Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

FREEDOM OF INFORMATION ACT/PRIVACY PROGRAM

August 12, 2014

In reply refer to: FOIA #BPA-2014-01504-F

Sarah A. Peters
WildEarth Guardians
PO Box 50104
Eugene, OR 97405

Ms. Peters:

We have received your request for records under the Freedom of Information Act (5 U.S.C. § 552) from the U.S. Department of the Interior – Bureau of Land Management (DOI-BLM). Your letter was received by Bonneville Power Administration (BPA) on July 28, 2014, and has been assigned control number BPA-2014-01504-F. Please use this number in any correspondence with the agency about your request.

You requested:
"A list of all site-specific projects the Bureau of Land Management has approved within Bull Trout Critical designated critical habitat since 2011 and all associated decision documents for these projects (EA and Decision Notices and ROD and Environmental Impact Statements), including any that implement INFISH Management Direction (Interim Management Strategy for Anadromous Fish Producing Watersheds).

All bull trout specific Biological Opinions and Assessments as produced for the BLM in the areas of Oregon, Idaho, Washington, and Montana since 2011."

Response:
On July 23, 2014, the DOI-BLM transferred your request to us with a request to review "one revised draft document (totaling 86 pages)." This document is entitled, *Kootenai River Habitat Restoration Project Phase I, Braided Reach I Implementation – Draft Biological Assessment.* We have reviewed this record and are releasing it in full.

Appeal:
You may still seek administrative appeal pursuant to Department of Energy FOIA regulations at 10 C.F.R. § 1004.8 if you feel the search was not adequate. If you choose to appeal, you must do so in writing within 30 days, and include the following information:

(1) The nature of your appeal - denial of records, partial denial of records, adequacy of search, or denial of fee waiver;
(2) Any legal authorities relied upon to support the appeal; and
(3) A copy of this determination letter.

Clearly mark both your letter and envelope with the words "FOIA Appeal," and direct it to the following address:

Director, Office of Hearings and Appeals
Department of Energy
1000 Independence Avenue SW
Washington DC 20585-1615

I appreciate the opportunity to assist you. If you have any questions about this letter, please contact Colleen Cushnie, FOIA Case Officer (BPA Contractor, ACS), at (503) 230-5986.

Sincerely,

Christy Munro

Christy Munro
Freedom of Information/Privacy Act Officer

Cc: Ms. Yadyra Esparza, Bureau of Land Management
Attachments

Kootenai River Habitat Restoration Project

Phase 1, Braided Reach 1 Implementation

Draft Biological Assessment

Action Agency: Bonneville Power Administration

Prepared by:

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October 2010

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1 Introduction

This Biological Assessment (BA) was prepared to evaluate the effects to Kootenai River white sturgeon (Kootenai sturgeon) (*Acipenser transmontanus*, endangered) and Columbia River bull trout (*Salvelinus confluentus*, threatened), and their designated critical habitat associated with the Kootenai Tribe of Idaho's (Kootenai Tribe) proposed project to implement habitat restoration treatments on the Kootenai River. The proposed project is the first phase of the Kootenai River Habitat Restoration Project (KRHRP) in Braided Reach 1 (KRHRP Phase 1, Braided Reach 1). The Bonneville Power Administration (BPA) would fund the Kootenai Tribe's proposed restoration project (proposed action).

The proposed action includes implementing habitat restoration treatments to stabilize eroding banks, trap sediment and promote floodplain development, increase riparian vegetation, and increase channel margin and side channel complexity. The proposed treatments are designed to contribute to the overall multi-phased restoration of ecosystem function by addressing specific limiting factors identified in Braided Reach 1 in the KRHRP Master Plan (KTOI 2009).

Project actions will occur within an area known as Braided Reach 1 of the Kootenai River at two distinct sites: Phase 1a (between RM 158 and 159) and Phase 1b (between RM 156 and 157) (Figure 1). Braided Reach 1 extends nearly four river miles (RM 160.9 to RM 156.2) from the Moyie River confluence downstream to the upstream extent of the backwater influence from Kootenay Lake.

The Kootenai Tribe will solicit and evaluate proposals from contractors to supply materials needed to implement the proposed action. It is expected that materials that meet the required specifications will be acquired from a variety of sources within the region. Because suppliers are obligated to comply with the ESA and other applicable regulatory requirements associated with acquiring these materials, sourcing of materials is not considered part of this proposed action.

Four other species are listed as threatened or endangered under the federal ESA in Boundary County, Idaho. Based on the scope, timing, and location of the proposed project in Braided Reach 1 of the Kootenai River, BPA has determined that the proposed action would have no affect to gray wolf (*Canis lupus*, endangered), woodland caribou (*Rangifer tarandus caribou*, endangered), grizzly bear (*Ursus arctos*, threatened), or Canada lynx (*Lynx canadensis*, threatened). Although the gray wolf, grizzly bear and woodland caribou are known to occur in remote areas of Boundary County and the Canada lynx could occur in the vicinity, none of these species are river dependent, and none are typically found in developed areas with moderate to high levels of human activity. Therefore, the proposed project should have "no effect" on these listed species, and these species will not be considered further in this analysis.

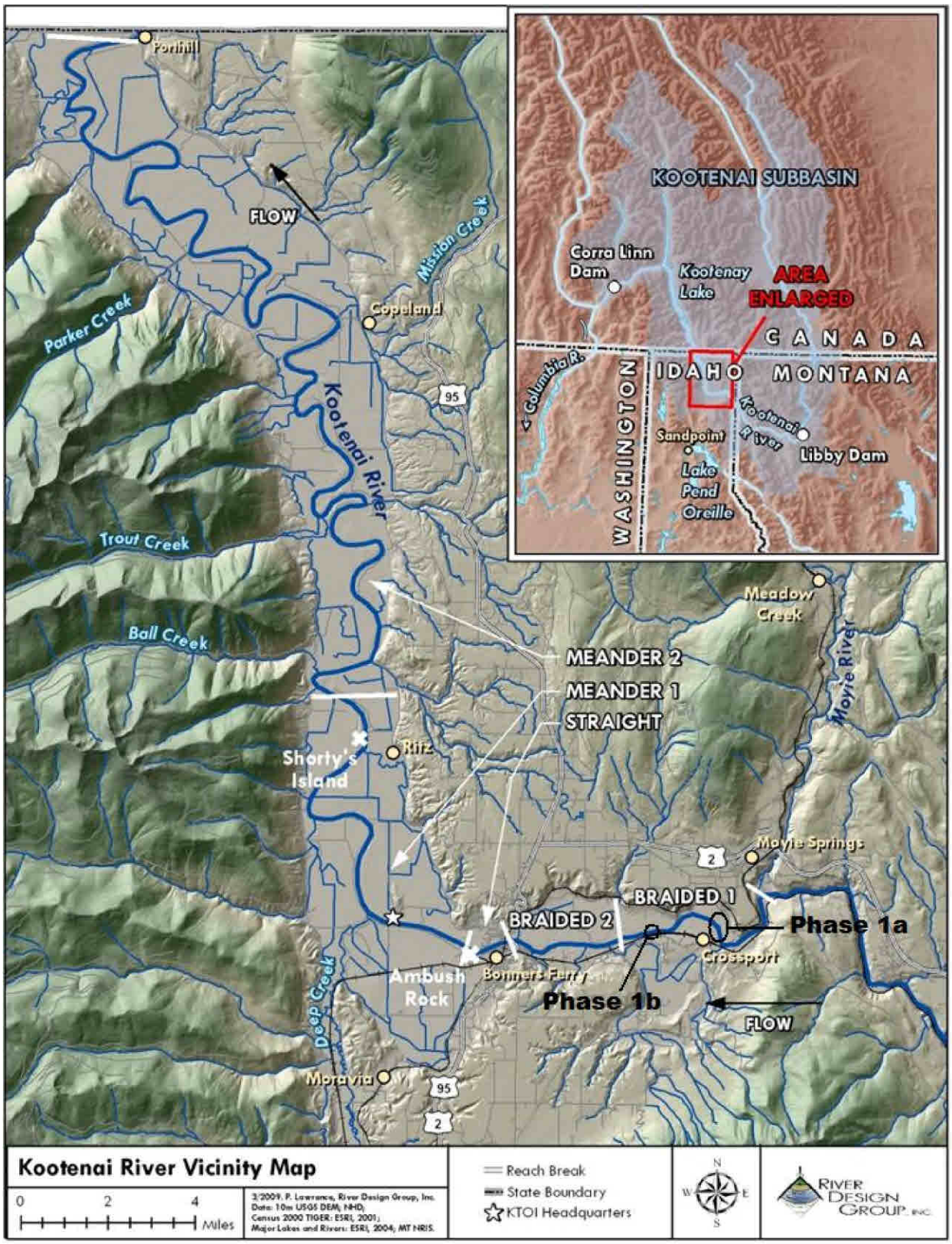


Figure 1. KRHRP Phase 1 vicinity map.

1.1 Federal Action and Legal Authority

Section 7 of the Endangered Species Act of 1973 (as amended) directs federal departments and agencies to ensure that actions authorized, funded, and/or conducted by them are not likely to jeopardize the continued existence of any federally proposed or listed species, or result in destruction or adverse modification of critical habitat for such species. Section 7(c) of the ESA requires that federal agencies contact the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) before beginning any construction activity to determine if federally listed threatened or endangered (T&E) species or designated critical habitat may be present in the vicinity of a proposed project. The KRHRP will potentially affect only USFWS-managed species; therefore, consultation will not be undertaken with the NMFS. A Biological Assessment/Evaluation (BA/BE) must be prepared if actions by a federal agency or permits issued by a federal agency will result in construction in the vicinity of T&E species, as determined by the USFWS.

The Kootenai Tribe proposes to implement the proposed action with BPA funding. Therefore, BPA is the lead federal agency. The U.S. Army Corps of Engineers (Corps) would evaluate the proposed action pursuant to Section 404 of the Clean Water Act. Under Section 404 of the Clean Water Act, the Corps has authority to permit or deny proposed actions that entail the placement of dredged or fill materials into waters of the United States. This BA was prepared to initiate ESA consultation with the USFWS for the federal action of funding by the BPA and permitting by the Corps to ensure that implementation of the proposed action (KRHRP, Braided Reach 1 – Phase 1) will not jeopardize the continued existence or recovery of Kootenai sturgeon and bull trout.

1.2 Project and Federal Action Agency History

1.2.1 KRHRP Master Plan and Libby Biological Opinion

The Kootenai Tribe completed the KRHRP Master Plan, presenting a framework for an ecosystem-based river habitat restoration project in the Idaho portion of the Kootenai River subbasin. The Master Plan provides a summary of historical and existing conditions in the Kootenai subbasin; specific physical and biological characteristics in each river reach in the project area; and limiting factors related to habitat for focal aquatic species and other species occurring within the project area. Based on this information, the Master Plan identifies restoration strategies and habitat restoration treatments that could be used to address limiting factors in each Kootenai River reach.

The KRHRP is included as part of a legal framework defined by the USFWS Libby Dam Biological Opinion (BiOp) and a related Settlement Agreement. The BiOp was initially developed in 1995, with subsequent opinions in 2000 and 2006. The 2006 BiOp included a Reasonable and Prudent Action (RPA) to avoid jeopardy to the continued existence of Kootenai sturgeon, focusing on actions to achieve habitat attributes considered necessary for successful Kootenai sturgeon recruitment based on an adaptive management approach. These attributes identified in the 2006 BiOp include recommendations regarding substrate, depth, velocity and temperature characteristics. During this same time frame (2003), the Center for Biological Diversity (CBD) initially sued the USFWS and Corps (operator of Libby Dam) and then amended their complaint in 2006 to challenge the new BiOp. A Settlement Agreement was

negotiated in 2007, resulting in a 2008 clarification to the RPA and dismissal of the CBD suit. The Settlement Agreement further required that Libby Dam operations be designed to achieve temperature, depth and velocity attributes conducive to successful Kootenai sturgeon recruitment. In addition, the Settlement Agreement stipulates that the USFWS and the Corps would cooperate and support the Tribe's efforts to implement the KRHRP Master Plan.

The Libby Dam Operations BiOp, as clarified in 2008, includes habitat attributes intended to support conditions favorable for migration and spawning in what is thought to be suitable existing habitat in the Braided Reaches. The proposed Braided Reach 1 – Phase 1 components of the KRHRP will contribute to improved habitat conditions in this reach. Phase 1 includes actions to address significant bank erosion in Braided Reach 1 that is contributing to sedimentation and degradation of Kootenai sturgeon spawning habitat downstream in the Meander Reaches.

If implementation of the Kootenai River Restoration Project has not begun by December 2012, is determined infeasible, or otherwise does not proceed to implementation, then the following actions would be triggered under the terms of the Settlement Agreement:

- Re-initiation of consultation;
- Interim Libby Dam release operations would continue;
- The Corps and the USFWS would evaluate the benefits to Kootenai sturgeon associated with additional flows to be spilled at Libby Dam (spill test); and
- If additional flows prove successful, the Corps and USFWS would analyze the benefits to Kootenai sturgeon associated with installation of an additional turbine or turbines at Libby Dam.

1.2.2 Other Actions

Other projects or programs that are being implemented through a cooperative, inter-governmental partnership that includes the Kootenai Tribe, the United States, Canada, Idaho and Montana include the following:

- The Corps, in partnership with their non-federal sponsor, the Kootenai Tribe of Idaho, will manage two Continuing Authorities Program (CAP) Section 1135 projects that fall under the broader umbrella of the KRHRP. One of these, the CAP Section 1135 Shorty's Island/Meander Reach Ecosystem Restoration project, will determine an alternative for enhancing substrate in the existing Kootenai sturgeon spawning reach in the Meander Reach and is included as part of Phase 1. The other, known as CAP Section 1135 Braided Reach Ecosystem Restoration, is intended to address the depth habitat criteria in the Braided Reaches, and may be included as part of Phase 2 of the KRHRP.
- Operational Loss Assessment Project – The purpose of the Operational Loss Assessment Project is to evaluate ecosystem effects of flow changes resulting from the management of Libby Dam. Ecosystem components evaluated by the project include insects, birds,

riparian vegetation and effects on these arising from changes in flow quantity, timing and duration.

- Kootenai River Ecosystem Improvement Project – The purpose of this project is to evaluate the effects of nutrient additions on aquatic species in the Kootenai River. Studies related to this project address all trophic levels including fish, macroinvertebrates, phytoplankton, algae and zooplankton. Nutrient additions are being implemented in response to hyper-oligotrophic (very low nutrient) conditions that are caused by Libby Dam intercepting nutrients and sediments. The project is focused on finding ways to address the effects of low nutrients on primary productivity in the ecosystem with the goal of ultimately improving the food web in the Kootenai River ecosystem.

- 10-Year Model Tributary Watershed Project – The 10-year Model Tributary Watershed Project, funded by the Bonneville Environmental Foundation, is intended to restore riparian and aquatic habitat along selected tributaries within the Kootenai River floodplain. One important aspect of the project is collaboration with floodplain landowners to restore ecosystem function in portions of the Meander Reach floodplain (downstream of the proposed action).

- Kootenai River Floodplain Reconnection Project – The Kootenai River Floodplain Reconnection Project is intended to restore hydrologic connection between the mainstem Kootenai River and selected floodplain areas. Currently, a pilot reconnection project is being designed for the Ball Creek area. The Kootenai River Valley Wetlands and Riparian Conservation Strategy (KTOI 2004) identified significant wetland losses due to agricultural conversion in the floodplain, and the Floodplain Reconnection Project is intended to demonstrate the potential of restoring some of this wetland area.

- Native Fish Conservation Aquaculture Project – The Kootenai Tribe currently operates a Kootenai sturgeon hatchery just downstream from Bonners Ferry. To enhance this species restoration effort, the Tribe proposes to construct another hatchery approximately seven miles upstream of Bonners Ferry at the confluence of the Moyie River and the Kootenai River[1]. This new hatchery will produce Kootenai sturgeon and native burbot. The intent of the aquaculture program is to sustain populations of these species (prevent functional extinction) as part of an integrated ecosystem restoration program where the ultimate goal is to overcome factors that are limiting recruitment and survival of these species.

1.3 Project Purpose and Objectives

The purpose of the Braided Reach 1 – Phase 1 projects is to address significant bank erosion in Braided Reach 1 that is contributing to sediment loading and degradation of Kootenai sturgeon spawning habitat downstream. Reducing erosion by installing bank structures and vegetation will also benefits aquatic habitat by increasing overhanging bank cover, shade and channel margin complexity that would improve habitat for other listed species, such as bull trout, and

[1] The ISRP approved the Tribe's Step 1 Master Plan for this program in August 2010.

species preyed upon by bull trout. These actions are needed to improve ecosystem function in the Kootenai River, and in particular to aid Kootenai sturgeon recruitment. Recruitment is thought to be very near zero due to a combination of factors, one of which is siltation of rocky substrate downstream in existing and potential spawning areas.

Specific objectives of the KRHRP, Braided Reach 1 – Phase 1 include:

- Establishing channel dimensions that are sustainable given the morphological setting, governing flow and sediment regime (this strategy applies to Phase 1 side channel restoration)
- Reducing fine sediment recruitment and increasing the ability of the floodplain to store sediment
- Reducing side channel high flow capacity and increasing access to floodplain surfaces
- Placing instream and bank structures to improve habitat conditions, reducing stream bank erosion, and facilitating vegetation recovery
- Restoring native vegetation along streambanks and in floodplain areas, resulting in a complex, multi-structured native plant community and riparian buffer with a mosaic of age classes and hydrologic regimes
- Using structures to create a narrower effective channel and creating places behind these structures where sediment can be stored, building a floodplain surface (in Phase 1, this strategy applies to side channel restoration)

2 Evaluation Methods

2.1 Analytical Framework Used

2.1.1 Restoration Strategy

Several limiting factors have been identified in Braided Reach 1 that are described in detail in the Master Plan (KTOI 2009). As part of defining the Braided Reach 1 – Phase 1 projects, three limiting factors were selected based on their direct relationship to Kootenai sturgeon habitat needs described in the 2008 Biological Opinion. These limiting factors include high levels of fine sediment supply from eroding river banks, lack of pool habitat, and insufficient channel depth. The Master Plan identified a restoration strategy in the Braided Reaches focused on establishing channel dimensions that are sustainable given the morphological setting, regulated hydrologic regime, and sediment regime. The strategy is to gradually reduce sediment supply and transport competence in a downstream direction and to promote sediment deposition on the floodplain. A new floodplain would be constructed that would be connected to the channel during average annual peak flows. The floodplain would be revegetated in a way that results in a complex, multi-structured native plant community with a mosaic of age classes and hydrologic regimes.

Because natural processes that normally form instream habitat for focal species are not currently functioning appropriately in the Braided Reaches, the restoration strategy also includes installing instream and bank structures that would function as habitat for aquatic species in the short term, providing cover and scour-pool forming features. Over the long term, as riparian and wetland plant communities develop on the floodplain and along stream banks, natural processes would result in large and coarse wood being recruited into the river channel, providing ingredients for future aquatic habitat like woody debris jams, buried logs and the pools that would result from this addition of complex hydraulic components. Further, stabilizing side channels and restricting side channel flow with large wood, riparian vegetation, and other bio-engineered floodplain features, would focus additional flow in the mainstem channel where depth would be increased. Table 1 summarizes the restoration strategy in Braided Reach 1, listing limiting factors, how Phase 1 restoration treatments address limiting factors, and what focal species and life stages are addressed.

Table 1. Summary of aquatic habitat limiting factors addressed by Braided Reach 1 – Phase 1, restoration treatments.

Key Aquatic Habitat Limiting Factors Affecting Braided Reach 1	Restoration Treatments that Address Limiting Factor	How Limiting Factor is Addressed by Phase 1 Design	Focal Species & Life Stages Addressed
Lack of cover for juvenile fish	• Wood placement • Floodplain construction • Bank re-grading • Engineered log jams • Revegetation	Wood elements will provide cover at most flows in main channel and side channels. Increased floodplain area and vegetation will provide cover during high flows and some during lower flows. Reduction of fine sediment inputs will increase interstitial microhabitats.	Bull trout, westslope cutthroat trout, redband rainbow trout, and kokanee salmon adult and juveniles
Lack of pool riffle complexity	• Wood placement • Floodplain construction • Engineered log jams • Revegetation	A combination of wood placement, construction of floodplains and establishment of riparian and floodplain vegetation along banks will help address the lack of aquatic habitat complexity. Bank vegetation will provide near bank habitat, provide shade and promote development of pool habitat, in addition to providing hiding cover for fish.	Burbot, bull trout, westslope cutthroat trout, redband rainbow trout, kokanee salmon adult and juveniles
Simplified food web from lack of nutrients	• Wood placement • Floodplain construction • Bank re-grading • Engineered log jams • Revegetation	The combination of wood placement, construction of floodplains and establishment of riparian and floodplain vegetation along banks, will increase the exchange of nutrients between the river and floodplain.	Sturgeon, burbot, bull trout, westslope cutthroat trout, redband rainbow trout, kokanee salmon adult and juveniles
Insufficient pool frequency	• Wood placement • Engineered log jams	Wood placement along the main channel and within side channels may result in increased pool frequency.	Sturgeon, burbot, bull trout, westslope cutthroat trout, redband rainbow trout, kokanee salmon adult and juveniles

Key Aquatic Habitat Limiting Factors Affecting Braided Reach 1	Restoration Treatments that Address Limiting Factor	How Limiting Factor is Addressed by Phase 1 Design	Focal Species & Life Stages Addressed
Lack of off-channel habitat for rearing	• Engineered log jams • Floodplain construction	Side channel restoration treatments will increase complexity of potential off-channel rearing habitats.	Limited potential use of Braided Reach 1 for rearing.
Altered water quality	• Wood placement • Floodplain construction • Bank re-grading • Engineered log jams • Revegetation	Reduced bank erosion will reduce suspended sediments	Sturgeon, burbot, bull trout, westslope cutthroat trout, redband rainbow trout, kokanee salmon adult and juveniles
Insufficient depth for Kootenai sturgeon migration preference	• Wood placement across side channel entrances	Phase 1 projects will have minimal effect on this limiting factor. Narrowing the effective channel width will increase stream power, encouraging transport of bed materials, and potentially scouring a deeper thalweg.	Migrating adult sturgeon
Insufficient velocity for Kootenai sturgeon spawning preference	• Wood placement across side channel entrances	Phase 1 projects will have minimal effect on this limiting factor. Narrowing the effective channel width will increase stream power, encouraging transport of bed materials, and potentially scouring a deeper thalweg.	Spawning adult sturgeon

Source: KTOI 2010

2.1.2 Design Process

The following process was used to design projects in Braided Reach 1 guided by the overall restoration strategy described above. Based on the Master Plan analysis, preliminary concepts were developed for Phase 1 projects in late 2009. To refine the specific components, the Tribe convened a peer review advisory team (PRAT) workshop in December 2009. The PRAT is a multidisciplinary team of international and regional experts in river restoration, engineering and geomorphology, sturgeon, and riparian ecology. Using the Tribe's recommendations as a starting point, the PRAT was asked to identify critical feasibility issues and develop initial recommendations to support an alternatives evaluation and preliminary design. The results of the December workshop were, in turn, presented to federal agency partners and fishery co-managers (BPA; Corps; USFWS; Idaho Department of Fish and Game; Montana Fish, Wildlife and Parks; and BC Ministry of Environment) for input at a workshop in January 2010. In February 2010, the Tribe initiated feasibility analysis and preliminary design based on feedback from these workshops. This feedback guided development of the proposed Phase 1 design described in this BA.

