Yankee Fork Floodplain Restoration Project Implementation Plan 2008-2024

Project # 200205900- Yankee Fork Salmon River Dredge Tailings Restoration Project

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Executive Summery

The Yankee Fork Salmon River (YFSR) is located in Central Idaho and is one of the larger watersheds (190 mi^2) within the Upper Salmon River Basin. The river lies in the Salmon-Challis National Forest east of Stanley, Idaho. The Yankee Fork contributes to the Upper Salmon River with diverse habitats, the availability of low gradient stream channel reaches, aquatic productivity, and a remnant spawning and rearing population, this contributes to make the Yankee Fork an important site for Spring Chinook salmon, Steelhead and other native species within this system. The Tribes are especially concerned about the Spring Chinook run in the Yankee Fork Salmon River. There is a need to increase numbers of anadromous fish to promote recovery. The Yankee Fork Dredge reaches are in need of restoration for these endangered species to create spawning and rearing habitat.

Dredge mining in the early 1900's has severely altered ten kilometers of the stream, eliminating much of the natural meander pattern, associated instream habitat, and riparian vegetation and their functions. The existing stream-floodplain complex consists of unconsolidated and unvegetated dredge tailings that offer little habitat for both aquatic and terrestrial species. The historic floodplain has been severely altered and the Yankee Fork Salmon River can no longer access the floodplain causing an interruption of natural and nutritional fluxes. Therefore, it is important to this system, that the floodplain is restored back to near natural conditions.

The goal of the Yankee Fork Salmon River Floodplain Restoration Project (YFRP) is to restore natural river channel characteristics, floodplain function, hydraulic and sediment regimes, and aquatic habitat within the dredge reach of the YFSR, to create a system that is self sustaining. Restoring the river to natural conditions will create a healthy, functioning riparian community that will help benefit the enlisted spring Chinook salmon, Steelhead salmon, other native fishes and wildlife, also to help restore cultural significance, within this system by improving habitat conditions. While the expected outcomes include benefits to anadromous salmonids, especially Spring Chinook salmon, through a healthy, functioning floodplain and riparian community, and increase in spawning and rearing habitat for salmonids, also create in stream habitat diversity and upslope stability. The project does not plan on removing all the dredge tailings within the YFSR, due to the large volume of rock piles and the high expense of the removal; therefore, the YFRP will concentrate on the dredge tailing along the river. By removing the dredge tailings along the river it will have access to its floodplain. And the YFRP would like to reconnect Jerry's Creek and Silver Creek, two tributaries that have not accessed the river since 1950's. Included in the plans are to also reconnect ponds to the river, there is ground water within these ponds that would help benefit the river with cooler waters.

Vision

Restoring the Yankee Fork Salmon River, historically a major Chinook salmon producer, to natural conditions will contribute to the reestablishment of a healthy functioning riparian community. It will provide numerous benefits to Chinook salmon, Steelhead, other native fishes, wildlife, and the riparian vegetation, all of which will benefit and enhance the Shoshone Bannock Tribes unique traditions and culture, and Treaty rights. This Restoration Project is in accordance with the Tribes Snake River Policy, which provides "*the 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....*"

Snake River Spring Chinook salmon have used the Yankee Fork and its tributaries for spawning and rearing long before European settlements entered the Upper Salmon basin watershed. The Shoshone Bannock and other tribes used the Salmon River and the Yankee Fork Salmon River to fish and hunt, historically, currently, and hopefully in the future. Historically, Native Americans uses the YFSR are the Bannock; every summer the Bannock would travel to the Yankee Fork Salmon River and camp at the mouth of Ramey Creek to harvest Chinook salmon. The Yankee Fork Salmon River is an exclusive and common use area for the Shoshone Bannock and other Tribes. To help keep the fish run adequate for future uses the YFRP plans to complete various tasks to help restore the Yankee Fork dredge reaches.

Continue baseline data for an additional two years

Plan on gathering sediment transport data and continue working the discharge rating curve. These data points and other data collected from reference sites will help determine what rehabilitation techniques will be the most successful in the long term. A ground survey of the existing ponds will be conducted to fill in the missing data gaps. Water quality data will also be collected throughout the two year period of baseline collection and beyond if needed.

Environmental site characterization with the dredge reaches of the Yankee Fork

The site characterization will help determine the extent of the contaminants left by the dredging in the early 1900's. As part of the restoration planning process a environmental site characterization will be complete at various locations. The results of the site characterization will determine if the system should be disturbed and where or how much containment are within the dredge tailings. It would be important to complete the site characterization within the next two years.

Working with external stakeholders, Simplot and technical team throughout the projects duration

Keeping everyone involved from the beginning will help the projects success of restoration. Will continue working with Simplot to secure an easement

throughout the dredge areas of the Yankee Fork Salmon River. The Tribes will involve Simplot throughout the projects duration to help with restoration. Summer 2008, a Technical Advisory Team will be formed to help determine what will best fit the restoration project and ensure the progress of the planning, restoration, and monitoring and evaluation phases. This team will consist of a geomorphologist, hydrologist, fish biologist, ecologist, botanist, and an engineer.

Comparison between fish abundance and food availability

The Idaho State University Ecology Department is nearly complete with the M& E plan and plans to be finished spring 2009 with the preliminary data. Along with the M & E plan there will be a study on comparing the fish abundance to food availability within the Yankee Fork Dredge Reaches. These studies will be complete in June 2009. This study will help determine if there is enough food available within the dredge portions of the Yankee Fork for Chinook salmon and other aquatic species. The work will be completed by the current graduate student with the Idaho State Universities Ecology Department.

Planning process to select the best fit pilot project, analyze the baseline data to determine what would be the most successful restoration plan and Permitting process

The pilot project will be selected, the permitting process will begin and then construction in 2010 with two years to monitor and evaluate once construction is complete. If success is determined for the pilot project, the YFRP will produce a final restoration plan for the dredge area. Once the engineer designs are complete the permitting process will begin for the remainder of six miles. The project will be done in section miles and constructed each year starting in 2012-2015. If there is not sufficient funding each year, the project will then do smaller sections each year, adding another 3-6 years. Once each section is complete monitoring and evaluation will begin.

Monitoring and Evaluation will begin once construction is complete at each section

M & E will follow the Idaho State University Ecology Departments monitoring and evaluation plan. This M & E plan will be implemented once construction is complete and evaluated over several year spans to determine the success of the restoration plan. This will take several years due to the life cycle of the Chinook salmon of 3-5 years cycles.

