ steelhead are combined for analysis purposes. *O. mykiss* larger than 230 mm are considered resident rainbow trout.
Three ground counts of redds are conducted during late summer and early fall by Shoshone-Bannock Tribal personnel. Personnel walked the streamside wearing glasses with polarized lenses to increase the visibility of redds. Carcasses encountered were measured to the nearest cm (fork length), and lengths of live adult Chinook salmon observed were estimated to the nearest 5 cm (fork length). Crew members were trained to estimate lengths, and calibration was performed by first estimating the lengths of carcasses before actual measurements were taken.

Macroinvertebrates

During periodic years in the fall, five quantitative Hess samples (m^2 sample area with a 250µm-mesh capture net) per strata are collected from riffle/run habitats stratified at 50-m intervals and preserved in ethanol. The samples are processed further as follows: In the laboratory each macroinvertebrate sample is hand-sorted using a fixed count method with sub-sampling if necessary (Barbour and Gerritsen 1996). A 500 count and "big pick" (large specimens that are difficult to sub-sample that are analyzed separately from the rest of the sample) is performed and the results of both processes were combined. The invertebrates are identified to the lowest feasible taxonomic level using standard identification keys (Merritt and Cummins 1996, and others).

Habitat Inventory

A physical habitat inventory is completed during late summer and fall using a modified version of the (Northern/Intermountain Regions) fish and fish habitat standard inventory (Overton et al. 1997). The inventory defines the structure (pool/riffle, forming features), pattern (sequence and spacing) and dimensions (length, width, depth, area, volume, and so forth) of fish habitat; describes species composition, distribution, and relative abundance of salmonid species; and facilitates the calculation of summary statistics for habitat descriptors. Habitat units (main channel, side channel, and adjacent) are numbered consecutively moving upstream for the entire length of each stratum (Overton et al. 1997). Intervals for detailed measurements are determined in advance in order to attain the recommended sample sizes of Overton et al. (1997). At each habitat type where detailed measurements are collected, left and right bank lengths, left and right bank percent undercut, left and right bank percent stability, left and right bank channel shape, and left and right bank riparian cover are estimated; numbers of large woody debris singles, aggregates, and root wads were counted.

Stream Flow

Discharge measurements (flow; m^3/s) are taken at five locations (transects) per system in order to develop stage-discharge relationships for a staff gauges. Discharge is measured using the methods of Davis et al. (2004). Staff height (ft-tenths) is recorded on the same day as discharge is measured. The data is collected over a wide range of flows to incorporate as much of the fluctuation of discharge throughout a year as possible.

Suspended Sediment

Suspended sediment concentration (mg/l) and turbidity (nephelometric turbidity units, NTU) are collected taken concurrently to examine the relationship between the two. Three water samples are taken during the spring and summer at sites above and below enhancement areas. The Equal-Width-Increment Method (EWI) as described in the Field Methods for Measurement of Fluvial Sediment (Edwards and Glysson revised from Techniques of Water-Resource Investigation of the U.S. Geological Survey Book 3, Chapter C2 1970) is used collect suspended sediment samples. With EWI, a suspended sediment sample is obtained with a sample volume proportional to the amount of flow at each of several equally spaced verticals of a cross-section. The verticals are collected with a EPA/USGS approved sample bottle and are collected at a previously calculated transit rate based on discharge (Edwards and Gleason 1970). Samples are then frozen and transported to the laboratory for analysis of suspended sediment concentration (mg/l) and turbidity.

Surface Substrate

Percent surface fine sediment is estimated using a modified version of the pebble count procedure described by Bevenger and King (1995) in which seven low gradient riffles and scour pool tails, systematically spaced, are sampled. The procedure differed from that described by Bevenger and King (1995) in that only suitable spawning habitat (low gradient riffles and scour pool tails) is sampled, and particles are selected by walking heel-to-toe and picking rocks from beneath our toes every one or two steps instead of at seven-foot intervals. The procedure was similar to that used by Saffel et al. (1996) in post-enhancement sampling in that a minimum of 100 particles were sampled along three to six transects across a riffle/pool tail. The procedure is different from that of Konopacky et al. (1986) for pre-enhancement sampling which measured particles at 25 equidistant points along three transects perpendicular to flow, resulting in a total of 75 particles sampled along three transects in a riffle. Particles are measured to the nearest one mm along the longest axis with a ruler and categorized according to the size classes (Wentworth scale) described by Platts et al. (1983).