2.1.3 Scientific and Technical Basis for Design

The initial basis for selection of restoration treatments to address limiting factors in the Kootenai River is described in the Master Plan (KTOI 2009). The restoration treatments identified in the Master Plan were selected based on analysis of limiting factors in the Kootenai River subbasin,

while also taking into account the constraints of existing conditions; knowledge gained from project contractors with experience implementing treatments in other river and floodplain habitat restoration projects; reviews of available literature, publications, and studies of the project area; input and professional opinion provided by an interdisciplinary group of technical experts, regional fish biologists and co-managers; and the following technical and biological information included in the Master Plan appendices:

- Hydraulic modeling of a range of pre- and post-dam discharge conditions
- Analysis of sediment transport characteristics using measured bedload and suspended sediment data
- Evaluation of existing vegetation conditions using field data
- Review of biological information pertaining to recruitment failure hypotheses for Kootenai sturgeon and life stage history and behavior for other focal species
- Investigation of the morphological departure between existing and historical river conditions

The scientific and technical basis for design of the Braided Reach 1 – Phase 1 restoration projects are described thoroughly in the Kootenai River Habitat Restoration Project Braided Reach 1 – Phase 1, Feasibility Analysis and Preliminary Design document (KTOI 2010). In summary, several key scientific and technical issues were evaluated during the design process, focusing on how hydrology, hydraulics, sediment transport, geomorphic processes, vegetation processes, and characteristics of aquatic habitat for a range of focal species may be integrated to address limiting factors in Braided Reach 1 to support the restoration concepts described in the Master Plan (KTOI 2009).

2.2 Information Gathering

Extensive data collection, analysis and modeling work has been completed over the last 20 years of Kootenai River conditions by a host of collaborating agencies, private sector scientists, and academic researchers, providing information on Kootenai River hydrology, sediment transport, water quality, historical conditions, sturgeon life history and habitat requirements, and the overall aquatic biological community of the Kootenai River. These efforts laid the groundwork for the Master Plan restoration framework used to guide the Braided Reach 1 – Phase 1 restoration project. These foundational data collection and analysis activities are described in detail in Section 1.2 of the Master Plan (KTOI 2009). Additional information collected to support the Phase 1 design includes:

- Topographic land survey data was defined using survey grade global positioning survey equipment to refine top and bottom of project streambanks, general terrace spot elevations and confirm LiDAR data accuracy. The survey data was merged with the LiDAR terrain model to more accurately capture project topography and provide the basis for design conditions.
- Wetland mapping of Phase 1 project areas has been completed.

- Geotechnical data from USDA Soil Surveys and USGS stratigraphy publications has been reviewed and on-site inspection of channel, bankline and floodplain conditions conducted.

- Stream bed sediment data was obtained through USGS bedload measurements, Wolman pebble counts and in-stream videography.

- Bankline stratagraphic characterization was performed as a component of the Bank Erosion Hazard Index analysis. Bank erosion has been measured at 10 sites in the Braided Reaches since 2007 by USGS. Bank erosion is measured twice per year following winter power augmentation flows and the spring freshet using survey grade GPS units. An additional six sites were added in the Phase 1 project areas in February 2010 in order to collect two years of pre-project baseline data. In addition to bank erosion measurements, BEHI ratings (Rosgen 2006) are available for the banks in the Braided Reaches.

- Hydrologic modeling is based on a revision of the Kootenai River terrain surface with the 2009 multi-beam bathymetric data and 2005 terrestrial LiDAR data. The one-dimensional model has been integrated with sediment information obtained from physical measurements, gage data, and USGS sampling efforts to develop a sediment transport routing model. This model will be used to evaluate aggradation and degradation within the system and ascertain overbank deposition and floodplain development. The one-dimensional hydraulic and sediment transport model will be used through the design phase to bracket the final treatment dimensions, locations and elevations. When this effort has been completed, the design will be evaluated with the International River Interface Cooperative (iRIC) Multidimensional model to verify project hydraulic performance including localized depth, shear and velocity, and to identify any final design modifications. The iRIC model will provide greater detail of specific project element effects on the flow field and applied hydraulic forces relative to individual structures.

3 Description of the Project Area and Action Area

3.1 Action Area (Braided Reach 1)

This project is proposed on the Kootenai River in Boundary County, Idaho (Figure 1), in Township 62 North, Range 2 East, Sections 21 and 28 (Phase 1a) and Sections 19 and 20 (Phase 1b). The Phase 1 action area is referred to as Braided Reach 1 of the Kootenai River and includes two distinct sites: Phase 1a (between RM 158 and 159) and Phase 1b (between RM 156 and 157) (Figure 1). Braided Reach 1 extends nearly four river miles (RM 160.9 to RM 156.2) from the Moyie River confluence downstream to the upstream extent of the backwater influence from Kootenay Lake.

The action area includes all areas to be affected directly or indirectly by the proposed federal action and not merely the immediate area involved in the action (50 CFR 402-02). For specific construction-related impacts, the action area is defined as a 0.5-mile radius around each Phase 1 construction site. For the purposes of evaluating potential increased turbidity due to instream

work, the action area encompasses each project site and reaches downstream to the end of the Braided Reach 1. It is anticipated that the action area is more than sufficient to encompass any minor and temporary short- or long-term impacts caused by project construction.

Implementing this project will involve numerous suppliers acquiring materials from outside the action area. Suppliers are obligated to comply with all applicable regulatory requirements in producing, extracting or acquiring these materials; therefore, sourcing of materials is not considered part of the proposed action.

3.2 Project Sites

Phase 1 consists of treatments at two project sites, Phase 1a (between RM 158 and 159) and Phase 1b (between RM 156 and 157). Phase 1a is on the right[2] bank of the mainstem Kootenai River and side channel on the right side of the river (Figure 2). Phase 1a also includes work on the mainstem Kootenai River left bank adjacent to a developing island/side channel feature. Phase 1b is on the right bank of the mainstem Kootenai River downstream of Phase 1a.

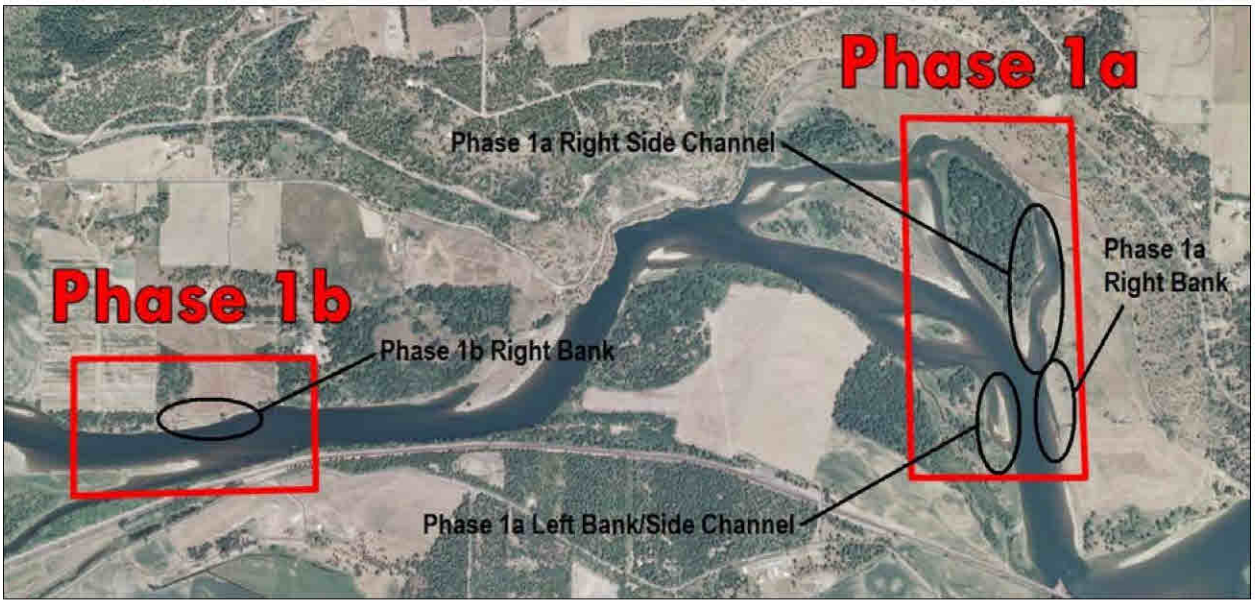


Figure 2. KRHRP Phase 1 vicinity aerial photo.

3.3 Existing Conditions

Existing conditions at each site are summarized in Table 2 below. The environmental baseline in the action area is discussed in detail in Section 6.0 (*Environmental Baseline Conditions in Relation to Species and Biological and Habitat Requirements*). In general, at each Phase 1 site the riverine habitat is of low complexity, riparian vegetation is of low structural diversity, woody vegetation is scare, and the banks are actively eroding and contributing fine sediment to the river. Additional details about each site are presented in Sections 3.3.1 and 3.3.2.

[2] River right and river left perspective is determined by looking in the downstream direction.

Table 2. Summary of existing conditions at Phase 1a sites.

Location	Existing Site Condition
Phase 1a - Kootenai River Right Bank	• Bank height corresponds to pre-dam floodplain elevation • Grazing results in a lack of bank vegetation • Fine soils and steep bank angles create unstable banks • Developing inset floodplain surfaces lack roughness, shelter, substrate and hydrology to support recruitment of native riparian plants
Phase 1a - Right Side Channel	• Side channel is enlarging due to right bank effects • Side channel lacks aquatic habitat complexity in the form of pools and bank cover
Phase 1a - Kootenai River Left Bank/Side Channel	• Stability of developing floodplain island is threatened by side channel enlargement
Phase 1b - Kootenai River Right Bank	• Bank height corresponds to pre-dam floodplain elevation • Grazing results in a lack of bank vegetation • Fine soils and steep bank angles create unstable banks • Developing inset floodplain surfaces lack roughness, shelter, substrate and hydrology to support recruitment of native riparian plants

3.3.1 Phase 1a Sites

The right bank Phase 1a project site is heavily grazed (see Photos 1 and 3), a use that effectively prohibits healthy riparian vegetation communities from becoming established. The dominant shrub present in this area is black hawthorne, which is resistant to grazing. The herbaceous understory is composed mostly of pasture grasses and annual or weedy forbs. As a result, approximately 0.75 miles of 10-foot-high banks are actively eroding at a rate greater than one foot per year, contributing fine sediment to the Kootenai River. Tension cracks are apparent at many locations along the bank line as the toe is undercut and the bank line is failing.

Photo 1. Looking upstream from the right side channel toward the Phase 1a main channel.

Photo 2. Phase 1a right side channel, looking upstream.

Photo 3. Phase 1a right side channel, looking downstream; Hideaway Island on left.

Photo 4. Phase 1a left side channel, looking downstream.

Right and left bank side channels in the Phase 1a area are capturing upwards of 15 percent of river flows at mean annual peak flow (approximately 30,000 cfs). In this reach, the mainstem Kootenai River is an extended glide feature (Photo 1) with an adverse or flat thalweg gradient, exhibiting a width-to-depth ratio of about 50 at 30,000 cfs (500-foot bankfull width and 10-foot mean depth). Because the side channels are carrying a significant portion of the total flow, stream power is reduced in the main channel. The side channel on the right side of the Kootenai River is active at all flows (Photos 2 and 3), but the left side channel is active at flows above approximately 5,000 cfs (Photo 4). The right side channel varies in width from 90 to 250 feet and the left side channel is between 90 and 120 feet wide. Depositional features appear to be forming along the main channel margins, and riparian vegetation is establishing on surfaces that correspond with approximately the 20,000 cfs river stage elevation. These features appear to be forming in association with large woody debris deposits.

Relatively undisturbed natural plant communities are present on the islands at the Phase 1a site because they are largely protected from intensive livestock grazing (side channel flows create a seasonal livestock barrier). The island created by the right side channel is part of the BLM-managed Hideaway Islands complex and is a Research Natural Area, designated for its high quality example of the black cottonwood/red-osier dogwood vegetative community type (Hansen et al. 1995).

The island created by the left side channel is a lower elevation feature and the plant community is an early successional stage of the black cottonwood/red-osier dogwood community type (Photo 4). On the downstream end of the island, a more recently developed depositional surface supports a sandbar willow community type. Adjacent vegetation on the left bank of the Kootenai River is also the black cottonwood/red-osier dogwood community type with inclusions of wetland features such as side channels, sloughs, and emergent wetland areas. Vegetation will be described in more detail in a wetland delineation report to be completed in September 2010.

3.3.2 Phase 1b Site

The Phase 1b site is composed of steep, non-vegetated eroding river banks (Photo 5). The banks lack vegetation in some areas due to livestock grazing. The Phase 1b bank condition is susceptible to erosion due to three factors, including a high bank that is nearly vertical, lack of riparian vegetation, and lack of erosion resistant material at the toe of the bank. As a result, these banks (approximately one-quarter of a mile long) are actively eroding at a rate greater than one foot per year, contributing fine sediment to the Kootenai River. The Kootenai River channel at the Phase 1b site is a run/developing pool feature and exhibits a width-to-depth ratio of about 70 (700-foot bankfull width and 10-foot mean depth). This reach has experienced little geomorphic adjustment over time other than bank line disturbance from the Trans Canada gas pipeline crossing, the BNSF railway alignment on the south bank, and the active streambank erosion occurring on the north bank.

Photo 5. Phase 1b right river bank typical condition.

4 Description of the Proposed Action

4.1 Project Design

4.1.1 Phase 1a Design

The Phase 1a project will implement treatments at three distinct locations in close proximity to one another: the 1,900-foot-long side channel (river right); a 1,050-foot-long segment of the Kootenai River mainstem river bank (river right); and an 800-foot-long Kootenai River mainstem river bank segment that includes a developing island/small side channel area (river left).

Other than ongoing bank erosion, limited geomorphic change is currently occurring within Braided Reach 1. The restoration approach in Phase 1a is to limit the amount of distributed energy through the multiple thread channel network and create floodplain surfaces that would facilitate deposition of fine sediments and encourage vegetation recruitment and floodplain development at two side channels, one on the right and one on the left side of the river (Figure 3). These actions will concentrate stream power within the active channel, aid in amplifying main channel scour, and create viable riparian and floodplain habitats to replace highly active eroding streambanks. The proposed treatments will contribute to establishing stable, low capacity side channels that add peripheral habitat complexity.

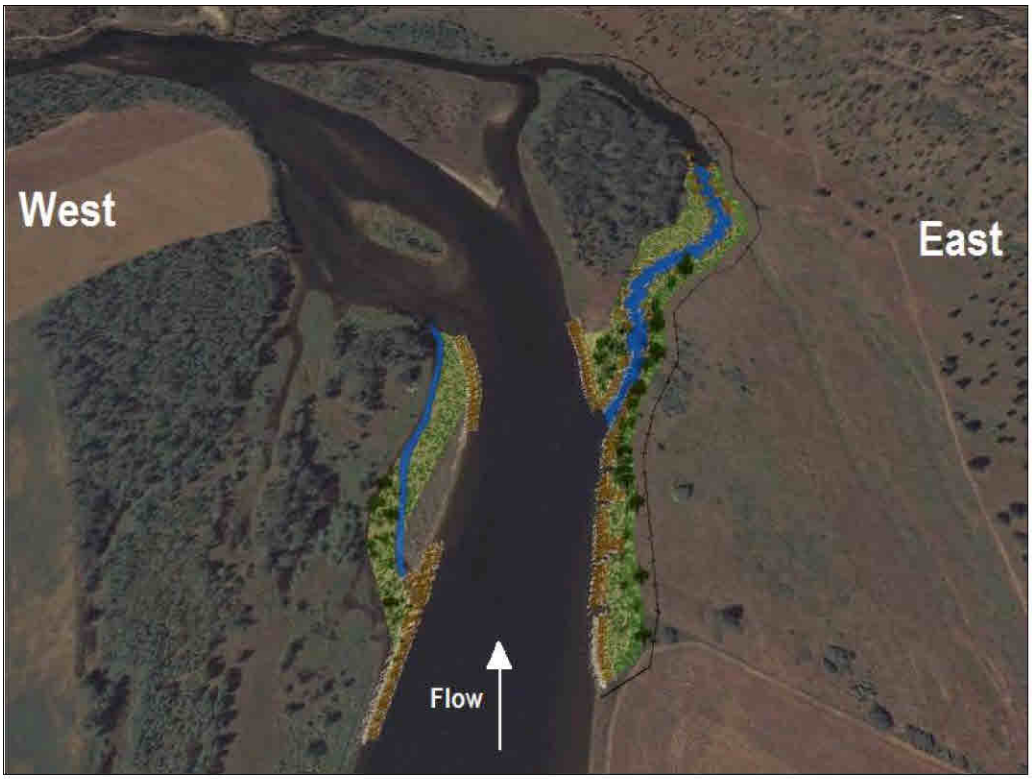


Figure 3. Phase 1a post-restoration condition.

The Phase 1a concept includes the following elements:

- Build on natural bank and floodplain-forming processes that are currently in progress within the Phase 1a reach.
  - Extend currently developing depositional features by adding large wood complexes and gravel/cobble that match the natural gradation in these depositional features.
  - Integrate large wood complexes and streambank bioengineering into the floodplain and lower banks at a range of elevations sufficient to trap and store sediment at variable flows.
- Concentrate flows in the main channel between these constructed streambank and floodplain features, activating the left side channel when the river stage is above 20,000 to 30,000 cfs (depending on the location along the constructed bank). At lower flows, the side channel will be connected to the Kootenai River from the downstream end; however, the constructed floodplain features will be porous, allowing some interstitial flow into the side channel.
  - Restoring the banks and creating floodplain surfaces would result in more energy focused in the active channel rather than enlarging the existing, degrading side channels.
  - Sediment deposition outside the banks would build a floodplain surface and create conditions where riparian vegetation and wetland features can become established, adding more stability to channel margins over the long term, resulting in conditions that may contribute to sustaining depths and velocities more suitable for Kootenai sturgeon.

- Establish a functional floodplain with structural diversity.
  - Grade floodplain surfaces to establish vegetation micro-sites that would support recruitment of native plants.
  - Add wood and roughness elements to floodplain surfaces to store sediment and reduce near-bank flow energy.
- Regrade and revegetate steep eroding banks along the side channels.
- Modify land management within a buffer along the banks on the right side of the river.
  - Install a riparian buffer fence to exclude livestock from grazing riparian vegetation at the Phase 1a right bank, right side channel, and Phase 1b sites.

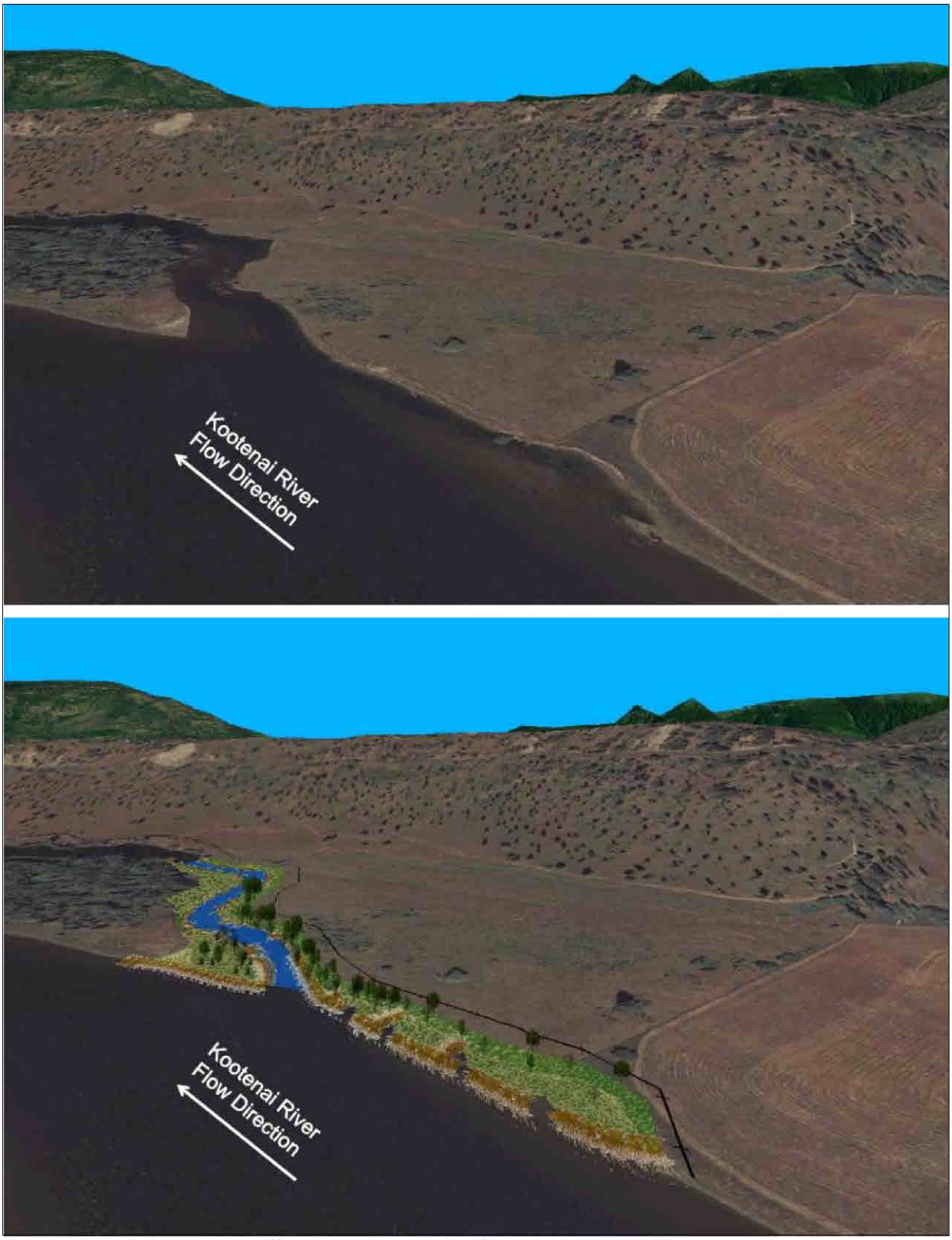
Specific treatment descriptions for the right bank side mainstem, right bank side channel, and left bank mainstem and side channel follow (see Appendix A for detailed project plans).