Vegetative planting where needed and minor reconstruction of structures

There will be vegetative planting within structures and along the floodplain. These plantings will be native plants that will be used to secure structures and to jumpstart the vegetative process within a floodplain.

The YFRP will include within the proposal for minor reconstruction/adjustments if there is high water before the stabilization is complete. These minor adjustments will be due to flooding and/or flash floods before the grass or vegetation has grown in for stabilization.

Finalize the success of the project; the M & E will be analyzed and aerial photography

Once M&E is complete, the data will be analyzed to determine success of the program, also with observations of fish using the constructed sites throughout the dredge reaches the YFRP can be used as an example for future dredge tailings projects. Aerial photography will be taken at the end of the project to see the before and after effects of restoration.

History/Background

This project has been first proposed in the late 1980's and has gotten little attention, due to the large scale restoration action and the amount of money it will cost. The project does not plan on removing all the dredge tailings within the YFSR, due to the large volume of rock piles and the high expense of the removal; therefore, the YFRP will concentrate on the dredge tailing along the river. By removing the dredge tailings along the river it will have access to its floodplain and since we are not removing all the dredge tailings within the system, the cost will be substantially less.

The question that is continually arising "how many fish will this bring back if restored?" and nobody can answer this question accurately, because nobody knows exactly. If the system is restored, fish will use it, but it will not bring back fish directly. However, it will help indirectly by creating stream habitat, rearing and spawning refuge for the Chinook salmon and other native fishes. There are other obstacles and/or barriers that fish are facing: dams, commercial fishing, ocean conditions, etc. Until these obstacles are attended to, the fish numbers will remain low and have a lower probability of returning. A further but grander complication for Snake River Chinook salmon and steelhead populations is the direct mortality during outmigration and returns associated with the operation of dams on the Columbia River and the lower Snake River. These complications are compounded by habitat degradation, introduction of exotics, hatchery supplementation, and instream flow diversions throughout the basin and combined these pressures on Snake River Chinook populations have led to basin wide decreases in Chinook stocks. Due to the decline of this species, Snake River spring/summer salmon were listed under the Endangered Species Act as threatened on April 22, 1992 (57 FR 42529), and the YFSR was classified as critical habitat on 28 December 1993 (58 FR 68543). Until migration problems are resolved, the resiliency and persistence of remaining salmon stocks will be dependent on the quality and diversity of stream habitats and restoration of historic habitats that have been destroyed from human impact. While the remaining populations of Chinook salmon and their life history stages and habitats are critical to the persistence and recovery. Fish returning will increase fish numbers to the mountain regions. With an abundance of fish returning to the Upper Salmon Basin and the restoration of the Yankee Fork Salmon River will enable these fish rearing and spawning areas within the Yankee Fork system.

The project plans to restore physical processes that create and maintain a self-sustaining system. Based upon a comparison of survey results from 2000 and 2007 showed little

change in bed elevation, it appears sediment and LWD currently delivered to the Yankee Fork are routed through the Yankee Fork and into the mainstem Salmon River. As a result, the quantity, quality, and duration of spawning and rearing habitat in the Yankee Fork is compromised, and material delivered to the Salmon River can aggravate flooding problems when it is deposited in flatter reaches near the downstream communities of Challis and Salmon. The restoration design will incorporate actions to reduce shear stress in the main Yankee Fork channel and increase the potential for depositing and storing substrate and LWD, thereby improving habitat complexity in the Yankee Fork and potentially helping alleviate downstream flooding concerns.

Accomplishments

2007

With financial and leadership assistance from BPA in FY 2007, the Shoshone-Bannock Tribes made outstanding progress on the Yankee Fork Floodplain Restoration Project over the past 12 months. With BPA's support, the Tribes actively engaged a diverse group of external stakeholders, acquired key data, and contracted for completion of a detailed conceptual design report. BPA's support also allowed the Tribes to continue working closely with the Stream Ecology Center at Idaho State University as part of the on-going monitoring of the dredge reach and reference reaches. Together these resources will help the Tribes and BPA answer important questions raised by the ISRP and others over the past decade regarding the Yankee Fork project. The ISRP and BPA have asked the Yankee Fork Restoration Project to come up with some answers in 2008 in order to continue funding for the project. The program has come up with an implementation plan for the Yankee Fork Salmon River Dredge Tailings and will be complete once baseline data is collected through 2010. Also, baseline data was collected throughout the field season, April-November of each field season. This baseline data consisted of water quality data: pH, dissolved oxygen, turbidity, temperature and discharge measurements. This data will also help determine what will be the best restoration efforts throughout the dredge reaches of the Yankee Fork.
The program manager, CH2M Hill, and the graduate student has given several presentations on the YFRP at various conferences, titles included are history and background, restoration project plans, and contribution of floodplain connectivity to aquatic ecosystem production.

2004-2006

Acquired stream monitoring and flow measurement equipment to commence water quality monitoring and flow measurements. The program initiated water quality monitoring in the Yankee Fork Salmon River this including the installation of continuous monitoring stations. Following approval by the Fort Hall Business Council, authorization from the US Forest Service was sought to install monitoring stations on three USDA Forest Service bridges (Flat Rock, Bonanza, and Jordan Creek Bridges) in the Yankee Fork Salmon River watershed. This work has been authorized through a Special Use

Permit (Authorization ID: YFK66) issued by the USDA Forest Service Salmon-Challis National Forest.

The program manager met with several stakeholders to discuss the Yankee Fork Salmon River Dredge Tailings Restoration Project and opportunities for cost sharing on the restoration and monitoring effort. Stakeholders contacted included the U.S. Forest Service, Idaho Department of Environmental Quality, and the Idaho Department of Fish and Game. The YFRP was presented at the April 2006 meeting of the Upper Salmon Basin Watershed Board and Technical Team (USBWB and USBWTT) to identify additional stakeholders to assist in restoration planning.

Continued work on the YFSR leaf decomposition study. This work includes descriptions of leaf processing using changes in leaf mass and leaf nutrients, as well as, assessing the macroinvertebrate community and measuring the accumulation of sediments in reference and mine altered portions of the YFSR. An abstract describing preliminary finding of this work was accepted at the North American Benthological Society's (NABS) Annual meeting in Anchorage, Alaska.