Subsurface Substrate

The percent subsurface fines < 6.3 mm is estimated in 2000 using a McNeil core sampler (McNeil and Ahnell 1964). Three core samples are taken in low gradient riffles and scour pool tails (sites suitable for salmonid spawning) at seven systematically-spaced sites in (n = 21 per stratum). In previous years, the number of core samples taken per riffle has changed periodically from two to three depending on the amount of sampling time available in a given year. In all

years, samples are/were wet-sieved in the field using sieve sizes of 75.0, 25.4, 9.5, 6.3, 4.75, 0.85, and 0.15 mm. The amount of sediment retained in each sieve is measured as volume of water displaced. Proportions of each size class are calculated by dividing the total volume of sediment less than the sieve size by the total volume of the sediment sampled, and proportions are corrected according to Shirazi and Sheim (1979) to represent dry volumes. Subsurface sediment is measured before and after enhancement. The 6.3 mm size class is used for analysis purposes as a complete breakdown of the data into the size classes listed above was not possible for samples collected in earlier years when this method was used.

Water Temperature

Stream temperatures are measured separately within each Stratum. Hobo-Temp™ or Optic StowAway™ temperature loggers are secured to rebar stakes driven into the streambed in well-mixed areas where the influence of sunlight was minimal. Temperature loggers are programmed to record stream temperatures every two hours.

Analyze/Interpret Data

Fishery

Total abundance of Age 0+ Chinook salmon is estimated based on calculations for stratified random sampling described by Thompson (1992). Abundance estimates (T) are determined for each stratum (h) as

$$T_h = N_h y_h$$

where N_h is the total number of sample units in stratum h and y_h is the sample mean for stratum h. Estimates (fish/100 m²) for each site are calculated by dividing the number of fish observed by the area of the site and multiplying by 100. The mean of the seven sites is used as the sample mean. The total number of sample units per stratum is calculated by dividing the total length of each stratum by 100. The estimate of total abundance (T_{st}) is then calculated as the sum of the strata estimates

$$T_{st} = \sum_{h=1}^{L} T_h$$

A 90% confidence interval (CI) is calculated for each year as

$$T_{st} \pm t_{(\alpha,df)} \sqrt{var(T_{st})}$$

Degrees of freedom (df) for the CI ire calculated using the Satterthwaite (1946) approximation where

$$df = (\sum_{h=1}^{L} a_h s_h^{\,2})^2 / [\sum_{h=1}^{L} (a_h s_h^{\,2})^2 / (n_h - 1)]$$

where $a_h = N_h(N_h - n_h)/n_h$, n_h is the number of sites sampled in stratum h, and s_h^2 is the sample variance from stratum h. The finite population corrected estimate of the variance for the overall abundance estimate ($var(T_{st})$) is calculated as

$$var(T_{st}) = \sum_{h=1}^{L} N_h(N_h - n_h)\frac{s_h^2}{n_h}$$

Also reported for each year are parr/redd estimates, number of redds, and percent egg-to-parr production estimates. The number of eggs is estimated based on assumptions of one female per redd (Bjornn 1978) and 5,594 eggs per female (Kiefer et al. 1992). Linear regression is used to relate Age 0+ Chinook salmon parr numbers to the number of redds observed the previous year, and to relate numbers of redds observed to numbers of Age 0+ Chinook salmon parr. Mean density (number of fish/100 m^2) by stratum for each species and age group is estimated by averaging the density of fish at each of the seven sites per stratum. Density for each species and age group is calculated by dividing the number of fish observed by the area of the site and multiplying by 100. Area is determined by measuring the length of the site along the thalweg and the width at three or more points along the length.