4.1.1.1 Phase 1a Main Channel Right Bank Restoration

The Phase 1 restoration plan for the Kootenai River right bank is presented in Appendix A, Drawing 3.3, and features 1,050 feet of restoration treatments along an exposed gravel bar adjacent to a steep eroding bank. Measures include streambank restoration, floodplain construction and habitat improvement using bioengineering techniques and large wood placement (Figure 4). Right bank treatments are divided into lower elevation and upper elevation bank treatments. In general, lower elevation bank restoration treatments address the riparian area below the water surface elevation when it is at about 30,000 cfs, and upper elevation bank restoration treatments address the upland area above this level. Proposed treatments will create conditions that increase channel margin roughness, promote floodplain accretion, and support the establishment of riparian vegetation on re-graded banks.

<u>Lower Elevation Bank Large Wood Placement</u>

The lower elevation bank will be restored by constructing a wood reinforced low bank line approximately 50 feet from the existing, eroded bank line toe (Appendix A, Drawing 3.6). The area between the wood placement and the existing bank line will be filled with material generated during wood foundation preparation and spoil from bank line shaping. This treatment will narrow the width of the Kootenai River at this location by 10 to 15 percent when flows are less than about 20,000 cfs. Flows greater than 20,000 cfs will overtop the large wood treatment and inundate the constructed floodplain surface between the wood and the right bank, encouraging fine sediment deposition and riparian vegetation recruitment. In addition to longitudinal large wood placement, perpendicular large wood will be placed at three locations to reduce flow velocity against the right bank at flows greater than 20,000 cfs. This measure will encourage sediment storage in these locations.



Note: top image is the existing condition; bottom image depicts the post-treatment condition.

Figure 4 Phase 1a right bank and side channel concept, before and after treatment.

Lower Elevation Bank Floodplain and Microtopography Creation

The area between an existing gravel bar and the right bank will be backfilled up to the modeled 20,000 cfs water surface elevation using excavated bank material and additional large wood as summarized below. Backfill material will be generated during foundation preparation for large wood installations and from bank regrading. Lower elevation bank floodplain microtopography will be created through passive restoration (natural accumulation of sediment that is a physical response to the placement of large wood described above), and the active creation of complex floodplain surfaces by placing and shaping excavated upper elevation bank materials.

Large wood placed along the lower bank area will create roughness elements that promote the accumulation and deposition of sediments. As these depositional surfaces form, natural processes (geomorphic disturbance, overflow events) will create a diverse surface that will have the appropriate elevation and substrate composition to promote the capture and germination of native riparian seeds.

In lower elevation bank areas where excavated material is available as a result of upper elevation bank treatment re-grading, floodplain surfaces will be created using backfilled material. These surfaces will be constructed to include micro-topography, and woody debris will be scattered throughout in order to provide roughness elements.

Lower Elevation Bank Revegetation

The revegetation strategy in lower elevation bank restoration areas is passive; surfaces are designed to encourage the establishment of native cottonwoods, willows and other riparian shrubs from seed that are naturally recruited from wind-blown or water-borne sources. This revegetation strategy depends on wood placement and microtopography treatments described above. Lower elevation bank restoration areas at slightly higher elevations will experience less-frequent scouring events, and some of these areas will be sufficiently protected so that cottonwoods and willows can survive winter and spring peak flows. These surfaces will trend toward the colonizing depositional cover type, composed of grasses, forbs, and young age-class willows and cottonwoods. Within lower elevation bank restoration areas, restoration cover types will have shifting boundaries in the first years after project implementation, depending on annual flow levels, scouring events, and duration of flow inundation. These surfaces can be expected to transition between exposed depositional and colonizing depositional cover types initially, after which some areas will develop into the older age class cottonwood shrub and riparian shrub cover types.

Upper Elevation Bank Restoration

Upper bank restoration treatments address the right bank area above the 30,000 cfs water surface elevation from the toe of the existing bank up to the top of the bank. Three re-grading methods will be applied to banks within the Phase 1a project area, each designed to be applied to distinct slope categories as well as any floodplain surface constraints (see Appendix A, Drawing 3.5).

Upper Elevation Bank Treatment 1

This treatment will be applied where bank slopes are currently 1.5:1 to 3:1 and cannot be re-graded to a lesser slope due to constraints such as the presence of healthy, mature vegetation, private land ownership, or existing infrastructure. The restoration approach on these slopes focuses on limiting erosion by reinforcing the toe of the slope. Coir (coconut fiber) fascines will be installed along the toe of the slope to prevent undercutting and erosion. Fascines will be constructed of 16- to 20-inch high-density coir logs anchored into the slope toe with either cables attached to aluminum duckbill earth anchors, or wooden stakes and twine. A shallow trench will be excavated prior to coir log placement and logs will be positioned horizontally along the slope toe, with approximately half of their diameter exposed. If any excavation of the slope is performed, the excavated material will be placed at the toe of the slope, establishing a transition between the slope and lower elevation bank restoration treatments, such as vegetated soil lifts. This excavated material will be graded to establish surface roughness and microtopographic variation.

Upper Elevation Bank Restoration Treatment 2

Upper elevation bank restoration treatment 2 will be applied where bank slopes are currently between 1.5:1 and 3:1, or where it is possible to regrade steeper slopes to this lesser gradient. Slope toes will be stabilized by installing 16- to 20-inch diameter anchored coir logs. Additionally, 12-inch diameter low density coir logs will be anchored at 10-foot spacing along the slope length, effectively shortening the length. Compost and seed will be placed over the entire surface of the slope, and covered in biodegradable coir fabric to provide nutrients, moisture and slope stability in the short term so seeds can establish. Containerized shrub and tree species will be planted through the coir fabric in order to establish woody species that have sufficient root mass to provide long-term slope stability. Planting methods for installed trees and shrubs will mirror techniques described in the revegetation section below.

If excavation is required, excavated material will be used in two ways. In areas where lower elevation bank treatments consist of engineered large wood structures, excavated material will be used to create microtopography floodplain surfaces (described above). This material will be graded to create surface roughness, with large woody debris scattered throughout to encourage sediment deposition and natural recruitment of vegetation. Alternatively, the material will be used for vegetated soil lift treatments described for the right side channel restoration at the Phase 1a site (see Section 4.1.1.2).

Upper Elevation Bank Restoration Treatment 3

The restoration approach for 3:1 (or more gradual) slopes focuses on revegetation and creating microtopographic variation to support a long-term riparian vegetation community. The desired long-term outcome is to establish a cottonwood forest and mixed conifer forest cover type. Excavated soil from re-grading will be used as described above.

<u>Upper Elevation Bank Microtopography Treatment</u>

Microtopography treatments will create surface roughness, and along with large woody debris, will create microsites to support diverse vegetation. This treatment will foster conditions that

trend toward mature cottonwood and mixed conifer forest types throughout the project area. Excavation will create an uneven surface, consisting of approximately six-inch variations in the graded surface. Smaller woody debris will be scattered across the surface, while larger woody debris will be partially buried, creating roughness elements, microsites, and stimulating development of soil organisms. Microtopography efforts will follow any necessary slope excavation and precede the revegetation treatments.

Upper Elevation Bank Revegetation

Revegetation treatments along the upper elevation bank will focus on establishing a diverse mix of riparian shrub and tree species. The goal is to establish riparian shrub, mature cottonwood and mixed conifer forest restoration cover types. Table 3 provides a list of species that are currently being grown in nurseries for installation in Phase 1a project areas. These species were identified as suitable for revegetation based on the physical and geomorphological conditions of the Phase 1a upper elevation right bank area. Detailed planting specifications will be developed as part of final design to ensure proper installation to maximize success. Installed plants will additionally require treatments in order to address weed competition and browse pressures. Weed competition will be reduced by installing brush blankets and browse pressure will be addressed by installing browse protectors.

Table 3. Riparian shrub and coniferous tree species to be planted as part of Phase 1a upper elevation right bank revegetation.

Species	Common Name
Trees	
Pinus ponderosa	ponderosa pine
Populus tremuloides	quaking aspen
Populus trichocarpa	black cottonwood
Betula papyrifera	paper birch
Pseudotsuga menziesii	Douglas-fir
Pinus contorta	lodgepole pine
Shrubs	
Salix exigua	sandbar willow
Salix bebbiana	Bebb willow
Crataegus douglasii	black hawthorne
Alnus incana (tenuifolia)	mountain alder
Cornus sericea	red-osier dogwood
Rosa woodsii	Wood's rose
Symphoricarpos occidentalis	snowberry
Amelanchier alnifolia	western serviceberry
Prunus virginiana	chokecherry

Upper Elevation Bank Riparian Fencing

Fencing will be installed to support restoration treatment goals by eliminating browse pressure from nearby livestock, and preventing the over-compaction of floodplain materials that result from constant livestock traffic (see Appendix A, Drawing 3.3). Limiting these pressures will provide an environment where revegetation efforts have the greatest likelihood of success. Browse exclosure fencing will be constructed at a height that prohibits entry by cattle, and will be left intact for a time period sufficient to allow establishment of healthy riparian vegetation. Specific construction criteria for fence installation will be determined during final design process.

4.1.1.2 Phase 1a Right Side Channel Restoration

The restoration plan for the right side channel is presented in Appendix A, Drawing 3.4, and includes 1,900 feet of treatment in an existing side channel. Restoration treatments will address side channel aquatic habitat conditions by creating pool habitat, improving bank cover, and enhancing hydraulic complexity. These treatments include installing bank structures, constructing floodplain surfaces, revegetating floodplain surfaces and modifying side channel geometry by controlling the inlet flow capacity from the mainstem Kootenai River channel. Bank structures will be installed along the margins of the existing base flow water surface in the side channel in order to narrow its effective width. Modifying the side channel bed is not part of the restoration plan. Components of the right side channel treatments are described in more detail below.

Right Side Channel Large Wood Placement

Engineered large wood structures will be constructed primarily along the outer bends of the side channel alignment in order to induce turbulence, create lateral scour pools and dissipate or redirect flow energy on an outer meander bend. Engineered large wood structures will also be used along the margins of the side channel entrance to control the inlet capacity by reducing its effective geometry. These measures will increase the availability of pool habitat and provide overhanging bank cover. Short-term structure performance depends on placement within a sequence of other bank structures described in the following sections. Long term, the structure will decompose and/or become abandoned and buried in the floodplain as the side channel migrates across the floodplain.

Engineered large wood structures consist of tiers or decks of logs buried in the toe of the bank and projecting into the channel. Large wood structures will be constructed by excavating a foundation to an elevation of maximum scour depth. Logs will then be placed and alternating decks of logs will be racked successively until the structure is constructed to its finished grade. Logs will be pinned and ballasted to counteract the forces of drag and buoyancy.

Side channel large wood structures will be approximately 50 feet long (parallel to the bank line) and approximately 30 feet wide. The structure will project laterally up to 20 feet into the 80-foot-wide side channel; the remainder of the structure will be buried in the bank. Each structure will consist of 40 logs, half of which will include a minimum 6-foot-diameter rootwad. Logs

will be 30 to 35 feet long, 10 to 27 inches in diameter, and will be placed in four to six decks (see Appendix A, Drawing 3.9).

Right Side Channel Vegetated Soil Lifts

Vegetated soil lifts are a revegetation and bank construction technique that combines layers of dormant willow, alder and cottonwood cuttings with fabric-wrapped soil to revegetate and stabilize stream banks and slopes. As cuttings take root and mature, they provide a natural seed source for colonizing depositional surfaces. Vegetated soil lifts will be used in areas where bank vegetation is desired immediately, but natural recruitment and native shrub regeneration is not likely to occur naturally due to steep, unstable banks. Vegetated soil lifts will be constructed along outer meander bends of the right bank in this side channel (see Appendix A, Drawing 3.4).

Vegetated soil lifts will be constructed on a stable toe or bench of imported cobble or logs, and will be constructed by wrapping soil within two layers of biodegradable coconut fiber (coir) fabric. The fabric acts to hold the soil in place while vegetation becomes established in the relatively high stress land/water interface. The face of each soil lift layer will be reinforced with a biodegradable coir log or other suitable material to help maintain the lift shape, keep fine soil particles from filtering out through the lift face, and maintain surface tension. To aid the process of natural vegetation recruitment, dormant willow, alder, and dogwood cuttings will be placed beneath, and between, each soil lift layer. Soil lifts will be tied into existing channel structures where feasible. These concepts are illustrated in Appendix A, Drawings 3.7 and 3.8.

Right Side Channel Floodplain Construction and Microtopography Treatment

The area between the newly constructed side channel banks and the existing side channel banks will be backfilled up to a range of elevations corresponding to the modeled 20,000 to 30,000 cfs water surface elevations. It will be filled with excavated bank material and additional large wood as previously discussed for floodplain and microtopography treatments. Backfill will be generated during bank structure foundation preparation and bank regrading.

Wood will be placed and microtopography established on constructed floodplain surfaces in the side channel to create roughness elements that promote the storage of fine sediments. As these depositional surfaces form, natural processes (geomorphic disturbance, overflow events) will create a diverse surface that will have the appropriate elevation and substrate composition to promote the capture and germination of native riparian seeds.

Right Side Channel Revegetation

Revegetation approaches along the right bank of the right side channel will include natural recruitment of cottonwoods and willows from seed, and installed plantings. In depositional areas that lie adjacent to engineered large wood structures, revegetation will result from natural recruitment on surfaces linked to microtopography and wood placement. Beneath vegetated soil lift structures, depositional surfaces may be revegetated with containerized plantings of riparian shrub species.

On lower elevation bank restoration areas adjacent to vegetated soil lifts, containerized plants will be installed to establish a riparian shrub zone that is more resilient to geomorphological

disturbances and overflow events. The restoration goal in these areas is to immediately establish the riparian and cottonwood shrub zones that typically develop over time in natural depositional areas. By establishing these vegetated surfaces, the vegetated soil lifts (and the banks that they protect) will be buffered from erosional processes as mature vegetation becomes established.

Revegetation efforts along the left bank of the right side channel will consist primarily of passive treatments designed to encourage the establishment of native cottonwoods, willows and other riparian shrubs from seed. These efforts are directly linked to wood placement and microtopography treatments. Wood placement along the lower elevation bank area will establish roughness elements that promote the accumulation and deposition of sediments. As these depositional surfaces form, natural processes (geomorphic disturbance, overflow events) will create a diverse surface with the appropriate elevation and substrate composition to promote the capture and germination of native riparian seeds.

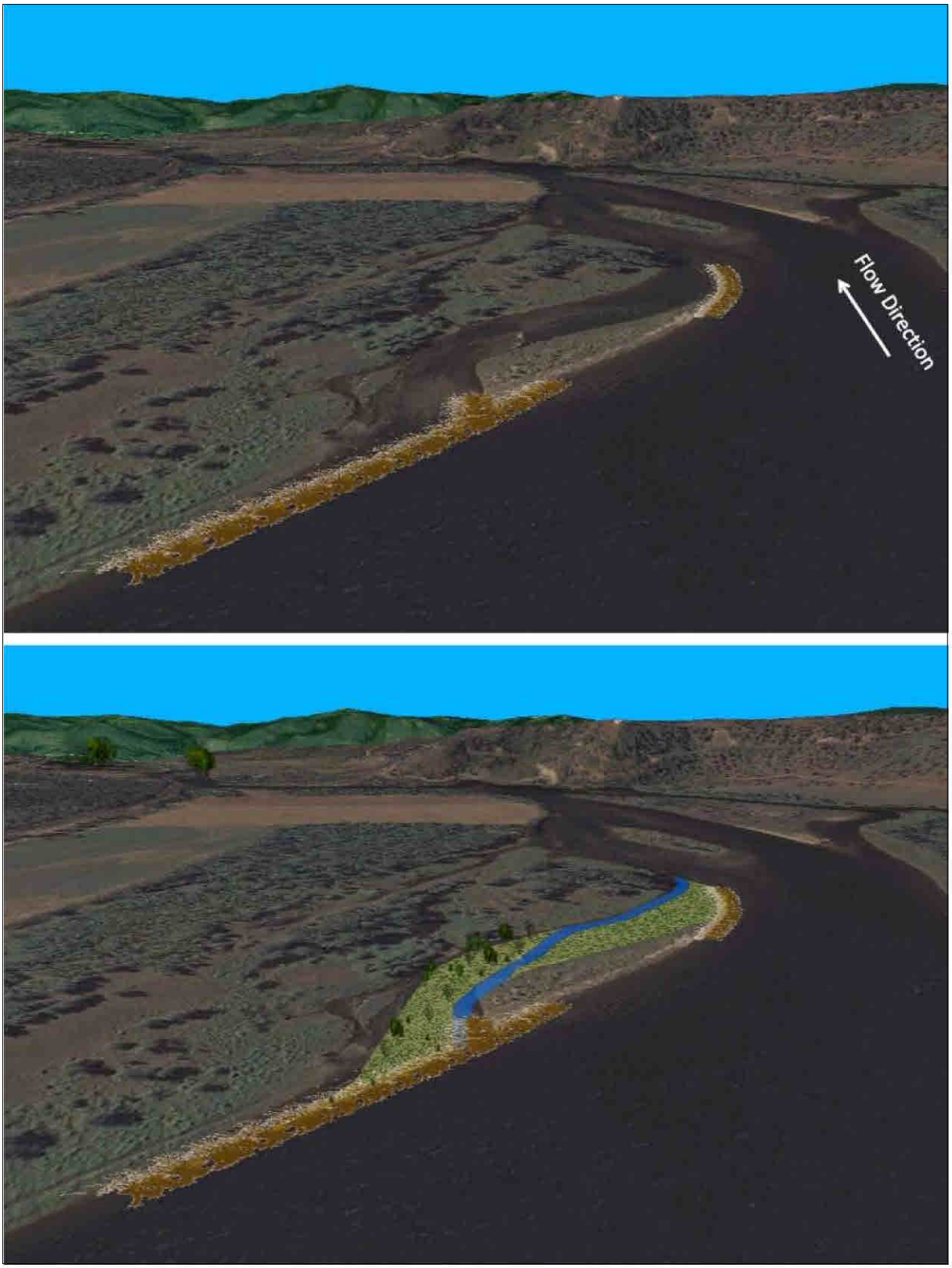
4.1.1.3 Phase 1a Left Bank/Side Channel Restoration

The Phase 1a restoration plan for the Kootenai River left bank is illustrated in Appendix A, Drawing 3.2, and includes 800 feet of restoration treatments upstream and downstream of a developing floodplain island that is threatened by enlargement of a small side channel. Proposed bank restoration treatments will create site conditions that increase channel margin roughness, promote floodplain accretion, protect developing floodplain vegetation and enhance off-channel wetlands in side channel backwater habitats.

Left Bank/Side Channel Large Wood Placement

Treatments will consist of engineered wood structures placed at the side channel inlet, limiting flow between the left bank and the island that has formed in the main channel (see Figure 5 and Appendix A, Drawing 3.6). Structures will be designed to allow flows greater than 20,000 cfs into the side channel, which will reduce stress on vegetation developing on the island. Currently the river flows through the side channel at flows higher than 5,000 cfs. Under the restored condition, flows greater than 20,000 cfs will overtop the large wood at the upstream end and flow between the left bank and the island. Flows less than 20,000 cfs will remain in the main Kootenai River channel; however, water will enter the side channel from the open downstream end, thus creating a non-flowing backwater habitat. The large wood structures will be porous to allow interstitial flow and seepage into the side channel at very low velocities, reducing scour and enhancing deposition of fine sediments.

The large wood will also provide microsites where plants and seeds can grow in a protected environment, adding organic matter to the soil and promoting microbial activity to support soil development, and retaining moisture during drier parts of the growing season. As the vegetation becomes established, it will provide physical structure that resists erosion and helps control channel plan form. The large wood will provide overhead cover and velocity refugia for aquatic organisms, promoting macro-invertebrate production on the woody materials to enhance habitat conditions for aquatic organisms in the project reach.



Note: top image depicts existing condition with the addition of wood treatment; bottom image depicts the post-treatment condition.

Figure 5. Phase 1a left bank side channel concept.

As described previously, engineered wood structures will be constructed by excavating foundations to an elevation of maximum scour depth. Base members will be placed and alternating decks of large wood will be racked successively until the structure reaches design finish grade. At this site, member size will vary from 6- to 24-inches-diameter and 20 to 35 feet long. Large wood will be placed at a density of approximately one to two pieces per linear foot, resulting in a structure width (perpendicular to flow) of approximately 25 feet and height of 5 to 7 feet (some of which will be buried). Large wood will be anchored in a matrix of native alluvium, imported alluvium and brush in order to counteract buoyancy and drag forces.

Left Side Channel Revegetation

Revegetation in the left side channel will be passive treatments designed to encourage native cottonwoods, willows and other riparian shrubs to establish from seed. Wood placed at the side channel entrance will promote deposition at the upper end of the side channel, increasing the area with the appropriate elevation and substrate to recruit riparian vegetation.