Started work on a monitoring and evaluation plan for the YFSR with Idaho State University Stream Ecology Center. ISU's Stream Ecology Center was contracted to complete and implement the monitoring and evaluation during 2006.

Began working on the YFRP proposal to secure future funding; this was not a great success due to the high cost to complete restoration with the Yankee Fork Dredge area. The ISRP commented to this proposal and disapproved it, however, the YFRP responded, and was able to continue for one additional year to provide answers to the ISRP. These comments of the ISRP and responses of the YFRP are in located in Appendix D.

2002-2003

In 2002, the YFRP was proposed and not successful in acquiring funding from BPA. And then in 2004, the YFRP received funding to start collecting field data and getting the project started.

Monitoring and Evaluation Plan

The Tribes recognize and appreciate the importance of documenting the success of the restoration project. The ability to attribute success to restoration actions requires an understanding of existing conditions and associated natural variability in the key biological, physical, and chemical monitoring parameters prior to restoration work. The Tribes plan to engage monitoring experts in the Pacific Northwest to refine the experimental design now that the proposed restoration actions have been identified on the ground and a proposed implementation schedule has been developed.
Methods employed to assess physical, biological, and chemical changes associated with future restoration efforts will be consistent with previous data collection activities. Consistency will allow the Tribes to make appropriate statistical comparisons for detecting and quantifying biological, chemical, and physical responses. Monitoring is also important because of the life stages of anadromous fishes. The YFRP feels that it is critical to have a well thought out monitoring plan due to the species life cycle of 3-5 years and it would be appropriate to see long term data set. To determine the success of the project at least two life cycles of these species should be monitored.
Currently, the Tribes are continuing to collect water quality data to help ensure the pre-restoration data set is as long as possible. The Tribes plan to monitor the water quality (discharges, sediment, pH, turbidity, conductance, temperature, and dissolved oxygen) fish abundance, cross sections throughout the dredge reaches and any changes within the system due to construction. This continued monitoring will help eliminate data gaps and also help determine success of the project once restoration is complete. The program will collect data prior to construction and will continue to collect data during and after construction. The Tribes will then compare pre- and post-restoration data to evaluate success of the project. Results learned from this restoration project would help to inform future restoration of dredge mine reaches throughout the Western States. A complete description of the measurements proposed as part of the research, monitoring, and evaluation (M&E) component of this proposal are described in Appendix B.

Conceptual Design

In summer 2007, the Tribes contracted with CH2M HILL (with Steve Clayton as the project manager) to prepare a report analyzing and evaluating restoration alternatives for the Yankee Fork Salmon River dredge reach. Steve and his team have been working with Tribes to create the conceptual rehabilitation design and delivered by May 2008 (Appendix C). Within this design are majority of the restoration plans that would help the system become a more natural self sustaining river. Since May 2008, when the final conceptual design was received, the YFRP program manager wants to add geomorphology technique to the restoration efforts, and to add this to the existing design. But first, baseline data will be collected in order to determine what exact actions will create a more natural channel within the dredge areas of the YFSR. The CH2M Hill's design will be implemented, but only after geomorphology baseline data is collected and

then the YFRP will determine what will best suite the YFSR, to create a near natural self sustaining system.

Within CH2M Hill's design the implementation of all actions associated with the three primary alternatives (floodplain reconnects, tributary reconnects, and pond reconnects) would require approximately 102,000 cubic yards of excavation and disturbance to approximately 7.3 acres (6 percent) of the existing tailings surface area. The resulting benefits would increase the combined channel length by 2.5 miles, increase the inundation area by 20 acres, and increase the potential to store 4 acres of spawning-sized substrate in the main channel. The YFRP feels that these numbers can be increased with more natural channel morphology, for instance a natural riffle-pool-glide complex that fall within natural meandering channel. Studying the YFSR system and comparing to reference sites, we then will add to the current conceptual design a full restoration plan for the YFSR within the dredge tailings.

Increased flow through the existing and new pond series would allow year-round access and improve habitat quality for juvenile salmonids while reducing long-term operations and maintenance costs. There would be two tributary reconnects: Jerry's creek and Silver Creek that are currently disconnected from the river. Connecting these two streams will help keep continuous flow throughout the year, through existing ponds that are currently stagnant; these ponds and creeks will be reconnected to the YFSR. This final conceptual design is a draft design and will be implemented based on the results of the baseline data.

The next two years, baseline data will be collected throughout the YFSR and other reference sites; this will help provide restoration actions to be implemented. The reference data will then be used to build a more natural system that nature intended, also, when duplicated to stable reference sites, the YFSR will need very little maintenance. This idea follows the natural river equilibrium scenario and will need very little maintenance if followed properly.

Site Characterization

At the external stakeholder meeting in Challis, Idaho, on March 4, 2008, Dr. Tom Frost with the USGS presented the preliminary findings of his study titled "Water and Sediment in the Yankee Fork of the Salmon River, Idaho (USGS, in review)." The stakeholders encouraged the Tribes to include a site characterization as a key next step in the restoration planning process. Tribes are proposing to conduct additional field sampling in summer 2009 to better characterize soil conditions in the specific vicinity of the proposed restoration actions. This field work will also support the final design phase of the restoration by describing subsurface properties necessary for geotechnical and biostabilization elements of the design.

Permitting

The Tribes and CH2M HILL met with state and federal permitting agencies in Boise on April 23, 2008, to provide a progress update on the project and solicit input from those organizations. The agencies were very interested in seeing the project move ahead and agreed to work closely with the Tribes. The agency group had differing recommendations on whether to permit the project as individual actions or as a whole reach. The agency group did agree that a pilot project approach would be the most effective way to start. They also felt that 6 months would provide sufficient time to acquire all the necessary permits prior to construction. The permitting process for the pilot project will begin in 2009, while the remaining sites will be concluded in 2012, depending on the success of the pilot project. This timing is incorporated into the attached schedule.

Several important resources are already available to the Tribes and BPA to support the permitting process. These include a draft NEPA document submitted as an appendix to the feasibility plan prepared by Bechtel (1987) for the original construction of the pond series. While dated, this document provides important key information that is still relevant and applicable.

Additionally, the USFS contracted for two cultural resources reports, completed in 2002 and 2003. These reports include very detailed information on existing pre-historic and historic resource currently located in the dredged reach.