Macroinvertebrates

Macroinvertebrate taxa are entered into a spreadsheet and separated by abundance, richness, Ephemeroptera, Plecoptera, and Tricoptera (EPT) richness, dominant order (Elmidae, Ephemeroptera, Plecoptera, Tricoptera, Coleoptera, Diptera (D)) richness, % dominant taxon and order, % Miners, % EPT, % EPTD, % Predators, % Scrapers, % Shredders, % Collector/Gatherer, % Collector/Filterer, Simpsons (H'), Hilsenhof Biotic Index (HBI, Hilsenhof 1988), Fine Sediment Bioassessment Index (FSBI, Relyea et al. 2000), and Jaccards Coefficient (Rosenberg and Resh 1993). These community measures are then averaged for each strata and compared above and below enhancement areas with a t-test or ANOVA (SPSS 2003). Regression and Multivariate Analysis is used where relationships to physical or environmental variables are desirable (Pcord4 1999, SPSS 2003).

Impact Assessment

Density of non-anadromous salmonids and macroinvertebrate community measures are calculated to compare information before and after habitat enhancement activities. Non-anadromous salmonid species used in the analysis include mountain whitefish, brook trout, bull trout, westslope cutthroat trout, and resident rainbow trout (*O. mykiss* > 230 mm). By monitoring densities of non-anadromous fish, we hope to determine the impact of the habitat enhancement on resident salmonids until improvements in out-of-basin survival allow anadromous salmonid production to increase. Mean densities of non-anadromous fish are compared before and after habitat enhancement. Mean values for each year sampled within the before or after time period were treated as replicates, tested for normal distribution, and compared using a paired *t*-test (SPSS 2003). Results of tests are considered significant at $p < 0.10$.

Suspended sediment

Each of the three replicate water samples is analyzed for turbidity and suspended sediment concentration. Turbidity for each sample is estimated using a LaMotte Chemical®, Model 2008 turbidmeter. An average NTU value is calculated for each date and site. Negative NTU measurements are interpreted as zero. Suspended sediment concentration (mg/l) is measured by filtration (gravimetric analysis) using Whatman GF/F® 0.7 micron filters. To determine sediment concentration, the filters are pre-dried at 60EC for 20 minutes and then weighed; the water and sediment sample is filtered at 15 psi; and both filter and sediment are dried at 60EC for a minimum of 20 hours. Sediment concentration (mg/L) is calculated as the difference between the dried weight of the filter and sediment (mg) and the dried weight of the filter alone (mg) divided by the volume of water in the sample (L). An average suspended sediment concentration is calculated for each date and site. The relationship between suspended sediment concentration and turbidity is evaluated using simple linear regression. This relationship is useful for times when suspended sediment can only be determination by taking a turbidity measurement - a more cost-effective procedure.

Quantitative assessment of sediment contribution of the cut-off channel is performed by calculating percent change of sediment concentration between the above and below sites. Using percent change rather than actual sediment concentrations should alleviate the problem of differences in flow and sediment yield from year-to-year.

Subsurface sediment

Mean values for each year sampled within the pre- or post-enhancement period are treated as replicates and compared using a two-sample *t*-test (Stewart-Oaten et al. 1986) or a Mann-Whitney *U* test, depending on whether or not the samples met the assumptions for a *t*-test (equal variance, normal distribution). Results of tests are considered significant at $p \leq 0.10$. Percent surface fines ≤ 8 mm is used for analysis purposes in this report as opposed to the criteria of Overton et al. (*In press*) of ≤ 6 mm as breaking the data set at this point in the earlier years sampling (i.e., 1984 - 1995) was not possible. Percent surface fines ≤ 6 mm are also reported.