4.1.2 Phase 1b Design

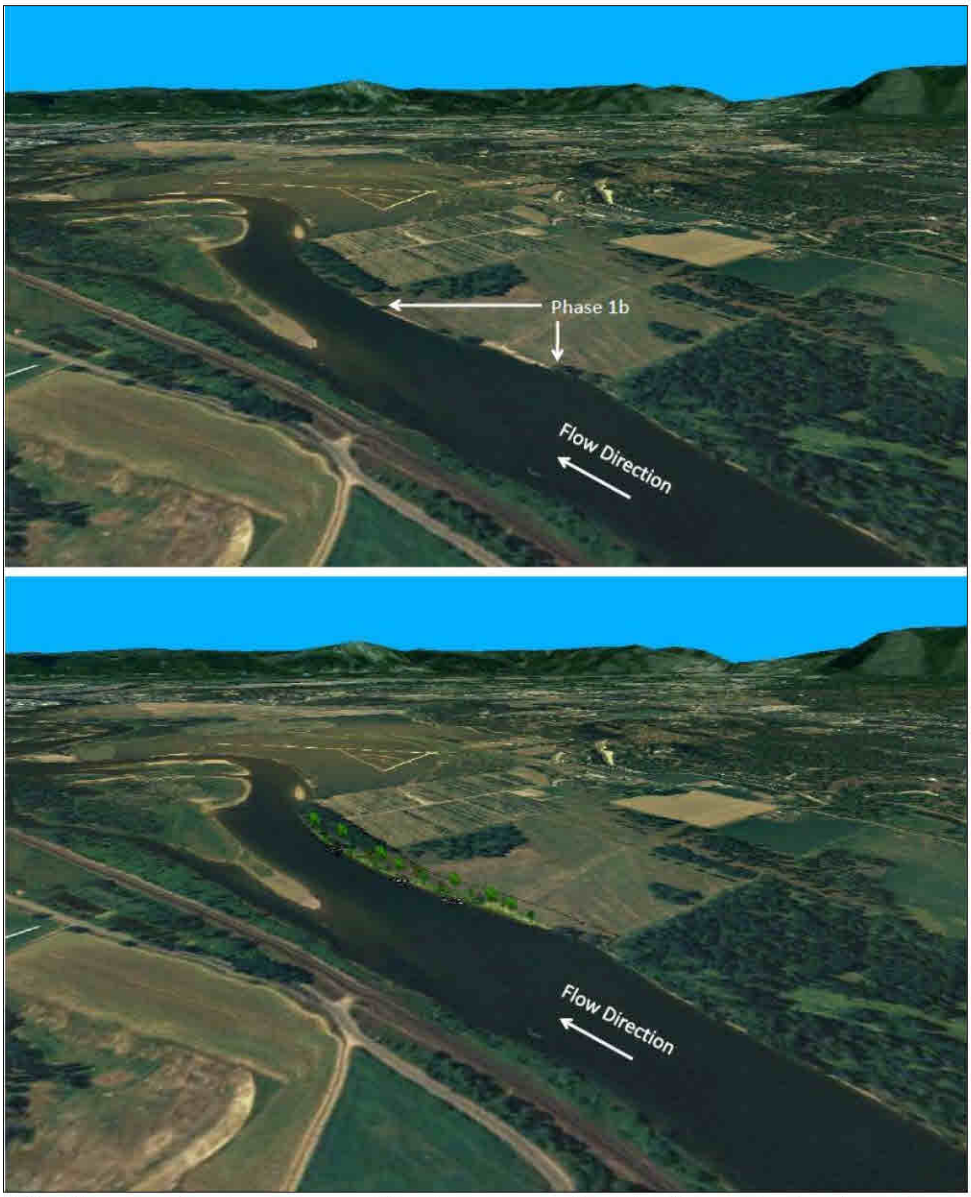
The Phase 1b site is on the north side of the Kootenai River, across from the former community of Crossport, near the downstream boundary of the Braided Reach 1 between RM 156 and 157. This reach has experienced little geomorphic adjustment over time other than streambank disturbance from the TransCanada gas line crossing, the BNSF railway alignment on the left bank, and active streambank erosion occurring on right bank. The Phase 1b bank condition is susceptible to erosion due to three primary factors: a high (18- to 20-foot) bank that is nearly vertical, lack of riparian vegetation, and a lack of erosion resistant material at the toe of the bank. The Phase 1b project is designed to address the eroding streambank by constructing vegetated floodplain surfaces between engineered large wood structures along 800 feet of steep eroding bank (Figure 6).

Restoration treatments will be implemented at one site on the right bank of the Kootenai River (see Appendix A, Drawings 4.1 through 4.6) that will be similar to the treatments previously described in Section 4.1.1.1. Measures will include large wood structures installed along a section of eroding bank. The structures will extend laterally into the channel, creating a velocity and shear concentration zone further out in the channel that will create pool habitat and complexity. The structures will be installed as described in Section 4.1.1.1, including installation of vegetated soil lifts, upper elevation bank treatments, and treatments 1 and 2 for grading, microtopography creation, revegetation, and fencing.

The Phase 1b concept includes the following elements:

- Reduce sediment supply from bank erosion by installing large wood complexes and bioengineering treatments along 800 feet of severely eroding bank.
  - Large wood structures will provide bank toe protection and create complex aquatic habitat including cover and velocity gradients.
  - Bioengineering structures will provide upper elevation bank protection and offer conditions that support establishment of riparian vegetation.

- Increase localized pool depth with large wood structures that promote scour and pool formation.
  - Large wood will increase roughness, dissipate energy and redirect flow away from the bank.
- Establish a functional floodplain with structural diversity.
- Re-grade and revegetate steep banks along the side channels.
- Modify land management within a buffer along the bank on the north side of the river.
  - Install a riparian buffer fence to exclude livestock from grazing riparian vegetation within a minimum 50-foot riparian buffer.



Note: Top image depicts existing condition; bottom image illustrates the post-treatment condition

Figure 6. Phase 1b right bank concept.

4.2 Project Construction

4.2.1 Phase 1a Construction

4.2.1.1 Site Access

Right Bank Site Access

The Phase 1a right bank project area will be accessed from State Highway 95-2, then proceeding south along the two-lane District 2 – County Road 60 to its culmination. From this point, a 1.5-lane unimproved access road traverses a high bluff above the Kootenai River (Appendix A, Drawing 6.1). The road winds down to the floodplain of the Kootenai River and transitions from primarily a rock bed to a dirt road across the broad floodplain. The upper elevation segment of road may require minor widening at one to three bends to facilitate construction equipment access. Blasting and heavy ripping will likely be required at these sites. The earthen bed of the lower elevation segment will require placement of appropriate subgrade material to facilitate heavy equipment access. This lower elevation segment crosses open grazing land with few limitations on equipment access or staging. Access to both the side channel and mainstem bank worksites will be created by excavating an equipment path from the floodplain to the side channel bed. This will likely be established from the right bank property at the inlet to the side channel, facilitating machinery access and material delivery to both treatment sites. Much of the targeted streambed is exposed under low flow conditions and will allow equipment to operate along the stream banks and portions of the side channel in dry conditions. All work within the side channel will be conducted within the ordinary high water mark. Construction access to upland portions of Hideway Island is not proposed.

Left Bank Site Access

Access to the Phase 1a left bank site will be from State Highway 95-2, proceeding south along the District 15 – County Road 24. Approximately 0.5 miles before the Dobson Creek - Katka Creek turnoff, a field access road turns to the north and crosses the BNSF railroad tracks. Although construction vehicles must be trucked across the tracks, no improvements will be required at the BNSF crossing.

A level hard-packed access road parallels the railway line for about 0.5 miles. Near its eastern terminus, two narrow vehicle tracks turn north, and provide informal access to the river. These tracks will be improved to provide direct access to the cobble floodplain at the Phase 1a project site. Grading will be required to moderate the contours of the initial 500-foot segment of road. The access route could then transition to the elevated cobble bar that runs continuously along the bank line to the project area. This bar is fully exposed during the low flow conditions expected at the time of construction. Alternatively, rather than driving on the cobbles, the initial segment of road could be improved on the floodplain upland (a reed-canary grass community) up to the work sites. The first alternative would require less site restoration post-demobilization.

4.2.1.2 Equipment

The construction contractor will select equipment suited to efficiently accomplishing each work element. Heavy equipment expected to be used is listed by major work element in Table 4.

While some machinery will be shared among the three work sites, due to the compressed construction schedule, it is likely that the contractor will mobilize three construction teams that will be aided by this assortment of equipment. Several BMPs will be implemented to minimize the risk of introducing toxic substances to the river as a result of heavy equipment use (see Section 4.3.2).

Table 4. Heavy equipment to be used at each work site.

Access Improvements	Work Area Isolation and Erosion Control	Construction
Dozer	Excavator	Dozer
Excavator	Front End Loader	Excavator
Grader	Bobcat	Front End Loader
Front End Loader	Dump Truck	Skidder
Compactor		Bobcat
Dump Truck		Dump Truck

4.2.1.3 Staging

At the Phase 1a right bank site, equipment and materials will be staged on an upland terrace feature above the ordinary high water mark at the project site. This area is currently a marginal pasture with little shrub or tree cover and provides ample space for equipment and materials to be stockpiled. Equipment fueling and maintenance areas will be located in this general area, several hundred feet from the river (see Appendix A, Drawing 6.1).

At the left bank site, equipment and materials will be staged adjacent to the project site on the floodplain above the ordinary high water mark. Materials could also be staged on the elevated cobble bar within the side channel (during low flows). Equipment fueling and maintenance will occur at an upland location where the currently unimproved access road diverges from the road paralleling the BNSF tracks (Appendix A, Drawing 6.1).

Several BMPs will be implemented related to staging areas to minimize temporary impacts to upland areas. These are described in Section 4.3.2.

4.2.1.4 Dewatering

Right Bank – Mainstem Work Area

Instream construction will occur during the late August - September low flow period when much of the treatment areas are naturally dewatered. Dewatering is expected to be unnecessary for upland activities that extend into October, including upland site work, restoration and revegetation. The upstream half of the Phase 1a main channel right bank component will be completely dry for shaping and modification. The downstream half of the site will be under two to three feet of water flowing into the entrance of the side channel. The constructed floodplain elements extend into the side channel approximately 75 feet from the toe of slope and will require foundation excavations below the water for scour countermeasures. To isolate the right bank and side channel work areas from flowing water, a cofferdam or silt curtain will be placed along the waterward edge of the work area. In addition, pumping or ditching infiltrated water out of the work area may be required. Pumped and/or ditched water will be directed to a settling basin for sediment treatment and will not be discharged directly into the Kootenai River or the side channel. Construction and dewatering BMPs are further described in Section 4.3.2.4 and illustrated in Appendix A – Design Drawings.

At most it is expected that Phase 1a right bank work will dewater a maximum of 54,100 square feet of habitat.

Right Bank Side Channel Work Area

This side channel will be dewatered by constructing a bulk bag cofferdam across the inlet to prevent surface inflow from entering the side channel. Groundwater seepage and residual pools can be managed by pumping or sandbagging to direct flow through the site. Although most fish in the side channel are expected to volitionally exit via the downstream channel opening after the upper elevation cofferdam is placed, fisheries biologists will salvage fish from residual pools before construction commences. A floating sediment curtain, settling basin or other turbidity best management practices (BMP) will be required at the downstream end of the side channel work area. Construction and dewatering BMPs are described in Section 4.3.2.4 and illustrated in Appendix A – Design Drawings.

It is expected that right side channel work will dewater up to 240,935 square feet of habitat.

Left Bank Side Channel Work Area

Dewatering and work area isolation will likely not be necessary to install the left bank/side channel treatments. The inlet to the left side channel will be completely exposed during construction and significant dewatering will not be required. The downstream location will be implemented in shallow water within the Kootenai River; BMPs will be implemented to manage construction-related turbidity. Construction of the large wood structures will require that foundation excavation be performed and these excavations can be sidecast to provide a temporary cofferdam to manage surface water flow. Localized dewatering with trash pumps may be required to place some large wood structures. Construction and dewatering BMPs are described in Section 4.3.2.4 and illustrated in Appendix A – Design Drawings.

It is expected that the left bank side channel work will dewater up to 114,940 square feet of habitat.

4.2.1.5 Construction Sequencing

Construction typically will proceed from upstream to downstream at each site following the general sequence identified below.

1. Mobilize equipment
2. Construct access and site improvements
3. Deliver and stage materials
4. Implement dewatering plan and BMPs
5. Construct lower bank restoration treatments
6. Construct upper bank restoration treatments
7. Construct floodplain surfaces with backfill
8. Install side channel bank structures
9. Place growth media and construct microtopography
10. Install plants and transplant shrubs/trees
11. Install the riparian fence
12. Reclaim the site and seed disturbed areas
13. Demobilize equipment
14. Complete any additional site restoration activities

Right Bank Work Area

The Phase 1a right bank projects will be initiated by improving the access roads and staging areas. These activities include widening segments of the access road, improving roadway subgrade, and grading limited areas for material and equipment staging and maintenance. The two Phase 1a right bank project components (right side channel and mainstem right bank) may be implemented concurrently.

Construction will be initiated by excavating foundations for the lower bank treatments, including floodplain construction adjacent to the toe of the right bank. Material removed during foundation preparations will be temporarily staged in an upland area and will be used to backfill the large wood installations or used for floodplain construction. Following installation of the lower bank treatments, upper bank construction can be initiated. Bank re-grading will result in surplus material that may be used to backfill the floodplain surfaces along the right bank or within the side channel. Following backfill and construction of floodplain surfaces in the side channel, side channel bank structures can be installed and surface treatments applied. Incorporated into these floodplain areas will be roughness elements, microtopography, and planting.

Concurrent to the large wood structure installation, bank shaping can occur at some locations with excavated material stockpiled and used for the bio-engineering treatments and vegetated soil lifts. Upon completion of the lower elevation bank treatments, the transition and construction of the upper elevation bank treatments will occur. Within the side channel, the

contractor will be directed to implement the project elements adjacent to Hideaway Islands, then work towards the right bank line. After all of the instream elements are complete, a transition will be made to the upper elevation bank components, allowing the contractor to work their way out of the channel. Upper elevation floodplain vegetation planting and site restoration activities will be performed after earthwork is complete, followed by installation of livestock exclusion fencing. All work is expected to take approximately 30 days.

Left Bank Work Area

The Phase 1a left side channel project will be initiated by improving the final segment of access road and establishing a contractor mobilization area. This will include coordinating with BNSF about railroad crossings, preparing areas for material and equipment staging and maintenance, and installing water quality protection measures. Construction will follow, beginning with foundation excavation for the constructed floodplain and engineered large wood structures. Spoil developed during the foundation preparation will be used for fill at this site. Surfaces that are disturbed and compacted during access improvements, materials delivery, and site work may require some restoration. Riparian fencing will not be a component of the left side channel treatments. All work is expected to take approximately 30 days.

4.2.1.6 Materials

The Kootenai Tribe will solicit and evaluate proposals from contractors to supply materials needed to implement the proposed action. It is expected that materials that meet the required specifications will be acquired from a variety of sources within the region. Construction materials, including trees, rock, alluvium, rebar and bioengineering fabrics, will be stockpiled in delineated sites at each project area. Materials will be contained in as small an area as practicable to limit disturbance. Stockpile locations will be restored following project completion. All surplus materials, including rock chips, sticks, bioengineering remnants, etc., will be disposed of off-site at a location approved for such purposes by Boundary County regulations.

Trees with rootwads to be used for habitat structures will be cedar, spruce, pine, or fir with limbs that are intact to the extent possible and will be sound throughout the entire stem and rootwad. Other wood species may be substituted upon approval of the project inspector prior to installation.

Key members in the large wood structures will be pinned using a minimum of 1-inch-diameter rebar that completely passes through the adjoining wood member. Exposed rebar will be cut flush with the large wood. Rock for ballasting the wood structures will be dense, sound and free from cracks, seams and other defects conducive to accelerated weathering. The rock fragments will be angular to sub-rounded in shape.

Selected trees with large and numerous limbs will be placed in the log structures in accordance with design drawings. Proposed trees with rootwads will be approved by the project inspector prior to installation. The placement of trees with rootwads will begin at the lowest level next to the streambed and progress upward and oriented as designed. Voids between tree stems will be

filled with smaller trees, large limbs and excavated cobble and ballast with large boulders. Ballast will be placed in stable orientations on large wood elements.

Revegetation will use native woody plant materials or woody plant materials adapted to the site and as specified in the project revegetation plan and drawings. The plant material will be free from disease and harmful insects. Table 5 identifies the materials expected to be required for the Phase 1a restoration treatments.

Table 5. Estimated quantities of materials for Phase 1a.

Category	Item	Quantity	Units	Diameter	Length	
Wood	Large Logs	760	ea	18 - 24 in	35 ft	
	Medium Logs	730	ea	12 - 18 in	25 - 35 ft	
	Small Logs	2665	ea	6 -12 in	20 - 25 ft	
	Brush	2620	ea	3 - 6 in	15 - 20 ft	
	VSL Toe Log	120	ea	12 in	15 ft	
Category	**Item**	**Quantity**	**Units**	**D_{15}**	**D_{50}**	**D_{95}**
Rock	6-inch Plus Alluvium	0	cy			
	6-inch Minus Alluvium	2,535	cy			
	24-30 inch Boulders	0	ea			
	24 inch Riprap	30	cy			
	Gravel/Soil Mix	438	cy			
	Growth Media	63	cy			
Category	**Item**	**Quantity**	**Units**	**Width**	**Length**	**Thickness**
Bioengineering	Willow Cuttings	6,250	ea			
	Coir Mat (13' x 165' roll)	12	rolls	13 ft	165 ft	
	Coir Fabric (13' x 165' roll)	12	rolls	13 ft	165 ft	
	12" diaRolankaBioD Roll-S (Coir Log)	13	Coir Logs	12 in Dia	10 ft	
	16" diaRolankaBioD Roll-40 (Coir Log)	7	Wattles	16 in Dia	10 ft	
	Wooden Wedge Stakes	1,875	ea	4 in	18 in	2 in
Category	**Item**	**Quantity**	**Units**	**Size**		
Plants	Containerized trees and shrubs	4050	ea	1 gallon		
	Browse protectors	4050	ea	4 ft x 4 ft		
	Wooden Stakes	8100	Ea	4ft x 2" x 2"		

4.2.2 Phase 1b Construction

4.2.2.1 Site Access

Access to the Phase 1b project area will be from State Highway 95-2, exiting to the District 2 – County Road 60 south as far as the Trans Canada gas line crossing. From this intersection, turn west toward the river along a single lane, unpaved private road, crossing pasture lands to the river (see Appendix A, Drawing 6.3).

4.2.2.2 Equipment

Phase 1b construction will use the same equipment and procedures as described in Section 4.2.1.2. BMPs to minimize the risk of pollution are described in Section 4.3.2.

4.2.2.3 Staging

Equipment and material staging areas will be in the pasture adjacent to the project site. This area is currently in seasonal pasture and provides ample space for equipment and material staging well away from the river. BMPs related to staging areas are described in Section 4.3.2.1.

4.2.2.4 Dewatering

Dewatering and isolating the Phase 1b work area will be necessary, although reduced in extent by conducting the work in late August to September when flows are low and much of the area is naturally dewatered. The lower bank restoration treatments extend into the channel approximately 25 to 100 feet from the toe of the right bank and will require foundation excavations below water for scour countermeasures. Dewatering methods for foundation work may include installing a cofferdam or silt curtain waterward of the lower bank work site to isolate the right bank work area from flowing water. These methods are described in Section 4.3.2.4 and illustrated in Appendix A – Design Drawings. Pumping or ditching maybe required to remove infiltrated water from the work area; it will be directed to a settling basin for sediment treatment prior to release back into the Kootenai River or the side channel.

Phase 1b work is expected to temporarily dewater a maximum of 35,398 square feet of riverine habitat.

4.2.2.5 Construction Sequencing

Construction sequencing at the Phase 1b site will follow the same methods as described in Section 4.2.1.5. Additional site specific details follow.

Access to the bottom of the bank line and the stream channel will be established by excavating a short access road from the high terrace field to the channel bed. It is likely that an old cattle watering access will be used to limit bank shaping for heavy equipment access. This approach will enable machinery to access the upstream components of Phase 1b (engineered large wood structures) and the downstream components (bio-engineering treatments). Because construction will occur during low flows, much of the streambed will be exposed, allowing equipment to operate along the streambank and within the channel in dry conditions. Materials can either be brought to the channel through the improved bank access route or end-dumped from the top of the bank.

Once river access is established, instream foundation excavation will commence for the lower elevation bank treatments, including engineered large wood structures and rock and wood toes for the vegetated soil lift treatments. Spoil generated during the foundation preparation will be stockpiled and used for backfill as needed for bio-engineering applications. Large wood structures will be placed and the grade brought to design elevation by filling between the face of the structure and the existing bank line. The vegetated soil lift structures will be constructed

vertically, extending from the channel bed to the point of intersection with the existing bank, where shaping will repose (relax) the existing vertical bank.

Concurrent with the large wood structure installation, bank shaping can occur using stockpiled materials. When the lower elevation bank treatments are complete, the transition and upper elevation bank treatments will be initiated. After all of the instream elements are complete, transitioning to the upper elevation bank components will allow the contractor to work their way out from the channel. Upper elevation floodplain vegetation planting and site restoration will be performed, after which project exclusion fencing will be installed. All work is expected to take approximately 30 days.

4.2.2.6 Materials

Construction materials required for Phase 1b will be the same as described in Section 4.2.1.6 for Phase 1a. Table 6 identifies materials expected to be required for Phase 1b restoration treatments.

Table 6. Estimated quantities of materials for Phase 1b.

Category	Item	Quantity	Units	Diameter	Length	
Wood	Large Logs	115	ea	18 - 24 in	35 ft	
	Medium Logs	70	ea	12 - 18 in	25 - 35 ft	
	Small Logs	427	ea	6 -12 in	20 - 25 ft	
	Brush	160	ea	3 - 6 in	15 - 20 ft	
	VSL Toe Log	96	ea	12 in	15 ft	
Category	**Item**	**Quantity**	**Units**	**D_{15}**	**D_{50}**	**D_{95}**
Rock	6-inch Plus Alluvium	174	cy			
	6-inch Minus Alluvium	1,174	cy			
	24-30 inch Boulders	0	ea			
	24 inch Riprap	35	cy			
	Gravel/Soil Mix	406	cy			
	Growth Media	58	cy			
Category	**Item**	**Quantity**	**Units**	**Width**	**Length**	
Bioengineering	Willow Cuttings	5,800	ea			
	Coir Mat (13' x 165" roll)	40	rolls	13 ft	165 ft	
	Coir Fabric (13' x 165" roll)	10	rolls	13 ft	165 ft	
	12" diaRolankaBioD Roll-S (Coir Log)	140	Coir Logs	12 in Dia	10 ft	
	20" Coir Log	34	Coir Logs	20 in Dia	10 ft	
	16" diaRolankaBioD Roll-40 (Coir Log)	58	Wattles	16 in Dia	10 ft	
	Wooden Wedge Stakes	2220	ea	4 in	18 in	2 in
	Earth Anchors	360	ea			
Category	**Item**	**Quantity**	**Units**	**Root volume**		
Plants	Containerized trees and shrubs	350	Ea	1 gallon		
	Browse protectors	350	ea	4 ft x 4 ft		
	Wooden Stakes	700	Ea	4ft x 2" x 2"		

4.3 Proposed Conservation Measures

Conservation measures presented below are components of the proposed action and requirements for the contractors implementing the Kootenai River restoration projects. The following measures are intended to minimize potential construction impacts to listed species and designated critical habitat at the project sites. Further details are provided in Appendix A, Sheets 6.0 through 6.6.

4.3.1 Pre-construction Activities

Before work commences, the following actions must be completed.

- Grading and offset stakes will be placed according to construction documents to identify the limits of construction areas.

- Staging areas and clearing/disturbance limits will be visibly marked in the field with orange plastic fencing or similar methods.

- The contractor will ensure that the following materials for emergency erosion control are on site: (1) a supply of sediment control materials (e.g., silt fence, straw bales), and (2) oil absorbing floating booms and spill containment kits at each of the three work sites.

- Temporary erosion controls identified on project drawings must be in place until completion of construction activities and site restoration.