ISRP Comments and YFRP Response 2006

Below is the programs answer to the ISRP comments 2006 of the FY 2007-2009 F&W Program Project Proposals that the Yankee Fork Restoration Project had proposed and commented on by the ISRP.

Response to ISRP comments

The Yankee Fork Salmon River Dredge Tailings Restoration Project sponsors appreciate the opportunity to address comments from the ISRP review process. We identified eight separate issues in the ISRP's comments and have organized our responses accordingly. In addition, we are submitting a revised proposal with additional detail. (To keep our response as brief as possible, full citations for references are only included in the accompanying proposal.)

ISRP Comment #1:

"The proposal itself is well put together and easy to read, but the scientific rationale for benefits to fish and wildlife is not convincing."

Response to ISRP Comment #1:

The project sponsors appreciate the complement on the organization and readability of the proposal; a key goal of our original proposal was to have a readable and scientifically defensible document. Although we believe the direct benefits to fish and wildlife, and especially anadromous and fluvial salmonids, was articulated in the original document, we have highlighted the direct benefits to fish and wildlife below and cross-referenced them in the revised proposal.

First, the Yankee Fork Salmon River (YFSR) is described as critical habitat for Snake River spring/summer Chinook salmon (Oncorhynchus tshawytscha) and steelhead (O. mykiss). The U.S. Fish and Wildlife Service defined "critical habitat" as an area essential for the "conservation" of species in question. This designation implies that recovery of these species requires essential habitats, like the YFSR, to support populations of ESA-listed species. Therefore, the long-term goal of habitat improvement through reconnection of the YFSR with its historic floodplain should benefit Snake River spring/summer Chinook salmon and steelhead (page 3 of proposal).

In addition, the YFSR supports populations of resident fish including bull trout (Salvelinus confluentus) and westslope cutthroat trout (O. clarki lewisi; Upper Salmon River Interagency Technical Advisory Team 1999; Ray and Bacon 2005). Although densities of bull trout are relatively low in the Yankee Fork drainage, this drainage is seasonally important for bull trout. Schoby (2006) recently monitored movement patterns of bull trout and westslope cutthroat trout in the Upper Salmon River Subbasin using radio telemetry. His work indicated that the YFSR was important summer habitat for

fluvial populations within the Upper Salmon River Subbasin; twelve of 21 bull trout monitored in 2003 spent time in the YFSR (Schoby 2006; page 5 of proposal). Densities of westslope cutthroat trout are high and equal to that of age 0+ Chinook salmon in the drainage (Ray and Bacon 2005); westslope cutthroat trout densities are 5.29/100m^2 in dredged reaches above the West Fork Yankee Fork (WFYF) and 6.45/100m^2 in the dredged segment below WFYF and slightly below densities found in tributaries of this drainage (Ray and Bacon 2005).

This project will also provide indirect benefits to fish and wildlife by re-establishing fluxes of energy and nutrients critical to the productivity of linked river-floodplain systems. Loss of floodplain connectivity reduces the exchange of organic matter between terrestrial and aquatic ecosystems (Cummins et al. 1989). Because multiple trophic levels in stream food webs depend on terrestrial carbon sources, loss of connectivity can significantly diminish in-stream productivity (Wallace et al. 1997). Severing stream-riparian connections can also reduce inputs of terrestrial invertebrate prey, which are known to play an important and disproportionate role in the diets and energy budgets of salmonid fishes (Baxter et al. 2005). Moreover, critical nutrient storage and transformation is known to occur on and within floodplains (Stanford and Ward 1993), including retention and processing of marine-derived nutrients (via salmon carcasses; Gende et al. 2002). The proposed restoration on the YFSR would help re-establish all of these important terrestrial-aquatic food web linkages and benefit a suite of fish and wildlife. The project monitoring will be designed to document changes in abundance of organisms expected to respond to the restoration including, but not limited to, fish, birds, bats, amphibians, spiders, and other riparian specialists (Baxter 2005; page 6 of the original proposal).

ISRP Comment # 2:

"A stated goal is to increase Chinook smolt production by an order of magnitude. This is certainly a gross exaggeration of the project's potential. The ISRP previously concluded that fishery benefits on this project are likely to below."

Response to ISRP Comment #2:

Based on our reviews of previous ISRP comments and the corresponding sets of sponsors' responses (FY 2000 and FY 2002 Mountain Snake), we did not see definitive conclusions that fishery benefits on this project were likely to be low.

In contrast, as noted in the FY 2000 Sponsor Response to the ISRP (8/6/1999), potential smolt production is high in the YFSR drainage. An estimated 425,000 Chinook salmon smolts and 59,000 steelhead smolts could be produced (Kiefer et al. 1990). We believe both Chinook redd counts and parr abundance have been reduced by the dredge-mining activities. Recent smolt production for the YFSR (5,000 smolts/yr) is about 5% of the system's estimated potential (90,000 smolts/yr; Reiser and Ramey 1987). While more

current production estimates are not available for YFSR, we believe the past mining has substantially reduced productivity.

As noted above, YFSR provides important habitat for species beyond Chinook salmon, including fluvial and adfluvial populations of bull trout. Schoby (2006) found that fluvial bull trout populations within the Upper Salmon River Subbasin move into the YFSR during summer months. Between 1 June and 20 September 2003, 12 of 21 bull trout tagged and tracked in the Upper Salmon River spent time in the YFSR (Figure 1). While this recent work cannot predict historic use of the YFSR by nonanadromous salmonids, it highlights the current importance of the YFSR to bull trout in the Upper Salmon River.