Temperatures

Temperatures are summarized and compared to local fish criteria (PACFISH, etc)

Sinuosity

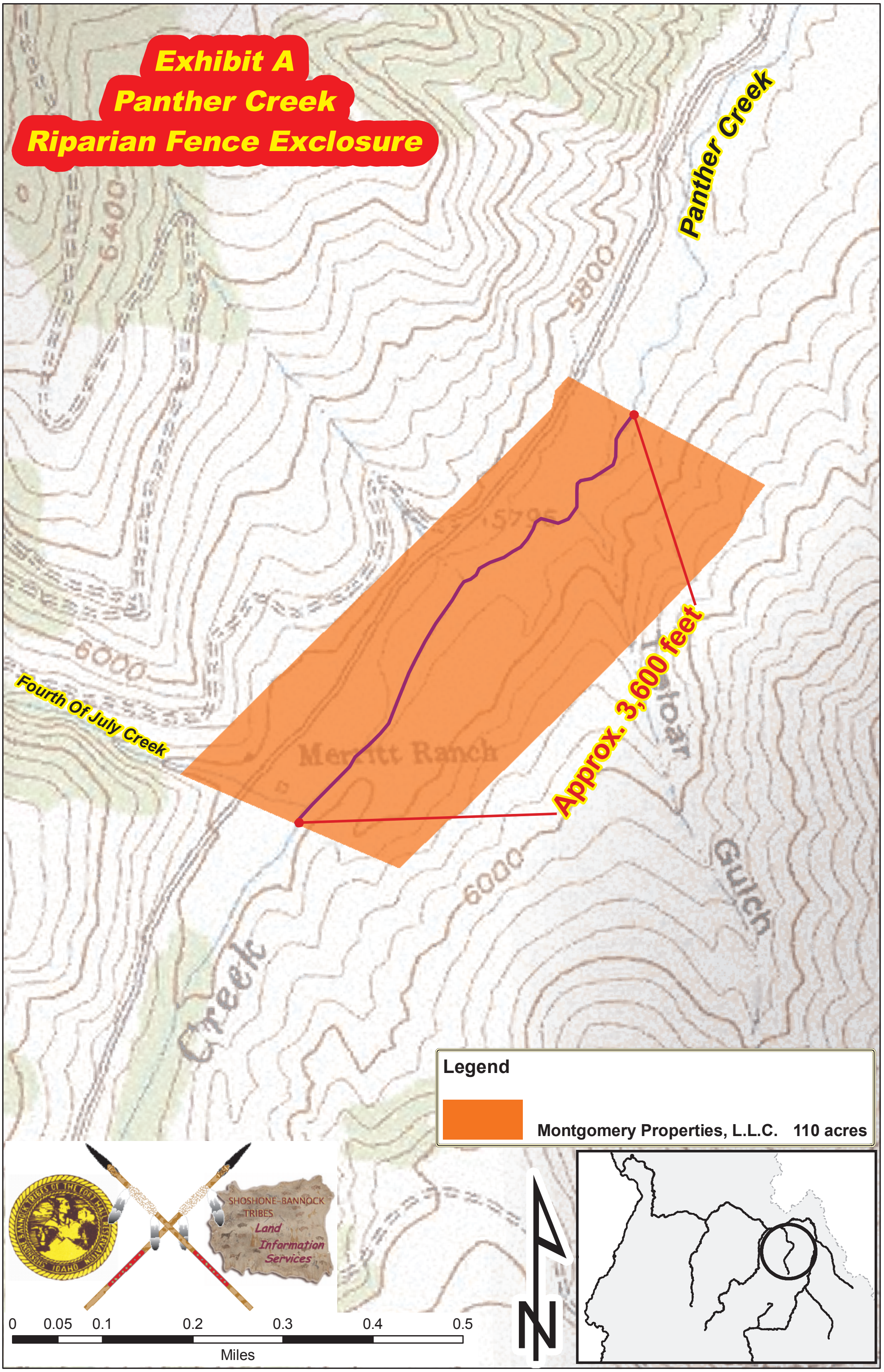
The ratio of stream length to valley length is digitized in GIS using aerial photography (Rosgen 1996).

