

Lead Agency:



United States  
Department of  
Agriculture,  
Forest Service

July 2015



Cooperating  
Agencies:



Nez Perce Tribe



U.S. Department  
of Energy,  
Bonneville Power  
Administration



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# Final Record of Decision

## Crooked River Valley Rehabilitation

Red River Ranger District, Nez Perce – Clearwater National Forests  
Idaho County, Idaho



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**Crooked River Valley Rehabilitation  
Final Record of Decision  
July 2015**

**Red River Ranger District  
Nez Perce-Clearwater National Forests  
Idaho County, Idaho**

**Lead Agency:** USDA Forest Service

**Cooperating Agencies:** Nez Perce Tribe  
U.S. Department of Energy,  
Bonneville Power Administration  
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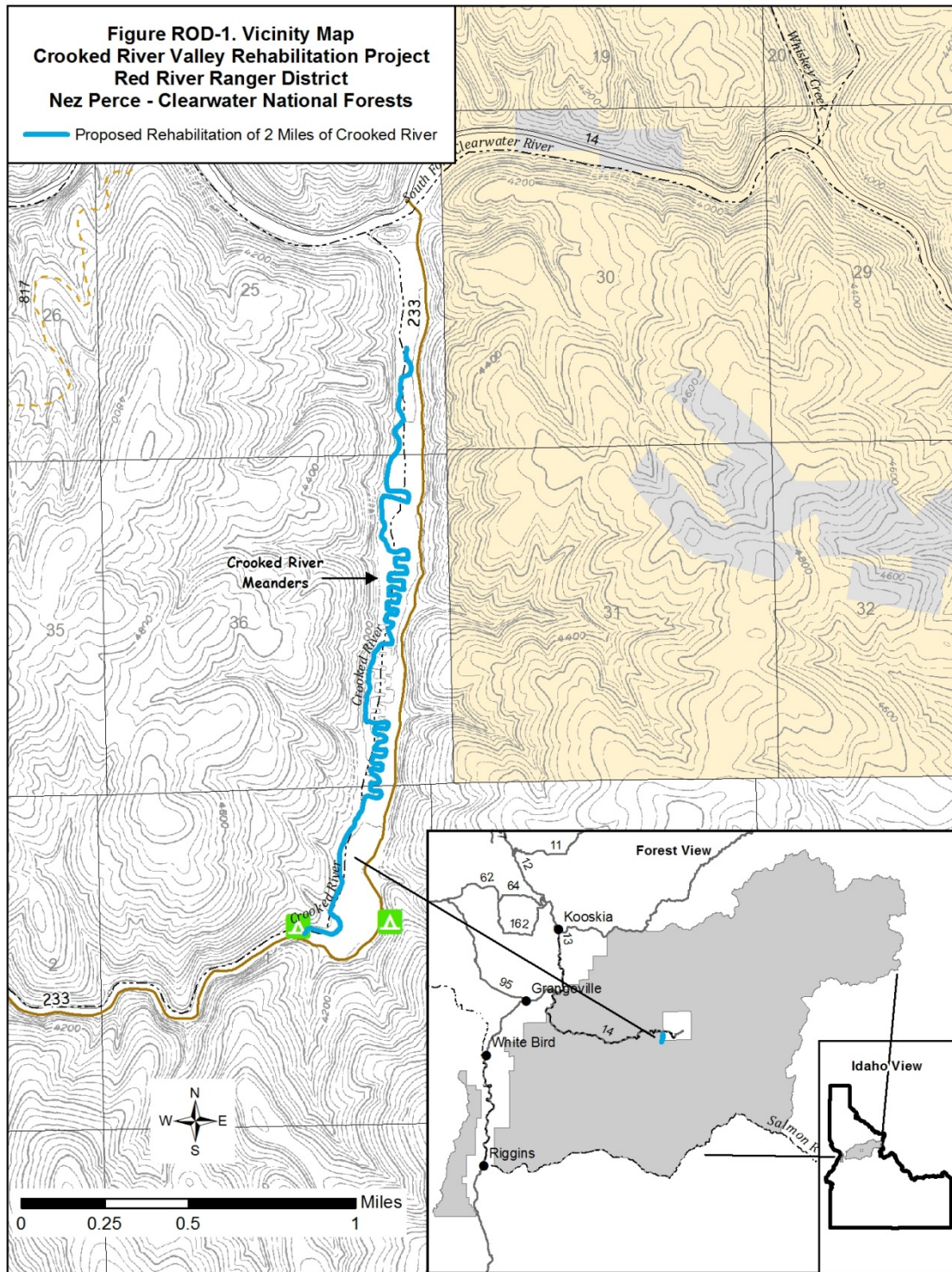


Figure ROD-1. Vicinity Map of Crooked River Valley Rehabilitation project.

## Decision Summary

After extensive analysis and based on my consideration of comments, I have decided to implement **Alternative 2** as described in the Final Environmental Impact Statement (Final EIS) for the Crooked River Valley Rehabilitation project. In making this decision I have considered: the condition of Crooked River, the current aquatic habitat and water quality conditions of Crooked River, the current condition of soil resources, the condition and status of one National Register historic site, the current condition of wildlife habitat, current mining claims, public comments, and the potential environmental effects of this project, and applicable laws and regulations. I believe my decision is the best balance of all of these factors. This Record of Decision documents my decision and rationale for implementing the selected actions in the project area.

The project area is located in the Crooked River watershed, within the Red River Ranger District in the Nez Perce – Clearwater National Forests in north-central Idaho, approximately 5 miles west of Elk City, Idaho. The project area, approximately 115 acres, extends from 0.1 mile upstream from the mouth of Crooked River (at the Idaho Department of Fish and Game weir) to approximately 2.0 miles upstream. The valley width includes Road 233 on the east side of the valley to the base of the hillslope on the west side of the valley. The location is Township 29 North, Range 7 East, Sections 25 and 36; and Township 28 North, Range 7 East, Section 1 (Figure ROD-1).

Briefly, this Decision will rehabilitate 2 miles of Crooked River, known as the Meanders over the next six years. This project will restore channel and floodplain functions, restore instream fish habitat complexity, and improve water quality in the Crooked River valley. This will be achieved by: grading the majority of the tailings piles and reconstructing the river and its floodplain to create natural stream sinuosity and morphology; restoring floodplain and hydrologic functions; constructing instream channel structures to provide spawning and rearing habitat for steelhead, spring/summer Chinook salmon, bull trout, and cutthroat trout; improving water quality; and restoring riparian areas. In addition, Alternative 2 will maintain developed and dispersed camping opportunities in the project area, and preserve heritage resource areas as identified by the Forest Service Archeologist through consultation with the State Historic Preservation Office. Two project-specific Forest Plan Amendments will be completed (ROD, Appendix B).

Various issues were addressed through design or mitigation measures. They include: the effects to fish and fish habitat, water quality (sediment, temperature, mercury, toxins), soil resources, re-vegetation, transportation, control of invasive species, effects to sensitive plants and wildlife, access to mining claims, access for public recreation, and cultural resources (including effects to one National Historic Register Site).

Alternative 2 will accomplish the following actions (Figures ROD-2 and ROD-3):

- Construct a 6,000 foot temporary bypass channel and temporary access road/levee. Following construction of the channel, these structures will be removed and decommissioned.
- Re-grade approximately 115 acres of floodplain by moving dredge tailings and fill in approximately 10, 960 feet of current channel.
- Reconstruct approximately 7,400 feet of stream channel.
- Install woody bank structures.
- Construct more than 2,700 feet of side channels.
- Create conditions for 64 acres of wetlands.
- Replant the valley bottom with native and approved non-native, plant species.
- Monitor and evaluate project actions.

## Purpose and Need for Action

Historic mining activities have altered the Crooked River valley and have led to degraded fish habitat, causing inadequate densities of fish in Crooked River. The Forest Service needs to restore the Crooked River valley to improve fish habitat and water quality in Crooked River. The proposed action would achieve goals and objectives in the Forest Plan, in a below objective watershed, to improve habitat conditions improve habitat for Endangered Species Act (ESA)-listed and sensitive fish species, and respond to objectives of the Nez Perce Tribe. To meet the purpose and need, the proposed action is to restore channel and floodplain functions, restore instream fish habitat complexity, and improve water quality in the Crooked River valley. These actions should rehabilitate the valley to a state where the hydrologic and geomorphic processes sustain more appropriate habitat condition for fish in Crooked River.

During the 1930s through 1950s the entire main stem of Crooked River was heavily impacted by dredge mining, which left large tailings piles and deep ponds throughout the valley bottom. Physical changes to the valley bottom have altered stream and riparian processes, and have affected aquatic and terrestrial habitat conditions that resulted in degraded ecosystem conditions relative to historic conditions. The lower 2 miles have been altered so drastically that hydrologic and geomorphic condition resemble that of a spring-fed creek instead of a snow-melt dominated system, instream complexity is low, the majority of the streambed is armored, and the recolonization of native riparian vegetation has been impaired.

Desired aquatic habitat in the project area is a rehabilitated stream corridor capable of supporting natural aquatic processes and sustaining the habitat requirements of the focal aquatic species for a range of life stages and seasonal behavior patterns. This would include an accessible and functioning floodplain, natural stream meanders, complex fish habitat, healthy riparian vegetation, and improved water quality (USDA Forest Service 1987a). The Crooked River watershed contains important aquatic resources and has high aquatic potential (90 percent), but existing habitat conditions cause the Lower Crooked River watershed to be below the objective established in the Forest Plan (50 percent). Comments on the Draft EIS asked for more information on the historic conditions of the project area and the alignment of the proposed river channel. The desired condition of the channel and floodplain will be based on hydrologic, hydraulic, terrain and earthwork analysis in the project area to support desired functions.

The Final EIS documents the analysis of two alternatives considered in detail, and 11 alternatives considered but eliminated from detailed study, to meet this need.

## Decision

As the Forest Supervisor, I am the Responsible Official for this decision. Based on the analysis documented in the Crooked River Valley Rehabilitation Final Environmental Impact Statement and the project record, **I have decided to implement Alternative 2** as described below. In making this decision, I considered information: in the Final EIS and supporting project record; all public comments; results of consultation and coordination with the National Marine Fisheries Service, U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, and Idaho State Historic Preservation Office; and input from cooperating agencies including the Nez Perce Tribe, Bonneville Power Administration (BPA), and the U.S. Army Corps of Engineers (USACE).



## Rehabilitation Actions

Alternative 2 is the Selected Alternative. Under Alternative 2, the lower 2 miles of the Crooked River valley and Crooked River will be rehabilitated to improve fisheries habitat (Figures ROD-2, ROD-3 and Final EIS, Appendix A). This alternative will follow the specific Design and Mitigation Measures identified in this section in the Final EIS below. Additional measures and monitoring identified through the consultation process will also be followed as outlined in the Biological Opinions from U.S. Fish and Wildlife Service and NOAA – National Marine Fisheries Service (ROD, Appendix C).

Alternative 2 project area spans from the Idaho Department of Fish and Game weir intake structure, which is approximately 0.1 mile upstream of the confluence with the South Fork Clearwater River, to about 2.0 miles upstream where the valley narrows. The valley rehabilitation/reconstruction is proposed to address the areas that have been adversely impacted by historic dredge mining.

Alternative 2 will re-grade approximately 115 acres of floodplain by moving dredge tailings. No dredge material will be removed from the project area. Approximately 6,000 feet of temporary bypass channel/haul road will be constructed, used and decommissioned. Approximately 10,960 feet of current channel will be filled in and approximately 7,400 feet of new stream channel will be reconstructed, using onsite material including old mine tailings. The new stream channel will have woody bank treatments added to provide stability. Large woody debris will be added along approximately 9,400 feet of stream channel to provide habitat complexity. More than 2,700 feet of side channels will be constructed. The stream channel will be constructed so as not to interfere with Road 233 in the lower 2 miles. An illustration of the proposed floodplain features, including the side channels and vegetation communities, is provided in the Final EIS, Chapter 2, Figure 2-2.

This alternative is based on designs and design criteria provided in the *Final Design Report: Crooked River Valley Rehabilitation Design* (RDG et al. 2013a) and the *Design Criteria Report: Crooked River Valley Rehabilitation Design* (RDG et al. 2012). The stream restoration is proposed to address areas of impact in the lower 2 miles of Crooked River. For engineering design details on the proposed action, see Final EIS, Appendix A. The design of the new river channel and floodplain was developed to provide a rehabilitated landscape capable of sustaining geomorphic processes to support desired aquatic habitat and vegetative conditions. The desired future geomorphic condition includes restoring river and floodplain functions by reducing channel entrenchment, establishing pool development processes, addressing stream flows and ponding, and modifying the channel hydraulics to produce flows that will support a mobile gravel bed (produce spawning areas).

Alternative 2 will be implemented in six construction phases, accomplished within annual budget allocations. Phases 1, 2, 3 and 4 include: bypass channel construction, floodplain grading, channel construction and bank/floodplain treatments, bypass channel reclamation, and re-vegetation. Two Phases (termed Options 1 and 2) include floodplain grading, large woody debris placement, and re-vegetation. The phasing sequence is summarized in Table ROD-1 below, Figure ROD-2 below, and depicted in the Final EIS, Appendix A in Figures A-1a, A-1b and A-1c (RDG et al. 2013a). A bypass channel station or channel station listed as in Table ROD-1 is the linear distance in feet along the channel in the design plan and on figures in Final EIS, Appendix A (RDG et al. 2013a).

Project Phases were developed in order to meet water management (bypass channel) requirements, temporary stabilization measures of unconsolidated material required to transition from each phase to prevent flood damage to newly constructed features, earthwork volumes

(balancing cut and fill), and environmental compliance considerations (fish passage). Project Phases 1 through 4, as outlined below, must be constructed in order to meet these measures and reduce the overall environmental impact of the project. Two Options were developed that could be constructed any time: before Phase 1, during the construction of Phases 1 through 4, or after completing Phase 4. These were developed as Options to allow for flexibility in the construction timing and based on available funding overtime.

Implementation of all six phases is dependent upon funding over time. Funding from BPA will be used for this Alternative, if BPA makes a decision to provide funding following the Forest Service decision. Other grants or funding could also be used. The amount of the construction bids for each phase will determine how and when they are implemented. It is the Forests' intent to complete all six phases of construction to meet the purpose and need of the project.

Following the Forest Service decision, BPA will decide whether to provide funding toward the Crooked River Valley Rehabilitation Project and USACE will decide whether to provide Clean Water Action Section 404 authorization for the project.

**Table ROD-1. Alternative 2 - Construction phasing approach for the Crooked River Valley Rehabilitation project (RDG et al. 2013a)<sup>1</sup>.**

Phase	Year	Scope
Phase 1	2015	Temporary bypass channel construction (bypass channel stations 0 to 4000). Temporary haul road/levee construction. New channel construction and floodplain grading (channel stations 3100 and 7400), including grading of secondary floodplain features (swales, depressions, wetlands, and side channels). Material stockpiling, including large woody debris, rock, woodchips and soil. Salvage wood and herbaceous plants and sod.
Phase 2	2016	Temporary bypass channel construction (bypass channel stations 4000 to 6000). Temporary haul road/levee construction. New channel construction and floodplain grading (channel stations 7400 to 10600), including grading of secondary floodplain features (swales, depressions, wetlands, and side channels). Material stockpiling, including large woody debris, rock, woodchips and soil. Salvage wood and herbaceous plants and sod.
Phase 3	2017	Bank treatments and floodplain roughness (channel stations 3100 and 10600). New channel activation. Re-vegetation of floodplain. Stockpile large woody material.
Phase 4	2018	Temporary bypass channel and haul road/levee reclamation. Add floodplain roughness, and upland floodplain grading, including grading of secondary floodplain features (swales, depressions, wetlands, and side channels between channel stations 3100 to 10600). Re-vegetation of floodplain.
Option 1	Any year 2015 to 2018	Floodplain grading and habitat structures (channel stations 0 to 3100). Plant floodplain and revegetation maintenance.
Option 2	Any year 2015 to 2018	Floodplain grading and habitat structures (channel stations 10600 to 12900). Plant floodplain and revegetation maintenance.

<sup>1</sup> Channel and bypass channel station numbers are located in FEIS, Appendix A, Figures A-1a through A-6.

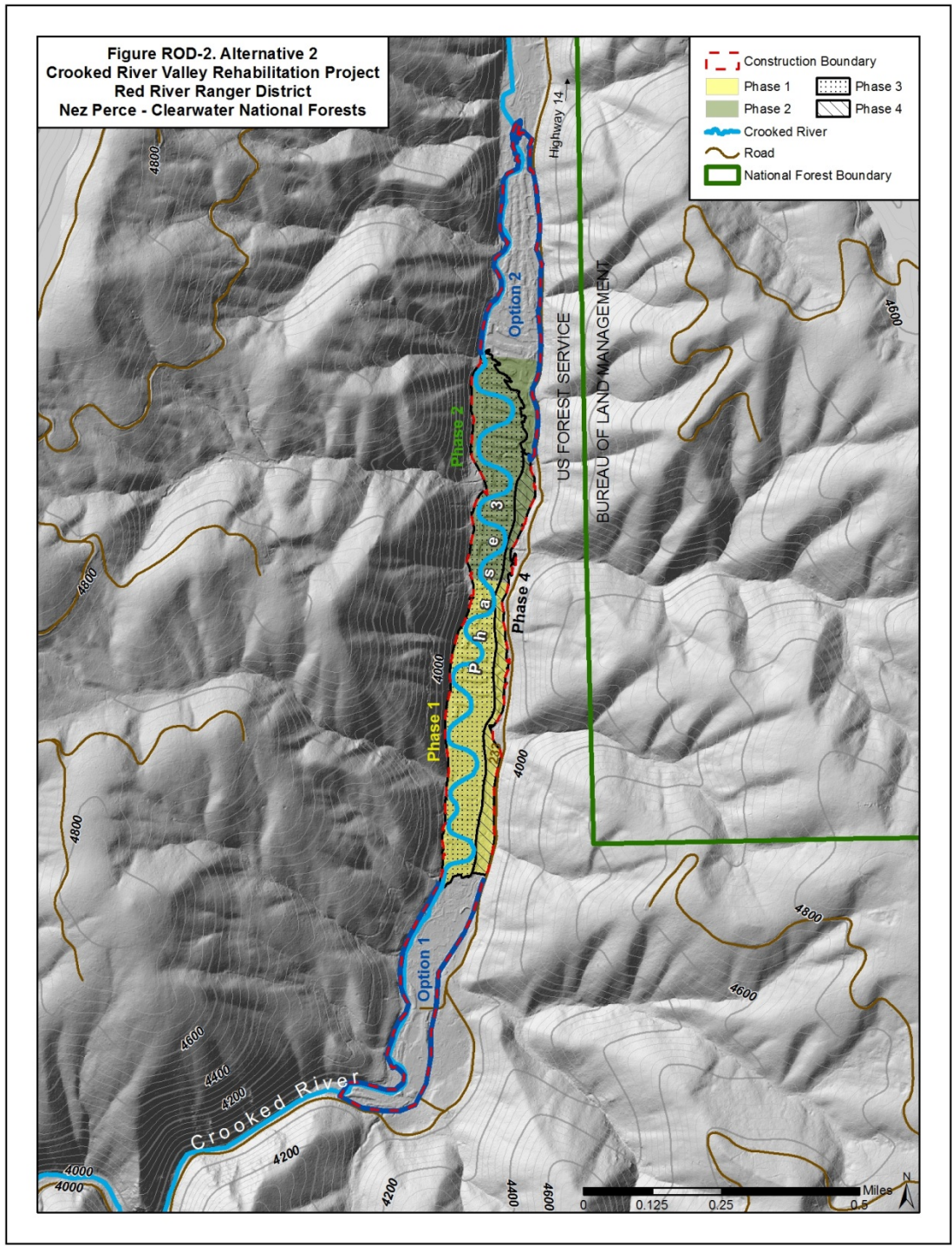
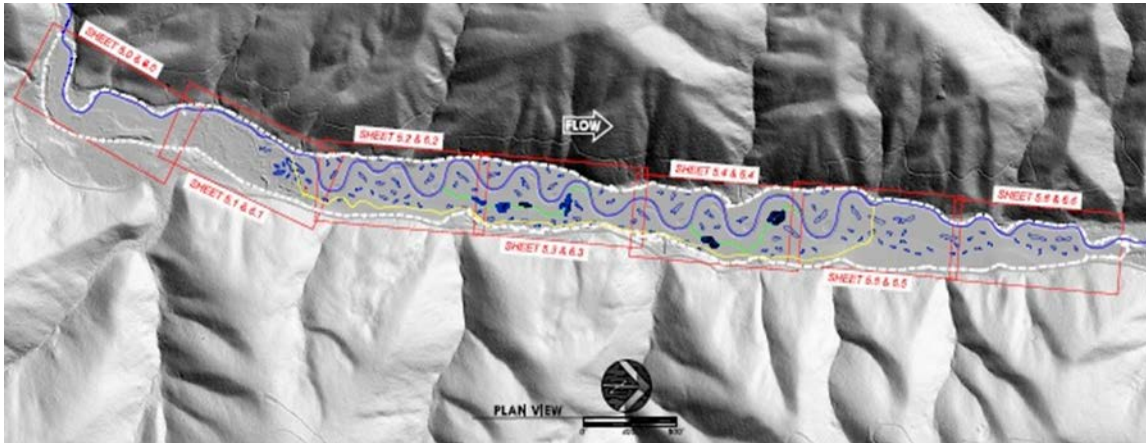


Figure ROD-2. Alternative 2 map of Crooked River Meanders.