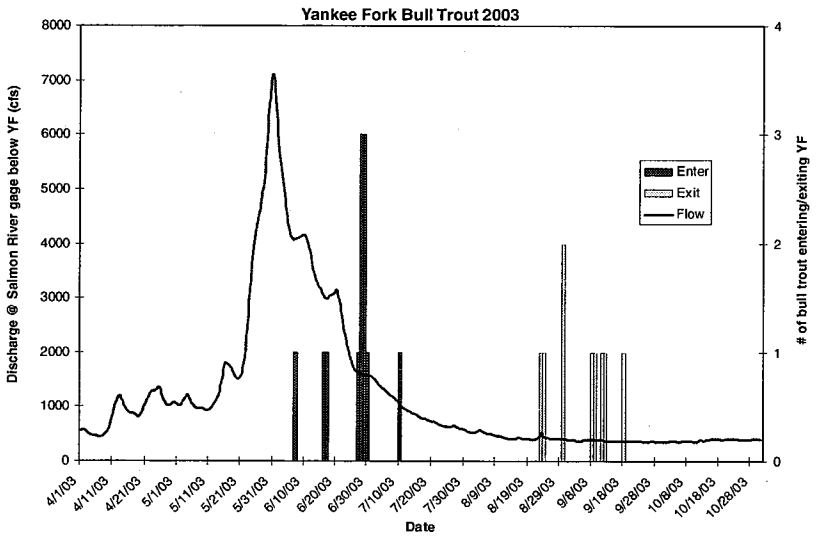

Figure 1. Bull trout use of YFSR and discharge during summer 2003. Bull trout (n=21) were tagged in upper Salmon River and the number and timing of fish entering and exiting the YFSR are shown (Schoby 2006).

ISRP Comment #3:

"The impacted area is a relatively short stretch of moderately high gradient. The primary Chinook salmon rearing area is upstream, and passage doesn't seem to be impeded."

Response to ISRP Comment #3:

Over 8.2 km of the mainstem Yankee Fork Salmon River has been impacted by historic dredge mining. As noted in the FY 2002 response to ISRP comments, USFS studies (Overton et al., 1999) indicate that the YFSR watershed was historically a major Chinook salmon producer (as well as steelhead, bull trout, and westslope cutthroat trout). Based on historical accounts and watershed assessments conducted by the USFS, Overton et al. (1999) estimated that the YFSR watershed historically provided 10 to 15% of the available Chinook spawning habitat within the entire Upper Salmon Subbasin (4th HUC). They also estimated YFSR provided 25 to 30% of the spawning habitat (substrate size, channel type) typical to the Chinook salmon phenotype (time of spawning, size of spawner) utilizing stream sections in the main Salmon River downstream of Valley Creek down to and including the East Fork Salmon River drainage. The dredged segment in the

YFSR also accounts for approximately 75% of the historical Chinook spawning habitat and fragments the remaining quality habitat within the YFSR (Overton et al., 1999).

This 8.2 km segment has an average slope of 0.86% (Figure 2), with the steepest canyon reach in lower YFSR having a slope of 1.2%, well within the preferred ≤ 5% gradient for Chinook spawning and rearing (Montgomery et al. 1999; Hanrahan et al. 2004). Examination of data describing fish distributions and channel types (Montgomery et al. 1999) reveals linkages between channel slope and salmonid spawning use and abundance across a wide range of slopes. Throughout the Clearwater River basin, the Chinook zone correlated with reaches with slopes <1%. In the Stillaguamish River in western Washington and from the Applegate River in southern Oregon, Chinook zones correlated with reaches with slopes <3%.

Similarly, Torgersen et al. (1999) found adult Chinook salmon in greater abundance in reaches with gradients ranging from 0.3% to 1.5% in the Middle Fork John Day River and 0.5% to 3.0% in the North Fork of the John Day. Greatest Chinook salmon abundances were identified in gradients ≤0.6% and ≤1.2% in the Middle Fork and North Fork John Day, respectively, but other physical variables (e.g. temperature, pool numbers, and width:depth) were also important (Torgersen et al. 1999).

Based on this literature and our understanding of the YFSR system, we do not view the 8.2 km reach impacted by mining in the YFSR as too short or steep, or insignificant in the context of historical spawning habitat available in the Upper Salmon River Subbasin. In fact, mapping of Chinook redds from 2002 to 2005 indicated that almost 32% of spawning occurs in a reach length that provides only 4% of the total stream length (stream length data from Draft Salmon and Steelhead Recovery Plans for Idaho; www.idahosalmonrecovery.net) of available in all of the YFSR watershed, and these redds are distributed throughout the entire reach (Figure 2).

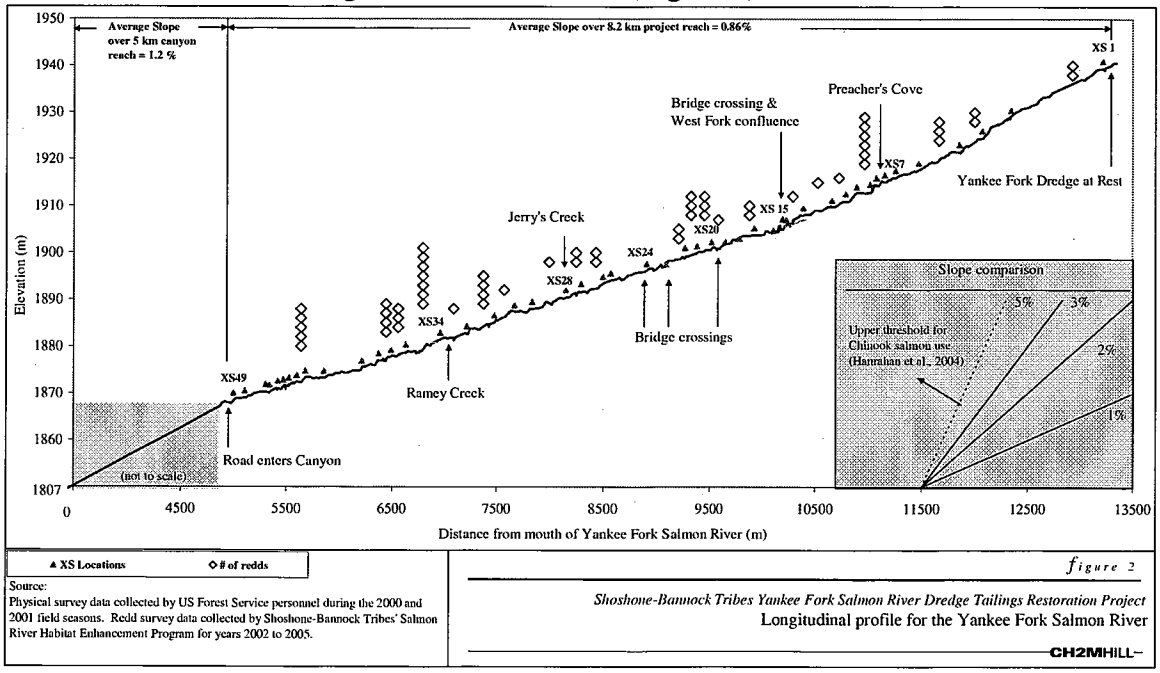

Figure 2. Longitudinal profile of the Yankee Fork Salmon River valley segment impacted by historic mining. The average slope of the river segment is shown along with survey points used to summarize reach-scale and segment-scale gradients. Locations of 2002, 2003, 2004, 2005 redds are shown above.