4.3.2 Construction and Dewatering BMPs

Site specific best management practices (BMPs) have been identified as a component of preliminary design. Appendix A, Sheets 6.0 through 6.6 are site plans for Phases 1a and 1b that contain specific notes addressing both construction and dewatering BMPs consistent with the descriptions provided in this subsections below. The BMPs follow the Idaho Department of Environmental Quality's *Catalog of Stormwater Best Management Practices for Idaho Cities and Counties* (DEQ 2005). Construction specifications will include these BMPs as guidance for contractors. Additionally, the Kootenai Tribe and contractors would implement any permit conditions, such as Section 401 Clean Water Act Water Quality Certification issued by Idaho Department of Environmental Quality. Construction specifications will refine conservation measures for the following work components:

- Mobilization & Demobilization
- Pollution Control
- Clearing and Grubbing
- Stripping
- Removal of Water
- Pump
- Vegetation of Construction Sites
- Fencing of Construction Sites
- Drainage Filter

- Erosion Control Blankets
- Construction Fabrics

4.3.2.1 Staging Areas

- Staging areas will be the minimum size necessary to practically complete the work.

- Staging area limits will be clearly marked on the ground with orange plastic fencing or similar methods prior to construction.

- Staging areas will be at least 150 feet or more from any stream or wetland.

- Staging areas will be chosen to minimize disturbance to perennial vegetation (based on logistical constraints).

4.3.2.2 Pollution Control

A Pollution Control Plan for construction activities will be prepared and implemented by the contractor to prevent construction-related pollution from reaching flowing waters or contaminating upland areas. This plan will include the following:

- Practices to prevent pollution from equipment and material storage sites, fueling operations and staging areas.

- Sanitary facilities such as chemical toilets will be located at least 150 feet from water bodies to prevent contamination of surface or subsurface water.

- A spill containment and control plan with notification procedures, specific clean up and disposal instructions for different products, quick response containment and clean up measures that will be available on the site, proposed methods for disposal of spilled materials, and employee training for spill containment.

- Spill containment kits will be stored at each work site and the construction crews will be trained in proper use.

- Developing a spill response plan describing the chain of command, incident response procedures, and agency notification protocols, and disposal protocols following all applicable local, state, and federal regulations.

- If a spill of chemical pollutants such as fuel or hydraulic fluid should occur, the plan will require that the contractor attempt to contain the spilled material. The following procedures will be followed:

  (a) Notify the project inspector immediately.

  (b) For spillage on land, construct earthen berms or use other suitable barricade material of sufficient size to contain the spill and keep it from spreading.

(c) For spillage on water, attempt to isolate and contain the spilled material. Commercial booms or other suitable materials shall be kept on site during construction to contain fuel and oil spills on water.

4.3.2.3 Equipment Maintenance and Refueling

- Prior to mobilizing to the project site, all equipment shall be washed to minimize the introduction of foreign materials and fluids to the project site. All equipment shall be free of oil, hydraulic fluid, and diesel fuel leaks.

- Vehicle staging, cleaning, maintenance, refueling, and fuel storage must take place in a designated area at least 150 feet or more from any stream or wetland.

- All vehicles operated within 150 feet of any stream or wetland must be inspected daily for fluid leaks before leaving the vehicle staging area. Any leaks detected must be repaired in the vehicle staging area before the vehicle resumes operation. Inspections must be documented in a record that is available for review on request.

- All equipment operated instream must be cleaned before beginning operations below the bankfull elevation to remove all external oil, grease and dirt.

- All power equipment within 150 feet of the water shall be inspected daily for fluid leaks and repaired. The contractor must prepare daily inspection reports.

- If a fluid leak does occur, the project inspector shall be notified immediately, and all work ceased at that specific location until the leak has been rectified. At all times during the construction phase, fluid spill containment equipment shall be present on-site and ready for deployment should an accidental spill occur. The project inspector reserves the right to refuse equipment that does not meet criteria.

- Stationary power equipment (e.g., generators) operated within 150 feet of any stream, water body or wetland must be diapered to prevent leaks.

- All fuel and lubricants will be stored in containers and areas that conform to applicable local, state and federal regulations.

- If a spill of fuel or hydraulic fluid occurs, the contractor will immediately attempt to contain the spilled material and notify the appropriate regulatory agency following the spill response plan and all applicable local, state, federal regulations.

- Sanitary facilities such as chemical toilets will be located at least 150 feet from waterways to prevent contamination of surface or subsurface water.

- Petroleum contaminated soils resulting from contractor fueling, greasing, and cleaning, or due to fluid leaks will be removed and disposed of following all applicable local, state, and federal regulations.

4.3.2.4 Erosion Control and Construction Stormwater Management

An Erosion Control Plan and a Stormwater Pollution Prevention Plan will be prepared for all applicable sites. These plans will identify BMPs to minimize erosion and sedimentation associated with access roads, stream crossings, construction sites, equipment and material storage sites, and staging areas.

- To prevent sediment from entering stream and wetland habitats, erosion control measures will be implemented such as filter bags, sediment traps or catch basins, vegetative strips, berms, jersey barriers, fiber blankets, bonded fiber matrices, geotextiles, mulches or compost, wattles and silt fences, and covering exposed soils with plastic sheeting.
- Disturbance to riparian vegetation will be the minimum necessary to achieve construction objectives so as to minimize habitat alteration and the effects of erosion and sedimentation.
- During construction, all erosion controls shall be inspected by the project inspector daily to ensure they are working adequately.
- If inspection shows that the erosion controls are ineffective, work crews will be mobilized immediately to make repairs, install replacements, or install additional controls as necessary.
- Sediment will be removed from control devices once it has reached 1/3 of the exposed height of the control.
- Measures will be implemented to prevent stockpile erosion during rain events or when the stockpile site is not moved or reshaped for more than 48 hours, by surrounding piles with compost berms, covering piles with impervious materials or other equally effective methods.
- Measures will be implemented to prevent construction vehicles from tracking sediment offsite or onto roadways where it is subject to washing into storm drains, waterways, or wetlands; including gravel access pads, wheel wash stations, or other equally effective methods.
- Removable pads or mats will be installed to prevent soil compaction in all temporary construction access points and staging areas in riparian or wetland areas.

4.3.2.5 In-water Work, Dewatering and Water Treatment

- The project will be implemented during the in-stream work window identified by IDFG and USFWS within August and September. This construction window occurs during the lowest seasonal flows within the Kootenai River system. The Kootenai River water surface width during summer low flow reduces to approximately 375 feet compared to 600 to 700 feet at bankfull flow.
- The work areas will be isolated using bulk bags, floating silt curtains, and coffer dams installed around the work area per Appendix A, Drawing 6.6.

- Bulk bags will be filled with river sand and gravels from an upland source.
- The silt curtains, bulk bags, and cofferdams will remain in place for the duration of work. After the work in the specific isolated work area is complete, these measures will be removed to introduce free flowing water into the area in a controlled manner. Introduced flow rates shall be managed to maintain low velocities (approximately 3 ft/sec) to minimize turbidity.
- Any pumps used to dewater areas potentially used by fish will be screened to prevent fish entrainment. Pump screens will meet National Marine Fisheries Service salmonid fry criteria.
- As work areas are dewatered, fish will be removed by seining and/or electrofishing. This work will be performed by fish biologists before dewatering pumps are activated. Fish will be transported safely downstream of the work zone and released as soon as possible after collection. A summary report of any fish salvage effort will be prepared that, at a minimum, includes a summary of methods, enumeration by species of fish encountered, and description of their ultimate disposition.

Bulk bags are made of geotextile fabric and are similar to standard sandbags, but on a larger scale (Figure 7). The proposed bulk bags are 3 feet wide by 3 feet long by 2.5 feet high. This type of water isolation barrier has been successfully used for dam removal projects. Bulk bags are filled with native sand and gravels from the project site then placed in the river with an excavator. The benefits of this approach are (1) the bags are made of fabric that does not react with water and will not harm aquatic species; (2) if a bag were unintentionally cut on the bedrock or during handling, they are filled with native river materials that would not cause a noticeable disturbance in the river; (3) the bulk bags are flexible and can deform to match the irregular shape of the river bottom, thus excluding flowing water and fish; and (4) since each bag is self-contained, the potential for large, catastrophic failure is negligible.

Figure 7. Bulk bags (left) and gravel cofferdam (right) used in combination for work area isolation on the Savage Rapids and Gold Hill dam removal projects.

Dewatering Phase 1a Right Bank

The upstream half of the Phase 1a right bank project site will be exposed for shaping and bank modification. The downstream half of the site will be under two to three feet of water flowing into the entrance of the side channel. The lower bank restoration treatments extend into the channel approximately 75 feet from the toe of the right bank and will require foundation excavations below water for scour countermeasures. The lower 200 feet of the right bank will be dewatered using bulk bags. Silt curtains will be used further to isolate the site for turbidity management (see Section 4.3.2.6).

Dewatering Phase 1a Right Side Channel

Bulk bags will be placed across the side channel inlet to dewater the construction area. Groundwater seepage and residual water within the existing pools to be dewatered may be managed by pumping after fish removal has been performed. Most resident fish are expected to volitionally leave the site as the inlet bulk bags are placed and water levels decline. Residual pools will need to be electrofished and/or seined. Bulk bags and a floating silt curtain will be placed across the side channel at the downstream end of the project. Pumped water will not be discharged directly into the Kootenai River or the side channel. Infiltration water will be pumped to a swale located on the terrace that is outside the limits of ordinary high water as shown on Drawing 6.0 in Appendix A.

Dewatering Phase 1a Left Side Channel

Work area isolation will be required along the upstream and downstream left bank treatment areas. Dewatering will be required at the downstream left bank treatment site. The inlet to the left side channel will be completely exposed during construction. Turbidity will be managed on the streamward side of the treatment through placement of a floating silt curtain (see Section 4.3.2.6). The downstream treatment location will be implemented in shallow water within the Kootenai River and will require dewatering and work area isolation. A silt curtain will be placed prior to initiating earth work. Construction of the large wood structures will require excavation for a foundation; excavated material will be sidecast streamward to provide a temporary cofferdam. The streamward edge of the cofferdam will be isolated with a floating silt curtain. The downstream end of the treatment will be isolated by connecting the cofferdam to the river left streambank through bulk bag placement. After fish removal has been performed, groundwater seepage and residual water in the work area will be managed by pumping. Infiltration water will be pumped to a temporary swale on the left bank floodplain that will be contained with bulk bag placement (Appendix A, Drawing 6.0).

Dewatering Phase 1b Right Bank

Dewatering and work area isolation will be needed to construct Phase 1b, although treatments will be installed when much of the site is naturally dewatered. Turbidity management and work area isolation will be managed to the streamward side of the treatment by placing a floating silt curtain (see Section 4.3.2.6). Installation of the large wood structures will require that foundation excavation be performed and dewatered by bulk bag placement and pumping. Groundwater seepage and residual water will be managed by pumping after fish removal has

been performed. Pumped construction water will be placed in a temporary storage swale within the northern floodplain area that will be enhanced with bulk bag placement (Appendix A, Drawing 6.3).

4.3.2.6 Turbidity Management

- The contractor shall install a "Layfield FSC 13" floating silt curtain, or an approved equal. The silt curtain will retain fine silts and sediments on-site and will not allow fish to enter the work areas. The curtain will be installed starting at the waterline along the stream bank and worked outward (similar to a seining net) and along the bottom to ensure that no fish are trapped inside the work area.

Floating silt/turbidity curtains may be used to isolate turbid water from clean water during the installation of the engineered wood structures and bioengineering. These curtains are generally permeable barriers constructed of a flexible reinforced thermoplastic material or geotextile with a flotation material on the top and a ballast chain on the bottom (Figure 8). The curtains are designed to control the distribution of suspended sediment by creating a controlled containment area. When combined with low-flow conditions, turbidity curtains provide a highly effective way to reduce turbid water interaction with clean river water as illustrated in Figure 9. The silt curtain will not allow fish to enter the work area. The curtain is installed starting at the water line along the stream bank, proceeding outward (similar to a seining net) and along the stream bottom to ensure that no fish are caught inside the work area.

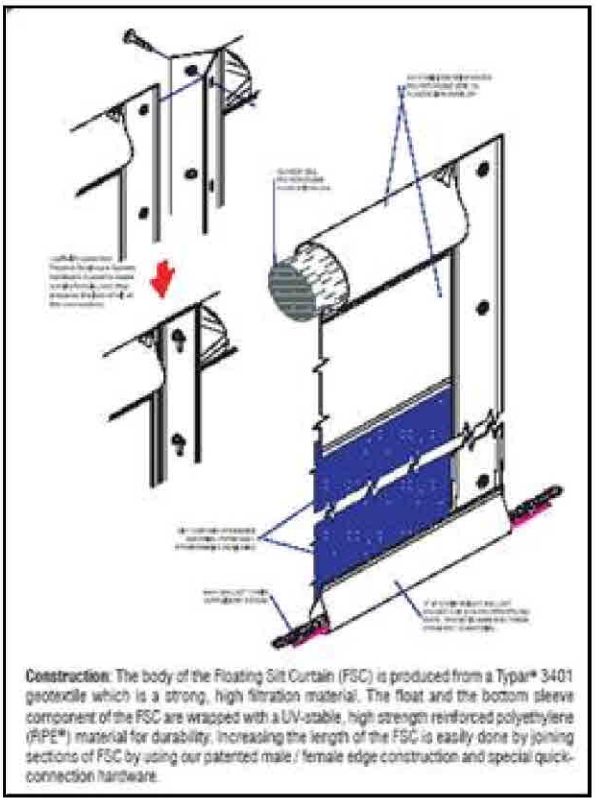


Figure 8. Illustration of a floating silt curtain.

Figure 9. Example of a silt curtain isolating an active work area from clean water.

4.3.3 Site Restoration

Streambanks, soils and vegetation will be restored at each project site as previously described for the overall habitat restoration plan. Temporary construction impacts outside the treatment areas will be restored as follows.

- All temporary access roads will be obliterated, the soil stabilized, and the site revegetated.
- All staging areas will be restored to pre-construction condition, or as requested by the landowner.
- All applicable temporary erosion control measures will remain on site and operational until the site is stabilized, at which time temporary control measures will be removed. Where appropriate, this would include seeding the disturbed areas with certified weed-free seed to stabilize the sites.
- Implement any mitigation measures for impacts to waters of the United States that are specified in permit(s) issued by the Army Corps of Engineers and Idaho Department of Environmental Quality through Section 404 and 401 of the Clean Water Act, respectively.

4.4 Performance Monitoring

The performance monitoring program for the Phase 1 sites will include short- and long-term metrics. A detailed performance monitoring program will be developed in early 2011. Short-term metrics will include factors such as water quality, hydrologic parameters, erosion parameters, and plant survival and density that indicate whether specific restoration treatments

are functioning as expected (Table 7). An example of draft monitoring metrics and the relationship to habitat limiting factors, specific restoration treatments and objectives is provided in Table 7. Specific success criteria and monitoring metrics will be refined in early 2011. Additional detail on specific proposed monitoring metrics is presented in the Kootenai River Habitat Restoration Project Braided Reach 1 – Phase 1, Feasibility Analysis and Preliminary Design document (KTOI 2010).

Table 7. Relationship of limiting factors to monitoring metrics.

Limiting factor	Restoration treatment	Objectives	Monitoring Metrics
Floodplain grazing	Install livestock exclosure fencing to create a non-grazed riparian pasture	• Grazing is halted, a riparian buffer will be created, and riparian vegetation will have a chance to colonize banks and floodplain.	• Forage utilization • Woody vegetation browse • Observed livestock use (ex. Hoof prints, trails) • Landowner agreement in place and in compliance
Lack of outer bank vegetation and bank erosion	Re-grade and seed banks	• Bank erosion rates will be low and will be similar to other densely vegetated banks on the river. • Banks will be able to support riparian vegetation communities, planted shrubs and trees will begin to colonize surfaces and provide seed sources for long-term plant community establishment.	• Seedling density • Canopy cover
	Plant willow cuttings and containerized plants		• Survival • Density • Canopy cover
	Add microtopography and wood to create more complex niches for plant establishment		• BEHI ratings • Bank erosion rates
Lack of surfaces that support riparian recruitment	Install LWD structures on bank margins	• Increase roughness on bank margins with LWD to promote floodplain accretion on existing features and provide protection for colonizing vegetation. • Floodplain hydraulics (velocity and shear stress) support deposition of sand and silt.	• Hydrologic connectivity (topography/elevation of constructed floodplain surfaces relative to ecologically significant flows) • Floodplain hydraulics (velocity and shear stress)
	Construct floodplain surfaces with excavated fill from re-graded banks		• Groundwater depth • Canopy cover of plants
River and floodplain response to altered flow and sediment regimes	Install structures to manage flow into side channels	• Right side channel is connected at all flow levels and does not significantly alter mainstem sediment transport. • Left side channel is maintained primarily as a backwater habitat and is connected to mainstem at flows greater than 20,000 cfs.	• Integrity and observed function of side channel inlet control structures
			• Side channel flow capacity
Lack of aquatic habitat complexity	Enhance side channel habitat	• Increase pool availability, pool-riffle hydraulic complexity and near-bank cover with LWD, bank vegetation, and bioengineering structures.	• Hydraulic complexity (side channel geometry) • Integrity and observed function of bank structures
	Plant vegetation and promote natural plant		• Survival • Density

Limiting factor	Restoration treatment	Objectives	Monitoring Metrics
	colonization.		• Canopy cover • Overhanging banks • Density of instream cover

Source: KTOI 2010

Long-term metrics, such as proportional abundance of restoration cover types, will indicate a trend toward broader project goals such as a positive shift in habitat quality. Short- and long-term success criteria will include triggers that prompt a decision to either monitor more intensively, begin some type of corrective action, or to take no additional action. For example, if plant survival is less than 80% after two growing seasons, this could trigger additional data collection to determine if this signals a potential long-term decline. Alternatively, if plant survival is less than 60%, replanting certain areas could be triggered.

Routine and corrective maintenance will be a key component of performance monitoring. Upon completion of construction, the Phase 1 sites will be inspected regularly to ensure that erosion control measures are performing effectively and where installed, exclusion fencing is succeeding. Routine maintenance will include steps such as watering the installed plants for the first two growing seasons and inspecting for browse protection for the first five years. Both weeds and invasive plant species will be controlled while the desired species become established. Seeded areas may be reseeded as part of routine maintenance, particularly in areas bounded by high concentrations of noxious weeds.

At this time, maintenance of instream structures installed at Phase 1a and 1b projects is not proposed. If through monitoring, new instream or upland earthwork is deemed necessary, such modifications would result in either re-initiation of ESA consultation, or new ESA consultation depending on the particular circumstance.

5 Species Occurrence and Biological Requirements

5.1 Status of Species and Critical Habitat

5.1.1 Status of Kootenai Sturgeon and Critical Habitat

The Kootenai River white sturgeon is one of 18 landlocked populations of white sturgeon known to occur in western North America and the population is genetically distinct from all other sturgeon populations (USFWS 2006). The Kootenai sturgeon population has been declining for at least four decades and recruitment has been largely insignificant since the 1950s (Paragamian et al. 2005). The last Kootenai sturgeon year class confirmed by collection of over 20 fish is believed to have occurred in 1974 (USFWS 1999; Duke et al. 1999). Due to the population's precipitous decline and ongoing lack of juvenile recruitment, the Kootenai River white sturgeon Distinct Population Segment (DPS) was federally listed as endangered on September 6, 1994 (59 FR 45989). The remaining wild population is declining by about 9 percent per year as fish die naturally and are not replaced. Based on projected population declines, fewer than 50 wild adult Kootenai sturgeon are projected to exist after the year 2030 (Paragamian et al. 2005).

The USFWS designated the Kootenai River from RM 141.4 to RM 152.6 in Boundary County, Idaho as Kootenai sturgeon critical habitat on September 6, 2001 (66 FR 46548). An additional section of the Kootenai River, coinciding with the project reach from RM 152.6 to 159.7, was designated as critical habitat on February 10, 2006 under the interim rule. The final critical habitat rule was published on July 9, 2008, and includes the Braided Reach.

5.1.2 Status of Bull Trout and Critical Habitat

The Columbia River bull trout DPS was federally listed as threatened in the Columbia Basin on June 10, 1998 by the USFWS (63 FR 31647). This designation includes bull trout in the Kootenai River subbasin within the United States. The USFWS conducted a 5-year review of the ESA listing status for bull trout in the coterminous United States that was published in April, 2008 (USFWS 2008b). This review included the following observations: most population trends are unknown; there is a broad distribution of risk across the landscape; most core area bull trout populations are at high risk or at risk of extirpation; and the smallest core areas tend to be at a higher risk. Ultimately, the USFWS determined that "threatened" status remains warranted for bull trout, including the Columbia River DPS. The 5-year review final report indicated the USFWS would initiate a new, separate assessment to identify the individual status of each current DPS and determine if they need reorganization (possibly into smaller spatial units). This effort has not yet been completed.

The USFWS issued a final rule for bull trout critical habitat for the coterminous United States on September 26, 2005, and on January 10, 2010, the USFWS proposed to revise the bull trout critical habitat designation. The proposed revised critical habitat rule includes the Phase 1 project area.

5.2 Biological Requirements

5.2.1 Kootenai Sturgeon Habitat Requirements

The Libby Dam Operations BiOp (USFWS 2006) contains a complete summary of the life history and habitat requirements of the Kootenai sturgeon, which is incorporated here by reference. In this section, we list designated Kootenai sturgeon critical habitat parameters determined to be needed within the project area.

Primary constituent elements (PCEs) were identified by the USFWS. They include habitat features necessary for Kootenai sturgeon to breed and rear offspring through the free-swimming larvae stage. Kootenai sturgeon critical habitat PCEs include water temperature, depth, substrate, turbidity, and velocities appropriate to trigger Kootenai sturgeon breeding, and water volumes and substrates sufficient to provide cover and shelter to incubating embryos and yolk sac larvae. Specifically, PCEs defined for Kootenai sturgeon critical habitat published in the final July 9, 2008 rule are:

PCE 1: A flow regime, during the spawning season of May through June, that approximates natural variable conditions and is capable of producing depths of 23 feet (7 meters) or greater when natural conditions (for example, weather patterns, water year) allow. The depths must occur at multiple sites throughout, but not uniformly within, the Kootenai River designated critical habitat.

PCE 2: A flow regime, during the spawning season of May through June, that approximates natural variable conditions and is capable of producing mean water column velocities of 3.3 feet/second (1.0 meter/second) or greater when natural conditions (for example, weather patterns, water year) allow. The velocities must occur at multiple sites throughout, but not uniformly within, the Kootenai River designated critical habitat.

PCE 3: During the spawning season of May through June, water temperatures between 47.3 and 53.6°F (8.5 and 12°C), with no more than a 3.6 °F (2.1 °C) fluctuation in temperature within a 24- hour period, as measured at Bonners Ferry.

PCE 4: Submerged rocky substrates in approximately 5 continuous river miles (8 river kilometers) to provide for natural free embryo redistribution behavior and downstream movement.

PCE 5: A flow regime that limits sediment deposition and maintains appropriate rocky substrate and inter-gravel spaces for Kootenai sturgeon egg adhesion, incubation, escape cover, and free embryo development. (Note that the flow regime described above under PCEs 1 and 2 should be sufficient to achieve these conditions.)