Figure ROD-3 displays the major rehabilitation actions: construction of the temporary bypass channel (yellow); new channel construction (blue); floodplain swales and depressions (blue shapes), side channels (green), and side channel wetlands (black shapes).



**Figure ROD-3. Alternative 2 - Major rehabilitation actions.**

## Detailed Actions

**Temporary Bypass Channel Construction.** Alternative 2 will construct a temporary bypass channel on Crooked River to reduce the direct impacts of construction to water quality, fish, and aquatic organisms during rehabilitation. The temporary bypass channel will be constructed prior to any instream or floodplain work, and remain in use until completion of the new floodplain and stream channel (3-4 years). Cofferdams and/or headgates will be constructed in the mainstem channel to divert Crooked River into the temporary bypass channel. This temporary bypass channel (about 6,000 feet) will be constructed along the east side of the valley using existing mining ponds to pass water, fish and aquatic organisms during construction of the project. The temporary bypass channel will be constructed to contain a 10-year flow event ( $Q_{10}$  - 1,061 cubic feet per seconds - cfs) of Crooked River and will allow a spillway into the newly constructed channel if flows reach a 25-year event (1,316 cfs). The probability of a 25-year event occurring in any given year is 1 in 25, which was considered low risk since the bypass channel will only be in place for 3-4 years. Fish and aquatic organism salvage will occur in the main channel, ponds, and temporary bypass channel before de-watering actions. Following construction, the new channel of Crooked River will be slowly re-watered during low flow, cofferdams or headgates removed, and the temporary bypass channel reshaped into the floodplain.

**Temporary Access Road/Levee.** Alternative 2 will construct an approximately 6,000 foot long temporary access road/levee in the project area to reduce the impact to Road 233 and the public traveling on Road 233 during river rehabilitation. Approximately 23,200 cubic yards of material will be excavated for the bypass channel and the material will be used in construction of the temporary access road. There are three existing access roads into the project areas: these areas will be used to access the valley bottom from Road 233. Stream crossing structures will be installed on these existing access routes in three locations over the temporary bypass channel (see Final EIS, Appendix A). Following construction of the channel, the temporary access road

structures will be removed and the temporary road decommissioned (Phase 4). Existing access roads will be retained for recreational use.

**Floodplain Re-grading.** Alternative 2 will re-grade approximately 115 acres of floodplain including existing dredge tailings. No dredge material will be removed from the project area. Trees, shrubs, and rocks will be removed and stockpiled in designated staging areas. This salvaged material will be used in bank and floodplain treatments. Floodplain grading includes dredge pile excavation, pond filling, and upland construction. The total estimated earthwork quantity is 190,000 cubic yards for all Phases and Options. The floodplain was designed to flood frequently to allow for moderate disturbance and distribution of sediment.

The new floodplain will be re-graded so that about 50 acres will seasonally flood every 1.5 years, which will create conditions for the formation of approximately 64 acres of wetlands, including 14 acres of open water. This will provide a net increase of 12 acres of wetlands in the project area. The floodplain will be constructed with secondary features, which include swales and depressions, and will also contribute to the development of wetland features. Final EIS, Appendix B provides the Clean Water Act 404(b)(1) analysis that describes the Least Environmentally Damaging Practicable Alternative, as Final EIS-Alternative 2, for the alteration of wetlands. The 404(b)(1) provides an analysis of the alternatives considered as well as the no action and proposed action, and their potential impact to wetlands.

The new floodplain will be roughened (approximately 49 acres) to provide micro-topography such as ridges and furrows. Large woody debris will be partially buried on the floodplain. This will help create stability in the floodplain by breaking up flow paths across the surface, provide depositional areas for sediment and recruited seeds, and increase water holding capacity in the floodplain. An illustration of the proposed floodplain features, including the side channels and vegetation communities, is provided in the Final EIS, Figure 2-2.

**New Channel Construction.** Approximately 10,960 feet of the current channel will be filled in and approximately 7,400 feet of new stream channel will be reconstructed. The new stream channel will have woody bank treatments to provide stability. Large woody debris will be added along approximately 9,400 feet of the stream channel to provide habitat complexity. More than 2,700 feet of side channels will be constructed (three segments). The stream channel will be constructed so as not to interfere with Road 233 in the lower 2 miles.

**Re-vegetation.** The valley bottom will be replanted with native and approved non-native plant species, including alder, willow and spruce, to facilitate the continuous and natural recruitment of wood and instream substrate material. Vegetation communities were identified that will fit the ecological site potential, maximize aquatic habitat function, and be sustained by channel processes. Rehabilitation treatments (floodplain features) will create the conditions necessary to support development of vegetation communities over time. However, the floodplain will be replanted to speed up the recovery efforts. The floodplain will be planted with alder, cottonwoods, spruce, willows, and dogwood plants grown in 1-to-8 gallon sized containers. Sedge plugs and willow cuttings will be used in the swales and depression to help form wetlands. Final EIS, Figure 2-2 shows the plant community types for the new floodplain. Final EIS, Figure 2-3 shows a cross section of distribution of floodplain vegetation communities.

Sedge plugs and willow cuttings will also be used in the depressions and swales to provide wetland habitats. Large plants (>5-gallon) will be planted on the southern banks of the new channel and at the areas on the meander bends that will have the greatest shear stress. Smaller plants (1- to 3-gallon sized container) will be planted along the remaining banks and side channels. Planting efforts will focus on areas adjacent to the stream channel first, within the depressions and swales, and then on the upland areas last. The overall number of plants used in revegetation efforts depends on the size of individual plants. Larger plants (5- and 8-gallon sized container) will be spaced at about 6 to 8 feet apart and clumped. Smaller plants (1- and 3-gallon sized container) plants will be spaced about 2 to 3 feet apart. Sedges and rushes (10 to 20 cubic inches) will be spaced at less than one-foot intervals and willow cuttings will be used along the banks. Approximately 20,000 plants of the various sizes will be planted.

Species will be planted on the floodplain based on their community type. For example, bare colonizing species, such as herbaceous and woody species (coyote willow, Drummond willow, water sedge) will be planted in depositional areas along the channel, while alder, spruce, and black cottonwoods will be planted in low floodplain areas with a focus near the stream and side channels. Alders will be planted on the low floodplain along with black cottonwoods, a variety of willow species, red-osier dogwood and spruce. The uplands will be planted with fir, spruce and pine species. To increase plant productivity, soil material will be salvaged during floodplain construction and used within the upper foot of the new floodplain to provide rooting material for the plants. Woody material and wood chips will be distributed throughout the site to improve soil productivity.

**Material Stockpiling.** Materials such as large woody debris, rock, wood chips, and soil will be stockpiled in the dispersed campsites near Campground 4, requiring the temporary closure of four dispersed sites (about 1.5 acres) prior to beginning construction. These dispersed campsites will be closed for the duration of the project. Campgrounds 3 and 4 may also be closed year-round for the duration of the project to store materials and ensure public safety. Much of the material will come from within the project area, but some will be imported. Soil will come from within the project area. Large woody debris and wood chips will be imported from the Crooked River watershed from the American and Crooked River project (USDA Forest Service 2005a), the Red Pines project (USDA Forest Service 2006), Orogrande Community Protection project (USDA Forest Service 2011c), or other local projects evaluated through a NEPA process. See Final EIS, Appendix C for more details. Large woody debris will be added to the stream channel for habitat complexity, and to the floodplain to provide microsites and roughness. Wood chips and soil will also be added to the floodplain to increase water retention in the substrate in order to improve plant survival.

To provide nutrients and a food source for fish, cobble substrate and large woody debris may be added to the newly created channel from the temporary bypass channel.

## Design and Mitigation Measures by Resource Area

The following project design and mitigation measures have been developed to eliminate or reduce to acceptable levels the effects of the actions. Their potential effectiveness is described in italics, in the Final EIS, Chapter 3, and in more detail in the project record. Effectiveness is rated as being high, medium or low or a combination thereof (i.e. medium to high). Many of the mitigation measures described below are commonly used by the Forest Service and the effectiveness is based on how well the mitigation measure performed on past projects.

### Soils, Water Quality, and Fish Habitat

1. Complete ground-disturbing activities during low-flow conditions. Adjust instream work dates site-specifically through coordination with the Central Idaho Level 1 Team (USDI Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration-National Marine Fisheries Service (NOAA-NMFS), USDA Forest Service, and USDI Bureau of Land Management) and other agencies. Follow all conservation measures outline in the Biological Opinions from NOAA-NMFS and USFWS (ROD, Appendix C). (Effectiveness: *High, based on experience*)
2. Thoroughly wash and inspect all equipment used in stream restoration activities before it enters the Nez Perce – Clearwater National Forests to help prevent the introduction of chemicals to the site. Keep all equipment in a well-maintained condition to minimize the likelihood of a fluid leak. (Effectiveness: *High, based on experience*)
3. Stage all construction equipment in a location and manner to minimize soil and water pollution. (Effectiveness: *High, based on experience*)
4. Require a Spill Prevention, Control, and Containment Plan that is approved by the Forest Service contracting officer representative for handling and storage of petroleum products. Keep any storage of petroleum products in excess of 200 gallons within constructed containment structures that have an impervious liner with a capacity equal to or larger than the storage container. Locate the containment structure at least 150 feet from live water. Before being used within 300 feet of the stream reconstruction site, inspect all heavy equipment or other machinery for hydraulic leaks or other leaks. Do not use leaking or faulty equipment. Clean equipment that has accumulations of oil, grease, or other toxic materials prior to use in these areas. Do not permit disposal of petroleum products on national forest land. (Effectiveness: *High, based on experience*)
5. Fuel and lubricate equipment at least 150 feet from all waterbodies. Service and refuel in a manner that avoids spills and overfills. (Effectiveness: *High, based on experience*)
6. Require a Storm Water Pollution Prevention Plan (SWPPP) and National Pollution Prevention Discharge Elimination System (NPDES) permit, approved by the Environmental Protection Agency prior to commencing construction activities. Ensure that erosion control measures are in place before construction or staging of erodible materials begins. Follow all conservation measures outlined in the SWPPP, NPDES, Section 404 permit, and 401 certification. (Effectiveness: *Moderate to High, based on experience*)
7. Divert or pump stream around work site. Place screens on pump intakes following NMFS fish screen criteria (NMFS 2011). (Effectiveness: *Moderate to High, based on experience*)



8. Install silt fences, straw bales, and/or sand bag windrows as needed before excavation occurs to separate the disturbed areas from the live water and prevent eroded soil from entering the stream channel. (Effectiveness: *High, based on experience* [Clarkin et al. 2003])
9. Stabilize any road cuts, fills, and treads with a cover of annual rye and/or mulch where roads will remain for more than 1 year. (Effectiveness: *Moderate, based on experience*)
10. Grade and shape all disturbed sites to allow drainage. Seed disturbed sites as needed immediately upon completion of work in that area with certified weed-seed-free seed. Replant any small trees excavated from the work sites on the rehabilitated disturbed areas to help stabilize the soils. (Effectiveness: *Moderate to High, based on experience*)
11. For fish and aquatic organism salvage operations, drive or remove fish, amphibians, and mussels (referred to as fish salvage) from area. Removal will be done so as to result in minimal injury or disturbance to behavior. Ensure that a fisheries biologist is present onsite during dewatering and all salvage operations. Reduce water volume using pumping or diversion. Set up block nets to isolate areas to ensure that all species are moved. Conduct electroshocking only when a biologist with at least 100 hours of electrofishing experience is onsite to conduct or direct all activities associated with capture attempts in accordance with *Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act* (NMFS 2000) and *Best Management Practices for Pacific Lamprey* (USFWS 2010). (Effectiveness: *Moderate to High, based on experience*)
- 11a. All water bodies, especially ponds, will be checked for amphibians prior to and during construction of any work associated with the temporary bypass channel, side channel, temporary road, floodplain, and new channel, etc. All life stages of amphibians will be collected and immediately translocated to the pond near channel station +110.00 (pond being retained and western toad breeding area). Western toads tend to lay eggs in shallow water with emergent vegetation and facing a certain exposure. Take note of the conditions surrounding the egg masses and mimic those conditions when the egg masses are translocated to the new pond. It may be possible to translocate the new egg masses immediately adjacent to the egg masses in the identified pond (Effectiveness: *Moderate, based on experience*).
- 11b. Sanitize, clean and inspect equipment (machines, waders, nets, etc) of invasive aquatic organisms. Do not dump water from water tenders directly from one stream or pond to another. Disinfect/decontaminate all gear, clothing, equipment, and waders, with a 10% bleach solution prior to entering any water bodies in the Crooked River Valley Rehabilitation project area to prevent spread of fungal pathogens. Standard disinfection protocols will be followed (Maxell no date, Phillot et al. 2010). (Effectiveness: *Moderate, based on reference and experience*).
- 11c. In some instances, disposable gloves have been shown to cause mortality when handling certain life stages of amphibians, especially tadpoles. If disposable gloves are necessary for aquatic organism salvage operations and handling of aquatic organisms in the translocation process, follow steps outline by Cashins et al. 2008 and Greer et al.

- 2009 to minimize exposure and reduce incidental mortality of amphibians to pathogens/toxins from the gloves. (*Effectiveness: Moderate, based on experience*).
13. Apply the State of Idaho Best Management Practices (BMP) and Forest Service Soil and Water Conservation Practices are incorporated in this document by reference (IDL 2013; USDA Forest Service 1988b and 2012). (*Effectiveness: High, based on experience*)
  14. Contact appropriate utility companies to locate and move or avoid underground powerlines prior to ground-disturbing activities. Restore all utility lines upon completion of the project so that no loss of power occurs. (*Effectiveness: High, based on experience*)
  15. Stage sanitary facilities such as chemical toilets at least 150 feet from waterbodies to prevent contamination of surface or subsurface water. (*Effectiveness: High, based on experience*)
  16. Obtain and comply with all appropriate permits prior to ground-disturbing activities (such as Joint Application for Permit, 401 Water Quality Certification, National Pollutant Discharge Elimination System, Storm Construction General Permit). Adjust any mitigation or monitoring through coordination with regulatory agencies. (*Effectiveness: High, based on experience*)
  17. Within productive riparian areas, build soil and plant substrate suitable for restoring expected vegetation types. (*Effectiveness: High, based on experience*)
  18. Conserve plants and active soil materials for re-use in valley and roadside reclamation and upland restoration activities. (*Effectiveness: High, based on experience and Final Design Report [RDG et al. 2013a]*)
  19. Secure side-slopes after construction activities using onsite materials where available, including natural mulch from residual vegetation slash, chipping/masticated material, and/or transplanted trees and shrubs. (*Effectiveness: Moderate to High, based on experience*)
  20. Implement procedures outlined in the Best Management Practices for Mercury Collection from the project, as follows. It is not likely that mercury would be found during implementation, based on data collected in the project area (FEIS, Appendix E). However, if mercury is detected through monitoring during construction activities, appropriate measures may be taken that could include development of a detailed sampling and analysis plan and a health and safety plan. (*Effectiveness: Moderate, based on experience*)

#### **Transportation**

22. Water road surfaces, including the temporary haul road to reduce airborne dust. (*Effectiveness: High, based on experience*)
23. Provide maintenance on Road 233 commensurate with construction-induced effects. (*Effectiveness: High, based on experience*)

#### **Noxious Weeds/Sensitive Plants and Wildlife**

24. Implement appropriate protection measures, under the direction of the Forest native plant coordinator, if previously unknown Forest Service sensitive plant species are observed and activities will impact individuals or populations during implementation.