(For detailed information on the references cited in this Appendix, please see http://www.cbfwa.org/solicitation/documents/199405000/199405000n.doc)

APPENDIX E

MAPS OF SPECIFIC LOCATIONS OF POTENTIAL PROJECTS

Exhibit A
Panther Creek
Riparian Fence Exclosure



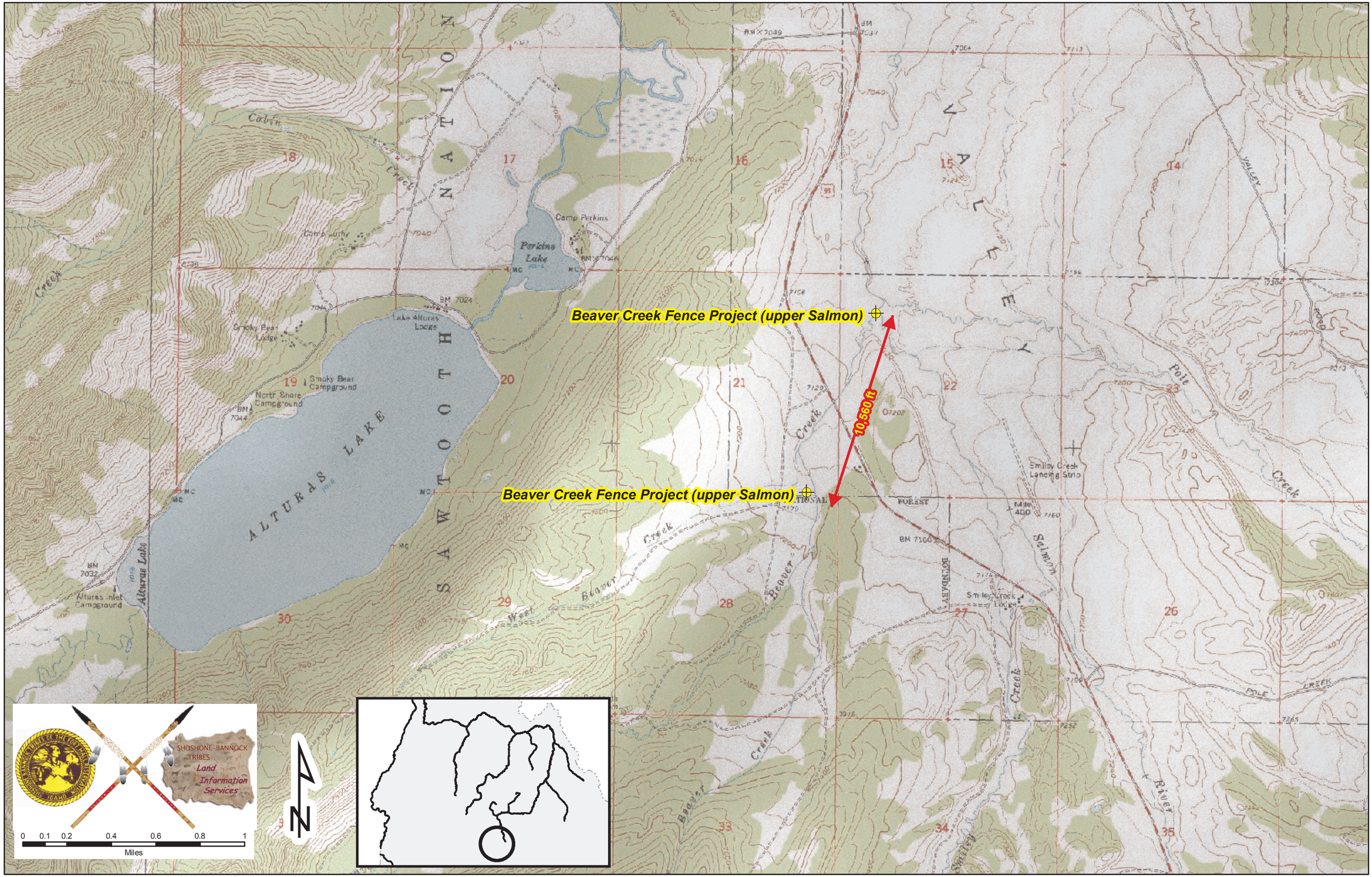
Appendix Figure E-1. Location of Panther Creek riparian fence exclosure on 110 acres of Montegomery Property, LLC. <<61>>