5.2.2 Bull Trout Habitat Requirements

The USFWS Libby Dam Operations BiOp (USFWS 2006) contains a complete summary of the life history and habitat requirements of the Columbia River bull trout, which is incorporated here by reference. In this section we describe the proposed revised bull trout critical habitat requirements as they relate to bull trout use of the project area. This area is used by adult and subadult bull trout as foraging, migration, and over-wintering (FMO) habitat (USFWS 2006). The project area is not used by bull trout for spawning or early rearing; these habitat uses occur in tributaries to the Kootenai River.

The 2010 proposed revised critical habitat rule identified primary constituent elements needed for bull trout survival. Within the proposed designated critical habitat areas of the Kootenai River, the PCEs for bull trout are those habitat components that are essential for the primary biological needs of foraging, dispersal, genetic exchange, or sheltering[3]. The PCEs applicable to the mainstem Kootenai River in the action area are as follows:

PCE 1: Springs, seeps, groundwater sources, and subsurface water connectivity (hyporehic flows) to contribute to water quality and quantity and provide thermal refugia.

PCE 2: Migratory habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.

PCE 3: An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.

[3] A substrate PCE (6) related to spawning and early rearing was also defined, but is not applicable to the mainstem Kootenai River where these uses do not occur and are not thought to have occurred historically.

PCE 4: Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure.

PCE 5: Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures at the upper elevation end of this range. Specific temperatures within this range will vary depending on bull trout life history stage and form; geography; elevation; diurnal and seasonal variation; shade, such as that provided by riparian habitat; and local groundwater influence.

PCE 7: A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph.

PCE 8: Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.

PCE 9: Few or no non-native predatory (e.g., lake trout, walleye, northern pike, smallmouth bass; inbreeding (e.g., brook trout); or competitive (e.g., brown trout) species present.

While the descriptions of the proposed revised critical habitat PCEs would suggest habitat requirements of bull trout are known, in actuality, very little scientific literature has quantified habitat requirements for bull trout FMO uses. Further discussion regarding migratory adult and subadult bull trout FMO habitat requirements follows.

Habitat components that have been associated with bull trout include cool water temperature, high degree of instream cover, complex and stable channel form, clean and unembedded spawning and rearing substrate, and unobstructed migratory corridors (Howell and Buchanan 1992; Rieman and McIntyre 1993). Water temperature above 15°C (59°F) is believed to generally limit bull trout distribution, although migratory bull trout have been documented in migratory corridors with temperatures well over 16°C for varying time periods (Howell et al. 2009, Goetz et al. 2004, Baxter 2002, Dunham et al. 2003). While it is thought that a high degree of habitat complexity, such as abundant pools and large woody debris, is associated with bull trout presence, these attributes represent optimal conditions as described in the scientific literature that are correlated with headwater resident adult bull trout, migratory bull trout during spawning, and early rearing life stages. These habitat associations are not necessarily valid when large migratory adult and subadult bull trout that are over-wintering in mainstem river reaches such as the lower Kootenai River.

Other than an abundant forage base, unobstructed upstream and downstream passage conditions, and water temperatures generally below 15°C, little is known about FMO habitat requirements for migratory adult and subadult bull trout, especially in large river reaches such as the lower Kootenai River. The most recent comprehensive review of published peer-reviewed scientific literature on bull trout habitat use (24 articles reviewed) only found two articles addressing bull trout over-wintering and foraging habitat quantification in large mainstem rivers[4] (Al-

[4] Al-Chokhachy et al. (2010) stated that they found only one article (Jakober et al. 1998) that dealt with bull trout habitat associations in lower-most reaches (i.e., larger river reaches); however, Jakober et al. (1998) addresses headwater tributaries, not lower river reaches. Conversely, in the Al-Chokhachy et al. (2010) reference, they cite

Chokhachy et al. 2010). Al-Chokhachy et al. (2010) identified "the need for elucidation of habitat use patterns in downstream reaches, which may act as critical overwintering habitat or migratory corridors". The only peer-reviewed published studies on subadult habitat use on the Flathead River may not be applicable to the Kootenai River. Overwintering conditions are harsh in the upper Flathead River system due to anchor and frazil ice formation (Muhlfeld and Marotz 2005). Deep, slow habitats used by subadult bull trout in the Flathead River likely provide areas of protection from these unfavorable conditions, which may not be of concern on the Kootenai River where anchor and frazzle ice are not a common issue. Lowery's 2009 unpublished data indicate that on the Skagit River, where anchor and frazzle ice are not a concern, subadult bull trout commonly use shallower river margin habitat in winter, and were essentially absent from the deepest pools in that study reach.

5.3 Site Specific Critical Habitat Context

5.3.1 Kootenai Sturgeon

The lateral extent of Kootenai sturgeon critical habitat at the Phase 1 project sites includes the river channel up to the ordinary high-water line on each bank of the Kootenai River. The entire Phase 1 project reach of the Kootenai River is within designated Kootenai sturgeon critical habitat. The project sites potentially could be used for sturgeon spawning, rearing, and migration if habitat conditions were conducive, although as described in Section 5.4.1, sturgeon do not heavily use the project area under current conditions. A description of how sturgeon PCE requirements relate to existing conditions within the project action areas is presented in Section 6.1.

5.3.2 Bull Trout

The action area includes no designated bull trout critical habitat under the 2005 bull trout critical habitat rule; however, under the proposed revised 2010 rule, the Kootenai River would be designated critical habitat. The 2005 critical habitat designation remains in effect until a final decision is made on the proposed revised 2010 rule. However, in this BA analysis we assume the project action area is designated bull trout critical habitat. The project area potentially could be used for adult and subadult bull trout foraging, migration, and overwintering habitat, although as described in Section 5.4.2, bull trout abundance is relatively low in the Kootenai River in Idaho. A description of how bull trout PCE requirements relate to existing conditions within the project action areas is presented in Section 6.2.

5.4 Species Occurrence and Habitat Use in the Project Area

5.4.1 Kootenai Sturgeon in the Project Area

Kootenai sturgeon currently occupy waters of the Kootenai River in Idaho and Montana and the Kootenay River and Kootenay Lake in British Columbia (Figure 1). Juvenile (nearly all hatchery-produced) and adult Kootenai sturgeon forage in and migrate freely throughout the Kootenai River, predominantly downstream from Bonners Ferry (RM 152) and in Kootenay

two articles dealing with bull trout rearing in large mainstem river systems, which are Muhlfeld et al. (2003) and Muhlfeld and Marotz (2005) concerning subadult bull trout seasonal movement and winter habitat use in the mainstem Flathead River (MT).

Lake. Paragamian et al. (2005) determined the current mortality rate of to be 9 percent per year, and estimated that fewer than 500 adult sturgeon would remain by 2005. Generally, very few Kootenai sturgeon occur upstream from Bonners Ferry in Braided Reach 1, although the braided reach provides at least three of the four PCEs identified in Section 5.2.1:

- During most years, the braided reach has velocities at or above 3.3 feet per second.
- The braided reach provides a large part of the five miles of continuous submerged rocky substrate identified as a PCE for free embryo and larval distribution behavior and downstream movement.
- Flow regimes in the braided reach typically limit sediment deposition and maintain rocky substrate suitable for Kootenai sturgeon egg adhesion, incubation, escape cover and free-embryo development.

Adult Kootenai sturgeon spawn in the Kootenai River from May through July (Apperson and Anders 1991; Marcuson 1994; Paragamian et al. 2001). An estimated 4.6 million eggs were naturally spawned in the Kootenai River during the 2005 spawning season (USFWS 2006). Intensive field monitoring has shown that nearly all eggs do not survive; intensive surveys over many years have only found one hatching embryo, and no free-swimming larvae or young-of-the-year have been captured (USFWS 2006). Based on data from 1992 through 2001, it is estimated that an average of only about 10 naturally produced juvenile Kootenai sturgeon survive long enough each year to be captured as juveniles in annual gill net recruitment and survival studies (Paragamian et al. 2005).

Recruitment failure may be caused by numerous factors, including fish currently spawning at sites where conditions appear unsuitable for successful incubation and early rearing (Anders et al. 2002). Research to date suggests that recruitment failure is caused by egg or larval suffocation, predation and/or other mortality factors affecting these early life stages (Anders 1991; Duke et al. 1999; USFWS 1999; Paragamian et al. 2001; Anders et al. 2002; Koch 2004; Koch et al. 2006). Further research, based on monitoring releases of very small young-of-the-year Kootenai sturgeon, suggest a potential second density-dependant bottleneck to recruitment that may be associated with competition or predation, lack of food, and rearing habitat capacity (Justice et al. 2009).

Nearly all Kootenai sturgeon spawning occurs in the Kootenai River over sand substrate available downstream of Bonners Ferry (below RM 152). As river flows increase, a few Kootenai sturgeon migrate further upstream to the gravel substrates available at and upstream of Bonners Ferry (Paragamian et al. 1997). Despite many years of augmented flow releases from Libby Dam intended to attract spawning Kootenai sturgeon, the vast majority of tagged fish have been located downstream of Braided Reach 1 (Rust and Wakkinen 2009). Rust and Wakkinen (2009) reported that one female Kootenai sturgeon went upstream above Bonners Ferry into Braided Reach 1 in 2008 and was documented as far upstream RM 168.8 (upstream of the Phase 1a project area), although the detailed movement data in Appendix 1 of the report did not indicate such movement. This was the furthest upstream migration of any tagged Kootenai sturgeon recorded since IDFG began telemetry studies in 1991 (Rust and Wakkinen 2008). The previous upstream-most documented tagged adult female Kootenai sturgeon was reported in

2007 at RM 155, downstream of the Phase 1a project area (Rust and Wakkinen 2008). The few pre-spawn, or possibly spawning Kootenai sturgeon, that have been tracked with telemetry gear into the Braided Reach 1 have remained there only briefly. For example, in 2006, a tagged spawning age female Kootenai sturgeon migrated into the Braided Reach and remained there for as long as 2-3 days (USFWS 2007). Ripe male and female Kootenai sturgeon were translocated to the Braided Reach during the spawning time, but they vacated the area, typically moving downstream (Pete Rust, Senior Fisheries Research Biologist, IDFG, personal communication 2006).

5.4.2 Bull Trout in the Project Area

Bull trout are widely distributed through the lower Kootenai River, from Libby Dam downstream to Kootenay Lake in British Columbia, but do not appear to be abundant (KTOI and MFWP 2004). Available data indicate that only several hundred adult bull trout occur in the entire core area downstream from Libby Dam, encompassing Kootenay Lake and the lower Kootenai River subbasin (KTOI and MFWP 2004). Spawning and rearing by migratory adults occur in headwater tributaries draining portions of British Columbia, Idaho, and Montana. Migratory adult and subadult bull trout forage and over-winter in Kootenay Lake and the Kootenai River. Adult bull trout are known to migrate downstream from Kootenai Falls, and a few have been observed to migrate back upstream past the falls (KTOI and MFWP 2004). Bull trout spawning in the mainstem Kootenai River has not been documented and spawning probably does not occur due to lack of suitable habitat and water temperatures outside the suitable spawning and incubation ranges (USFWS 2002a).

Some adult bull trout likely use the mainstem Kootenai River for a transient migratory corridor between Kootenay Lake and spawning tributaries upstream. Transient migrations most likely occur immediately post-spawn in late fall when adults move downstream out of spawning tributaries to Kootenay Lake to forage and overwinter. For example, at least two bull trout tagged by biologists in Kootenay Lake (British Columbia) were detected in Idaho as far upstream as the Moyie River (KTOI and MFWP 2004). Some adult bull trout could use the mainstem Kootenai River for extended foraging during overwintering periods between spawning migrations (late fall to early summer), a typical fluvial life history. For example, five of eight adult bull trout radio-tagged in O'Brien Creek in Montana migrated downstream into the Kootenai River in Idaho following spawning, and some migratory bull trout over-winter in deep holes of the lower Kootenai River (Walters 2002).

Upstream migration likely occurs in the late spring to summer, as adults return to the spawning tributaries. For example, in the Idaho section of the Kootenai River, bull trout generally began moving upstream toward O'Brien Creek, Montana, by June or July, entering it in June, July, and September (Walters and Downs 2001; Walters 2002, 2003). Adult bull trout migrations can occur very quickly, with individuals traveling over 50 miles in less than one week to a month or more (Goetz et al. 2004, Baxter 2002).

Juvenile bull trout usually rear in tributaries in close proximity to spawning reaches from 1to 4 years (more commonly after 1.5 to 3 years) before migrating to downstream river or lake reaches to rear until reaching sexual maturity. Then they begin making seasonal upstream migrations to spawn. After migrating out of upstream spawning tributaries, "subadult" bull trout may rear in

the mainstem Kootenai River for extended periods through early summer or may migrate through the reach to Kootenay Lake. Subadult bull trout are known to make extensive and complex migrations that seem to be very exploratory in nature (Baxter 2002, Goetz et al. 2004).

6 Environmental Baseline Conditions in Relation to Species Biological and Habitat Requirements

The environmental baseline includes the past and present impacts of all federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process 50 CFR § 402.02(d). The baseline provides a reference for the USFWS to evaluate the species' current status in relationship to the proposed action. The Libby Dam Operations BiOp generally summarizes the environmental baseline of the Braided Reach (action area of the Phase 1 project), which is incorporated here by reference (USFWS 2006).

For proposed actions that affect freshwater habitat, the Services usually define the biological requirements for listed species in terms of a concept called properly functioning condition (PFC). PFC is the sustained presence of natural habitat-forming processes in a watershed (e.g., riparian community succession, bedload transport, precipitation runoff pattern, channel migration) that are necessary for the long-term survival of the species through the full range of environmental variation. PFC, then, constitutes the habitat component of a species' biological requirements. The indicators of PFC vary between different landscapes based on unique physiographic and geologic features. For example, aquatic habitats on timberlands in glacial mountain valleys are controlled by natural processes operating at different scales and rates than are habitats on low-elevation coastal rivers or arid desert river systems. The PFC concept includes a recognition that natural patterns of habitat disturbance will continue to occur. For example, floods, landslides, wind damage, and wildfires result in spatial and temporal variability in habitat characteristics, as will anthropogenic perturbations.

The proposed Phase 1 project is focused on improving riverine habitat physical characteristics; therefore, in this section we summarize the existing environmental baseline in terms of habitat conditions that are important to sustain the long-term persistence of Kootenai sturgeon and bull trout in Braided Reach 1. Appropriate habitat conditions are defined by each species' critical habitat PCEs. We assess the environmental baseline function of the Kootenai River in the action area at providing critical habitat PCEs for each species by rating each PCE condition as "properly functioning (PFC)", "impaired (IC)", or "not properly functioning (NPF)". A summary of each PCE element follows Table 8, along with a justification for the status of each PCE element in the action area. The effects that the proposed projects may have on the environmental baseline of each PCE element are analyzed subsequently in Section 7.4.

Table 8. Environmental baseline summary of relevant sturgeon and bull trout critical habitat PCEs in Braided Reach 1.

Baseline Environmental Conditions			
PCE[a]	**Function**	**Description**	**Cause of Degradation from PFC**
Kootenai River White Sturgeon			
Water Depth	NPF	Depth of 23 feet is very uncommon in Braided Reach 1.	Libby Dam operations have reduced peak flows, and in combination with floodplain development, have altered river geomorphic processes.
Water Velocity	IC	Water velocities on average are above 3.3 ft/s, although the duration and geographic extent may not be sufficient.	Libby Dam operations have reduced peak flows, and in combination with floodplain development have altered river geomorphic processes.
Water Temperature	IC	Water temperatures generally fall within properly functioning PCE range, but not always.	Libby Dam operations have resulted in warming of the river in May to June, although values are near the sturgeon water temperature criteria.
River Substrate	IC	Existing Braided Reach 1 channel is characterized by large cobble bars, shallow depths and bank erosion along the mainstem channel and within side channels, although gravel and cobble are the dominant channel substrates.	While the dominant substrate is rocky, the extent of the rocky substrate is not continuous for 5 miles (the Braided Reach 1 is only about 4 miles long); widespread bank erosion contributes fine sediment to downstream reaches.
Sediment Regime	IC	River banks in Braided Reach 1 are actively eroding, contributing fine sediment that fills interstitial space within gravel and cobble substrates.	Development in the riparian zone, grazing, and agriculture have reduced riparian vegetation, resulting in widespread bank erosion.
Columbia River Bull Trout			
Cold Water Springs, Seeps, and Hyporheic Flows	NPF	The Kootenai River has been largely disconnected from its floodplain; riparian vegetation has been largely degraded; no known significant cold water springs or seeps are known to occur.	Libby Dam operations, diking, and floodplain development have likely altered the hyporheic flow regime.
Migratory Corridor	PFC	While the habitat in Braided Reach 1 has been highly modified compared to historical conditions, there is no known impediment that would hinder migratory bull trout movement through the reach during the probable migration time.	NA

Baseline Environmental Conditions			
PCE[a]	Function	Description	Cause of Degradation from PFC
Forage Base	IC	While specific abundance of all potential forage species is unknown, it is likely that the large degree of habitat modification of the Kootenai River has reduced the abundance of forage species.	Libby Dam operations, as well as riparian and floodplain alterations, have reduced habitat complexity, likely reducing productivity of forage fish and aquatic invertebrates.
Habitat Complexity	NPF	In the Braided Reach 1, banks are actively eroding, large woody debris is scarce, and pool forming processes have been hindered.	Libby Dam operations, as well as riparian and floodplain alterations, have reduced habitat complexity,
Water Temperature	PFC	Temperatures during the likely time migratory bull trout inhabit Braided Reach 1 (most likely in post-spawn late fall through winter to mid-summer, are on average between 2 to 15°C (i.e., less than 60°F).	Libby Dam operations have altered water temperatures, resulting in cooler temperatures in the early summer.
Spawning Substrate	NA	Spawning is not suspected currently or historically in the mainstem Kootenai River.	NA
Seasonal Hydrograph	IC	Seasonal hydrograph patterns are similar to historic conditions, although peak flow magnitude has been reduced.	Libby Dam operations have reduced the peak flow magnitude.
Water Quantity and Quality	IC	Water quality is generally good, but peak flows have been reduced.	Libby Dam operations have reduced the peak flow magnitude.
Non-native Species	IC	Several non-native species are present that could compete or prey on migratory subadult and adult bull trout, although the specific abundance of non-native species is unknown. If abundance of non-native fish is high, this PCE may be NPF.	Illegal and legal stocking has occurred.

Notes: NA = Not Applicable, PFC = Properly Functioning Condition, IC = Impaired Condition, NPF = Not Properly Functioning
[a] PCEs for Kootenai sturgeon and Columbia River bull trout are identified in Sections 5.2.1 and 5.2.2.

6.1 Kootenai River White Sturgeon

Kootenai sturgeon critical habitat PCEs were designated for breeding and rearing of offspring through the free-swimming larvae stage, including PCEs to trigger Kootenai sturgeon breeding, and to provide substrate cover and shelter to incubating embryos and yolk sac larvae. Appropriate water depths, temperature, and flow velocities, as well as suitable rocky or gravel substrate (all Kootenai sturgeon critical habitat PCEs), are all essential for successful spawning. Past and present operations of Libby Dam, along with river valley land management practices,

have degraded the environmental baseline for these habitat elements to the extent that the co-occurrence of these PCEs at the same place and time during the critical breeding period is extremely limited and insufficient to support their successful recruitment at levels that provide for the conservation of the species.

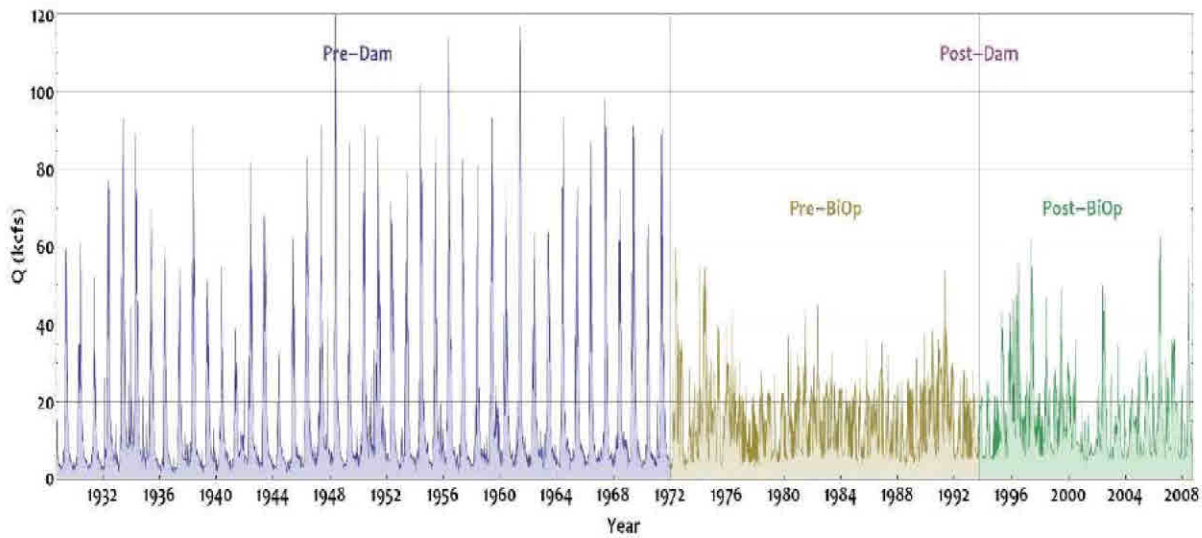
Under current environmental baseline conditions, Kootenai sturgeon critical habitat PCEs are not functioning at a level sufficient to encourage spawning in Braided Reach 1 on a regular basis. Nor do environmental baseline conditions provide sufficient egg/larvae survival in any portion of the Kootenai River for positive recruitment to the Kootenai sturgeon population, as evidenced the lack of naturally-produced juvenile sturgeon over the last 30 to 50 years.

In the following rating of the environmental baseline with respect to sturgeon habitat requirements, we identify the PCE (in italics), followed by the existing environmental baseline condition. The environmental baseline information is summarized from KTOI (2010) unless otherwise cited.