- Appropriate measures will vary depending upon the ecology of the species involved and nature of the activity. (Effectiveness: *High, based on monitoring and experience*)
25. Revegetate the project area using native and approved non-native species, as approved by the Forest native plant coordinator, immediately upon completion of the project. (Effectiveness: *Moderate, based on experience*)
  26. Apply only certified weed-seed-free mulching material and seed. Seed inspection testing is to be completed by a certified seed laboratory against the state noxious weed lists and documentation of the test provided to the contracting officer representative or designated inspector. Mulch material will be state certified weed free. (Effectiveness: *Moderate, based on experience*)
  27. Soil, gravel, rock, and any material hauled to the project area must come from sources determined to be weed free. Sources will be approved by a contracting officer representative or designated inspector as weed free. (Effectiveness: *High, based on experience*)
  28. Following implementation, monitor to detect invasive and noxious weeds. Treat identified weed infestations following the Nez Perce National Forest Noxious Weed Environmental Assessment (EA)(USDA Forest Service 1988a), Biological Assessments (USDA Forest Service 2013b draft), and Biological Opinions for Herbicide Treatment of Invasive and Noxious Weeds on the Nez Perce National Forest (2013–2022) (NMFS and USFWS 2013 draft) when applying herbicides within 50 feet of sensitive plants to reduce potential for incidental contact of spray compounds with non-target species of concern and to avoid potential harmful exposure. Adjust treatment through coordination with the Central Idaho Level 1 Team. (Effectiveness: *Moderate, based on experience*)
  29. Prior to weed treatment, provide personnel with map locations and species identification of all known sensitive amphibians and plant habitats to reduce potential harmful exposure and direct contact. (Effectiveness: *Moderate to High, based on experience*)
  30. Avoid directly spraying chemicals on any terrestrial or aquatic organism other than invasive plants (to reduce potential for incidental contact of spray compounds with non-target species of concern and avoid potential harmful exposure). (Effectiveness: *Moderate to High, based on experience*)
  31. Thoroughly wash and inspect all off-road equipment associated with the project for mud, soil, plant parts, and aquatic organisms prior to entering the Nez Perce – Clearwater National Forests. Cleaning must occur off National Forest lands. (Effectiveness: *High, based on experience*)

### **Minerals**

32. Protect or re-establish corners of existing lode mining claims. (Effectiveness: *High, based on experience and Final Design Report [RDG et al. 2013a]*)
- 32a. During the temporary closure of the project area, the Forest Service will work with the mining claimants to get a waiver and notice of intent to hold. (Effectiveness: *High, based on Forest Service experience*)
- 32b. After implementation, the Forest Service will work with the claimants to determine when their mining claim could be accessed. (Effectiveness: *High, based on experience*)

- 32c. Retain material within existing placer mining claims, unless owner agrees to other alternatives. Document the movement of material near the claim boundaries, for each placer claim during implementation. (Effectiveness: *Moderate, based on experience*)

### **Recreation**

33. During construction, place into effect a Forest Supervisor temporary area closure that will be in effect yearlong for the duration of the construction for the valley bottom, including Campgrounds 3 and 4. Keep Road 233 open. Notify public 1 year in advance of closure and have information available on the Forest Service website. (Effectiveness: *High, based on experience*)
35. Retain dispersed recreation access points in the Crooked River valley. (Effectiveness: *High, based on experience*)
36. Retain and protect Campgrounds 3 and 4. (Effectiveness: *High, based on Final Design Report* [RDG et al. 2013a])

### **Cultural Resources**

37. If human remains or materials subject to cultural patrimony (as defined in the Native American Graves and Repatriation Act) are encountered, the contractor will contact the Nez Perce – Clearwater National Forests. (Effectiveness: *Moderate, based on recognition of resource and contact with Heritage personnel*)
38. If any American Indian–related cultural resource materials, sites, or artifacts are discovered during project implementation, stop work and notify the Forest Service archeologist (36 CFR 800.13b). (Effectiveness: *Moderate, based on recognition of resource*)
39. Retain a representative sample of dredge piles for public interpretation. (Effectiveness: *High, based on Final Design Report* [RDG et al. 2013a])
40. Construct a three-panel educational kiosk in the Meanders to inform the public of the history of the Crooked River Valley, following relevant laws and Forest Service direction for accessibility. (Effectiveness: *High, based on experience*)
41. Follow guidance and conduct any monitoring, documentation, or other measures directed by Idaho State Historical Preservation Office or the National Office of Historic Preservation. (Effectiveness: *High, based on experience and consultation*)
42. Thoroughly photograph, document, and map historic dredge piles that are proposed for removal. (Effectiveness: *High, based on experience* [Desert West Environmental 2013a])
43. Record the historic Gnome village. (Effectiveness: *High, based on experience* [Desert West Environmental 2013a])
44. Perform a social business history related to the economic contribution historic dredge mining operations made to the local central Idaho economy. (Effectiveness: *High, based on experience* [Desert West Environmental 2013a])

**Other Specific Design and Mitigation Measures**

45. Fish and aquatic organism salvage operations from the mainstem channel will occur after July 15 when steelhead and Chinook salmon have emerged from redds and bull trout will not be migrating in the project area, for each phase requiring dewatering of the mainstem channel or bypass channel. Fish and aquatic organism passage will be provided at all times. (Effectiveness: *Moderate, based on experience and Final Design Report* [RDG et al. 2013a])
46. During dewatering, floodplain grading, or temporary bypass channel or new channel construction, if “quick” conditions occur, halt activity until condition stops or other sufficient mitigations occur. (Effectiveness: *Moderate to High, based on experience*)
47. Keep natural soils in place onsite or stockpile them for future use. (Effectiveness: *High, based on experience*)
48. Operate dewatering within the construction area continuously until project construction has been completed to minimize turbidity and sedimentation. Turbid water may be pumped to the floodplain or settling ponds to keep areas dry during construction and to reduce sediment input delivery to Crooked River and the South Fork Clearwater River. Water bypass channel and new channel slowly to prevent turbidity from reaching 50 Nephelometric Turbidity Units (NTUs) above background 300 feet downstream. Monitor turbidity during watering, and if turbidity levels approach 50 NTUs above background 300 feet downstream, reduce flow in channel until turbidity levels recede to 10 NTUs above background. Follow design and mitigation measure 6, as required with approved permits. (Effectiveness: *Moderate to High, based on experience*)
49. Construct a temporary haul/access road through the project area to reduce potential degradation to Road 233 and impacts to the public. Install crossing structures for the bypass channel in 2 to 3 locations prior to watering the bypass channel. Decommission haul/access road following use, but retain existing access roads for recreation. (Effectiveness: *High, based on Final Design Report* [RDG et al. 2013a])
50. Ensure that Road 233 remains clear of debris and equipment during construction. (Effectiveness: *High, based on Final Design Report* [RDG et al. 2013a])
51. Store mulch piles to reduce combustion hazard. (Effectiveness: *Moderate, based on experience*)
52. Construct temporary bypass channel of Crooked River to pass water, fish, and aquatic organisms during construction. Construct temporary bypass channel prior to any instream or floodplain work, and use until completion of the new floodplain and stream channel (2–3 years). Construct a spillway on the cofferdam or headgates to spill any flows greater than the  $Q_{10}$  (Ten year return interval flow -1,062 cfs) into the new channel to reduce the potential for bypass channel failure at high flows. If the new channel is activated at high flows, fish will be salvaged following Design and Mitigation Measures 11, 11a, 11b, and 11c. The bypass channel will be evaluated for stability through cross section and longitudinal analysis prior to watering and at the end of each construction season. Slowly re-water the newly constructed channel during low flow. Remove cofferdams or headgates and reshape the bypass channel into the new floodplain. (Effectiveness: *High, based on experience* [i.e. observations and work in Red River Narrows and Mill Creek]).

53. Ensure sands and gravels are properly mixed into the new channel to prevent water from going subsurface. Inspect the new channel when rewatering to ensure flows do not go subsurface. If flows are lost, wash fine sediment into the substrate to seal interstitial spaces. If water loss continues, turn off rewatering efforts and remix substrate with an excavator. Bentonite may be used if water continues to go subsurface. Follow all measures for watering the new channel as outlined in the Biological Assessment – ROD, Appendix C. (Effectiveness: *Moderate, based on experience of RDG on other restoration projects*)
54. Install wood catchment structures to prevent large woody debris from moving at high flows and interfering with structures the downstream of the project area (e.g. IDFG fish intake and weir). Wood catchment structures will be anchored in at the lower end of the project area in the new floodplain, incorporate large boulders and designed to withstand high stream flows (greater than  $Q_{50}$ ). (Effectiveness: *Moderate based on similar applications on the Tucannon River in Washington (Dave Karl, Washington Department of Fish and Wildlife.Pers.com, 2013)*)

## Monitoring Requirements

Monitoring for implementation and effectiveness of design and mitigation measures described above, compliance with Biological Assessments or Opinions; or as authorized by permits to be prepared for this project will be completed over time. Full monitoring plans are located in the project record.

The Forest Service and Nez Perce Tribe will inspect the projects during implementation for implementation and compliance to ensure that they are completed per contract specifications and to ensure that design and mitigation measures are being followed. The project will also be monitored for effectiveness to ensure that mitigation activities are meeting or working towards the desired condition.

A fish biologist and/or other qualified personnel (stream restoration specialist, hydrologist, etc.) from the Nez Perce – Clearwater National Forests or Nez Perce Tribe will ensure that the design and mitigation measures are being adequately implemented. The Forest Service Contracting Officer's Representative will be present most days during construction, and a designated inspector will be onsite. Any last-minute changes made to accommodate site-specific conditions must be within the range of effects analyzed in the EIS or Biological Assessment, or authorized by permits to be prepared for this project. A fish biologist or other qualified personnel will conduct compliance monitoring that tier to regulatory documents, including Biological Opinions, Clean Water Act Section 404 permits, Section 401 water quality certification, NPDES permit, and SWPPP.

Monitoring for vegetation, floodplain and wetlands will be done as part of the Clean Water Act Section 404 permit. A vegetation monitoring report will be completed and provided to the USACE annually, for 5 years after construction activities are completed. The floodplain will be monitored for function and deposition. Wetlands will be inventoried throughout the project area.

Monitoring for vegetation survival and invasive plants will occur in the longer term. Vegetation will be monitored following methods outlined in Protocol for Monitoring Effectiveness of

Riparian Planting Projects (Crawford, 2011). The monitoring goal is to determine if riparian plantings are effective at restoring riparian vegetation for the Crooked River Valley Rehabilitation project. Monitoring will include tracking the number of original plants remaining alive in Year 1 and 3. After 3 years, it is difficult to distinguish between planted plants and natural recruitment. If at least 50% of the original plantings are not surviving by year 3, a site condition evaluation will be conducted to determine the mode of failure and the site will be replanted after adaptive management is applied (e.g. fencing or watering of plants). After Year 3, the percent of riparian cover will be used to determine project effectiveness. The project is deemed effective if there is at least a 20% increase in mean canopy density by Year 5. Monitor again in Year 10.

Invasive weeds will be monitored and treated at Years 1, 3, 5, 7, and 10 if new infestations are found.

Monitoring of the floodplain and channel will be done using photos, at established points, taken prior to and post construction to document changes. The Nez Perce Tribe may contract aerial photography prior to construction and post construction to document the overall changes in the valley bottom.

Groundwater levels will be monitored during implementation, and post- implementation for a minimum of three years.

Monitoring of large woody debris, entrenchment ratios, cobble embeddedness, and temperature will be conducted over the long term to document changes in the project area from the proposed project.

## **Forest Plan Amendments**

Alternative 2 includes two project-specific, non-significant Forest Plan amendments (see ROD, Appendix B; and FEIS, Appendix D).

The first amendment will exempt the Crooked River Valley Rehabilitation project from Forest Plan Soil quality standard #2 in order to facilitate the restoration of productivity in the project area. The current Nez Perce Forest Plan standard specifies that there can be no new activities in areas where detrimental soil disturbance (DSD) is over 20%. The existing condition exceeds this standard. Under Alternative 2, the amount of detrimental soil disturbance will decrease from 65 to 4 percent, over the next 20 years. This non-significant amendment is project-specific, and applies only to the Crooked River Valley Rehabilitation selected alternative. This amendment does not apply to any activities or projects outside of the project area.

The second amendment will exempt the Crooked River Valley Rehabilitation project (site SHC-32 in the project area), from Forest Plan – Cultural resource standards #2 and #4, and Management Area 3 – Cultural resource standard #4 in order to facilitate the rehabilitation of the Crooked River Valley. Site SHC-32 is a National Register Site created from past mining activities. Alternative 2 will complete rehabilitation actions on the historic property. This non-significant amendment is project-specific, and applies only to the Crooked River Valley Rehabilitation selected alternative. This amendment does not apply to any activities or projects outside of the project area.

## Decision Rationale

My decision to select Alternative 2 is based on how well the actions will restore channel and floodplain functions, restore instream fish habitat complexity, and improve water quality in the Crooked River valley. This alternative will achieve goals and objectives in the Forest Plan, in a below objective watershed, to improve habitat for Endangered Species Act listed fish. Although this will impact recreation in the short term (up to 6 years) the recreation experience will be enhanced over the long term. In the short term, I recognize other nearby places people can go for a very similar experience. This alternative will remove some historic mining features, but we are recording and interpreting the mining history while completing the last action in a mining project (reclamation). We have done similar restoration nearby and it has had a positive impact on natural resources and visitor experience (e.g. Red River, Newsome Creek, McComas Meadows, etc).

My criteria for making a decision on this project was based on how well the management actions analyzed in the Final EIS address the purpose and need of the project, and consideration of issues that were raised during the scoping process, the Draft EIS comment period and during the objection period. I considered the Forest Plan and Record of Decision standards and guidelines for the project area and took into account competing interests and values of the public.

During the objection resolution period, the Objection Reviewing Officer and I met with the objectors to discuss their concerns with the Draft Record of Decision and Final EIS. I heard their concerns about the changes to project area and analysis in the Final EIS. The forest has made additions and corrections to the Final EIS (temperature, turbidity, mercury, and economic impact) relative to their objections. With the decision, I added a new design and mitigation measure #32c to address the concerns about current mining claims in the project area, and I have made contact with the current placer mining claimants. I also modified design and mitigation measure #40 to provide for accessibility to the new interpretive kiosk that will be installed. I am confident in the techniques that will be used to rehabilitate the Crooked River stream channel, floodplain and fish habitat. Planned monitoring will show the changes overtime. The forest has been successful in securing funding for this type of project in the past. I believe that this project will also provide an economic benefit to Idaho County in both the short and long term.

I feel Alternative 2, includes the actions to retain a portion of the historic dredge pond and piles and provide public information at the interpretative kiosk in the project area. This will increase the public's awareness of the past mining history in Crooked River that is not currently in place. I would like to continue to work on the Gold Rush Loop tour public information brochure and other ways to increase the public awareness about Idaho County's mining history in Crooked River, and other areas on the forest. I understand and recognize the trade-offs to changing the existing National Register Site for restoring fish habitat. However, I believe this change is necessary in Lower Crooked River.

I have reviewed the alternatives analyzed in detail (Final EIS, Chapter 2) and find they are responsive to the issues and concerns as well as the purpose and need for action. The issues (Final EIS, Chapter 2) were developed based on public comments and an interdisciplinary review of existing conditions in the project area. The purpose and need for action (Final EIS, Chapter 1), is consistent with the goals and objectives of the Forest Plan (FEIS, Chapter 1). I have reviewed the project area needs identified in the Forest Plan and the South Fork Clearwater River Landscape Assessment in 1998. I have reviewed other documents published that assess the existing environmental conditions of the South Fork Clearwater River Subbasin, the Crooked River Watershed, and surrounding watersheds and habitat areas. Most of the documents include



management recommendations for supporting critical aquatic habitats and much of the preliminary background information needed for a study of this nature. These studies included:

- Nez Perce National Forest – Land and Resource Management Plan
- Environmental Assessment for the Implementation of Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH)
- Endangered Species Act (ESA)
- South Fork Clearwater River – Landscape Assessment.
- South Fork Clearwater River Subbasin Assessment and Total Maximum Daily Loads
- Clearwater Subbasin Management Plan
- Snake River Steelhead Recovery Plan for the Clearwater Subbasin
- American and Crooked River Project Environmental Impact Statement and Record of Decision
- Crooked River Valley Rehabilitation Project Wetland Delineation Report
- Crooked River Archaeological Survey
- A Functional Analysis and Business History of Bucket-Line Dredge Operations; Lower Crooked River, Idaho
- Native Materials Inventory: Crooked River Valley Rehabilitation Design
- Design Criteria Report: Crooked River Valley Rehabilitation Design
- Examples of similar rehabilitation efforts (FEIS, Chapter 1, page 1-7)

I find the purpose and need to be supported by the scientific information and these documents. Other projects in the Columbia River Basin, as monitored by Roni and Quinn (Response to Comment 22; FEIS, Appendix F, p. F-16) have documented that these types of restoration/rehabilitation efforts for fish habitat have been successful. The Selected Alternative is based on design criteria that will provide a landscape capable of sustaining geomorphic processes to support desired aquatic habitat and riparian vegetation (FEIS pages 2-2 to 2-3) in order to meet the purpose and need. The purpose and need of the project is not to restore the valley to its exact condition prior to mining activities (1930s – 1950s), but to a state where the hydrologic and geomorphic processes sustain more appropriate habitat condition for fish (FEIS; p. 1-1 to 1-2; p. 1-6 to 1-10; Appendix F, pages F-2 to F-4). In addition, I have read and considered actions analyzed in the Forest Plan, as amended; the Forest Plan Final EIS, and the Forest Plan Record of Decision.

I reviewed alternatives that were considered but eliminated from detailed study (Final EIS, Chapter 2) to ensure that an adequate range of alternatives was considered. I reviewed public comments from the scoping period, those received on the Draft EIS (Final EIS, Chapter 1 and Appendix F) and during the objection period. The preferred alternative presented in the Final EIS was updated to include additional design and mitigation measures to address those concerns, and actions identified through consultation with other agencies. Briefly, design and mitigations measures 1, 6, 11a, 11b, 11c, 32a, 32b, 32c, 40, 45, 48, 52, 53 and 54 were modified or added to Alternative 2 (Final EIS, Chapter 2).

The interdisciplinary team considered all public comments received during public scoping when developing the Draft and Final EIS. For the Crooked River Meanders, thirteen alternatives were considered, two in detail. For the Crooked River Narrows Road, nine alternatives were considered and eliminated from detailed study. I find the range of alternatives considered was thorough and complete, and reflects public comments and concerns.

Alternative 2 was designed to respond to the purpose and need described in Chapter 1 (FEIS, pages 1-1 to 1-3), to comply with the Forest Plan direction and regulatory framework (FEIS, pages 1-15 to 1-19) and to address public concerns received on the Draft EIS (FEIS, pages 1-11 to 1-14). When compared to the other alternatives, this alternative will restore channel and floodplain functions, restore instream and fish habitat complexity and improve water quality in the Crooked River valley.

## Meeting the Purpose and Need

I believe Alternative 2 best meets the purpose and need for this project by balancing the need to restore channel and floodplain functions, restore fish habitat complexity, and improve water quality with the effects to cultural resources, soil resources, and wetlands.

I selected Alternative 2 over the other alternatives, because it best meets the purpose and need for action while being responsive to public and other agency comments (Final EIS, Chapter 2; Table ROD-2). Alternative 2 will directly improve degraded fish habitat in the Lower Crooked River watershed. Proposed activities will provide improvement to fish habitat conditions by improving pool quality, increasing large woody debris recruitment, and increasing spawning habitat and higher-quality rearing habitat. These changes will improve overall fish habitat complexity in Crooked River from the existing condition. Reconstruction of the floodplain and channel will result in smaller particles being distributed across more of the floodplain and larger particles suitable for spawning to move into Reaches 3 and 4 of Crooked River. Restoring channel and floodplain function, instream fish habitat complexity, and improving its water quality, will increase fish habitat potential in Lower Crooked River towards the 90% Fishery/Water Quality Objective identified in the Forest Plan.

Specifically Alternative 2 best meets the purpose and need in the following ways:

### Channel and Floodplain Functions

Alternative 2 best meets the need to restore channel and floodplain functions by creating a new river channel and floodplain of Crooked River. This will be accomplished by re-shaping dredge tailings to create the processes that historically formed and sustained the Crooked River channel. The desired condition is not to restore the valley to its exact condition prior to mining activities, but provide a landscape capable of sustaining geomorphic processes to support desired aquatic habitat and vegetative conditions.

Alternative 2 will implement actions to restore channel and floodplain functions in the project area. This alternative is consistent with the Forest Plan (USDA Forest Service 1987a, as amended, Appendix A) for fishery/water quality objectives for Lower Crooked River, and Management Area 10-Riparian Areas. This will meet the Forest Plan goals to maintain or improve habitat elements such as water quality, stream channel integrity, instream flows, and riparian vegetation.

Actions will reconstruct areas of past dredge mining in the lower 2 miles of Crooked River. This alternative will fill in about 10,560 feet of current channel, construct about 7,400 feet of new stream channel and construct about 2,700 feet of side channels. Alternative 2 will re-grade about 115 acres of floodplain by moving dredge tailings and roughening and adding woody debris to the floodplain surface.

Alternative 2 will increase the amount of bankfull floodplain (from 15 to 43 acres) and increase the amount of upland floodplain (from 7 to 13 acres). Over time, the new floodplain will be characterized by complexity and diversity, and consist of surface elevations that correspond to a

range of desired floodplain vegetation communities and desired geomorphic features. These include wetlands, side channels, and oxbow or pond features of varying depth that will create an abiotic template to support complex and highly functioning plant communities. The result will be a wide range of ecological niches within a diverse mosaic of plant communities along Crooked River.

Under Alternative 2, Crooked River channel geomorphology will be constructed to improve the channel entrenchment ratio, channel width-to-depth ratio, decrease channel sinuosity and increase sediment transport (increased mobility of gravel and cobble particle sizes).

Under Alternative 2, channel entrenchment ratio will increase from moderate (1.7–2.5) to slight (10.0–12.5). Increased channel entrenchment ratio will reconnect Crooked River with its floodplain, and more natural and frequent flooding of the floodplain will occur.