Taken together, these findings emphasize how restoration of dredged reaches of the YFSR has the potential to improve anadromous and resident fish production throughout the Upper Salmon River Subbasin. Any existing reduction in spawning in the impacted segment relative to upstream reaches may actually be a consequence of the mining that decreased overhead cover, reduced pool densities, and armored the streambed (MacFarlane 2006). The goal of this project is to restore channel-floodplain interactions so that riparian and instream habitat diversity is increased and quality and quantity of existing spawning habitat are increased.

ISRP Comment #4:

"Some objectives do not seem reasonable, and methods for the actual stream engineering are not given."

Response to ISRP Comment #4:

Since we are unsure exactly which objectives in our original proposal "did not seem reasonable," we have focused our response on describing methods for the actual stream engineering. We did elect to remove construction of a 1-km pilot project from our proposal and budget, but our revised proposal still includes stream engineering design, and supporting data collection, as we see this as a crucial next step in the success of this project.

The following approach and methods for the actual stream engineering were developed as supporting documentation for the cost estimates for engineering design (and subsequent construction of the 1-km pilot project) presented in Table 2 in the original proposal. We decided to not include exhaustive detail at that time to improve the readability of the overall document, but we have included more information here in response to the reviewers' comments. Additional detail, beyond that outlined here, has been developed as part of the cost estimating and can be provided if necessary. The project design and engineering methods would include, but not be limited to, the following:

- Manage the project
- Prepare for and attend SBT/agency project meetings
- Review existing data and incorporate into the design
- Coordinate and conduct additional project survey/mapping, including LiDAR
- Conduct a geotechnical exploration of the project reach to determine subsurface conditions needed for design and construction
- Execute hydraulic analyses and design
- Develop drawings, specifications, and construction cost estimates at specified design intervals (conceptual, intermediate, and final) and incorporate input from the Shoshone-Bannock Tribes and any other reviewers
- Prepare Storm Water Pollution Prevention Plan (SWPPP)

- Finalize drawings, specifications, and engineer's cost estimate, complete with stamp by licensed professional engineer
- Finalize the construction bid package for advertisement to contractors and coordinate advertisement of the project for bid, attend the pre-construction bid meeting, and assist in review of bids
- Assist in the application for all required permits (CWA 404, stream alteration permit, NPDES permit, county road permit, etc.)
- Conduct an environmental characterization of the dredge spoils within the project reach and review previous monitoring of mercury and selenium in waters, sediments, and biota of the YFSR (USGS in prep), and provide recommendations for any required action during construction

As noted in our original proposal, the engineering design approach and methods emphasize restoration of physical processes that address biological limiting factors. The design will optimize restoration potential while working within the existing physical and social constraints within each of the geomorphic reaches comprising the full 8.2 km of YFSR. We expect the design to incorporate methods such as the following: 1) creation of off-channel salmonid rearing and refuge habitat through placement of instream structures and excavation at specific locations in existing dredge piles with no changes to the existing channel alignment or geometry, 2) changes to the existing channel geometry to create floodplain benches with no changes to the existing alignment, and 3) maximizing the opportunity for new channel alignment and geometry by restricting changes only by the size of the presettlement floodplain.

The design approach proposed here has been successfully implemented by the engineering firm, CH2M HILL, on the Mores Creek project near Idaho City, Idaho, and will draw from experiences of similar projects elsewhere that included the redistribution of dredge tailings and river-floodplain reconnection including Resurrection Creek (Alaska), Merced River Ranch (California), and North Fork of John Day River (Oregon). Mores Creek is similar to YFSR in terms of past disturbances and proposed restoration actions, and Mores Creek received a favorable ISRP review as part of the current BPA proposal process (http://www.cbfwf.org/solicitation/components/forms/Proposal.cfm?PropID=591).

ISRP Comment #5:

"Previous ISRP concern over the need for a conservation easement that would limit future development of lands associated with the stream channel restoration was not addressed."

Response to ISRP Comment #5:

As stated in the 2002 response to ISRP comments on the project, the Shoshone-Bannock Tribes are actively working with the J.R. Simplot Company (Simplot) to formalize an agreement acceptable to both parties; the agreement sought would eventually develop

into a conservation easement. A Simplot representative has participated in planning meetings and accompanied the project technical team on a visit to a comparable successful restoration project involving redistribution of mine tailings and reconnection of the river and floodplain (North Fork John Day River).

An existing easement between Simplot and the Shoshone-Bannock Tribes is on file at Custer County Courthouse and is being used as a model for the new agreement. The easement signed in 1987 grants access to, and facilitated the connection of, off-channel rearing ponds on Simplot lands that were established at the time of signature. Moreover, the easement states that both parties (Simplot and the Tribes) "recognize the need to restore salmon runs in Idaho and to work cooperatively to achieve that goal" (Grant of Easement for Stream Project dated September 1987).

Conversations with Simplot on the issue of a conservation easement are ongoing, and an update on the progress of an easement to restrict future activities within the proposed project area is described here. The Fish and Wildlife Department of the Shoshone-Bannock Tribes (Tribes) contacted Mr. Vic Conrad, Simplot's Land, Water, & Asset Recovery, on 22 December 2005 regarding the original proposal to discuss the Tribes' continued desire to establish a conservation easement, a critical element to the restoration of the dredge-impacted segment of the YFSR. During the follow-up discussion on 17 January 2006 (after submittal of the proposal) between the Tribes' Special Counsel, Fish and Wildlife Department representatives, Water Resources Engineer, and Simplot, the terms of such an agreement were drafted. Negotiations over the terms for an agreement to place lands located in the proposed project area into an easement are ongoing, and Simplot continues to support the Tribes' efforts to restore salmon populations in the YFSR and the Upper Salmon River Subbasin.

While progress in negotiating with Simplot may be slower than what the ISRP would hope for, we would encourage the ISRP to recognize that in the absence of a restoration design it is difficult for Simplot to understand how the restoration would look, where the channel would be located, and other related factors. As a result, it is difficult for Simplot to evaluate their tradeoffs associated with this restoration work. The value of the channel design as a communication tool is one of the reasons we see the design as the important next step on this project.