North Fork Hughes Creek Culvert

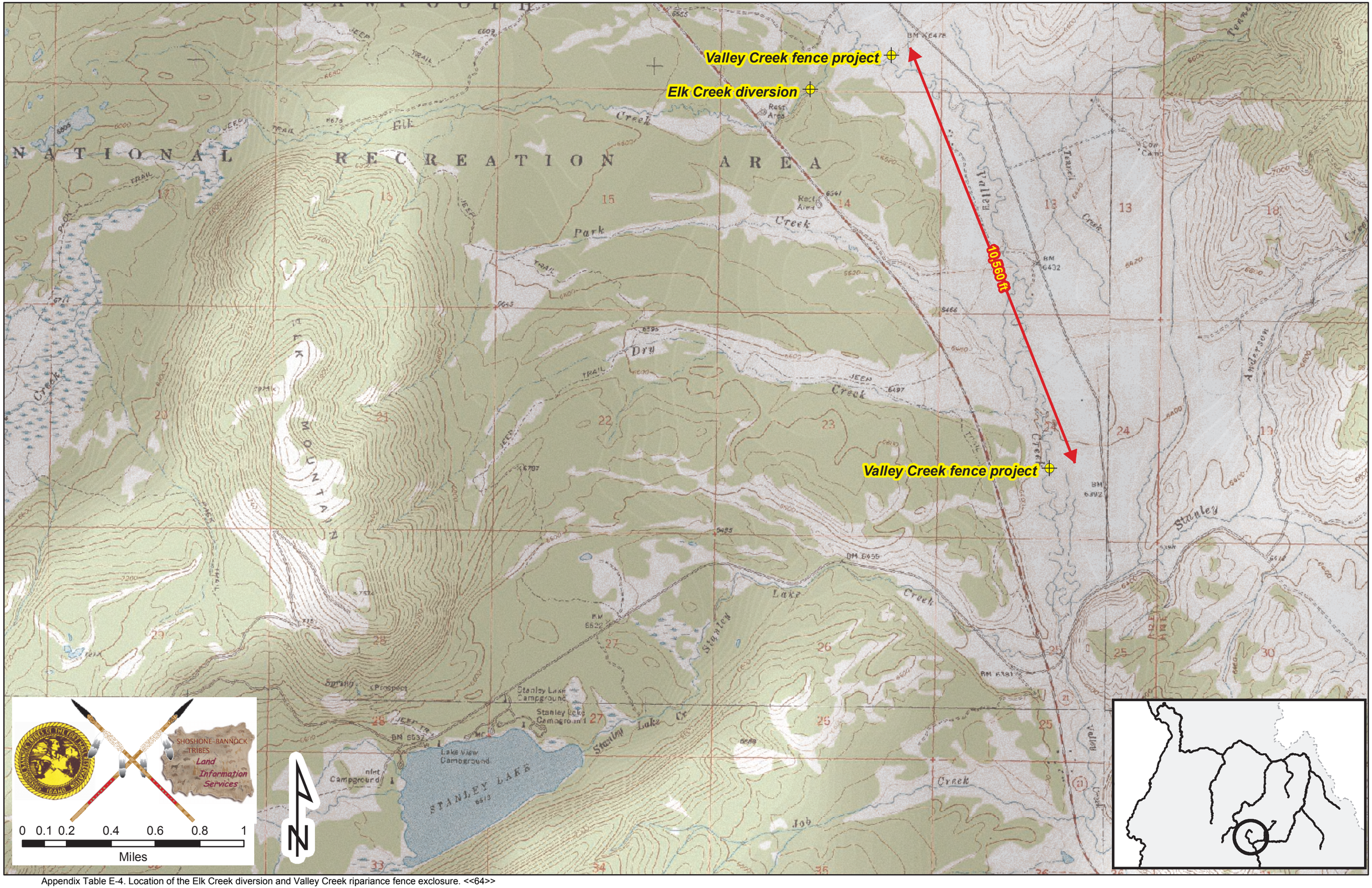
SHOSHONE-BANNOCK TRIBES
Land Information Services