Channel width-to-depth ratios will change slightly initially, and the channel shape will remain wide and shallow in the short term. In the long term, width-to-depth ratios are expected to decrease in response to increased complexity of the channel margins through the addition of woody debris structures, and increased complexity within the channel through the addition of large woody debris.

Alternative 2 will re-shape the majority of dredge tailings to reconstruct the channel and its floodplain, to create more natural stream sinuosity and to meet the need to restore channel and floodplain functions of Crooked River. Channel sinuosity will change from a tortuous meander pattern (ranging from 2.2 to 2.7) to a more natural channel (ranging from 1.2 to 1.6). This new channel sinuosity will provide higher channel gradients and corresponding higher velocities, which will increase the river's competence to transport gravel and provide suitable spawning substrate to the downstream reaches.

Under Alternative 2, stream gradients in the new channel will increase water velocities in upstream reaches (Reaches 1 and 2) to support a mobile gravel bed, and provide downstream reaches (Reaches 3 and 4) with appropriately sized spawning gravel and support the maintenance of clean interstitial spaces. This reconstruction of the floodplain and channel will result in smaller particles being distributed across more of the floodplain and larger particles suitable for spawning to move into Reaches 3 and 4 of Crooked River.

Alternative 1 would not make these changes.

### **Instream Fish Habitat Complexity**

Alternative 2 will reconstruct the Crooked River channel and floodplain to provide more spawning habitat, and higher quality rearing habitat for ESA-listed fish. Replanting the valley bottom with native and approved non-native plant communities will input large woody debris over time.

Alternative 2 best meets the need to directly improve habitat for ESA-listed and sensitive fish species in lower Crooked River. This alternative will move toward meeting Forest Plan established fishery/water quality objectives in Crooked River, which are currently not being met in Lower Crooked River (USDA Forest Service 1987a, as amended, Appendix A). This alternative will move toward meeting the Forest Plan goal to provide and maintain a diversity and quality of habitat that ensures a harvestable surplus of resident and anadromous game fish species.

This alternative is consistent with standards and guidelines in PACFISH specific to habitat restoration and will contribute to attainment of Riparian Management Objectives, which are currently not being met. This alternative will move the conditions within Lower Crooked River watershed toward meeting the established fishery/water quality objectives in the Forest Plan, which are not currently, begin met.

Alternative 2 will increase the pool:riffle ratio, reconnect the floodplain, increase the amount of large woody debris and improve the channel entrenchment ratio that will improve pool quality and quantities, more than Alternative 1. Together these features will restore fish habitat complexity from the currently degraded condition in Crooked River.

Alternative 2 channel design incorporates 30% pools, 40% riffles, 10% runs, and 20% glides to create a diverse habitat structure with much more spawning habitat for Chinook salmon and steelhead. The new channel will change the pool:riffle ratio from 63:37 to 40:60 and increase fast water habitat and potential cutthroat and steelhead preferential habitat.

Under Alternative 2, a more natural sinuous channel will be constructed with floodplain connectivity, woody debris habitat features, channel spanning woody debris cover, and revegetation of native plant species. All of these elements will enhance pool habitat by increasing pool-forming processes, thermoregulation, and protective cover necessary for aquatic species.

Alternative 2 will create a more natural meander wavelength and double the stream slope (from 0.003 to 0.006 (feet/feet) through the valley. This will allow sediment transport processes to be regained in the system to minimize sediment deposition or down-cutting, and create clean, unembedded spawning gravels. This design creates the opportunity for streamflows to maintain the bedform and a highly complex habitat to increase spawning potential and higher-quality rearing sites.

Alternative 2 will create complex fish habitat features by adding large woody debris, creating a channel that will increase spawning habitat and higher quality rearing habitat for fish species. Recruitment of large woody debris will be expected to increase following floodplain and stream rehabilitation due to proximity of the riparian area proposed plantings, and establishment of riparian vegetation.

## Water Quality

Alternative 2 will best meet the need to improve water quality by completing rehabilitation of Crooked River. Water temperature in Crooked River currently exceeds state standards.

Alternative 2 will implement actions to improve water quality in the project area, but have both short- and long-term effects. This alternative is consistent with the Forest Plan (USDA Forest Service 1987a, as amended) water and riparian resources standards on Crooked River. Design and mitigation measures, including a temporary bypass construction and compliance monitoring for turbidity, will be implemented to minimize increases in turbidity during construction activities (Final EIS, Chapter 2). This alternative will move toward meeting the Forest Plan goal to provide water of sufficient quality to meet or exceed Idaho State Water Quality Standards and local and downstream beneficial uses. The proposed activities to restore channel and floodplain functions and re-establish vegetation will move toward meeting requirements in the South Fork Clearwater River Total Maximum Daily Load in Crooked River to reduce water temperatures in the long term (IDEQ et al. 2004).

Alternative 2 will improve water temperatures overtime by decreasing solar radiation on Crooked River. Effective shade will be increased with the establishment of desired riparian plant communities, including woody vegetation in the long term. By restoring the channel and floodplain altered by past dredge mining, groundwater flow will be reconnected to Crooked River and help reduce water temperatures.

## Summary

The Crooked River Valley Rehabilitation Project Final EIS documents the analyses and conclusions which this decision is based. This alternative meets requirements under the applicable laws, regulations and policies listed in this document and the Final EIS.

I have considered the direct, indirect, cumulative, short and long term effects on natural resources, and cultural resources of the Selected Alternative. Issues identified by the interdisciplinary team and the public have been considered and evaluated in detail in the Final EIS and project record. Effects to cultural resources, ESA listed species and water quality have been analyzed and considered in detail through the consultation processes required by laws and regulations.

All practical means to avoid or minimize environmental harm from the decision have been adopted, through the application of the design and mitigation measures identified for this alternative (Final EIS). I have chosen to complete rehabilitation of Crooked River, while mitigating the adverse effects to cultural resources and fish. I feel the forest plan amendments are necessary to complete the rehabilitation activities and will provide a long term benefit to soil resources. I understand the trade off to the one National Register historic site by completing the rehabilitation activities to the benefit of fish and water resources.

**Table ROD-2. Comparison of response of alternatives to project's purpose and need.**

Indicator	Alternative 1 (No Action)	Alternative 2 (Proposed Action) (Selected Alternative)
<i>Need: Restoring stream and floodplain functions, restoring instream fish habitat complexity, and improving water quality in Crooked River.</i>		
Stream reconstruction	No reconstruction for stream rehabilitation.	Reconstruct areas of impact in the lower 2 miles of Crooked River. Fill in 10,560 feet of current channel and construct about 7,400 feet of new stream channel. Construct about 2,700 feet of side channels.
Floodplain restoration	No floodplain regrading. No floodplain roughening or addition of woody debris.	Regrade about 115 acres of floodplain by moving dredge tailings. Roughen floodplain and add woody debris to surface.
Fish habitat complexity	No change to existing pool quality, pool quantity, and habitat features.	Reconstruct channel and floodplain to provide more spawning habitat, and higher quality rearing habitat. Replant valley bottom with native plant and approved-non-native communities to input large woody debris overtime. Moves Lower Crooked River watershed toward established Forest Plan fishery/water quality objectives.
Water quality	No change to existing water quality conditions.	Reduced water temperature overtime.

## Consideration of Issues and Concerns

Involvement of all interested individuals, businesses, organizations and county, state, and federal agencies and the Nez Perce Tribe was sought to provide detailed information for defining the issues, concerns, mitigations and treatment options. The interdisciplinary team used this information to identify issues and formulate alternatives to the proposed action. The Crooked River Valley Rehabilitation Draft EIS was released for public comment, with Alternative 2 identified as the preferred alternative. A summary of the comments that were received for the Draft EIS, and responses to those comments, is in Appendix F of the Final EIS. The rationale for those issues used to develop alternatives is described in the Final EIS, Chapter 2.

When compared to other alternatives, Alternative 2 provides the best balance of addressing public concerns and meeting the purpose and need for action. Alternative 2 was modified after issuance of the Draft EIS in response to public and regulatory concerns regarding potential impacts to fish and fish habitat, water quality (sediment, temperature, mercury, toxins), soil resources, re-vegetation, transportation, control of invasive species, effects to sensitive plants and wildlife, access to mining claims, access for public recreation, and cultural resources (including effects to one National Historic Register Site).

Most issues raised by the public or other agencies could be addressed, some could not. Over 54 specific Design and Mitigation Measures have been developed to eliminate or reduce to acceptable levels, the effects of Alternative 2 actions. Alternative 2 actions, include many design and mitigation measures that will be applied to reduce the short term effect of construction to soil, water quality, fish and fish habitat, public access, sensitive and invasive species, mining claims, recreation, and cultural resources. Alternative 2 addresses those concerns in the following ways.

### Cultural Resources

Comments to retain the dredge mine tailings, identified as National Register Historic Site (SHC-32) would best be addressed by Alternative 1, the no action alternative. An infinite number of river configurations could have been developed to restore the stream channel and floodplain, while retaining some of the existing dredge mine tailings.

In response to concerns about impacts to cultural resources, the Selected Alternative includes Design and Mitigation Measures 37, 38, 39, 40, 41, 42, 43 and 44 to mitigate the effect to cultural resources. These design and mitigation measures were specifically developed to ameliorate this adverse effect to the National Register Historic Site (SHC-32) characteristics (Final EIS, pages 3-114 to 3-117). The existing cultural resource was recognized as important to evaluate, identify and consider as the project proposed action was being developed. I feel the following design and mitigation measures have specifically addressed the public concerns about this cultural resource in the following ways:

- Through the application of Design and Mitigation Measure 42 to photograph, document, and map the historic dredge piles that will be removed, will create a formal record of the historic property such that it can be studied and measured, thus ensuring the resource's ability to convey information related to dredge mining once the resource is removed.
- Through the application of Design and Mitigation Measure 39 to retain a representative sample of dredge piles for public interpretation, will ensure that the visiting public can interact with the actual resource and tangibly understand their form and function through a first-person experience.

- Through the application of Design and Mitigation Measure 40 to construct a three-panel educational kiosk in the project area to inform the public of the history of the Crooked River Valley, will educate the public as to the greater historical context associated with dredge mining along the Crooked River.
- Through the application of Design and Mitigation Measure 43 to record the historic Gnome village (outside of the project area), will enhance a resource that will not be affected by the project, but is nonetheless languishing along the Crooked River. Enhancement of the Gnome village will help mitigate impacts of the project on the dredge piles because the two resources share a similar historical theme, timeframe, and geographic scope.
- Through the application of Design and Mitigation Measure 44 to perform a social business history related to the economic contribution historic dredge mining operations made to the local central Idaho economy, will promote understanding of the economic value of historic mining activities to local rural economies such as Elk City, Idaho.

Design and mitigation measures 37 to 44 were specifically developed to ameliorate adverse effects to the National Register characteristics of site SHC-32. Measure 44 describes the social business history related to the economic contribution historic dredge mining operations and is currently available to the public.

The existing condition in the project area includes a historic property created by past mining. No rehabilitation actions could be implemented without a project-specific Forest Plan amendment related to cultural resource standards. I have heard and considered the objectors' points about the impacts to cultural resources on my draft decision. At this time, I continue to have a desire to improve the water quality, fish habitat and soil resources in the project area that have been impacted by past mining. A project-specific Forest Plan amendment will be needed to allow actions on the historic property. With my decision to complete rehabilitation actions in Alternative 2, I also approve a project-specific Forest Plan Amendment (see ROD, Appendix A, Cultural Resources; Final EIS, Appendix B).

I would like to recognize there are many other examples of dredge mining on the Red River Ranger District including in upper Crooked River, Newsome Creek and American River and that even with the implementation of the Selected Alternative the local mining history will continue to be visible first-hand by the public.

#### **Water Quality, Fish and Fish Habitat.**

Comments about potential short and long term effects to water quality, fish and fish habitat were best addressed with Alternative 2 through the development of numerous design and mitigation measures (as described above and in ROD, Appendix C).

Alternative 2 includes measures and monitoring to minimize turbidity from instream activities (Design and Mitigation Measures 1, 6-10, 13, 16-19, 46-49 and 52; ROD, Appendix C). Providing a temporary bypass channel and constructing a temporary work road would physically separate the majority of the construction area from direct contact with Crooked River which would reduce the amount of sediment delivered to waterbodies and minimizing increases in turbidity during construction (47, 48, and 52). As a part of the design, temporary settling ponds will be constructed to capture sediment across the work area and prevent sediment delivery to the bypass channel and the South Fork Clearwater River. Turbid water may be pumped to the floodplain or settling ponds to keep areas dry during construction and to reduce sediment delivery to Crooked River and the South Fork Clearwater River. The Idaho State Water Quality Standard for turbidity will be monitored during instream activities such as construction of the bypass channel, watering

the by-pass channel, and re-watering the new channel. If turbidity levels approach 50 NTUs above background 300 feet downstream of the activity, flow in the channel will be reduced until turbidity levels recede to 10 NTUs above background. As required, all conservation measures outlined in the Storm Water Pollution Prevention Plan (SWPPP) and National Pollutant Prevention Discharge Elimination System (NPDES) permit, Clean Water Act Section 404/Stream Alteration permit, and Clean Water Act Section 401 Water Quality Certification will be implemented as part of my Decision.

Water temperature in Crooked River currently exceeds state standards. Alternative 2 actions will restore channel and floodplain functions and re-establish vegetation, which are expected to reduce water temperature in the long term and move them towards the state standard.

Proposed activities will move the Lower Crooked River watershed toward the Forest Plan Fishery/Water quality objective of 90 percent habitat potential, as identified in the Forest Plan. Proposed activities will provide direct improvement to fish habitat conditions by improving pool quality, increasing large woody debris recruitment, and increasing spawning habitat and higher-quality rearing habitat. These changes will improve overall fish habitat complexity in Crooked River from the existing condition.

Alternative 2 actions will have a short-term potential to adversely affect ESA-listed threatened fish species (steelhead and bull trout), and may impact five sensitive species (westslope cutthroat trout, interior redband trout, Pacific lamprey, western pearlshell mussel, and spring Chinook salmon; ROD, Appendix C). The long term benefits to these species outweigh the short term effects from construction activities and construction phasing and numerous design and mitigation measures will reduce these effects. In formal consultation with NOAA-Fisheries and U.S. Fish and Wildlife Service, the agencies have concurred with the determination of effects to listed fish and their habitat. Endangered Species Act, Section 7, consultation is completed with federal agencies. They both have issued Biological Opinions that include conservation measures, terms and conditions, reporting and monitoring requirements. These will be implemented as part of my Decision (ROD, Appendix C).

## Wetlands

Alternative 2 will have a short- and long-term effect on wetlands . This alternative will adversely impact 31 of 52 total acres of wetland during construction, and create an expected 42 acres of wetlands. The result will be an overall expected increase of 12 acres of in the long term wetlands (from 52 to 64 acres). This alternative will increase wetland area and diversity for the benefit of fish, wildlife and plant species (FEIS, Water Resources, Wetlands). The requirements of the approved Clean Water Act Section 404 permit authorization will be implemented as a part of my Decision (ROD, design and mitigation measure 6 and monitoring requirements).

## Wildlife

Western toads (sensitive species) are present in the project area and direct effect to habitat will occur. Alternative 2 will cause a loss of potential breeding habitat and mortality during construction could occur. Non-breeding habitat will increase and overall habitat conditions will improve as the floodplain functions are restored. This alternative will displace Forest Plan management indicator species (elk, moose, pine marten), and other species in the short term. A long-term reduction in ponded foraging moose habitat will occur with channel and floodplain restoration; however, foraging habitat in the floodplain will improve over time. No change to elk habitat effectiveness level will occur in any elk units. Alternative 2 may impact one sensitive



plant species (Idaho barren strawberry) following the restoration of the floodplain, which will make the habitat too wet for the species.

Over the past 60 years, natural recovery of the project has not resulted in positive changes to the project area (Alternative 1). An aggressive rehabilitation of the project area under Alternative 2 will result in long term positive changes for water quality, fish habitat, wetlands, wildlife and plants.

### Recreational and Mining Claim Access

Comments on recreational and mining claim access were raised regarding the change or restriction to use from the rehabilitation of Crooked River valley. Alternative 2 will have a short-term effect on two developed and 18 dispersed recreation sites in the project area, for up to 6 years during implementation. However, in the long term, the same number of access points for dispersed camping, and existing developed sites will be available for use. Fishing access will be limited during construction because of the area closure, but in the long term the public will have walking access to fishing in the restored Crooked River stream channel. I believe there will be a long-term public, and Idaho County, benefit from this project (Final EIS, Social Economics).

Alternative 2 will have a short-term effect on access to some mineral claims and there will be an increase to placer claim reclamation bonds in the future. However, there will be no effect on actual mineral resources. My current emphasis in lower Crooked River is to improve degraded water quality and fish habitat as directed by the Forest Plan. Following this rehabilitation, mining activities will continue to be an approved activity in Crooked River.

I have made contact with the existing mine claimants. As specified in design and mitigation measures (32, 32a, 32b, 32c), I will work with the existing placer claimants before, during and after implementation of my Decision.

### Soil Resources

In response to concerns about soil resources Alternative 2 will change the amount of detrimental soil disturbance from a level that currently exceeds the Forest Plan standards. By implementing Alternative 2 the amount of detrimental soil disturbance will decrease from 65 to 4 percent, over the next 20 years. Because the existing Forest Plan standard of 20 percent is exceeded, no rehabilitation actions could be implemented without a project-specific Forest Plan amendment. My decision will improve the soil resources in the project area that have been impacted by past mining. With my decision to complete the rehabilitation activities in Alternative 2, I also approve a project-specific Forest Plan amendment (see ROD, Appendix A- Soil Resources; Final EIS, Appendix B).

### Tribal Treaty Rights

In addition to rights reserved by treaties, federally recognized American Indian tribes have special rights under various federal statutes: National Historic Preservation Act (NHPA) (36 CFR 800), National Forest Management Act (NFMA), National Environmental Policy Act (NEPA) (42 U.S.C.), Archaeological Resources Protection Act of 1979 (43 CFR 7), Native American Graves Protection and Repatriation Act of 1990 (NAGPRA [43 CFR 10]), Religious Freedom Restoration Act of 1993 (P.L. 103141), American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996, 1996a) (AIRFA), Executive Orders 12898, 13007 and 13175. Some of these statutes and federal guidelines direct federal agencies to consult with tribal representatives who may have concerns about federal actions that may affect religious practices, other traditional cultural uses, or cultural resource sites and remains associated with tribal ancestors. Any tribe whose aboriginal territory

occurs within a project area is afforded the opportunity to voice concerns for issues governed by NHPA, NAGPRA, or AIRFA.

The Nez Perce – Clearwater National Forests lie within the Nez Perce Tribe’s ceded territory and are central to both tribal and federal efforts to recover imperiled species. In Article 3 of its 1855 Treaty with the United States, the Nez Perce Tribe explicitly reserved for itself certain rights, including the right to fish, hunt, and gather within the Nez Perce – Clearwater National Forests, including Crooked River watershed. Crooked River lies entirely within the ceded territory of the Nez Perce Tribe.

The Crooked River Valley Rehabilitation project has been discussed with the Nez Perce Tribe at quarterly staff-to-staff interdisciplinary meetings since January 2013. The Nez Perce Tribe believes that projects in National Forests, such as the Crooked River Valley Rehabilitation project, are needed to enhance efforts to recover and restore anadromous fish species and their habitat.

I am committed to fulfilling the Forest Service’s trust responsibilities and to strengthen our government-to-government relationship with the Nez Perce Tribe. The Forests manage and provide ecosystems that support Tribal traditional practices. The Crooked River Valley Rehabilitation project will return this ecosystem to a more natural state, allowing opportunities for traditional uses, especially fishing, to improve and continue on for generations.