ISRP Comment #6:

"It is interesting that a similar project funded in the past by BPA (Crooked River on South Fork Clearwater) and now perhaps in need of re-doing was not mentioned in the proposal."

Response to ISRP Comment #6:

We were aware of past BPA-funded efforts on Crooked River, but were not aware of the current Crooked River proposal. After revisiting two of the project reports describing the

older Crooked River work and the reviewing the current Crooked River proposal submitted by the Nez Perce Tribe and Nez Perce National Forest (http://www.cbfwf.org/solicitation/components/forms/Proposal.cfm?PropID=471#part2), we noticed how the positive aspects of the past and proposed Crooked River work are remarkably similar to the Yankee Fork Salmon River Dredge Tailings Restoration Project. The current Crooked River proposal includes several observations of the past work and notes the magnitude of the proposed restoration effort.

> "Restoration in the lower watershed should focus primarily on restoring, to the extent possible, the hydrologic and riparian processes of the mainstem channel, with aquatic habitat creation being the end result. Past restoration efforts in this channel were successful where they re-established hydrologic function, and largely unsuccessful (with the exception of providing cover) in areas where hydrologic function was not re-established. . . . .
>
> Restoration of this mainstem channel will not be easy or inexpensive. Preparing for this restoration will require detailed analysis and good planning. It will likely need to be phased in over time, due to the cost."
> (http://www.cbfwf.org/solicitation/components/forms/Proposal.cfm?PropID=471#part2)

In contrast to the current proposals for YFSR and Crooked River, BPA-funded work on Crooked River in the late 1980s focused primarily on the use of instream structures to increase habitat diversity as well as the creation of off-channel habitats for juvenile wintering and rearing. Baer et al. (1990) and Siddall (1992) noted the installation of hundreds of instream structures as well as creation of 1.5 ha of side channels and ponds. While the structures increased pool habitat (Baer et al. 1990; Siddall 1992), culverts that connected the side channels to the main channel have been difficult to maintain through time (N. Gerhardt, Nez Perce National Forest, 1999, pers. comm. with S. Clayton). This primary focus on structures is definitely not the current approach proposed for the Yankee Fork Salmon River Dredge Tailings Restoration Project. Instead, the restoration effort proposed here will follow successful approaches from other projects that focused on improving channel-floodplain interactions.

Interestingly, from 1985-1999, over 0.9 ha of floodplain habitat was created at Crooked River (Siddall 1992), and lessons learned from that component of the early Crooked River work provide support for the approach currently proposed for YFSR, Crooked River, and Mores Creek. For example:

> "3. The removal or leveling of dredge piles to create natural banks and flood plains has been extremely successful. The result is aesthetically appealing, and encourages vegetative recolonization. Both shrub and conifer growth are markedly improved. A more natural topographical configuration will allow riparian communities to restabilize, and a healthy riparian area will assist the channel itself in restoring its dynamic equilibrium. . . .

5. Rehabilitating a system so drastically affected by dredge mining is an exceedingly difficult, costly and lengthy process. Planning and design are critical. . . . Project work would benefit from more rigorous definition of appropriate locations and elevations for bankfull stage, the flood plain, and valley terraces above the flood plain." (Siddall 1992)

Based upon our review of the Crooked River project, we strongly support the Nez Perce Tribe's current proposal to continue the floodplain habitat creation components. We believe that Crooked River and Yankee Fork Salmon River Dredge Tailings Restoration Project have the potential to serve as examples for similar efforts that may follow in other regions of the Pacific Northwest. Our goal to restore anadromous and resident fish production in the YFSR and Crooked River will use strategies and approaches that reflect the current paradigm shift in river restoration from hard engineering approaches to the restoration of the natural sustainable processes characteristic of healthy functioning ecosystems (Ebersole et al. 2003, Palmer et al. 2005, Reeve et al. 2006).

Collectively, our project team has amassed a large dataset documenting conditions in the YFSR and reference watersheds in central Idaho, and this existing information is the basis for our assessment and post-restoration monitoring program. The success of our project is rooted in this effort, and our work will benefit from the opportunities that this data provides, including the ability to assess responses at the watershed scale using within and among watershed comparisons. Palmer et al. (2005) and Reeve et al. (2006) emphasized the need for effective post-restoration monitoring in successful river restoration. Surprisingly, Bernhardt et al. (2005) found that such monitoring was associated with only 10% of the 3,700 river restoration projects included in their national review of river restoration. The synergy with other projects/programs in the Upper Salmon River drainage and similar projects elsewhere, the extensive dataset, and historical and cultural significance of the YFSR make this watershed a strong candidate for restoration. Our ultimate goal is to disseminate our findings widely and use the lessons learned from this endeavor to inform similar efforts throughout the region.

ISRP Comment #7:

"If resources were unlimited and the availability of effective methods were assured, this might be the right thing to do at this profoundly altered site."

Response to ISRP Comment #7:

We recognize the importance of allocating limited funds to the projects with the best potential to increase Chinook salmon productivity throughout the Columbia River basin. As noted in the FY2002 response to ISRP comments and above, the Yankee Fork Salmon River has been designated critical habitat for Snake River Chinook salmon (64 FR 57399) and since then has also been designated critical habitat for Snake River summer steelhead (70 FR 52630).

While it is difficult to guarantee the effectiveness of any particular approach to stream restoration, we feel strongly that the approach proposed for YFSR is scientifically defensible for the following reasons:

- Excellent potential to increase productivity of Chinook salmon and other salmonids
- Emphasis on restoring physical processes, not solely installation of habitat structures
- Consistent design approach with restoration of dredge mined reaches including the North Fork John Day River (Oregon; McKinney and Calame 1994), Resurrection Creek (Alaska; MacFarlane 2006), Mores Creek (Idaho), and Merced River Ranch (California; Stillwater Sciences 2005).

Important progress, summarized here, has been made on this project even though the FY 2002 proposal was only partially funded.