6.1.1 Water Depth

PCE 1: *A flow regime, during the spawning season of May through June, that approximates natural variable conditions and is capable of producing depths of 23 feet (7 meters) or greater when natural conditions (for example, weather patterns, water year) allow. The depths must occur at multiple sites throughout, but not uniformly within, the Kootenai River designated critical habitat.*

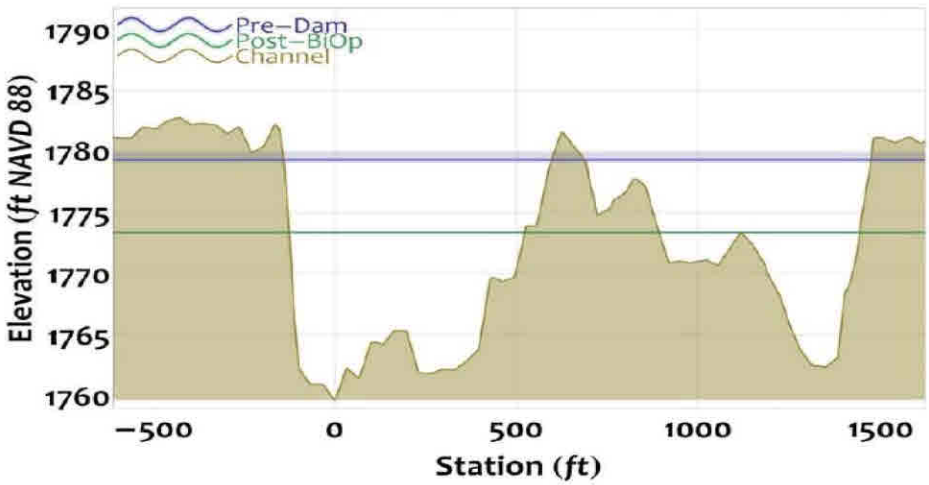
The hydrographic pattern of the Kootenai River is controlled chiefly by Libby Dam operation, which has reduced mean annual peak flows (Figure 11) from 65,000 cfs to 30,000 cfs. Between RM 158 and 159 in Braided Reach 1 (the Phase 1a project area), the main channel is an extended glide feature (adverse or flat thalweg gradient) and exhibits a width-to-depth ratio of about 50:1 (500-foot bankfull width and 10-foot mean depth). The Kootenai River channel at the Phase 1b site is a run/developing pool feature and exhibits a width-to-depth ratio of about 70 (700-foot bankfull width and 10-foot mean depth). Due to the channel cross section, geomorphic attributes, and the corresponding reduction in depth from the lowered annual peak flow (Figure 12), the project action area rarely, if ever, exhibits depths of 23 feet at multiple sites. Therefore, the environmental baseline for this PCE rates as “not properly functioning” in the Braided Reach 1 – Phase 1 action area.



Source: KTOI (2010)

Note: The post-BiOp period spans three biological opinions from USFWS, published in 1995, 2000 and 2006.

Figure 11. The historical mean daily discharge of the Kootenai River measured at Porthill, Idaho (USGS Station # 12322000) during pre-dam and post-dam eras.



Source: KTOI (2010)

Note: Lower water surface elevations in the post-dam era combined with levees have resulted in a loss of floodplain connection in all reaches.

Figure 12. Surveyed cross section with pre-dam (65,000 cfs) and post-BiOp (30,000 cfs) mean annual peak discharge water surface elevations for Braided Reach 1 near RM 158.

6.1.2 Water Velocity

PCE 2: *A flow regime, during the spawning season of May through June, that approximates natural variable conditions and is capable of producing mean water column velocities of 3.3 ft/s (1.0 m/s) or greater when natural conditions (for example, weather patterns, water year) allow.*

The velocities must occur at multiple sites throughout, but not uniformly within, the Kootenai River designated critical habitat.

As stated above, the Kootenai River hydrologic regime is primarily determined by Libby Dam operations. The USGS has been monitoring river stage, discharge and velocity at several locations throughout the Braided Reaches since 2008 to support continued hydraulic model calibration. A comprehensive summary of reach-scale average hydraulics for the Braided Reaches is available in the Master Plan (KTOI 2009). In summary, the reach-average velocity in Braided Reach 1 is estimated to be 4.4 ft/s at 30,000 cfs and 6.4 ft/s at 65,000 cfs. On average, flows of 30,000 cfs can occur in late-May and June under the existing environmental baseline condition (Figure 13), although sustained flows of 30,000 cfs through May and June are uncommon. These data suggest that velocities of at least 3.3 ft/s may be sustained for extended periods during May to June in Braided Reach 1, although the duration and geographic extent may not be sufficient to rate this PCE as "properly functioning". Most likely the existing environmental baseline for this PCE in the Braided Reach 1 – Phase 1 action area is "impaired".

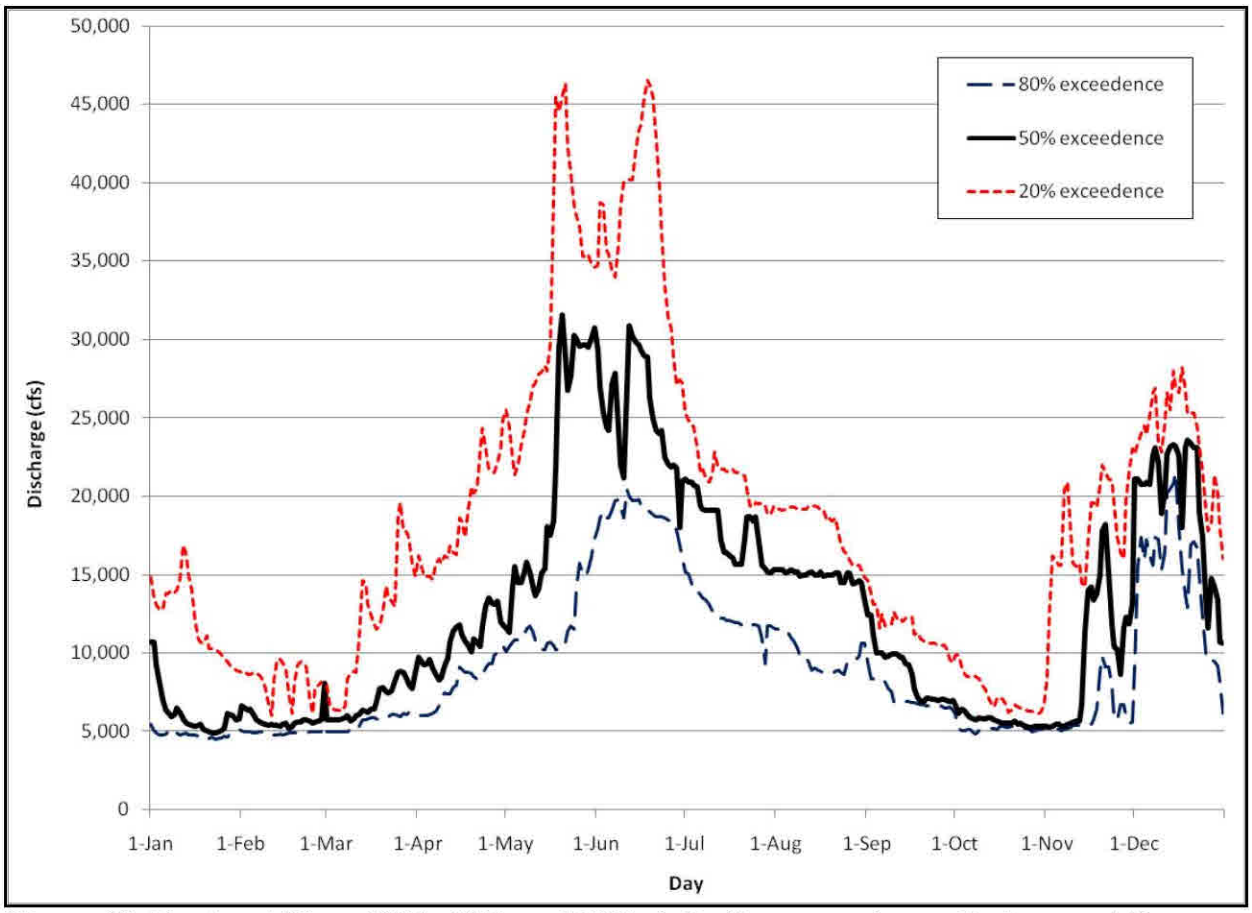
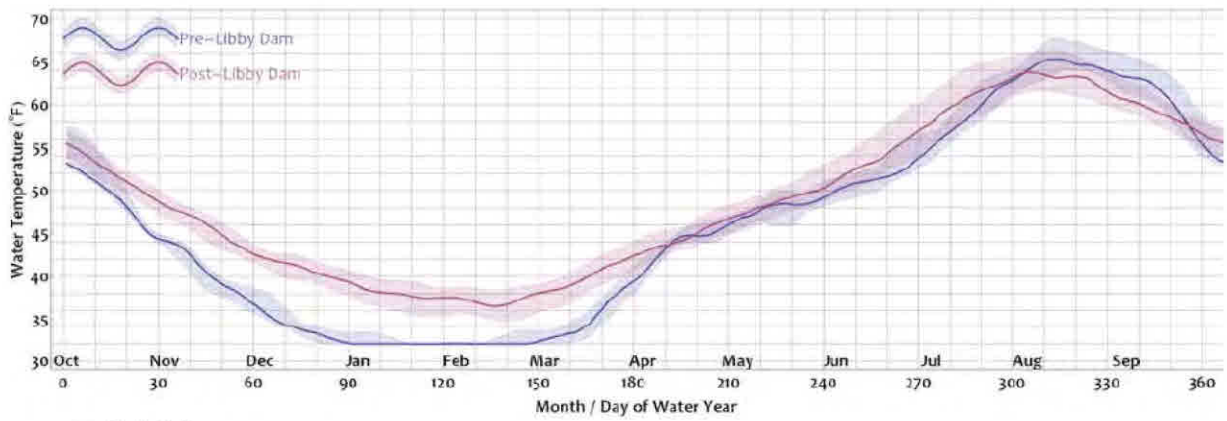


Figure 13. Kootenai River 20%, 50% and 80% daily flow exceedence discharge at the USGS Kootenai River at Tribal Hatchery Near Bonners Ferry gage (Station No. 12310100) from 2003 to 2009.

6.1.3 Water Temperature

PCE 3: *During the spawning season of May through June, water temperatures between 47.3 and 53.6 °F (8.5 and 12°C), with no more than a 3.6 °F (2.1 °C) fluctuation in temperature within a 24- hour period, as measured at Bonners Ferry.*

Water temperatures in the project reach are influenced primarily by Libby Dam operations, as well as by the ambient air temperature. Based on long-term data collected at the USGS Porthill Gage (located downstream of the action area), Libby Dam operations have resulted in warming of the river in May to June, although values are near the sturgeon water temperature criteria (Figure 14). The environmental baseline for this PCE is likely "impaired" to some degree in the Braided Reach 1 – Phase 1 action area.



Source: KTOI (2009)

Figure 14. Average pre- and post-dam water temperature for the Kootenai River at Porthill (USGS Station No. 12322000).

6.1.4 River Substrate

PCE 4: *Submerged rocky substrates in approximately 5 continuous river miles (8 river kilometers) to provide for natural free embryo redistribution behavior and downstream movement.*

The existing channel is characterized by large cobble bars, shallow depths and bank erosion along the mainstem channel and within side channels, although gravel and cobble are the dominant channel substrates. In addition, widespread bank erosion contributes fine sediment to downstream reaches. While the dominant substrate is rocky, the extent of the rocky substrate is not continuous for 5 miles (Braided Reach 1 is only about 4 miles long); therefore, the environmental baseline condition for this PCE rates as "impaired" in the Braided Reach 1 – Phase 1 action area.

6.1.5 Sediment Regime

PCE 5: *A flow regime that limits sediment deposition and maintains appropriate rocky substrate and inter-gravel spaces for sturgeon egg adhesion, incubation, escape cover, and free embryo*

development. Note: the flow regime described above under PCEs 1 and 2 should be sufficient to achieve these conditions.

As stated above, the Kootenai River hydrologic regime is primarily determined by Libby Dam operations. River banks in Braided Reach 1 are actively eroding, contributing fine sediment that fills interstitial space within gravel and cobble substrates. In addition, PCEs 1 and 2 rate as "not properly functioning" and "impaired" (respectively). Therefore, at best, the environmental baseline for this PCE rates as "impaired" in the Braided Reach 1 – Phase 1 action area.

6.2 Columbia River Bull Trout

The 2010 proposed revised critical habitat rule identified primary constituent elements (PCEs) needed for bull trout survival. Braided Reach 1 of the Kootenai River is used by adult and subadult bull trout potentially as foraging, migration, and over-wintering (FMO) habitat (USFWS 2006). Spawning and early juvenile rearing is not known or suspected to occur either historically or currently in Braided Reach 1. The proposed designated critical habitat PCEs related to FMO habitat are those habitat components that are essential for the primary biological needs of foraging, dispersal, genetic exchange, or sheltering[5]. In the following rating of the environmental baseline for bull trout habitat, we identify the PCE (in italics), followed by the existing environmental baseline condition. The environmental baseline information is summarized from KTOI (2010) unless otherwise cited.

6.2.1 Cold Water Springs, Seeps, and Hyporheic Flows

PCE 1: *Springs, seeps, groundwater sources, and subsurface water connectivity (hyporehic flows) to contribute to water quality and quantity and provide thermal refugia.*

The Kootenai River has been largely discontented from its floodplain through construction of levees and Libby Dam operations, conditions which likely have altered hyporheic flow. Libby Dam operations have altered water temperatures, resulting in cooler flows in the early summer and warmer flows in the late summer (Figure 14). Major cold water springs, seeps or cold groundwater sources that would provide thermal refugia for bull trout during summer warm periods are not known to occur. Therefore, the environmental baseline for this PCE rates as "not properly functioning" in the Braided Reach 1 – Phase 1 action area.

6.2.2 Migratory Corridor

PCE 2: *Migratory habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.*

While the habitat in Braided Reach 1 has been highly modified compared to historical conditions, there is no known impediment that would hinder migratory bull trout movement through the reach, which based on general migratory bull trout life history, would be expected from late fall (post spawn), through winter, to mid-summer. There are no physical barriers

[5] A substrate PCE (No. 6) for spawning and early rearing was also defined, but is not applicable to the mainstem Kootenai River where these uses do not occur and are not thought to have occurred historically.

present and water temperatures are, on average, within the species tolerance (below about 16°C or 50°F) during these periods (Figure 14). Therefore, the environmental baseline condition for this PCE rates as "properly functioning" in the Braided Reach 1 – Phase 1 action area.

6.2.3 Forage Base

PCE 3: *An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.*

Adult and subadult bull trout are highly opportunistic foragers, preying heavily on fish, but also on aquatic macroinvertebrates, fish eggs (including large scale sucker egg masses), other invertebrates and terrestrial insects, and sometimes even small mammals and amphibians (Lowery 2009). In the Kootenai River, there are several fish species that could be potential prey for adult and subadult bull trout, such as mountain whitefish, northern pike minnow, peamouth chub, redside shiner, longnose dace, juvenile rainbow trout and a wide range of aquatic insects.

While specific abundance of all potential forage species is unknown, it is likely that the large degree of habitat modification has reduced forage species abundance; therefore, at best, the environmental baseline of this PCE is likely "impaired" in the Braided Reach 1 – Phase 1 action area.

6.2.4 Habitat Complexity

PCE 4: *Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure.*

River habitat complexity has been greatly reduced in the Kootenai River by land use modification in the riparian zone and disconnection of the river from its historical floodplain. In Braided Reach 1, banks are actively eroding, large woody debris is scarce, and pool-forming processes have been hindered. Therefore, the environmental baseline of this PCE is "not properly functioning" in the Braided Reach 1 – Phase 1 action area.

6.2.5 Water Temperature

PCE 5: *Water temperatures ranging from 2 to 15°C (36 to 59°F), with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shade, such as that provided by riparian habitat; and local groundwater influence.*

Similar to the existing condition of PCE 1, thermal refugia is not known to exist in the Kootenai River Braided Reach 1 during warm summer periods, although Libby Dam operations have resulted in cooler temperatures in the early summer. Migratory bull trout movement through the reach, which based on general migratory bull trout life history, would be expected from late fall (post spawn) through winter to mid-summer. At these times, water temperatures average between 2 to 15°C, i.e. less than 60°F (Figure 14). Because existing water temperatures appear

to fall within the species' tolerance for FMO habitat use, the environmental baseline for this PCE rates as "Properly Functioning" in the Braided Reach 1 – Phase 1 action area.

6.2.6 Seasonal Hydrograph

PCE 7: *A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph.*

Libby Dam operations have resulted in significant departures from the natural hydrograph, primarily through reduction of peak flow magnitude, although the overall seasonal pattern is the same. Therefore, the environmental baseline for this PCE rates as "impaired" in the Braided Reach 1 – Phase 1 action area.

6.2.7 Water Quantity and Quality

PCE 8: *Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.*

It is unknown what "sufficient water quality and quantity" is necessary to support normal reproduction, growth and survival of bull trout in the Kootenai River. There are no known water quality limitations that would be expected to have a major impact on bull trout productivity in Braided Reach 1. However, due to the overall modification of the hydrograph the environmental baseline of this indicator may be "impaired".

6.2.8 Non-native Species

PCE 9: *Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass; inbreeding (e.g., brook trout); or competitive (e.g., brown trout) species present.*

Brown trout, brook trout, smallmouth bass, largemouth bass, and northern pike are known to occur in the Kootenai River subbasin. The potential presence and abundance of these species in Braided Reach 1 is unknown. Therefore, at best, the environmental baseline for this PCE would rate as "impaired" and could be "not properly functioning".

7 Analysis of Effects of the Proposed Action

7.1 Direct Effects on Listed Fish

In this section, direct effects of the proposed Phase 1 projects are analyzed. The primary avenue for direct negative effects to aquatic species would occur during in-water work. Potential direct construction effects include: capture and handling during fish salvage of de-watered areas; harassment or actual mortality through contact with the in-water construction equipment or during dewatering; and effects on water quality, such as increased turbidity during construction, which may displace individual fish. Direct effects on critical habitat during instream construction are discussed in Section 7.1.2, Effects on Designated Critical Habitat.

7.1.1 Capture, Handling, Mortality, and Harassment During In-Water Work

Temporary construction effects on juvenile and adult listed fish (Kootenai sturgeon and bull trout) include potential capture and handling during salvage operations in work areas to be dewatered.

The instream work area is relatively small (a total of 445,365 square feet may be dewatered) when compared to available habitat within the Kootenai River in Idaho; the river reach at the Phase 1 sites is much less than one percent of the total length of the Kootenai River between Kootenai Falls and Kootenay Lake. Given the overall low abundance of bull trout and Kootenai sturgeon at the project sites, it is very unlikely that construction of Phase 1 would force bull trout or Kootenai sturgeon into alternative (suitable or unsuitable) habitats or cause migration delays (temporary disturbance at most) due to the small area of disturbance and the large scale of alternative suitable habitat. Further, the habitat at the projects sites was selected for restoration, as existing conditions currently consist of low complexity and low function habitat, further suggesting that bull trout and Kootenai sturgeon are unlikely to be present.

Based on their general life history pattern, current habitat availability, and overall low abundance in this reach (see Sections 5.4.1 and 5.4.2 for further discussion on use of the reach by these species), the chance of encountering bull trout or Kootenai sturgeon during in-water work is low.

While direct effects in the form of capture, handling, harassment, or mortality during instream work are unlikely, a few juvenile sturgeon and possibly a bull trout could be encountered during dewatering and fish relocation efforts. Fish removal will be conducted in areas to be dewatered, after fish exclusion devices are in place. Fish will be captured by trained fish biologists using a variety of techniques, such seining and electrofishing. During warm summer periods, it is preferable to conduct fish removal during coolest temperatures; therefore, fish removal will be conducted during the morning (as logistically feasible). After capture, fish will be placed into aerated containers, enumerated by species and transported to the nearest slow-water habitat unit outside of the construction zone for release as soon as possible. During capture, large predator fish will be segregated from smaller fish to avoid predation during transport. While mortality of captured and relocated fish will be minimized, some mortality can be expected (up to about 1 percent).

De-watering and in-water work would be conducted in late summer after Kootenai sturgeon have spawned. Wild juvenile Kootenai sturgeon are very low in abundance (Rust and Wikkinen 2008). Nearly all wild and hatchery juvenile Kootenai sturgeon are found downstream of Braided Reach 1 (Rust and Wikkinen 2008). Therefore, it is unlikely that Kootenai sturgeon of any life stage would be present at the Phase 1 sites during the proposed construction period. Although sturgeon presence is not expected, there is a small possibility that a few juvenile hatchery-origin sturgeon could be present in areas that would be dewatered. It is expected any adult sturgeon would volitionally move out of the project area as soon as project activities started; however, if any juvenile sturgeon are present they may become trapped behind the cofferdams and need to be removed. Although it is unlikely any sturgeon will actually be present during construction, for the purposes of this consultation it is assumed that one adult sturgeon may be startled out of the project area and 10 juveniles may be captured by seining or electrofishing and relocated out of the construction zone. Some mortality during fish capture and

transport can be expected; and therefore, up to one juvenile sturgeon at maximum could be killed during fish salvage efforts.

Available data indicate adult and subadult bull trout may be present in the action area, most likely seasonally during winter and spring. In the late summer, most bull trout likely move from the mainstem Kootenai River to spawning tributaries. Bull trout appear to be at a fairly low abundance level in the mainstem Kootenai River in general, and abundance in the late summer is likely even much lower as fish move to spawning tributaries. There is a small possibility that subadults may be using the area during the construction season, or that adult bull trout could be migrating through the areas to be dewatered. Adults and subadult bull trout would likely volitionally leave the project area as soon as project activities started. If any fish were trapped within the cofferdam area, they would likely be subadults. Although it is unlikely any bull trout will actually be present during construction, for the purposes of this consultation it is assumed that one adult bull trout may be startled out of the project area and two subadults may be captured by seining or electrofishing. Some mortality during fish capture and transport can be expected; and therefore, up to one subadult bull trout at maximum could be killed during fish salvage efforts.

7.1.2 Water Quality Alteration and Fish Displacement

Adverse water quality effects on listed fish and their critical habitat potentially could occur during instream or near-stream work. For example, sediment may be introduced to the river and turbidity could increase during in-water activities, or heavy equipment could introduce fuel, hydraulic fluid, or other toxic substances into the river.

7.1.2.1 Turbidity

Turbidity should return to pre-construction levels within a short period of time following site stabilization. Several measures will be implemented to reduce or eliminate the potential for erosion and elevated turbidity, or the discharge of toxic substances to the river (see Section 4.3.2, Conservation Measures).

Even with best management practices (BMPs) and monitoring, a short-term decrease in water quality through inadvertent releases of sediment to the river may occur. Rain events increase the risk of water quality degradation due to soil erosion. The risk would be greater if water treatment and containment facilities are overwhelmed during an unusually large rain event. Given the dry climate and proposed late summer construction, this type of event is not expected to occur. Any rainstorm would likely be of short duration, and any substances entering surface waters would likely be greatly diluted by the increased flow volume in the river.