## **Alternatives Considered**

In addition to the Selected Alternative, I considered one other alternative in detail and eleven alternatives considered but eliminated from detailed study as discussed below. Alternative 1 was the environmentally preferred alternative. A more detailed comparison of these alternatives can be found in the Final EIS on pages 2-1 through 2-38.

### **Alternative 1 – No Action**

Under the no-action alternative, current management plans would continue to guide management of the project area. The no-action Alternative would not complete any rehabilitation actions on Crooked River and would not meet the purpose and need of the project.

### **Alternative 2 – Proposed Action**

Alternative 2 proposes to rehabilitate the lower 2.0 miles of Crooked River, known as the Meanders. This alternative will best meet the purpose and need of the project. The project area, approximately 115 acres, extends from 0.1 mile upstream from the mouth of Crooked River (at the Idaho Department of Fish and Game weir) to approximately 2 miles upstream. The valley width includes Road 233 on the east side of the valley to the base of the hillslope on the west side of the valley. This alternative will rehabilitate up to 115 acres of floodplain by moving dredge tailings, filling in approximately 10,960 feet of current channel, reconstructing approximately 7,400 feet of stream channel, installing woody bank structures, constructing more than 2,700 feet of side channels, creating conditions for 64 acres of wetlands, and replanting the valley bottom with native and approved non-native plant communities. This alternative will construct, use and decommission a temporary bypass channel/haul road of approximately 6,000 feet. The project will be implemented over approximately 6 years (2015–2021).

## Other Alternatives Considered but Eliminated from Detailed Study

The interdisciplinary team considered the following alternatives, but eliminated them from detailed study for the reasons described below.

**Reconnect ponds to the river; no floodplain grading.** This alternative was dropped from further analysis because it did not meet the purpose and need of the project. Past restoration activities in the Crooked River Meanders section included connecting the river to the ponds. The ponds act as sediment sinks that impair overall fish habitat and the gradient of the river channel is currently too low to adequately sort necessary substrate for spawning and rearing habitat. This alternative would also continue to limit the re-establishment of riparian vegetation that is necessary for shading, large woody debris inputs, and food sources for aquatic organisms.

**Reconstruct 11,000 feet of stream channel and 115 acres of floodplain; maintain 1-year bypass channel.** This alternative would include reconstructing the stream channel in the lower and upper ends of the project area along with the proposed stream channel construction. This alternative would also regrade the floodplain such that material would be terraced along the road side of the valley so that flooding would occur only during a 500-year event. A bypass channel would be constructed and decommissioned each year to pass water and fish. Under this alternative, there would be fewer areas of wetlands being created than filled, there would be a high risk of adversely affecting the Idaho Department of Fish and Game weir downstream, and the phasing of the project and the regraded material could not be redistributed within the constraints of the construction season (June through September). Constructing a 1-year bypass channel would mean conducting fish-salvage operations twice each year for each phase of construction, which would likely increase the amount of take of ESA-listed fish. This alternative was dropped from further analysis because it was un-constructible within the construction window, posed high risks of damaging structures downstream, and potentially increased impacts to ESA-listed fish.

**Remove mine tailings from valley and use for road material; maintain river channel and ponds.** This alternative would entail using large equipment to remove tailings piles from the valley bottom and build up a road base for Road 233 through the Narrows. This alternative was dropped from further analysis because the material in the tailings piles is unsuitable as road base material, the cost of hauling the material would be prohibitive (>\$6 million), and maintaining the current pond features would impair substrate distribution and hydrologic functions, and would not improve stream temperatures of the river; thus, this alternative would not meet the purpose and need of the project.

**Phase the project with four reaches and complete all aspects of an entire reach during one construction season.** This alternative would entail completing all aspects of an entire reach during one construction season, including constructing a temporary bypass channel, regrading the floodplain, reconstructing the new channel and bank stabilization structures, installing large woody debris, rewatering the new channel, and decommissioning the bypass channel. Temporary stabilization measures would be required for the first three phases in the newly constructed stream channel and floodplain to prevent downcutting of the new channel during high spring flows. Temporary stabilization measures would include grade control structures to step down the new channel 3 feet into the existing channel and address the risk of head-cutting back upstream into the new channel. Similarly, temporary stabilization measures would be required to transition the new floodplain to existing ground and prevent floodplain erosion. These structures would prevent fish passage through the project area between construction phases. Constructing a 1-year bypass channel would mean conducting fish-salvage operations twice each year for each phase of

construction, which would likely increase the amount of take of ESA-listed fish. This alternative was eliminated due to channel in-stability between construction seasons (i.e., high flow) and the risk of increased impacts to ESA-listed fish.

**Various small fixes to the stream channel to improve fish habitat.** Alternatives such as adding large woody debris to the current channel and cutting off Meander bends to increase the stream gradient, as well as reconnecting some of the ponds to the main channel, were considered but dropped from further analysis. These types of projects have been implemented over the last 35 years in the Crooked River watershed and the South Fork Clearwater tributaries. Periodic monitoring of these efforts indicate that small, piecemeal restoration projects have failed to substantially restore the fisheries; therefore, it was determined that these types of actions would not meet the purpose and need of the project. A long-term improvement to instream habitat and the overall fisheries in the watershed requires restoring the hydrologic functions of the watershed. This requires stream channel-floodplain interactions, which cannot be achieved without floodplain regrading.

**Regrade 115 acres of floodplain and reconstruct up to 7,400 feet of stream channel in other configurations.** Some commenters requested analysis of the same concept of floodplain regrading and channel reconstruction, but with various alternatives to the proposed layout of the stream channel. The stream channel was developed to exhibit a meandering pattern and a range of riverbed elevations to support development of variable flow condition, which would in turn maintain instream habitat features (riffles and pools) for aquatic habitat. The stream channel could have been designed to meander on one side of the valley or the other. There are an infinite number of configurations for the new channel. All of these would have met the purpose and need of the project; however, designing each of these configurations would be cost prohibitive and the overall benefits to resources from the small changes in channel location would be similar in their effects. Therefore, the alternative involving various stream channel configurations has been dropped from further analysis.

**Forest Plan Amendment - Soils.** One comment suggested to amend the Forest Plan to inhibit Alternative 2, as presented in the Draft EIS. The Nez Perce Forest Plan directs the forest to prevent permanent impairment to soil productivity by following soil quality standards to control the areal extent of detrimental soil disturbance impacted by management activities (Forest Plan, page II-22, USDA Forest Service 1987a). This alternative was eliminated from detailed study because Alternative 1 – No Action addresses this issue.

**Miners to help do work.** One comment suggested mining claimants help move the material first to help with the project to cut costs and make the holes for the project. Forest Plan, Management Area 10 – Riparian Areas, Fish and Wildlife Habitat Management, Standard 2, directs the Forest Service to rehabilitate riparian areas before any further nondependent resource use of the immediate area is permitted (USDA Forest Service, 1987a, as amended; page III-31). Alternative 2 would complete rehabilitation of the Crooked River riparian area and meet this Forest Plan standard. This alternative was eliminated from detailed study because it could not be implemented under a Forest Service construction contract. It would be very difficult to coordinate contractor and claimant actions to meet the design specifications outlined in the contract. Also this would be a liability for the contractor and not feasible to implement under a Forest Service contract.

**Protect more Dredge Tailings.** Several comments suggested not completing Alternative 2 to protect historic and cultural sites, including one National Historic Register Site (SHC-32). Alternative 1 – No Action addresses this issue and would not disturb the existing cultural resource sites. Alternative 2 identified specific design and mitigation measures to mitigate the adverse effects to cultural resources in the project area. Alternative 1 and Alternative 2 provide a

wide range of actions that could affect cultural resources for the deciding official to consider; therefore no additional alternatives were developed to address this issue.

**Develop accessible fishing access to Crooked River.** A comment suggested developing accessible fishing to Crooked River. This alternative was considered but eliminated from detailed study because the purpose and need is focused on rehabilitation of Crooked River. I felt the rehabilitation work should be completed before access could be developed with another project in the future.

**Administratively withdraw mineral activities in the project area.** Some commenters advocated the withdrawal of mining claims and actions within the project area. This alternative was not considered in detail because it is more appropriately considered in the current Forest Plan revision effort than at a project level and is, therefore, outside the scope of the project and this EIS and decision.

## Public Involvement

Since January 1, 2013, the project has been listed in the Nez Perce National Forests' NEPA Schedule of Proposed Actions (SOPA) on a quarterly basis. Project information, including letters to the public, notices of public meetings, the Draft EIS, Final EIS and Draft ROD were posted regularly on the Forests' project at:

[http://www.fs.fed.us/nepa/nepa\\_project\\_exp.php?project=40648](http://www.fs.fed.us/nepa/nepa_project_exp.php?project=40648).

The Notice of Intent for the project was published in the *Federal Register* (Volume 77, No. 239, Page 73976) on December 12, 2012, with a 45-day comment period. In addition, as part of the public involvement process, the Forest Service mailed the proposed action letter to 395 potentially interested parties on November 30, 2012. To solicit input on the proposed actions the Forest Service held two public meetings: January 17, 2013, in Grangeville, Idaho; and January 28, 2013, in Elk City, Idaho. The proposal was provided to the public and other agencies for comment during scoping from December 12, 2012 to January 26, 2013. The Forest received twenty-eight comment letters on the proposed action. As an opportunity for a site visit to the project area, two field trips were scheduled in June 2013, one with those who commented on the scoping letter and one with regulatory agencies.

The legal notice of the Draft EIS's public availability was published in the *Lewiston Morning Tribune* on March 27, 2014, and the official, Notice of Availability of the Draft EIS was published in the *Federal Register* on March 28, 2014 (Volume 79, No.60, Page 17538). A copy of the *Federal Register* and legal notice were posted on the project webpage. As part of the public involvement process, on March 21, 2014 the Forest Service mailed the Draft EIS and letters to groups or individuals that had commented on the proposed action, and those potentially interested parties. To solicit input on the Draft EIS the Forest Service held two public meetings: May 6, 2013, in Grangeville, Idaho; and May 8, 2014, in Elk City, Idaho. The public comment period for the Draft EIS closed on May 12, 2014. The Forest received twenty-six comment letters on the Draft EIS (See Final EIS, Appendix F). The Draft EIS listed agencies, organizations, and people who received copies on pages 4-3 and 4-4. Distribution of the Final EIS is listed in the Final EIS on pages 4-7 to 4-8.

The Final EIS and a Draft ROD for the project were distributed in February 2015: to those listed in Chapter 4 (Final EIS); to Forest offices in Kamiah, Orofino, Grangeville, and Elk City; and posted on the Crooked River Valley Rehabilitation project webpage. The official legal notice that began the objection filing period was published on February 25, 2015, in the *Lewiston Morning*

*Tribune*, the newspaper of record. A Notice of Availability of the Final EIS was published in the *Federal Register* on February 27, 2015 (Volume 80, No.34, Page 9266). The 45-day objection filing period ended on April 13, 2015.

Objections were accepted only from individual and organizations who previously submitted written comments specific to the proposed project during scoping or other opportunity for public comment. Six of seven objection letters received were accepted by the Regional Office (36 CFR 218.5). The Objection Reviewing Officer scheduled and held an objection resolution meeting with the six Objectors on May 20, 2015, in Kamiah, Idaho. No resolutions to the objections were made at this meeting. On May 28, 2015 the Objection Reviewing Officer responded in writing to the objectors and found the project in compliance with laws, regulations and policies, and the Forest Plan, provided the Forest complete several instructions [(36 CFR 218.11(b)(2))].

The instructions, including, edits to the Final EIS, have been completed. A Notice of Availability of the Final EIS (June 2015) was published in the *Federal Register* on June 19, 2015 (Volume 80, No. 118, Page 35356). The Final EIS (June 2015) was also posted to the project webpage and a notice was sent to those who received the Final EIS and Draft ROD. A 30-day wait period ended on July 20, 2015 [40 CFR 1506.10 (b)(2)].

Using the comments from the public, other agencies, and cooperating agencies the interdisciplinary team identified several issues regarding the effects of the proposed action (see FEIS, Chapter 1, Issues). Main issues of concern included effects to fish and fish habitat, water quality, wetlands, cultural resources, mining access and public access. To address these concerns, the Forest Service created the alternatives described above. Full descriptions of issues significant to the proposed action appear in the Final EIS in Chapter 1, and are analyzed in Chapter 3.

## Forest Plan Consistency

This decision to select Alternative 2, as described above, is consistent with the intent of the Nez Perce National Forest Plan's long term goals and objectives listed below. The project was designed in conformance with forest plan standards and incorporates appropriate Forest Plan guidelines for fish, water resources, riparian resources, soil resource, wildlife, cultural resources, mineral resources, economics and air quality (USDA Forest Service 1987a, as amended).

Forest Plan consistency findings are discussed in **Appendix A** of this document and throughout the Final EIS. I have evaluated the Selected Alternative with Forest Plan goals, objectives and standards that apply to this project, and have determined that it meets management direction for all resources including the following (USDA Forest Service 1987a, pages II-1 and II-2). Appendix A includes details of how the Selected Alternative is consistent with Forestwide and Management Area standards. However, the Selected Alternative includes two non-significant project-specific forest plan amendments, one for cultural resources and one for soil resources (ROD, Appendix B; and FEIS, Appendix D).

### **Goal 1. Provide a sustained yield of resource outputs at a level that will help support the economic structure of local communities and provide for regional and national needs.**

Outputs relevant to this project including recreation opportunities, jobs, purchasing supplies locally, lodging, purchasing fuel, and other such activities are analyzed (See Final EIS Social Economics).

**Goal 2. Provide and maintain a diversity and quality of habitat that ensures a harvestable surplus of resident and anadromous game fish species.** The Selected Alternative will improve resident and anadromous game fish habitat. Alternative 2 will improve fish habitat by improving pool quality, increasing large wood debris recruitment, and increasing spawning habitat and creating higher quality rearing habitat (see FEIS, Aquatic Resources; ROD, Appendix C, Biological Assessment and Evaluation). The rehabilitation activities will also create a variety of jobs (See Final EIS Social Economics).

**Goal 3. Provide and maintain a diversity and quality of habitat to support viable populations of native and desirable non-native wildlife species.** Viable populations will continue to be maintained on the forest. The Selected Alternative rehabilitation activities will increase the non-breeding habitat of the Western toad and overall habitat conditions will improve as the floodplain functions are restored. Riparian area, elk forage habitat standards will be met or improved as this project is implemented (See Final EIS, Wildlife Resources).

**Goal 4. Provide habitat to contribute to the recovery of Threatened and Endangered plant and animal species in accordance with approved recovery plans. Provide habitat to ensure the viability of those species identified as sensitive.** The Final EIS has assessed the potential impacts to all sensitive, threatened and endangered plant and animal species relevant to the project area (See Final EIS, Wildlife Resources and Rare Plants).

**Goal 6. Recognize and promote the intrinsic ecological and economic value of wildlife and wildlife habitats. Provide high quality and quantity of wildlife habitats to ensure diversified recreational and public satisfaction.** Alternative 2 evaluated the intrinsic ecological and economic wildlife values. The Selected Alternative will improve both the quality and quantity of wildlife habitat (See Final EIS, Wildlife and Social Economics).

**Goal 11. Locate, protect, and interpret significant prehistoric, historic, and cultural resources.** An appropriate heritage resource survey has been conducted in the project area. All known sites within the project area have been evaluated and protection measures are in place for those sites eligible or on the National Register of Historic Places. The Idaho State Historic Preservation Office has approved all evaluation and protection measures (See Final EIS, Cultural Resources). A project-specific forest plan amendment will be applied to Cultural Resource standards #2 and #4 and Management Area 3, Cultural Resources, standard #4 (USDA Forest Service 1987a, pages III-9 and III-10; Final EIS, Appendix D; ROD, Appendix B).

**Goal 12. Provide a stable and cost-efficient transportation system through construction, reconstruction, maintenance, or transportation system management.** The Selected Alternative will implement design and mitigation measures to minimize impacts to recreation and other resources. The existing road system will be maintained (See Final EIS, Aquatic Resources, Water Resources, and Wildlife Resources).

**Goal 18. Maintain soil productivity and minimize any irreversible impacts to the soil resource.** The Selected Alternative will control erosion through compliance with design and mitigation measures, and administration during implementation. Design and mitigation measures for soils are described in the Final EIS (Chapter 2, Alternative 2 and Soil Resources). Alternative 2 will lay the foundation to rebuild soil functions, including chemical and biological properties adjacent to Crooked River. This alternative, with the approved project-specific Forest Plan amendment, will change the amount of detrimental disturbance from a level currently exceeding Forest Plan standards and Regional Guidelines (See Final EIS, Soil Resources). A

project-specific forest plan amendment will be applied to Soil Resource standard #2 (USDA Forest Service 1987a, page III-22; Final EIS, Appendix D; ROD, Appendix B).

**Goal 20. Maintain or enhance stream channel stability and favorable conditions for water flow.** The Selected Alternative will not increase water flow; however it will increase the Crooked River floodplain bankfull area through rehabilitation actions along two miles. The interaction between the stream channel and floodplain will become more frequent, and available at lower streamflows. Alternative 2 will improve channel morphology and sediment transport/bed mobility. Floodplain function will be improved through implementation (See Final EIS, Water Resources).

**Goal 21. Provide water of sufficient quality to meet or exceed Idaho State Water Quality Standards and local and downstream beneficial uses.** The Selected Alternative will be consistent with all applicable State and Federal water quality laws because of design and mitigation measures that have been included to protect water resources. Instream activities will be done in accordance with Idaho State Water Quality Standards, Clean Water Act Section 404 permit requirements, Stream Alteration permit requirements and National Pollution Discharge Elimination System permit requirements. There will be no effect to municipal water supplies, since none are located within, adjacent to, or downstream of the project area. Beneficial uses of Crooked River have been designated by the State of Idaho; the applicable water quality criteria include cold water, salmonid spawning and secondary contact recreation (IDEQ 2013). The associated water quality criteria that may be affected by this project include water temperature and turbidity. Design and mitigation measures, including compliance monitoring for turbidity, will be implemented to minimize turbidity from construction activities. Water temperature in Crooked River currently exceeds state standards. The proposed activities to restore channel and floodplain functions and re-establish vegetation will move the project area toward meeting requirements in the South Fork Clearwater River Total Maximum Daily Load in Crooked River to reduce water temperatures in the long term (IDEQ et al. 2004) (See Final EIS Water Resources and Aquatic Resources).

**Goal 22. Protect or enhance riparian-dependent resources.** The Selected Alternative will improve conditions for riparian-dependent resources and enhance the riparian areas along the lower two miles of Crooked River. PACFISH guidance will be applied to restoration actions within streamside and wetland Riparian Habitat Conservation Areas (See Final EIS, Aquatic Resources, Water Resources, and Wildlife Resources). Forest Plan standards for Management Area 10 – Riparian Areas will be met (USDA Forest Service, 1987a, pages III-30 to III-33).

## Findings Required by Other Laws and Regulations

To the best of my knowledge, my decision is consistent with all laws, regulations, and agency policy relevant to the Crooked River Valley Rehabilitation project. The following discussion is not an all-inclusive listing, but is intended to provide information on areas raised as issues or comments by the public or other agencies.

## Delegation of Authority

Consistent with Forest Service Manual 1230, I have been delegated authority as Forest Supervisor of the Nez Perce-Clearwater National Forests, effective November 16, 2014. I am responsible to



the Region One Regional Forester for management, development and administration of the Nez Perce-Clearwater National Forests.

## Clean Air Act

The project area lies totally within North Idaho Airshed 13. No smoke emissions will occur with implementation of the Selected Alternative. See Final EIS, Chapter 3, Air Quality.