- Field surveys, preliminary hydraulic modeling and sediment transport modeling, and initial restoration alternatives are outlined in Buffington et al. (in review).
- NEPA process and consultation is well underway; documents describing the Historical Context for the Yankee Fork Dredge and its Tailings and the Cultural Resources Report Narrative for the Yankee Fork Dredge Tailings Survey were completed in 2003 by Northwest Archaeological Associates, Inc.
- The Shoshone-Bannock Tribes have hired a Project Manager and are actively working with an interdisciplinary team including restoration ecologists, geomorphologists, and engineers to develop initial engineering designs and cost estimates.
- Dr. Colden Baxter, Idaho State University, and a graduate student are active participants and helped develop and implement a monitoring and evaluation plan using scientifically defensible monitoring and research approaches.
- Monitoring of peak flows, continuous flows, and water quality were initiated.
- Examination of key ecosystems processes were initiated to compare functional (leaf processing) and structural (macroinvertebrate communities) properties of mined and unmined reaches of the YFSR. This work was presented at the 2006 North American Benthological Meeting in Anchorage, Alaska.

While much has been accomplished with the limited BPA funding and substantial cost-sharing to date, progression towards the ultimate goal of restoration hinges upon full funding from BPA.

ISRP Comment #8:

"Cost estimates are $15 million through 2011 and that certainly is an underestimate. No cost-share is identified."

Response to ISRP Comment #8:

Since 1997, there has been nearly $435,000 of cost sharing on the Yankee Fork Salmon River Dredge Tailings Restoration Project (Table 1). Although not included in Table 1, the USFS, Idaho Department of Fish and Game, and Shoshone-Bannock Tribes have invested considerable time and effort over the last seven years in preliminary design and coordination for this project. As shown in Table 1, the USFS cost-share has been the most substantial and includes funds for the Watershed Analysis by Overton et al. (1999) and Buffington et al. (in review), and the Cultural Resources Report by Northwest Archaeological Associates, Inc. (2003).

We believe the forecasted cost of $15 million in the initial proposal for restoration of the entire YFSR valley segment impacted by historic dredge mining was appropriate based on the information available and construction cost estimates in the original proposal. The estimated cost is also consistent with similar projects of this scale. For example, an active USFS project on Resurrection Creek in Alaska's Kenai Peninsula redistributed dredge tailing piles, created a new channel including the construction of new meanders, and adjusted the floodplain gradient over a 1.6 km reach in 2005 (MacFarlane 2006). The cost of this effort was estimated at $1.4 million for design, construction, and monitoring and an additional $0.3 million for environmental compliance (NEPA) documentation (total estimated cost of $1.7 million; see http://wildfish.montana.edu/ for cost estimates of Resurrection Creek). (Additional work is being completed on Resurrection Creek in 2006.)

The entire valley segment impacted by historic dredging in the Yankee Fork Salmon River watershed is approximately six times longer than the reach restored on Resurrection Creek. The initial 1.6 km restoration of Resurrection Creek required the redistribution of 100,000 cubic yards of tailings (B. Baer, pers. comm.). Although the volume of tailings movement required to restore historic channel-floodplain interactions on the YFSR is currently unknown (but would be one of the initial design steps following collection of the LiDAR data), the Resurrection Creek project represents a comparable restoration approach and effort in an equally remote region of the country. Using the Resurrection Creek costs to project a comparable effort for the YFSR watershed suggests a total build-out cost in the range of $10 to $11 million, a value less than, but consistent with, our $15 million estimate in the original proposal.

Table 1. Summary of cost-share for the Yankee Fork Salmon River Dredge Tailings Restoration Project. The amount, description, and date of match are presented along with the funding agency and the agency/institution responsible for the work.

Match Amount	Match Description	Matching Agency	Date
$130,000	Watershed analysis of YFSR examining approaches for restoring Chinook Salmon populations	USDA Forest Service	1997 to 1999
$20,000	Supported Contractor to conduct site surveys	USDA Forest Service	2000 and 2001
$95,621	Performed site surveys to support design from restoration work on the YFSR	USDA Forest Service funding; work completed by University of Idaho College of Engineering	2000 and 2001
$112,800	Examine Hg and Se concentrations in aquatic organisms in the YFSR	USDA Forest Service funding; work completed by US Geological Survey Jackson Field Research Station	2001 and 2002
$4,955	Purchase and permitting of bank-operated traveling block cableway	USDA Forest Service	2001
$37,997	Completed Historical Context and Cultural Resource Report Narrative for the YFSR Dredge Tailings	USDA Forest Service funding; work completed by Northwest Archaeological Associates, Inc.	2002 and 2003
$4,000	Provided GIS services describing changes in river length and sinuosity following historic dredging and produced maps showing redd densities	Shoshone-Bannock Tribes-Land Information Services	2006
$3,600	Performed ADCP stream discharge measurements during peak runoff	US Geological Survey	2006
$3,860	Developed sampling design for biological monitoring and evaluation plan for the YFSR Dredge Tailings Restoration Project	Idaho State University Stream Ecology Center	2006
$1,800	Equipment for surface water sampling and flow measurements	Idaho State University Center for Ecological Research and Education	2006
$11,400	In-kind salary match for the preparation of a report on the Hg and Se concentrations in aquatic organisms in the YFSR	US Geological Survey Jackson Field Research Station	2006
$3,000 – pledged	Provide technical and engineering services associated with proposed airborne Remote Sensing methods	Idaho State University Remote Sensing Laboratory	pledged
$3,981 – pledged	Support surface water quality monitoring efforts	Idaho Department of Environmental Quality	pledged –to begin in Aug. 2006
Total Match			
$433,014			

Existing Resources on the Yankee Fork Salmon River
The Tribes can provide hard copies of specific documents at BPA's request.

- Land of the Yankee Fork (Yarber, 1963)
- Bureau of Fisheries (1930)
- Gold Dredge on the Yankee Fork (Packard, 1983)
- Feasibility Plan for the Enhancement of the Yankee Fork of the Salmon River, Idaho (Bechtel, 1987)
- Watershed Analysis Approaches for Chinook Salmon, Yankee Fork of the Salmon River, Idaho: An example (Overton et al., 1999)
- Historical Context for the Yankee Fork Dredge and its Tailings (Northwest Archaeological Associates, 2002)
- Cultural Resources Report Narrative for the Yankee Fork Dredge Tailings Survey (Northwest Archaeological Associates, 2003)
- Mercury and Selenium Concentrations in Biofilm, Macroinvertebrates, and Fish Collected in the Yankee Fork of the Salmon River, Idaho (Rhea et al., 2008)
- Water and Sediment in the Yankee Fork of the Salmon River, Idaho (USGS, in review)