Short-term and localized increases in turbidity will have little effect on listed fish at each of the project sites. Bull trout and Kootenai sturgeon are not likely to be present during construction. In addition, evidence suggests that salmonids, such as bull trout, are well adapted to short-term increases in turbidity, as such conditions occur naturally as a result of storms, landslides, or other phenomena (Redding et al. 1987). Many bull trout populations migrate through reaches of very high natural turbidity on an annual basis for days or weeks associated with natural unstable conditions. Examples include reaches affected by the Mount St. Helens eruption, such as Pine

Creek in the Lewis River Basin (WA), or heavily sediment-laden waters during summer glacial runoff, such as in the Hood River (OR) and Whitechuck River[6] in the Skagit River Basin (WA). Natural turbidity in these systems is high; it is unlikely that proposed Phase 1 construction could generate comparable turbidity levels throughout the mainstem Kootenai River cross-sectional area, even if no construction BMPs were installed.

Given the relatively small area to be graded, and the intent to implement containment and prevention measures, it is unlikely that turbidity would rise above detrimental thresholds for an extended period of time. Any turbidity caused by the proposed action is not expected to reach levels that would harm listed bull trout or Kootenai sturgeon, even if they were at the project site during construction.

Under a worst-case scenario, if a fine sediment pulse/turbidity event occurred and lasted for several days to weeks (such as if the sediment and erosion control BMPs were overwhelmed by an unexpected large storm or high flow event), such an impact would be similar to existing seasonal site conditions. Such a sediment pulse would likely occur only in conjunction with an unusually high flow or storm event that would naturally elevate turbidity from the many eroding banks present under existing conditions. Existing bank erosion is thought to be elevating fine sediment to a degree that precludes successful sturgeon spawning/recruitment in combination with other factors such as velocity and depth. For these reasons, a project-induced worst case sediment turbidity pulse would not be expected to significantly increase fine sediment deposition or the turbidity in the Kootenai River compared to existing conditions.

7.1.2.2 Toxic Substances

In-water work has the potential to degrade water quality through spill of toxic substances such as fuel or hydraulic fluid from construction equipment. This potential is best reduced by maintaining equipment in proper working condition and by developing and implementing a spill prevention control and countermeasure plan (SPCCP). Typically, a SPCCP would specify areas for equipment maintenance and refueling; identify spill prevention and emergency response strategies and requirements for keeping emergency response spill containment kits onsite; and direct that trained personnel be on site during in-water work. A SPCCP will be developed by the construction contractor and approved by appropriate agencies, before construction occurs.

Instream work will require a Corps of Engineers Section 404 dredge-and-fill permit, and Section 401 water quality certification. Through the construction permitting process, BMPs would be identified and approved by permitting agencies (see Section 4.3.2). Agency-approved measures would be employed during all instream and near-stream work to reduce the potential for introducing toxic substances or fines into the river. In addition, water quality would be monitored to assure compliance with state standards and allow quick response to unsafe conditions. Under a worst case scenario, a piece of heavy equipment could malfunction and release fuel or other toxic substances to the river. Although BMPs will be implemented to minimize this risk, if such were to occur, the volume would likely be very small compared to the

[6] Of note is that naturally high turbidity in the Whitechuck River migration corridor does not apparently limit population abundance, as bull trout are numerous enough to allow harvest.

total river volume and would be greatly diluted, likely causing little effect to the aquatic environment.

7.2 Indirect Effects

Indirect effects are caused by or result from the proposed action, occur later in time, are reasonably certain to occur, and may occur outside the area directly affected by the action. One reasonably certain indirect effect is likely. As discussed below under the analysis of effects on the environmental baseline, the project is designed to reduce bank erosion and sedimentation and enhance habitat complexity, measures that will incrementally improve Kootenai sturgeon spawning habitat in downstream reaches and bull trout feeding, migration or overwintering habitat, an entirely beneficial effect.

7.3 Effects from Interdependent or Interrelated Actions

Interrelated actions are those that are part of a larger action and depend on the larger action for their justification (50 CFR 402.02). Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR 402.02). At this time, we are unaware of any interrelated and/or interdependent actions that would affect Kootenai sturgeon or bull trout. The effects of implementing the overall KRHRP, as stipulated by component 2 of the USFWS RPA (USFWS 2006, as clarified in 2008) for the project reach, is presented in the cumulative effects section of this BA.

7.4 Description of How the Environmental Baseline May Be Affected

USFWS (2002b) details a matrix of habitat "pathways and indicators" to evaluate the effects of projects on the environmental baseline for bull trout. This matrix was developed for large landscape-scale actions. The matrix highlights important habitat attributes (i.e., pathways) that directly correspond with the proposed revised bull trout critical habitat PCEs. The USFWS does not have such a matrix to evaluate effects on the environmental baseline for Kootenai sturgeon; however, as with bull trout, the effects analysis presented in this document on sturgeon critical habitats PCEs also serves as the analysis of project effects on the environmental baseline. To standardize the analysis of effects on the environmental baseline, the critical habitat PCE frame work was used for both Kootenai sturgeon and bull trout. In the following section, we determine the effect of the proposed project on the existing environmental baseline condition (as rated in Section 6) for each sturgeon and bull trout critical habitat PCE in the Braided Reach 1 – Phase 1 action area.

In summary, the project is specifically designed to improve the sediment and substrate constituents of the sturgeon PCE 5, and would incrementally improve all other Kootenai sturgeon critical habitat PCEs over the long term (Table 9). Because sturgeon critical habitat PCEs should incrementally improve over the long term and contribute towards meeting properly functioning conditions, the proposed Phase 1 project would improve the environmental baseline for sturgeon in Braided Reach 1.

The proposed projects are designed specifically to improve bull trout PCE 4 (habitat complexity) over the long term, and may incrementally improve or have no influence on all other bull trout PCEs (Table 9). Incremental long-term improvements to the proposed revised bull trout critical

habitat PCEs would contribute to meeting properly functioning conditions. Therefore, the Phase 1 projects should improve the environmental baseline for bull trout in Braided Reach 1. A summary of the effect of the proposed project on each PCE element for each species follows Table 9.

Table 9. Summary of effects of projects on relevant sturgeon and bull trout critical habitat PCEs in Braided Reach 1.

Baseline Environmental Conditions			
PCE	**Baseline Function**	**Description**	**Effect of the Proposed Action**
Kootenai River White Sturgeon			
Water Depth	NPF	Stabilizing severely erosive banks, encouraging floodplain sediment and vegetation recruitment and reducing side channel capacity, may ultimately increase thalweg depth of the mainstem channel to a degree in the project area.	NR, may IMPROVE
Water Velocity	IC	Stabilizing severely erosive banks, encouraging floodplain sediment and vegetation recruitment and reducing side channel capacity, may ultimately increase thalweg velocity of the mainstem channel to a degree in the project area.	NR, may IMPROVE
Water Temperature	IC	Some incremental improvement in water temperatures may be realized when the Phase 1 riparian vegetation treatments become established and provide increased shade, and by narrowing and deepening the side channels and mainstem.	NR, may IMPROVE
River Substrate	IC	The goal of this phase of the KRHRP is to reduce erosion and sedimentation, which should result in increased rocky substrate exposure to some degree.	NR, may IMPROVE
Sediment Regime	IC	The goal of this phase of the KRHRP is to reduce erosion and sedimentation.	IMPROVE
Columbia River Bull Trout			
Cold Water Springs, Seeps, and Hyporheic Flows	NPF	The project will improve floodplain connection.	NR, may IMPROVE

Baseline Environmental Conditions			
PCE	**Baseline Function**	**Description**	**Effect of the Proposed Action**
Migratory Corridor	PFC	The project will not create or remove barriers.	NR
Forage Base	IC	Increasing habitat complexity may improve forage base productivity	NR, may IMPROVE
Habitat Complexity	NPF	The project will result in increased habitat complexity by adding large wood and scour pool forming features.	IMPROVE
Water Temperature	PFC	The project will increase riparian vegetation, and side channel width to depth ratio may be increased (reducing surface area).	NR, may IMPROVE
Spawning Substrate	NA	Spawning is not suspected currently or historically in the mainstem Kootenai River.	NA
Seasonal Hydrograph	IC	The project will have no influence on the hydrograph.	NR
Water Quantity and Quality	IC	The project will have no influence on water quantity. Water quality may be incrementally improved by excluding grazing in the riparian area and by reducing sediment contributions.	NR, may IMPROVE (water quality)
Non-native Species	IC	Increasing habitat complexity may favor native species.	NR, may IMPROVE

PFC = Properly Functioning Condition, IC = Impaired Condition, NPF = Not Properly Functioning; IMPAIR = impair properly functioning habitat; REDUCE = appreciably reduce the functioning of already impaired habitat; RETARD = retard the long-term progress of impaired habitat towards properly functioning condition; NR = not reduce, retard, or impair future attainment of PFC; IMPROVE = improve towards meeting properly functioning conditions; NPF = baseline not properly functioning; IC = impaired condition; PFC = baseline properly functioning condition; NA = not applicable.

7.4.1 Relevant Sturgeon Baseline Elements

7.4.1.1 Water Depth

PCE 1: *A flow regime, during the spawning season of May through June, that approximates natural variable conditions and is capable of producing depths of 23 feet (7 meters) or greater when natural conditions (for example, weather patterns, water year) allow. The depths must occur at multiple sites throughout, but not uniformly within, the Kootenai River designated critical habitat.*

The Phase 1 projects would not change the hydrographic pattern of the Kootenai River, which is controlled chiefly by Libby Dam operations. In addition, implementing the proposed projects would have no influence on future operations of Libby Dam towards meeting properly

functioning conditions for this PCE. One of the project goals is to stabilize eroding banks and encourage floodplain sediment and vegetation recruitment and reduce side channel capacity, which may encourage the transition to a more narrow and deepened mainstem river channel at the project sites. Therefore, the proposed treatments will not retard attainment of properly functioning conditions, and may improve the Kootenai sturgeon spawning depth PCE in the project area.

7.4.1.2 Water Velocity

PCE 2: *A flow regime, during the spawning season of May through June, that approximates natural variable conditions and is capable of producing mean water column velocities of 3.3 ft/s (1.0 m/s) or greater when natural conditions (for example, weather patterns, water year) allow. The velocities must occur at multiple sites throughout, but not uniformly within, the Kootenai River designated critical habitat.*

As stated above, the Phase 1 projects would not alter the hydrographic pattern of the Kootenai River. Implementing the proposed treatments also would have no influence on the ability of future Libby Dam operations to meet properly functioning conditions for this PCE. One of the goals of the Phase 1 projects is to stabilize severely erosive banks, encourage floodplain sediment and vegetation recruitment and reduce side channel capacity, which may ultimately increase thalweg velocity of the mainstem channel in these reaches. Therefore, the proposed projects would not retard attainment of properly functioning conditions and may contribute to improvement of this PCE in the project area.

7.4.1.3 Water Temperature

PCE 3: *During the spawning season of May through June, water temperatures between 47.3 and 53.6 °F (8.5 and 12°C), with no more than a 3.6 °F (2.1 °C) fluctuation in temperature within a 24- hour period, as measured at Bonners Ferry.*

The proposed Phase 1 projects would not have a major effect on Kootenai River water temperature patterns. Water temperatures in the project reach are influenced primarily by Libby Dam operations, as well as the ambient air temperature. Some incremental improvement in water temperatures may be realized when the Phase 1 riparian vegetation treatments become established and provide increased shade, and by narrowing and deepening the side channels and mainstem. Narrower and deeper channels have less surface area, and thus are more resistant to the warming effect from ambient air temperatures. Therefore, the proposed action would not retard attainment of properly functioning conditions. Kootenai sturgeon spawning temperature PCE may incrementally improve in the project area.

7.4.1.4 River Substrate

PCE 4: *Submerged rocky substrates in approximately 5 continuous river miles (8 river kilometers) to provide for natural free embryo redistribution behavior and downstream movement.*

The goal of this phase of the KRHRP is to reduce erosion and sedimentation, decrease channel width, increase velocity through the project reach, and create more complex habitats, over the

long term. The outcome of these improvements should incrementally increase exposure of rocky substrates downstream and may attract Kootenai sturgeon to the existing rocky substrates in Braided Reach 1, improving this PCE condition toward meeting the properly functioning condition criteria for the Kootenai sturgeon spawning substrate PCE.

7.4.1.5 Sediment Regime

PCE 5: *A flow regime that limits sediment deposition and maintains appropriate rocky substrate and inter-gravel spaces for sturgeon egg adhesion, incubation, escape cover, and free embryo development. Note: the flow regime described above under PCEs 1 and 2 should be sufficient to achieve these conditions.*

As described above, the proposed project has no influence over the Kootenai River hydrograph, but would reduce sedimentation, erosion and production of fine sediments that are transported downstream to known spawning locations that inhibit successful Kootenai sturgeon spawning. The proposed projects would directly improve this PCE condition by reducing erosion and sedimentation. The project would also incrementally reduce stream channel width, which may increase depth and velocity that would incrementally improve the properly functioning conditions of this PCE over the long term.

7.4.2 Relevant Bull Trout Baseline Elements

7.4.2.1 Cold Water Springs, Seeps, and Hyporheic Flows

PCE 1: *Springs, seeps, groundwater sources, and subsurface water connectivity (hyporehic flows) to contribute to water quality and quantity and provide thermal refugia.*

One of the goals of the project is to increase connectivity of the river with its floodplain at the project sites, which may improve hyporheic flow exchange to an incremental degree. The project would have no influence on springs and seeps, but would not retard future attainment of properly functioning conditions for this PCE.

7.4.2.2 Migratory Corridor

PCE 2: *Migratory habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.*

The proposed Phase 1 treatments would not remove or form any barriers that would influence bull trout migration through the project area. Therefore, the project would have no influence on this PCE and would not retard future attainment of properly functioning habitat conditions.

7.4.2.3 Forage Base

PCE 3: *An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.*

One of the primary project goals is to establish a diverse riparian vegetation community along the river and side channel banks. A diverse riparian vegetative community is expected to increase terrestrial insect recruitment to the aquatic environment. Stabilizing the banks and increasing aquatic habitat complexity with large wood installations is likewise expected to increase aquatic macroinvertebrate production in the project area. Increasing habitat complexity and macroinvertebrate production would increase the forage base for fish species that may be preyed upon themselves by migratory bull trout (which are highly piscivorous) that may use the project area during winter and spring. Therefore, the proposed project would not retard attainment of properly functioning conditions and may improve this PCE in the project area over the long term, progressing toward properly functioning conditions.

7.4.2.4 Habitat Complexity

PCE 4: *Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure.*

The Phase 1 treatments are designed to implement this PCE concept at the project sites by incorporating all of these fundamental design elements (large wood, side channel complexity, creation of scour pools, diverse riparian vegetation that can support undercut banks, and improved substrate conditions). Therefore, the proposed project is designed to improve this PCE in the project area over the long term, progressing toward properly functioning conditions.

7.4.2.5 Water Temperature

PCE 5: *Water temperatures ranging from 2 to 15°C (36 to 59°F), with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shade, such as that provided by riparian habitat; and local groundwater influence.*

The proposed Phase 1 treatments would not greatly influence water temperature patterns in the Kootenai River. Water temperatures in the project reach are primarily influenced by Libby Dam operations, as well as by ambient air temperatures. Some incremental water temperature improvements may be realized by implementing Phase 1 of the project through establishment of riparian vegetation that will increase shade, and by narrowing and deepening the side and mainstem channels. Narrower and deeper channels have less surface area, and thus are more resistant to the warming effect from ambient air temperatures. Therefore, the proposed projects would not retard attainment of properly functioning conditions and may incrementally improve this PCE, moving conditions towards meeting the bull trout water temperature PCE.

7.4.2.6 Seasonal Hydrograph

PCE 7: *A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph.*

The proposed Phase 1 projects would not change the Kootenai River hydrograph, which is primarily controlled by Libby Dam operations. In addition, implementing the proposed projects would have no influence on the future ability of Libby Dam to meet properly functioning conditions of this PCE, and therefore, would not retard achieving properly functioning conditions in the future.

7.4.2.7 Water Quantity and Quality

PCE 8: *Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.*

The Phase 1 treatments would not change water quantity patterns (i.e., the seasonal hydrograph) of the Kootenai River. These are primarily controlled by Libby Dam operations. In addition, implementing the proposed projects would have no influence on the future ability of Libby Dam to meet properly functioning conditions of this PCE, and therefore, would not retard achieving future properly functioning conditions.

Regarding water quality, one of the primary goals of the project is to reduce erosion and sedimentation. It is unknown if reducing erosion and sedimentation would benefit migratory bull trout directly in the project area, as migratory adult and subadult salmonids are typically adapted to increased turbidity during winter and spring. The effect is unlikely to be negative, most likely ranging from benign to beneficial. For example, reducing sedimentation and turbidity could increase primary productivity to some degree, ultimately incrementally increasing the fish forage base (beneficial effect). The effect of the proposed project would not hinder future attainment of properly functioning water quality conditions.

7.4.2.8 Non-native Species

PCE 9: *Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass; inbreeding (e.g., brook trout); or competitive (e.g., brown trout) species present.*

The proposed project is designed to create a more natural and complex habitat types that maybe more preferable to migratory adult and subadult bull trout than the current low-complexity condition. It is assumed that a more natural, complex habitat would favor native species such as bull trout over non-native species that may use the area. Therefore, Phase 1 treatments may improve habitat conditions to an incremental degree, which may improve PCE.

7.5 Effects on Designated Critical Habitat

A critical habitat analysis determines whether a proposed action will destroy or adversely modify designated or proposed critical habitat for listed species by examining any change in the conservation value of the essential features, i.e., the PCEs of that habitat. This analysis relies on statutory provisions of the ESA, including those in Section 3 that define “critical habitat” and “conservation,” in Section 4 that describe the designation process, and in Section 7 that sets forth the substantive protections and procedural aspects of consultation. It also relies on agency guidance for application of the “destruction or adverse modification” standard. With respect to designated critical habitat, the following analysis relies only on the statutory provisions of the

ESA, and not on the regulatory definition of "destruction or adverse modification" at 50 CFR 402.02.

Temporary effects that may result from construction (as described in Section 7.1.2), such as increased turbidity, are expected to be short term and minimized through appropriate application of BMPs (see Section 4.3.2). Such temporary effects are not expected to retard attainment of properly functioning conditions for designated sturgeon critical habitat or proposed revised bull trout critical habitat PCEs.

As described above in Section 7.4, the long-term effect of the projects would not retard attainment of properly functioning conditions or would improve all of the sturgeon designated critical habitat PCEs and proposed revised bull trout critical habitat PCEs in the Braided Reach 1 – Phase 1 action area. Therefore, the proposed projects would not destroy or adversely modify sturgeon designated critical habitat or proposed revised bull trout critical habitat over the long term.

7.6 Estimating Take

Section 9 of the ESA and federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the USFWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding or sheltering.

As described previously, it is very unlikely that any injury to or mortality of bull trout or Kootenai sturgeon would occur as a result of the proposed projects. These species are unlikely be in the action area during the late summer construction period. The species' critical habitat PCEs would be improved over the long term as a result of the proposed action. Due to low abundance of bull trout and Kootenai sturgeon and the large quantity of available habitat in the Kootenai River reaches in relation to the actual area of impact, potential displacement of individual bull trout or Kootenai sturgeon would likely be minor.

Under a worst case scenario there is a chance that a few juvenile sturgeon or a bull trout could be present in areas that would be dewatered. Such fish, if present, would be captured, documented, and relocated to the river away from the construction zone. Capturing and relocating a few individuals would not be expected to affect bull trout or sturgeon at either the population or DPS levels. Under a worst case scenario for the purposes of this consultation it is assumed that one adult sturgeon and one adult bull trout may be startled out of the project area and 10 juvenile sturgeon and two subadult bull trout may be captured by seining or electrofishing and relocated out of the construction zone. Some mortality during fish capture and transport can be expected; and therefore, under a worst case scenario up to one juvenile sturgeon and one subadult bull trout at most could be killed during fish salvage efforts.

7.7 Cumulative Effects

Cumulative effects are defined in 50 CFR § 402.02 as "those effects of future state, tribal, local or private actions, not involving Federal activities, that are reasonably certain to occur in the action area." Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA. Actions undertaken in the Kootenay River in Canada that could potentially affect the Kootenai River in the action area are not considered because these potential effects are outside the scope of the ESA.

Although a Section 7 action has been undertaken for Libby Dam operations (USFWS 2006), it is important to discuss the proposed project within the consultation framework of that related decision. The Libby Dam operations BiOp includes an RPA to reduce impacts of dam operations on Kootenai sturgeon. The 2008 BiOp clarification includes RPA Component 2, Action 2.1, which specifically identifies the KRHRP, stating "The action agencies shall cooperate in good faith with and support the Kootenai Tribe of Idaho's good-faith efforts to implement the Kootenai River Restoration Project Master Plan, including developing a funding strategy to implement the Plan" (USFWS 2008a). The proposed Phase 1 Braided Reach project represents initiation of Action 2.1 and RPA Component 2.

As discussed in Section 1.2.2 (Other Actions), several other restoration programs, combined with the KRHRP, comprise a comprehensive ecosystem initiative intended to restore structure, function and processes within a time frame intended to prevent Kootenai sturgeon and other species from becoming functionally extinct. These programs are being implemented through cooperative, inter-governmental partnerships that include the Kootenai Tribe, agencies of the United States, British Columbia, Idaho and Montana. Overall, cumulative effects are expected to be beneficial to Kootenai sturgeon in the action area.

It is unknown how these cumulative effects may influence bull trout foraging, migration, and over-wintering habitat uses within the project area. It appears that bull trout successfully use a wide range of habitat types for these life-history stages. If the riverine habitat in the Braided Reach returns to a condition more similar to pre-Libby Dam, the effect on bull trout would range from neutral to beneficial.

8 Finding of Effect

The proposed project is designed to benefit Kootenai sturgeon and bull trout. As described in Section 7.1.1 sturgeon are not expected to be in the project area during construction. However, for the purposes of this consultation, under a worst case scenario, it is assumed that one adult sturgeon may be startled out of the project area, ten juvenile sturgeon may be captured by seining or electrofishing, and up to one juvenile sturgeon mortality could occur. Similarly, it is unlikely any bull trout will actually be present during construction, but for the purposes of this consultation under a worst case scenario, it is assumed that one adult bull trout may be startled out of the project area, two subadult bull trout may be captured by seining or electrofishing, and one subadult bull trout mortality at most could occur. Therefore, BPA has determined the project "may affect", and is "likely to adversely affect" Kootenai River white sturgeon and Columbia River bull trout.

Designated sturgeon critical habitat PCEs and bull trout proposed revised critical habitat PCEs would be improved over the long term, and the project would not hinder attainment of properly functioning habitat conditions for these species. Therefore, the proposed Phase 1 project would not destroy or adversely modify Kootenai River white sturgeon designated critical habitat or Columbia River bull trout proposed revised critical habitat.

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Appendix A: Design Drawings

The following preliminary design drawings are provided:

Sheet 3.2	Phase 1a Left Bank Restoration Plan
Sheet 3.3	Phase 1a Right Bank Restoration Plan
Sheet 3.4	Phase 1a Right Bank Side Channel Restoration Plan
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