## Clean Water Act and Idaho State Water Quality Laws

The Selected Alternative complies with the Clean Water Act by following all state and federal laws, interstate and local requirements, administrative authority, process, sanctions, with respect to control and abatement of water pollution. These authorities are listed in the Final EIS (pages 1-15 to 1-20, and Chapter 5) and have been addressed by design and mitigation measures described in this document and the Final EIS (starting on page 2-2). These practices are designed to maintain or improve soil, water, riparian and aquatic resources, including beneficial uses. Project-specific BMPs have been developed to reduce potential impacts to assigned beneficial uses in the project area. Alternative 2 will be consistent with the State of Idaho Antidegradation Policy. Based on the analysis disclosed in this document and the Final EIS, Alternative 2, is expected to satisfy the Clean Water Act.

The Environmental Protection Agency, U.S. Army Corps of Engineers and Idaho Department of Environmental Quality were consulted on this project.

The Forest will file a Joint Application for Permits with the USACE and State of Idaho, Department of Water Resources, for Alternative 2. In addition, Section 404(1)(b) Practicability Analysis has been completed (Final EIS, Appendix B). The results of Section 404(1)(b) Practicability Analysis have identified the Least Environmentally Damaging Practicable Alternative (LEDPA), which is the Selected Alternative.

## Endangered Species Act and Magnuson-Stevens Fishery Conservation and Management Act

The effects on threatened, endangered, proposed, and sensitive species have been analyzed in compliance with the Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, and Forest Service policy. Biological Assessments/Biological Evaluations were completed for ESA listed and sensitive fish, wildlife and plant species. Potential effects to listed species are disclosed in the Final EIS, Chapter 3, Aquatic Resources, Wildlife Resources and Rare Plants (summarized in ROD, Appendix C). The Crooked River Valley Rehabilitation project is in compliance with the Endangered Species Act.

Fish species or their designated critical habitat currently listed under the Endangered Species Act occurring within the project area include Snake River steelhead trout and Columbia River bull trout. Forest Service sensitive aquatic species in the project area include westslope cutthroat trout, interior redband trout, spring/summer Chinook salmon, and pearlshell mussel.

Terrestrial wildlife species currently listed under the Endangered Species Act and occurring within the analysis area include lynx. The Biological Assessments/Biological Evaluations effects analysis concluded that the project will have “no effect” on ESA listed Canada lynx. Forest Service sensitive wildlife species in the project area include western toad, Gray wolf, harlequin duck, and fisher. The analysis for these species concluded that the project “may impact

individuals or habitats but not likely to cause trend toward federal listing or reduce viability for the population or species.”

No threatened, and proposed or candidate plant species or their suitable habitat occurs within the project area (USDI FWS 2012). The only Forest Service sensitive plant species in the project area is the Idaho barren strawberry. Individual Idaho barren strawberry plants will be impacted, with Alternative 2, and habitat will become too wet following the rehabilitation of the floodplain. Consultation of listed plants is not warranted and a Biological Assessment was not prepared for listed plant species as the Selected Alternative will have no effect on any species and no potential habitat (FEIS, Chapter 3, Rare Plants).

The Biological Assessments/Biological Evaluations effects analysis concluded that the project is “likely to adversely affect” ESA listed Snake River steelhead and Columbia River bull trout and their habitat through the proposed restoration. Activities will have “no effect” on ESA listed fall Chinook salmon. Formal consultation with NOAA-Fisheries and U.S. Fish and Wildlife Service has concurred with the determination of effects to listed fish and their habitat. Endangered Species Act, Section 7, consultation has been completed with federal agencies and they have issued Biological Opinions (ROD, Appendix C), including conservation measures, terms and conditions, reporting and monitoring requirements that will be implemented as part of my Decision. Any measures identified: to reduce the potential for adversely affecting EAS listed Snake River steelhead and Snake River spring/summer Chinook salmon, or to avoid or minimize take of bull trout, are included in my Decision.

As defined by the Magnuson-Steven Fishery Conservation and Management Act an assessment of “Essential Fish Habitat” was included in the Biological Assessment and FEIS for listed fish species (ROD, Appendix C).

## Executive Orders 11988 and 11990 - Floodplains and Wetlands

Executive Orders 11988 and 11990 pertain to floodplain management and protection of wetlands.

Alternative 2 includes restoration activities and project design and mitigation measures that will meet the intent and assist in the attainment of the objectives of these Executive Orders.

Executive Order 11988 directs the Forest to “restore and preserve the natural and beneficial values served by floodplains”. The Selected Alternative is consistent with that direction by restoring the currently degraded Crooked River floodplain. Alternative 2 will comply with Executive Order 11988 (Floodplain Management) because: (1) potential effects to floodplains in the project area have been evaluated; (2) design and mitigation measures have been developed to reduce short-term impacts to floodplains; and (3) Alternative 2 will restore the function of the floodplain.

Executive Order 11990 directs the Forest to “minimize the destruction, loss or degradation of wetlands”. The project proposes to modify existing wetlands as disclosed in the Final EIS (Chapter 3 and Appendix B). The Selected Alternative design and mitigation measures have been developed to avoid adversely impacting wetlands wherever possible, or to minimize wetlands destruction and preserve the values of wetlands. In the long term the expected wetland area will increase in the restored floodplain of Crooked River.

The Forest will apply for a Joint Application for Permits with the Army Corps of Engineers and Stream Alteration permit with the Idaho Department of Water Resources and apply required actions and monitoring (See Final EIS, Chapter 3, Water Resources).

## **Executive Order 12898 - Environmental Justice**

The Selected Alternative was assessed to determine whether it would disproportionately impact minority or low-income populations, in accordance with Executive Order 12898. I have reviewed the effects of Alternative 2 and find that these actions will have no disproportionate impacts on individual groups of peoples or communities. Implementation of the selected action will produce no adverse effects on minorities, including Native Americans or women and low-income populations. No civil liberties of American Citizens will be affected. Project specific consultations were held with the Nez Perce Tribe which holds treaty rights for hunting, fishing and other activities on the Nez Perce National Forest, starting in 2012. The implementation of this project is expected to provide employment opportunities in local communities in Idaho County. Some of these communities include minority populations that may benefit from the economic effects. Based on the analysis disclosed in the Final EIS and this document, the Selected Alternative complies with Executive Order 12898 (See FEIS, Chapter 3, Social and Economic Resources).

## **Executive Orders 13007 and 13175 – Tribal Consultation**

The Forests complete surveys of the entire project area, and consulted with the Nez Perce Tribe to identify and protect any sacred sites. No Indian Sacred Sites were identified in the project area. No changes to access will occur. See Chapter 3, Cultural Resources and project record, for more information.

The Forests have discussed the proposed activities and the analysis of effects from the proposed activities with the Nez Perce Tribe. The Forests have completed consultation with the Nez Perce Tribe (See Final EIS, Chapter 1 and Chapter 4 for more information).

## **Executive Order 13112 – Invasive Species**

Executive Order 13112 pertains to the federal coordination and response to the complex and accelerating problem of invasive species. The Selected Alternative might cause the spread of invasive species in the Crooked River Valley Rehabilitation project area to some degree. However, this potential harm will be outweighed by the overall benefits to the watershed by the proposed treatments. Design criteria and mitigation measures will be implemented to minimize any harmful effects associated with the spread of invasive species. These measures are designed to meet the guidance of Executive Order 13112. The restoration actions will create a more fully functioning hydraulic condition, and is expected to cause a decline in non-native invasive plant species populations over time (See Final EIS, Chapter 3, Invasive Plant Species).

## **Idaho Forest Practices Act**

The Idaho Forest Practices Act regulates forest practices on all land ownership in Idaho. Forest practices on National Forest System lands must adhere to the rules pertaining to water quality (IDAPA 20.02.01). The rules are also incorporated as BMPs in the Idaho Water Quality Standards. The Selected Alternative has been designed to be consistent with the Idaho Forest Practices Act. (See Final EIS, Chapter 3, Water Resources).

## Idaho Stream Channel Protection Act

The Idaho Stream Channel Protection Act regulates stream channel alterations between mean and high water marks on perennial streams in Idaho (IDAPA 37.03.07). The Selected Alternative has been designed to be consistent with the Idaho Stream Channel Protection Act. The Forest will apply for a Stream Alteration permit with the State of Idaho and commit to any permit provisions (See Final EIS, Chapter 3, Water Resources).

## Intentional Destructive Acts

According to the Department of Energy (DOE) Office of NEPA Policy and Compliance, environmental impact statements must explicitly address the potential environmental consequences of intentionally destructive acts (such as sabotage or terrorism) (USDOE 2006). This applies to all DOE proposed actions, including both nuclear and non-nuclear proposals.

Intentional destructive acts at project sites involving fish and habitat rehabilitation are generally focused on attempts to vandalize construction equipment and materials. There is an extremely low risk that the Crooked River Valley Rehabilitation Project area would become the target of vandalism because of its remote location. However, if such acts did occur, it is expected that any damaged equipment or problem areas, such as areas of hazardous material spills, would be isolated and repaired or cleaned up quickly by construction or project crews.

## Mining Law of 1872

The Forest Service is required by law to provide reasonable access to valid existing mineral rights, regardless of their form, whether it be an unpatented claim, lease, or private property (such as a patented claim), or subsurface mineral right. Under the Selected Alternative reasonable access will be provided to prospect, explore, develop, and produce mineral resources for general access to a claim but does not apply to the project for mining that may create a significant disturbance since there are no current approved Plans of Operation in the project area. A design and mitigation measure to locate, protect or replace claim corners will be followed. Four design and mitigation measures were added regarding mining claims and access during and following implementation, including movement of mineral resources.

## National Environmental Policy Act (NEPA)

The requirements of NEPA, as specified in 40 CFR Part 1500, have been fully applied through this project planning effort. The Draft EIS and Final EIS, and the comprehensive analyses and public involvement steps which they incorporate, comply with the letter and intent of NEPA. The Final EIS analyzed a reasonable range of alternatives, including no action, and discloses the expected environmental effects of each alternative within the context of identified issues. This ROD describes the selected actions and rationale for making these decisions. This project is in full compliance with the National Environmental Policy Act.

Cumulative effects are discussed in the Final EIS in Chapter 3 for each resource. Final EIS, Appendix C displays and discusses the past, ongoing and reasonably future foreseeable activities in the project area and cumulative effects analysis areas. If other projects occur in the future that significantly affect the basis of this decision, the decision would be amended.

## National Forest Management Act (NFMA)

The National Forest Management Act and accompanying regulations require that several specific findings be documented at the project level. Activities for the Crooked River Valley Rehabilitation project have been designed to be consistent with the NFMA and Nez Perce Forest Plan.

All resource plans must be consistent with the Nez Perce Forest Plan goals, objectives and standards [16 U.S.C. 1604(i)]. Consistency with Forest Plan goals, objectives and standards has been displayed throughout the Final EIS and in the project record. I have determined that the Selected Alternative will meet Forest Plan standards, with two project-specific amendments, and will contribute toward reaching Forest Plan goals and objectives as described in the Final EIS and this Record of Decision. Alternative 2 will comply with applicable Forest Plan management area direction, as amended. It will improve fish, wildlife, and plant habitat; enhance stream channel stability, and improve water quality by restoring the Crooked River channel and floodplain. The Forest has and will locate, protect and interpret significant cultural resources, with the application of specific design and mitigation measures identified as part of this project to mitigate the adverse effects to cultural resources in the project area. The Selected Alternative will improve soil productivity by changing the amount of detrimental soil disturbance in the project area. It will enhance riparian dependent resources. The action will contribute to meeting the multiple use goals established for the area without undue effect on soil, water, or other resources [(16 USC 1604(g)(3)(b)].

There are no federally listed threatened or endangered wildlife or plant species using the project area. The Selected Alternative is in compliance with the National Forest Management Act (see Final EIS, Wildlife Resources). The Selected Alternative will not affect population viability or distribution of native and desired non-native vertebrate species, including sensitive species, on the Forest. Individual Western toads and Idaho barren strawberry plants may be impacted during implementation (See Chapter 3, Wildlife Resources and Rare Plants).

The Selected Alternative will comply with the National Forest Management Act related to soil Resources through the compliance of the Forest Plan, Region 1 soil direction and Washington Office soil direction and the evaluation completed in the Final EIS (see FEIS, Chapter 3, Soil Resources). Through a project-specific Forest Plan amendment and completing rehabilitation activities the project area will move from a detrimentally disturbed condition to a desired plant community that will improve soil conditions overtime. Alternative 2 will lay the foundation to rebuild soil functions, including chemical and biological properties adjacent to Crooked River.

## National Historic Preservation Act

The National Historic Preservation Act (NHPA) sets forth a framework for identifying and evaluating historic properties, and assessing effects to these properties (36 CFR 800 Subpart B). Section 101 of the National Environmental Policy Act (NEPA) requires the federal government to preserve important historic, cultural, and natural aspects of our national heritage. To accomplish this, federal agencies utilize the Section 106 process associated with the NHPA (codified in 36 CFR 800.3b and 800.8). Locally, the Nez Perce-Clearwater National Forests use a programmatic agreement signed between Region 1 of the U.S. Forest Service, Idaho State Historic Preservation Office (SHPO), and Advisory Council on Historic Preservation to implement the Section 106 process.

The above entities have been consulted, and the State Historic Preservation Office concurred with our findings that Alternative 2 activities will have short term and long term impacts to one National Historic Register Site. Mitigation measures meant to recover significant values of the site have been identified and will be accomplished. The mitigation for site SHC-32 meets the intent of the NHPA because the Idaho Historic Preservation Officer has concurred on the mitigation package.

## Neotropical Migratory Bird Laws

Neotropical Migratory Bird Laws include the Migratory Bird Treaty Act (MBTA) and Migratory Bird Conservation Executive Order 13186. The Selected Alternative is in compliance with the MBTA and Executive Order 13186, which authorizes activities including habitat protection, restoration, enhancement, necessary modification, and implementation of actions that benefit priority migratory bird species.

## Region 1 Soil Direction

Regional direction is available from the Region 1 Forest Service Manual for Soil Management (FSM 2500-99-1, USDA Forest Service 1999a), referred to as R1 Soil Quality Standards. The Selected Alternative project will comply with Region 1 soil direction by improving soil productivity, soil hydrologic functions through rehabilitation and the reduction of the amount the project area in a detrimentally disturbed condition.

## Findings Related to Other Laws or Policies

**Energy Requirements and Conservation Potential of Alternatives.** With relation to national and global petroleum reserves, the energy consumption associated with the Selected Alternative will consume an undetermined amount of fossil fuels in order to move and transport material and to implement activities.

**Forest Service Policies.** The existing body of national direction for managing National Forests remains in effect. This action will contribute to the Forest Service Strategic Plan (FY2014-2018).

**Wilderness and Roadless Areas.** Congress, the State of Idaho and the Forest Service have identified Wilderness, Inventoried Roadless Areas and Idaho Roadless Areas. None of the Selected Alternative's activities will occur within an Inventoried or Idaho Roadless Area, or Wilderness.

## Permits Required

Rehabilitation activities including working instream and in wetlands requires a Joint Clean Water Act 404 Permit/Stream Alteration Permit from the U.S. Army Corps of Engineers and the Idaho Department of Water Resources. These activities will require a Clean Water Act 401 certification from the Idaho Department of Environmental Quality. These permits will be obtained. A Storm Water Pollution Prevention Plan (SWPPP) and National Pollutant Prevention Discharge Elimination System (NPDES) permit will be prepared, and approved by the Environmental Protection Agency. In addition, a Section 404(1)(b) Practicability Analysis has been completed for the Selected Alternative (FEIS, Appendix B).

Application for grants may be submitted to fund implementation of rehabilitation activities.

## Best Available Science

I am confident that the analysis of this project was conducted using the best available science. My conclusion is based on a review of the record that shows my staff conducted a thorough review of relevant scientific information, considered responsible opposing views, and acknowledged incomplete or unavailable information, scientific uncertainty, and risk. Please refer to the specialist reports in the Project Record for specific discussions of the science and methods used for analysis and for literature reviewed and referenced.

## Pre-decisional Administrative Review

This decision was subject to the objection process pursuant to 36 CFR Part 218, subparts A and B.

As the Deciding Official, of the Nez Perce-Clearwater National Forests, I prepared a Final Environmental Impact Statement (Final EIS) and a Draft Record of Decision (Draft ROD) for the Crooked River Valley Rehabilitation Project for review. These documents were distributed in February 2015 to those listed in Chapter 4 (Final EIS); distributed to forest offices in Kamiah, Orofino, Grangeville, and Elk City; and posted on the project webpage on-line at: [http://www.fs.fed.us/nepa/nepa\\_project\\_exp.php?project=40648](http://www.fs.fed.us/nepa/nepa_project_exp.php?project=40648). A legal notice in the *Lewiston Morning Tribune*, the newspaper of record, was published on February 25, 2015. The 45-day objection filing period ended on April 13, 2015.

Objections were accepted only from individual and organizations who previously submitted written comments specific to the proposed project during scoping or other opportunity for public comment (36 CFR 218.5). I was informed by the Regional Office that six objection letters met these criteria.

The Objection Reviewing Officer (Dave Schmid) scheduled and held an objection resolution meeting with the objectors, Terry Nevius (District Ranger), Jennie Fischer (Team Leader), several interdisciplinary team members and myself at the Nez Perce-Clearwater National Forests, Supervisor's Office, in Kamiah, Idaho; on May 20, 2015 from 2:00 to 4:00 p.m. (PDT). No resolutions to the objections were made at this meeting. On May 28, 2015 the Objection Reviewing Officer responded in writing to the objectors and found the project in compliance with laws, regulations and policies, and the Forest Plan, provided the forest complete several instructions [(36 CFR 218.11(b)(2))].

As instructed, edits to the Final EIS have been completed. A Notice of Availability of the Final EIS (June 2015) was published in the *Federal Register* on June 19, 2015. The Final EIS (June 2015) was also posted to the project webpage and a notice was sent to those who received the Final EIS and Draft ROD. The 30-day wait period ended on July 20, 2015 [40 CFR 1506.10 (b)(2)]. As the responsible official, I have now completed the instructions identified in the Objection Reviewing Officer letter and can sign this decision.

## Implementation

The project is anticipated to be completed within 6 years (2015-2021).

Implementation of the decision may occur immediately after this Record of Decision is signed.

## Contact Person

For further information concerning the Crooked River Valley Rehabilitation Project decision or the Forest Service objection process, contact Jennie Fischer, Project Team Leader at the Nez Perce-Clearwater Forests office, at 104 Airport Road, Grangeville, Idaho 83530 or at the following phone number: 208-983-4048, during normal business hours.

## Signature



CHERYL F. PROBERT  
Forest Supervisor  
Nez Perce-Clearwater National Forests

7-21-15  
Date



## Appendix A – Forest Plan Consistency

The following tables list the Nez Perce National Forest Plan standards (forestwide and management areas) for each resource that apply and will be met (USDA Forest Service 1987a, as amended). Full details are in the project record.