0 0.1 0.2 0.4 0.6 0.8 1
Miles

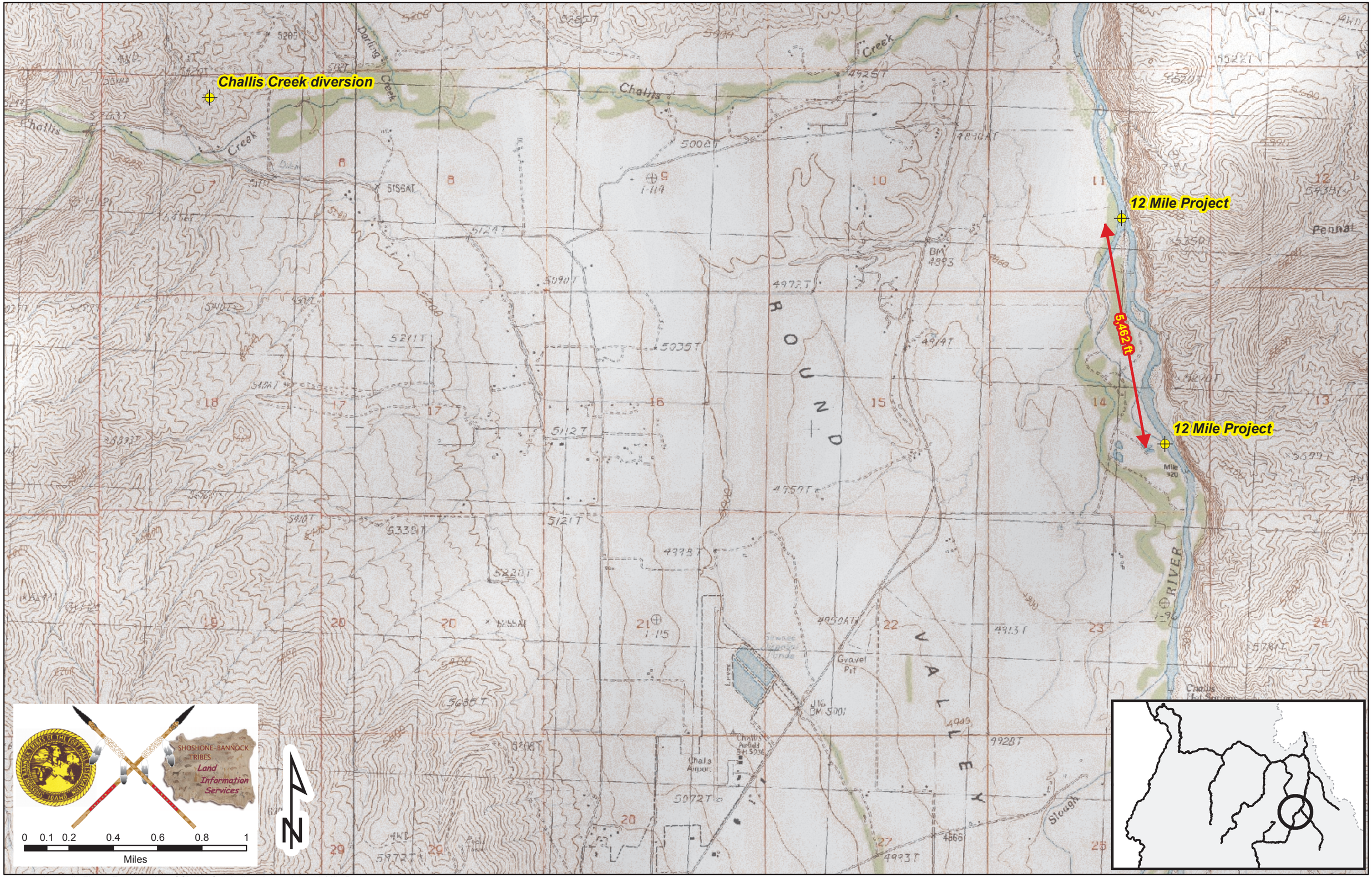
Appendix Figure E-2. Location of the North Fork Hughes Creek culvert replacement on USDA Forest Service. <<62>>



Appendix Figure E-3. Location of the Beaver Creek riparian fence exlcosure. <<63>>



Appendix Table E-4. Location of the Elk Creek diversion and Valley Creek ripariance fence exclosure. <<64>>



Appendix Figure E-5. Location of Challis Creek diversion and the 12-Mile Project.<<65>>