### Forestwide Standards

Standard Number	Subject Summary	Compliance Achieved By
<b>Forest Plan Standards – Wildlife and Fish</b>		
1	Maintain viable populations of existing native and desirable non-native vertebrate wildlife species	Alternative 2 will not lead to a loss of viability for any of the fish, wildlife or plant species under consideration.
2	In compliance with sub-section 7(a)(2) of the Endangered Species Act, a biological evaluation will be prepared (as described in FSM 2672.42) for all proposed management activities.	The Biological Assessments and Evaluations prepared for this project fulfill compliance with this standard. See also ROD, Appendix B and project record.
3	Monitor population levels of all Management Indicator Species on the Forest. Fish include westslope cutthroat trout, summer steelhead, and spring Chinook.	Cooperative efforts among Nez Perce – Clearwater National Forests, BLM, Nez Perce Tribe, Idaho Department of Fish and Game, U.S. Fish and Wildlife Service.
4	Recognize fishing and hunting rights guaranteed the Nez Perce Tribe.	Government to Government consultation has occurred for this project. The Forest continues to recognize the fishing and hunting rights guaranteed to the Nez Perce Tribe.
5	Coordinate with the Idaho Department of Fish and Game to achieve mutual goals for fish and wildlife.	Continued involvement and annual meetings between agencies. Although this standard generally applies to the forest level, the IDFG, Idaho Fish and Wildlife Information System was utilized for habitat and species observation/distribution information.
6	Use “Guidelines for Evaluating and Managing Summer Elk Habitat in Northern Idaho” to manage for and to assess the attainment of summer elk habitat objectives in project evaluations (Forest Plan Appendix B).	This Final EIS and Wildlife report documents the assessment of existing conditions within the project area and the effects of Alternative 2 and cumulative effects.
19	Restore presently degraded fish habitat to meet the fish/water quality objectives established in this Forest Plan.	Alternatives 2 will restore degraded fish habitat.
20	Use “Guide for Predicting Salmonid Response to Sediment Yield in the Idaho Batholith Watersheds” to evaluate fish habitat and attainment of objectives.	Evaluation of fish habitat and attainment of objectives has been completed in this analysis, as presented in Chapter 3. See Final EIS Water Resources section for more information. Application of this guide is not required for this type of project.

Standard Number	Subject Summary	Compliance Achieved By
<b>Forest Plan Standards – Wildlife and Fish (continued)</b>		
21	Meet established fishery/water quality objectives.	<p>Alternatives 2 will move the conditions within Crooked River toward meeting established fishery/water quality objectives in Crooked River, which is currently a below-objective watershed.</p> <p>Alternative 2 would directly improve degraded fish habitat in the Lower Crooked River watershed. Proposed activities would provide improvement to fish habitat conditions by improving pool quality, increasing large woody debris recruitment, and increasing spawning habitat and higher-quality rearing habitat. These changes would improve overall fish habitat complexity in Crooked River from the existing condition. Reconstruction of the floodplain and channel would result in smaller particles being distributed across more of the floodplain and larger particles suitable for spawning to move into Reaches 3 and 4 of Crooked River. Restoring channel and floodplain function, instream fish habitat complexity, and improving its water quality, which would increase fish habitat potential in Lower Crooked River towards the 90 percent Fish/Water Quality Objective identified in the Forest Plan.</p>
22	Schedule fishery habitat and watershed improvements in below objective watersheds. Plan how objectives will be met.	Alternative 2 will implement improvements starting in 2015.

Standard Number	Subject Summary	Compliance Achieved By
<b>Forest Plan Standards – Water</b>		
1	<p>Apply State water quality standards and "Best Management Practices" to land-disturbing activities to ensure State water quality standards are met or exceeded. In Idaho, "Best Management Practices," as defined by State regulation or agreement between the State and Forest Service, include the "Idaho Forest Practices Rules," "Best Management Practices for Road Activities," and "Rules and Regulations and Minimum Standards For Stream Channel Alterations." These documents are appended to, and are part of, this Forest Plan and are available upon request (see Appendix L).</p> <p>In the absence of established "Best Management Practices," activities will be conducted in a manner that demonstrates a knowledgeable and reasonable effort to minimize adverse water quality impacts.</p>	<p>Chapter 2 of the Final EIS contains a full list of project design and mitigation measures, including BMPs that have been identified to reduce effects to water quality.</p> <p>CWA Section 404 permits, Stream alteration, or NPDES permits would be obtained for Alternative 2.</p>
2	<p>Use the "Guide for Predicting Sediment Yields from Forested Watersheds" and "Forest Hydrology, Part II-- Hydrologic Effects of Vegetation Manipulation" to compare alternative effects on sediment and water yields.</p>	<p>See Water Resource, Final EIS. This standard does not apply to this type of project, however, this analysis method was used for Alternatives 2 and cumulative effects.</p>
3	<p>Evaluate site-specific water quality effects as part of project planning. Design control measures to ensure that projects will meet Forest water quality goals; projects that will not meet State water quality standards shall be redesigned, rescheduled, or dropped.</p>	<p>See Water Resource, Final EIS. Chapter 2 of the Final EIS contains a full list of project design and mitigation measures identified to reduce effects to water quality. Clean Water Act Section 404 permits, Stream alteration, or NPDES permits would be obtained.</p>
8	<p>Meet established fishery/water quality objectives for all prescription watersheds as shown in [Forest Plan] Appendix A.</p>	<p>See Final EIS effects analysis, Water Resource and Aquatic Resources. Alternatives 2 would move toward fishery and water quality objectives in Crooked River.</p> <p>See Wildlife and Fish Standard 21 above.</p>

Standard Number	Subject Summary	Compliance Achieved By
<b>Forestwide Management Standards – Cultural Resources</b>		
1	Survey all areas of potential land disturbance for cultural resources.	All landforms having a high probability for historic property locations would be surveyed for the presence of cultural resources.
2	Evaluate and protect sites and districts...	<p>All cultural properties within the Area of Potential Effects would be evaluated for their National Register eligibility. Historic property #SHC-32 would not be protected. A Forest Plan Amendment would be created for this adverse effect (see ROD-Appendix B and Final EIS - Appendix D).</p> <p>The existing condition in the project area includes a historic property created by past mining. No rehabilitation actions could be implemented without a project-specific Forest Plan amendment related to cultural resource standards. To improve the water quality, fish habitat and soil resources in the project area that have been impacted by past mining, a project-specific Forest Plan amendment will be needed to allow actions on the historic property.</p>
3	Protect American Indian religious and cultural sites...	No American Indian related sites are known to be located within the project area. Government-to-Government and staff-to-staff consultation has occurred.
4	Protect and preserve National Register eligible properties...	This project would have an adverse effect to a National Register eligible property (SHC-32). A Forest Plan Amendment would be created for this adverse effect (see Appendix D of the Final EIS).
5	Consult with Nez Perce Tribe...	Government-to-Government and staff-to-staff consultation has occurred.

Standard Number	Subject Summary	Compliance Achieved By
<b>Forest Plan Standards – Soils</b>		
1	Evaluate the potential for soil displacement, compaction, puddling, mass wasting, and surface soil erosion for all ground-disturbing activities.	Potential effects of Alternative 2 have been determined, as described in the Final EIS and in the Soils specialist report.
2	A minimum of 80 percent of an activity area shall not be detrimentally compacted, displaced, or puddled upon completion of activities. This direction does not apply to permanent recreation facilities and other permanent facilities such as system roads.	<p>Percent detrimental soil disturbance (DSD) has been determined for Meanders, No Action, and proposed action.</p> <p>Alternative 2 will complete a project-specific Forest Plan amendment (ROD Appendix B and Final EIS -Appendix D).</p> <p>The project specific amendment will exempt the Crooked River Valley Rehabilitation project from Forest Plan Soil quality standard #2 in order to facilitate the restoration of productivity in the project area. The current Nez Perce Forest Plan standard specifies that there can be no new activities in areas where detrimental soil disturbance (DSD) is over 20%. The existing condition exceeds this standard. Under Alternative 2, the amount of detrimental soil disturbance will decrease from 65 to 4 percent, over the next 20 years.</p>
3	Maintain sufficient ground cover to minimize rill erosion and sloughing on road cut and fill slopes and sheet erosion on other activity areas.	Addressed in design and mitigation measures in Chapter 2 for Meanders and Narrows Road activities.
<b>Regional Soil Quality Standards</b>		
Regional Standard	<p>The soil productivity direction identifies a value of 15 percent detrimental soil disturbance as a guideline that indicates potential impairment from project activities.</p> <p>Regional guidance for soil management provides direction that agency activities should result in a net benefit to soil conditions when past activities have left detrimental soil disturbance in excess of 15 percent areal extent (USDA Forest Service 1999).</p>	As noted above in consistency with the Forest Plan Soil Standard #2, Alternative 2 will comply with Region 1 soil direction, with the project-specific Forest Plan amendment (ROD - Appendix B and Final EIS -Appendix D).
<b>Forest Plan Standards – Invasive Plants</b>		
Range 3	Implement a weed control program to confine present infestations and prevent establishment of new areas of noxious weeds...	<p>Alternative 2 will be consistent with this standard.</p> <p>See Chapter 2 of DEIS, design and mitigation measures 25, 26, 27, 28, and 31; and Table 5 of this specialist report.</p>

Standard Number	Subject Summary	Compliance Achieved By
<b>Forest Plan Standards – Recreation</b>		
1	<p>Meet the adopted visual quality objectives (VQOs) in all land-disturbing activities over time. Specific VQOs have been recommended for all acres of the Forest and are displayed on maps in the planning records. Recommended VQOs will be reviewed, updated as necessary, and adopted during project planning. Adopted VQOs provide standards for all landscape-altering activities. Project planning will detail how the VQOs will be met. Reasonable time will be allowed to meet VQOs following land-disturbing activities.</p> <p>Retention and partial retention VQOs will be achieved along the Selway, South Fork Clearwater, and Salmon Rivers on the Forest. Retention will be achieved in the foreground area around developed recreation sites, with partial retention in the middle and background views. Retention and partial retention will also be achieved along selected trails and at wilderness portals.</p>	<p>This project will follow the VQOs established in the <i>American and Crooked River Project Record of Decision and FEIS</i> (USDA Forest Service 2005). In the ROD, the VQOs identified as recommended in the Forest Plan were reviewed and adopted (Final EIS, Table 3-466). No changes to the Forest Plan VQO recommendations were made.</p> <p>Current scenic integrity level (SIL) is very low.</p> <p>Retention in the foreground at Campground 3 and 4 will be met under Alternative 2. Partial retention in the rest of the project area. Short term effect to visual quality. Following construction, a variety of riparian and upland species would be planted adjacent to both developed and dispersed recreational sites to facilitate recruitment of native material over time, thus improving visual quality.</p>
3	<p>Manage for a full array of recreation opportunities, from primitive to roaded natural, as described by the Recreation Opportunity Spectrum (ROS).</p>	<p>Alternative 2 will not change recreation opportunities in the project area.</p>
6	<p>Mitigate the physical impacts of increased dispersed recreation use. Rehabilitation efforts will be based on resource damage to soils, water, and vegetation. Efforts may include closing the site for the short or long term, revegetation by seed or plants, signing, visitor contact, and printed material.</p>	<p>Alternative 2 will maintain the same number of dispersed recreation access points in the Meanders, some physical impacts at these sites would be treated, and the new floodplain would be planted with riparian and uplands species.</p>
<b>Forest Plan Standards – Air Quality</b>		
1	<p>Cooperate with Idaho Department of Health and Welfare in the State Implementation Plan (SIP). Meet the requirements of the SIP and State Smoke Management Plan.</p>	<p>Alternative 2 will implement design and mitigation measures 22 to reduce air quality impacts. Follow procedures outlined in the North Idaho Smoke Management MOA, and Montana and Idaho Airshed Group Operating Guide.</p>

Standard Number	Subject Summary	Compliance Achieved By
<b>Forest Plan Standards – Minerals</b>		
3	Provide reasonable access to prospect, explore, develop, and produce mineral resources. Evaluate access needs based on requirements of mining operations and environmental factors. Applicable road construction specifications and standards shall be met.	<p>This standard would be met for general access to a claim but does not apply to the project for mining that would create a significant disturbance since there are no current approved Plans of Operation in the project area. However, effects to future reasonable access was considered and evaluated in the Final EIS.</p> <p>Alternative 2 would change existing access during implementation in the Meanders area for up to 6 years. Long-term access would remain the same as exists currently.</p>
6	Notify mining claimants of impending Forest Service actions that may affect their claims. Reasonable effort should be made to protect claim corners and mine workings from disturbance as a result of Forest Service activities. Secure permission before entering claims with recognized surface rights.	<p>Claimants (lode and placer claims) were notified about this project and received a copy of the scoping letter for comment. Claimants (placer) in the project area have been contacted about the decision.</p> <p>Permission is not required to enter any of the claims associated with this project since none of the claims have recognized surface rights.</p> <p>See Chapter 2 of Final EIS, design and mitigation measures 32, 32a, 32b, 32c, 33, 49 and 50.</p>
11	Assist miners in developing reclamation plans which clearly state final management objectives for specific mined areas and detail the procedures and timeframes which will be followed to accomplish those objectives.	<p>This standard does not apply to the project because the two proposed Plans of Operations in the project area have not been approved.</p> <p>In the future, reclamation plans would clearly state restoration objectives that are consistent with final conditions implemented with this project.</p>

Standard Number	Subject Summary	Compliance Achieved By
<b>Forest Plan Standards – Roads and Trails</b>		
2	Analyze the economics of proposed access developments using proven tools, and incorporate them into the project design.	See effects analysis presented in the Final EIS, Transportation and Social Economics section.  Analysis of the economics of proposed changes to access developments was completed. No changes to access developments will occur with Alternative 2.
5	Maintain access facilities to the level commensurate with use, user type, user safety, and facility-resource protection.	Maintenance of roads in the project area will continue at the current levels, dependent upon jurisdiction. See Final EIS, Transportation, Indicators B and C.
6	Plan, design, and manage all access to meet land and resource management objectives, meet the State Water Quality Standards, and meet Best Management Practices (BMPs).	Action alternatives meet this standard.
8	Minimize impacts from construction in identified key riparian and wildlife areas. Develop rehabilitation plans for existing access facilities that are producing significant impacts on riparian-dependent resources.	See Chapter 2, Design and Mitigation Measures, of the Final EIS. Alternative 2 was developed to minimize effects to key riparian and wildlife areas from proposed activities (see Aquatic Resources, Water Resources, and Wildlife Resource sections of the Final EIS). Alternatives 2 will reduce impacts or improve conditions in riparian areas.
9	Design all proposed road systems to mitigate at least 60 percent of the sediment predicted. Utilize proven mitigation procedures in the design and construction of roads to meet up to 90 percent of the sediment predicted, where needed to meet resource management objectives.	See Chapter 2, Design and Mitigation Measures, of the Final EIS.



## Management Area Standards

Forest Plan, Management Areas 3, 7, and 10, provides direction, including standards that would apply to this project (USDA Forest Service 1987a, as amended) in the following tables. Full details are in the project record.

Standard Number	Subject Summary	Compliance Achieved By
<b>Management Area 3 – Standards – Cultural Resources</b>		
2	Identify National Register [sites] and eligible cultural resources that may be affected by an undertaking.	All landforms having a high probability for historic property locations have been surveyed for the presence of cultural resources.
3	Identify, inventory, and determine National Register eligibility for unevaluated sites...	All cultural properties within the Area of Potential Effects (APE) have been evaluated for their National Register eligibility.
3a	Identify the potential location of non-inventoried unevaluated sites and perform an archaeological reconnaissance	All landforms having a high probability for historic property locations have been surveyed for the presence of cultural resources.
3b	Apply National Register criteria to identified unevaluated sites.	All cultural properties within the APE have been evaluated for their National Register eligibility.
4	Protect National Register or eligible sites from deterioration or destruction.	The National Register eligible site SHC-32 will not be protected. Specific mitigation measures are required to ameliorate this adverse effect (36 CFR 800.6(a)). A project-specific Forest Plan Amendment will be completed for this adverse effect (see ROD-Appendix B and Final EIS Appendix D).
4a	Identify eligible or potentially eligible resources subject to deterioration or destruction.	All landforms having a high probability for historic property locations have been surveyed for the presence of cultural resources and would have their conditions documented.
4b	Identify and carry out measures to protect or recover significant values of eligible sites	Measures meant to recover significant values of site SHC-32 are described in the Final EIS, Cultural Resources in Direct and Indirect Effects and in Chapter 2 of the Final EIS.
5	Protect and preserve Native American religious cultural rights and practices	No American Indian related sites are known to be located within the project area. Government-to-Government and staff-to-staff consultation has occurred.
<b>Management Area 3 – Standards - Other</b>		
Water	1. Meet established fishery/water quality objectives for all prescription watersheds as shown in [Forest Plan] Appendix A.	See Forestwide – Water Standard #8 above and Water Resources section of the Final EIS.
Facilities Roads & Trails	1. Construct and maintain to provide public access to interpretive facilities, as long as cultural values are recognized.	See Chapter 2, Alternative 2; and Chapter 3, Cultural Resources, of the Final EIS.

Standard Number	Subject Summary	Compliance Achieved By
<b>Management Area 7 – Standards</b>		
Developed Recreation	<p>3. Adopted VQOs established during Plan implementation will recognize the high visual sensitivity of these use areas.</p> <p>4. Analyze the need for species diversity and screening in developed and dispersed recreation sites. Plant where planning indicates need.</p>	<p>3. The VQOs for the project area are Retention in the foreground in campgrounds and Partial Retention in the remainder of the project area (see Final EIS, Table 3-46 and Figure 3-35). Alternative 2 activities are consistent with this direction. This project would impact visuals in the short-term (up to 6 years), but the visual quality would be enhanced over the long-term.</p> <p>4. Alternative 2 will plant a variety of riparian and upland species adjacent to both developed and dispersed recreational sites.</p>
Water	<p>1. Meet established fishery/water quality objectives for all prescription watersheds as shown in [Forest Plan] Appendix A.</p>	<p>See Forestwide – Water Standard #8 above and Water Resources section of the Final EIS.</p>
Facilities Roads & Trails	<p>1. Construct and maintain as needed. 2. Maintain existing trails commensurate with use. Reconstruct to provide public safety and reduce environmental damage.</p>	<p>Alternative 2 will maintain Road 233 during construction (Final EIS, Chapter 2, design and mitigation measure 23). Alternative 2 would not change existing road and trail facilities.</p>
Wildlife and Fish Habitat Management	<p>Maintain sufficient streamside vegetative canopy to ensure acceptable water temperatures for fish and to provide cover. Management activities shall not be permitted to adversely change the composition and productivity of key riparian vegetation. Riparian areas now degraded by management should be rehabilitated before any further nondependent resource use of the immediate area is permitted. Schedule habitat improvements in all drainages presently below stated objectives. Improvements will include in-stream structures, channel changes, and riparian revegetation. Use in-stream improvements and barrier removal to enhance those drainages where habitat capacity is undisturbed. Maintain sufficient streamside vegetative structure, composition, and diversity for travel corridors between old-growth stands.</p>	<p>Streamside vegetation canopy, structure, composition and diversity are currently lacking along the Meanders section of the Crooked River Valley Rehabilitation project (Alternative 1). Alternative 2 will implement habitat improvements to move the area toward stated objectives.</p>

Standard Number	Subject Summary	Compliance Achieved By
<b>Management Area 10 – Standards</b>		
Water	1. Meet established fishery/water quality objectives for all prescription watersheds as shown in [Forest Plan] Appendix A.	<p>Alternatives 2 will move the conditions within Crooked River toward meeting established fishery/water quality objectives in Crooked River, which is currently a below-objective watershed.</p> <p>See Forestwide – Wildlife and Fish Standard #21 and Water Standard #8 above. See also Aquatic Resources and Water Resources sections of the Final EIS.</p>
Wildlife and Fish Habitat Management	<p>1. Maintain sufficient streamside vegetative canopy to ensure acceptable water temperatures for fish and to provide cover.</p> <p>2. Management activities shall not be permitted to adversely change the composition and productivity of key riparian vegetation. Riparian areas now degraded by management should be rehabilitated before any further nondependent resource use of the immediate area is permitted.</p> <p>3. Schedule habitat improvements in all drainages presently below stated objectives. Improvements will include in-stream structures, channel changes, and riparian revegetation. Use in-stream improvements and barrier removal to enhance those drainages where habitat capacity is undisturbed.</p> <p>4. Maintain sufficient streamside vegetative structure, composition, and diversity for travel corridors between old-growth stands.</p>	<p>1. Short-term decreases in streamside canopy will occur, but under Alternative 2, thousands of plants will be planted to increase streamside canopy.</p> <p>2. Alternative 2 will implement riparian improvements, including connecting vegetation to groundwater and floodplain processes and planting native grasses, forbs, shrubs, and trees.</p> <p>3. Alternative 2 will implement habitat improvements.</p> <p>4. See Wildlife section.</p>
Facilities Roads & Trails	<p>1. Design mitigation measures to reduce sediment from roads constructed in riparian areas by at least 70 percent.</p> <p>2. Minimize crossings in riparian areas. Cross streams at as near a right angle as practical. Construction parallel to streams (in riparian areas) should be avoided. Opportunities to remove roads and trails from riparian areas should be considered if they are producing significant impacts on riparian-dependent resources.</p>	<p>1. Chapter 2 of the Final EIS contains a full list of project design and mitigation measures to reduce sediment delivery from roads for all action alternatives.</p> <p>2. Under Alternative 2, temporary crossings will be installed at right angles on Crooked River for construction equipment. Alternative 2 will be consistent with this standard on temporary constructed segments.</p>
<b>Management Area 12, 13, 15, 16, 17, 21 – Standards - Water</b>		
MA 12, 13, 15, 16, 17, 21 Water	1. Meet established fishery/water quality objectives for all prescription watersheds as shown in [Forest Plan] Appendix A.	See Forestwide – Water Standard #8 above and Water Resources section of the Final EIS.
<b>Management Area (MA) Standards – Facilities – Roads and Trails</b>		
MA 16, 18 Facilities – Roads and Trails	1. Construction and reconstruction is permissible when roads are necessary to meet the multiple use objectives on adjacent lands.	This project is consistent with this standard.

## Forest Plan Amendment 20 (PACFISH)

The PACFISH Environmental Assessment amended the Forest Plan in 1995 and is incorporated as Amendment 20 (USDA Forest Service and USDI Bureau of Land Management 1995). PACFISH established riparian goals, riparian management objectives, and defined riparian habitat conservation areas. It includes specific direction for land management activities within riparian areas adjacent to streams, lakes, wetlands, and landslide-prone terrain. Riparian goals establish an expectation of the characteristics of healthy, functioning watersheds, riparian areas, and fish habitat. The goals direct the Nez Perce National Forest to maintain or improve habitat elements such as water quality, stream channel integrity, instream flows, and riparian vegetation. PACFISH standards and guidelines including FW-1, FW-2, FW-3, FW-4, WR-1 and WR-3 would be met through the application of design and mitigation measures in Alternative 2.

Standard Number	Summary	Project Compliance Achieved by
PACFISH standards and guidelines		
FW1	Design and implement fish and wildlife habitat restoration and enhancement that contributes to Riparian Management Objectives.	See Chapter 2 of the Final EIS and Effectiveness of Mitigation in the fish and wildlife reports. The proposed actions will improve fish and wildlife habitat. See Final EIS and Aquatic Resources, Wildlife and Water Resources reports.
FW3	Cooperate with Federal, Tribal, and State wildlife management agencies and eliminate wild ungulate impacts that prevent attainment of RMOs or adversely affect listed anadromous fish.	The Forest has cooperated with Federal, State and Tribal agencies on this project.  Wild ungulate-related impacts that could prevent the attainment of RMOs in the analysis area have not been documented. Wildlife browsing of newly planted vegetation will be addressed through monitoring of the vegetation.
FW-4	Cooperate with Federal, Tribal, and State fish management agencies to identify and eliminate adverse effects on native anadromous fish related to habitat manipulation, fish stocking, fish harvest, and poaching.	Meetings are held regularly with all partners to discuss and work toward this objective.
WR-1	Design and implement watershed restoration projects in a manner that promotes the long term ecological integrity of ecosystems, conserves the genetic integrity of native species, and contributes to attainment of Riparian Management Objectives.	Alternative 2 will be consistent with these standards and guidelines. The objective of this alternative is to restore the ecological and watershed integrity of the Meanders sections of Crooked River and would contribute to attainment of Riparian Management Objectives, which are currently not being met.
WR-3	Do not use planned restoration as a substitute for preventing habitat degradation (i.e. use planned restoration only to mitigate existing problems, not to mitigate the effects of proposed activities).	Planned restoration under Alternative 2 will not mitigate the effects of other activities in the watershed.

## **Appendix B - Forest Plan Amendments**

**NEZ PERCE NATIONAL FOREST  
LAND AND RESOURCE MANAGEMENT PLAN  
AMENDMENT NO. 38**

**PROJECT-SPECIFIC AMENDMENT TO SOIL QUALITY STANDARD #2  
FOR THE CROOKED RIVER VALLEY REHABILITATION PROJECT AREA**

The purpose of this amendment is to allow the Forest Service to implement restoration activities in the Crooked River Valley Rehabilitation project activity area that currently exceed Forest Plan – soil quality standard #2.

The goal of the Nez Perce Forest Plan Standards is to meet the National Forest Management Act where management actions will not produce substantial or permanent impairment of the productivity of the land (16 USC 1604(g)(3)(E)(i)).

To prevent permanent impairment to productivity, the Nez Perce National Forest soil quality standards (Forest Plan, page II-22, USDA Forest Service 1987a) control the areal extent of detrimental soil disturbance impact by management activities. Soil quality standard #2 currently reads as follows:

“A minimum of 80 percent of any activity area shall not be detrimentally compacted, displaced, or puddled upon completion of activities. This direction does not apply to permanent recreation facilities and other permanent facilities such as system roads.”

Standard #2 prevents management from further degrading areas with already poor conditions but does not provide for the restoration and rehabilitation actions of the magnitude needed for the Crooked River Valley Rehabilitation project. The current conditions have mining tailings that remain in a departed condition across the project area after 70 years for regrowth.

This project-specific amendment would exempt the Crooked River Valley Rehabilitation project from Forest Plan Soil quality standard #2 in order to facilitate the restoration of productivity in the project area.

\*\*\* End of Amendment \*\*\*

**NEZ PERCE NATIONAL FOREST  
LAND AND RESOURCE MANAGEMENT PLAN  
AMENDMENT NO. 39**

**PROJECT-SPECIFIC AMENDMENT TO:  
CULTURAL RESOURCE STANDARDS #2 AND #4 AND  
MANAGEMENT AREA 3 – CULTURAL RESOURCE STANDARD #4**

**FOR THE CROOKED RIVER VALLEY REHABILITATION PROJECT AREA**

The purpose of this amendment is to allow the Forest Service to implement restoration activities in the Crooked River Valley Rehabilitation project area, which contains one eligible cultural resource site that meets the National Register Criteria for Historic Places.

The goal of the Forest Plan is to identify and protect cultural properties that are considered eligible for the National Register of Historic Places. These properties are considered historic properties (36 CFR 800.16(1)(1)) and must be protected, avoided, or mitigated, during federal undertakings.

The Nez Perce National Forest Plan – Cultural resource standards #2 and #4 (Forest Plan, page II-17) and Management Area 3 standard #4 (Forest Plan, page III-9) apply to lands in the Crooked River Valley Rehabilitation project area (USDA Forest Service 1987a).

Cultural Resource standard #2 currently reads as follows:

“Sites will be evaluated and protected on a site-by-site basis unless larger areas such as historic or prehistoric districts are involved.”

Cultural Resource standard #4 currently reads as follows:

“Protect and preserve National Register and National Register-eligible cultural resources.”

Management Area 3 – Cultural Resource standard #4 currently reads as follows:

“Protect National Register or eligible sites from deterioration or destruction.”

Cultural Resource standards #2 and #4 and Management Area 3 – Cultural resource standard #4 direct the Forest to identify and prevent management from damaging historic or National Register-eligible cultural resources, but does not provide for the rehabilitation actions of the magnitude needed for the Crooked River Valley Rehabilitation project. The project area includes one eligible site (SHC-32).

This project-specific amendment would exempt the Crooked River Valley Rehabilitation project (site SHC-32 in the project area), from Forest Plan – Cultural resource standards #2 and #4, and Management Area 3 – Cultural resource standard #4 in order to facilitate the rehabilitation of the Crooked River Valley.

\*\*\* End of Amendment \*\*

## Appendix C – Consultation Documents

<i>Biological Assessments and/or Evaluations for Threatened, Endangered or Sensitive Species</i>
Summary of Determinations for Threatened, Endangered and Sensitive Species – 2 pages
Fish Species – Biological Assessment and Evaluation - 91 pages.
<i>Concurrence Letters and Biological Opinions</i>
USFS – Request for concurrence to USDI-FWS – 1 page.
USFS - Request for concurrence to NOAA-Fisheries – 1 page.
USDI – Fish and Wildlife Service - Concurrence Letter and Biological Opinion –64 pages.
NOAA- Fisheries - Concurrence Letter and Biological Opinion – 92 pages.

## Summary of Determinations for Threatened, Endangered and Sensitive Species

### **Threatened (T) Species Determination:**

**NE** = No Effect;

**NLAA** = Not Likely to Adversely Affect;

**LAA** = Likely to Adversely Affect;

**NLJCE** = Not Likely to Jeopardize Continued Existence.

### **Proposed (P) Species Determination:**

**NE**= No Effect;

**NLJCE** = Not Likely to Jeopardize Continued Existence;

**LJCE** = Likely to Jeopardize Continued Existence

### **Sensitive (S) Species Determination:**

**NI** = No Impact;

**BI** = Beneficial Impact;

**MI** = May impact individuals or habitat but not likely to cause trend toward federal listing or reduce viability for the population or species;

**LI** = Likely to impact individuals or habitat with the consequence that the action may contribute towards federal listing or result in reduced viability for the population or species.



<b>Fish Species</b>				
<b>Common Name</b>	<b>Status</b>	<b>Known Occurrence</b>	<b>Habitat Present</b>	<b>Alternative 2 Determination</b>
Fall Chinook salmon	T	No	No	NE
Snake River steelhead trout	T/MIS	Yes	Yes	LAA
Columbia River bull trout	T	Yes	Yes	LAA
Westslope cutthroat trout	S/MIS	Yes	Yes	MI
Spring Chinook salmon	S/MIS	Yes	Yes	MI
Interior redband trout	S	Yes	Yes	MI
Pacific lamprey	S	No	Yes	MI
Western pearlshell mussel	S	Yes	Yes	MI

<b>Wildlife Species</b>				
<b>Common Name</b>	<b>Status</b>	<b>Known Occurrence</b>	<b>Habitat Present</b>	<b>Alternative 2 Determination</b>
Lynx	T	No	No	NE
Western (boreal) toad	S	Yes	Yes	MI
Gray wolf	S	Yes	Yes	MI
Townsend's big-eared bat	S	No	No	NI
Black swift	S	No	No	NI
Ringneck snake	S	No	No	NI
Peregrine falcon	S	No	No	NI
Common loon	S	No	No	NI
Bald eagle	S	No	No	NI
Harlequin duck	S	Yes	Yes	MI
Wolverine	S	No	No	NI
Fisher	S	Yes	Yes	MI
Long-eared myotis	S	No	No	NI
Long-logged myotis	S	No	No	NI
Fringed myotis	S	No	No	NI
Long-billed curlew	S	No	No	NI
Mountain quail	S	No	No	NI
Flammulated owl	S	No	No	NI
Bighorn sheep	S	No	No	NI
White-headed woodpecker	S	No	No	NI
Black-backed woodpecker	S	No	No	NI
Coeur d'Alene salamander	S	No	No	NI
Pygmy nuthatch	S	No	No	NI

Plant Species				
Common Name	Status	Known Occurrence	Habitat Present	Alternative 2 Determination
Macfarlane's four-o'clock	T	No	No	NE
Spalding's catchfly	T	No	No	NE
Water howellia	T	No	No	NE
Payson's milkvetch	S	No	No	NI
Deerfern	S	No	No	NI
Lance-leaf moonwort	S	No	No	NI
Linear-leaf moonwort	S	No	No	NI
Mingan moonwort	S	No	No	NI
Northern moonwort	S	No	No	NI
Least moonwort	S	No	No	NI
Leafless bug-on-a stick	S	No	No	NI
Green bug-on-a-stick	S	No	No	NI
Broadfruit mariposa	S	No	No	NI
Constance's bittercress	S	No	No	NI
Buxbaum's sedge	S	No	No	NI
Many headed sedge	S	No	No	NI
Pacific dogwood	S	No	No	NI
Clustered lady's-slipper	S	No	No	NI
Dasynotus	S	No	No	NI
Idaho douglasia	S	No	No	NI
Giant helleborine	S	No	No	NI
Puzzling halimolobos	S	No	No	NI
Light hookeria	S	No	No	NI
Spacious monkeyflower	S	No	No	NI
Thin sepal monkeyflower	S	No	No	NI
Gold-back fern	S	No	No	NI
Whitebark pine	S	No	No	NI
Naked-stem rhizomnium	S	No	No	NI
Mendocino sphagnum	S	No	No	NI
Evergreen kittentail	S	No	No	NI
Short style toefieldia	S	No	No	NI
Douglas clover	S	No	No	NI
Plumed clover	S	No	No	NI
Idaho barren strawberry	S	Yes	Yes	MI

## Biological Assessment/Biological Evaluation (BA/BE) for Threatened, Endangered and Sensitive Fish Species

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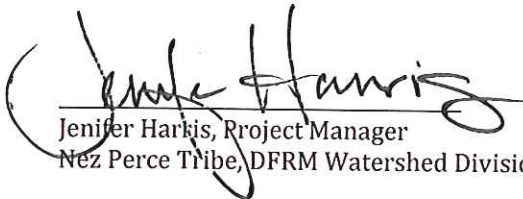
Nez Perce-Clearwater National Forests

# Biological Assessment and Biological Evaluation for the Crooked River Valley Rehabilitation Project


*For Snake River Basin Steelhead (*Oncorhynchus mykiss*), Bull Trout (*Salvelinus confluentus*), and Essential Fish Habitat (Fall Chinook Salmon and Spring Chinook Salmon (*Oncorhynchus tshawytscha*))*

Prepared by Nez Perce Tribe, Department of Fisheries Resource Management (DFRM),  
Watershed Division and Nez Perce- Clearwater National Forests  
7/29/2014


**Prepared by:**

  
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7.29.14  
Date

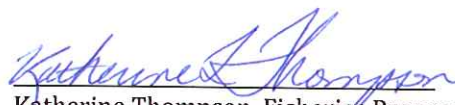
  
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7/29/14  
Date

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## ACRONYMS

ac	acres
BiOp	Biological Opinion
BMPs	Best Management Practices
BPA	Bonneville Power Administration
BA	Biological Assessment
°C	Degrees Celcius
CFR	Code of Federal Register
cfs	cubic feet per second
CWA	Clean Water Act
CWR	Clear Water River
cy	cubic yards
DC	Direct Current
ESA	Endangered Species Act
FA	Functioning Appropriately
FCRPS	Federal Columbia River Power System
Ft	feet
ft/ft	feet per foot
ft/s	feet per second
FR	Functioning at Risk
FUR	Functioning at Unacceptable Risk
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
in	inches
LI	Likely to Adversely Affect Individuals
LWD	large woody debris
m <sup>2</sup>	square meters
MDAT	Maximum Daily Average Temperature
MDMT	Maximum Daily Maximum Temperature
mi/mi <sup>2</sup>	miles/mile <sup>2</sup>
mg/l	milligrams per liter
MIS	Management Indicator Species
mm	millimeters
MSA	Magnuson-Stevens Fisheries Act
MWMT	Maximum Weekly Maximum Temperature
N/A	No applicable
NE	No Effect
NEPA	National Environmental Policy Act
NI	No Impact
NLAA	Not Likely to Adversely Affect
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPCNF	Nez Perce-Clearwater National Forest
NPF	Not Properly Functioning
NPT	Nez Perce Tribe
NRCS	Natural Resources Conservation Service
NTU	Nephelometric Turbidity Unit
ODFW	Oregon Department of Fish and Wildlife
OHWM	Ordinary high water mark
PDC	Pulse Direct Current
PF	Properly Functioning

PPM	parts per million
Qx	Flow Return Interval (number flowing Q is the number of years of the flow return)
RDG	River Design Group
RPA	Reasonable and Prudent Alternative
S	Sensitive
SPCC	Spill Prevention, Control, and Containment
T&E	Threatened and Endangered
TAG	Technical Advisory Group
TESC	Temporary Erosion and Sediment Control
TMDL	Total Maximum Daily Load
Tribe	Nez Perce Tribe
TSS	total suspended solids
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

# 1.0 INTRODUCTION

## 1.1 BACKGROUND

The Nez Perce Tribe and USDA Forest Service are proposing the Crooked River Valley Rehabilitation Project (CRVR) as presented in the Final Environmental Impact Statement. The project is funded by Bonneville Power Administration, through 2018, to meet commitments contained in the *2010 Supplemental Federal Columbia River Power System (FCRPS) Biological Opinion (BiOp)* (National Oceanic and Atmospheric Administration's [NOAA] National Marine Fisheries Service [NMFS] [NOAA Fisheries], 2010). Bonneville Power Administration (BPA) has committed to funding this project through the 2014-2018 Geographic Review process. The proposed Phases 1 through 4 would be complete by 2018, and the Option 1 and 2 would occur after Phases 1 through 4 are completed. These Options were designed as stand-alone projects that could occur with a one-season time frame.

The Nez Perce Tribe (Tribe) is the project sponsor and administers BPA funding. The project is on Nez Perce Clearwater National Forests (NPCWNFs) land and therefore they are the lead federal agency. The Tribe and NPCWNFs have partnered on similar restoration projects for the past 15 years. In accordance with the Endangered Species Act (ESA), NPCWNFs (as the federal agency of record) is required to ensure that any actions it approves would not jeopardize the continued existence of Threatened and Endangered (T&E) species or result in the destruction or adverse modification of federally listed critical habitat; therefore, NPCWNFs would consult with both the U.S. Fish and Wildlife Service (USFWS) and NMFS on potential effects of this project as required under Section 7 of the ESA. In addition, a U.S. Army Corps of Engineers (USACE) 404 permit would be secured prior to initiating work that may affect jurisdictional wetlands or Waters of the U.S. Issuance of a USACE permit is a separate Federal action included within this assessment. The Nez Perce Tribe, USACE and BPA are cooperating agencies for purposes fulfilling the NEPA process. Both USFWS and NMFS aquatic T&E species and their critical habitat are evaluated. The T&E species known to occur in the area include steelhead trout (*Onchorynchus mykiss*) and bull trout (*Salvelinus confluentus*).

The CRVR Biological Assessment (BA) was prepared in accordance with the following guidance and direction:

- Section 7(a)(2) of the Endangered Species Act of 1973 (as amended),
- 50 CFR § 402.12 (Interagency Cooperation, Biological Assessments),
- Endangered Species Consultation Handbook (USFWS and NMFS, March 1998),
- Magnuson-Stevens Fishery Conservation and Management Act (§ 305(b)) and its implementing regulations (50CFR § 600).

TABLE 1. LISTING STATUS OF SPECIES AND THEIR CRITICAL HABITAT IN CROOKED RIVER.

Species	Listing Status, Date and Reference	Critical Habitat Listing Date and Reference
Snake River Steelhead	Threatened 10/17/97 (62FR43927) 6/14/04 (69FR33102) 1/5/06 (71FR834)	Designated 9/2/05 (effective Jan 2, 2006) (70FR52630)
Columbia River Bull Trout	6/10/98 (63FR3167)	10/6/04 (69FR59996) 9/26/05 (69FR56212) 11/17/2010 (75FR63898)

This biological assessment tiers to the Crooked River Valley Rehabilitation FEIS (2014), the Nez Perce Forest Plan (1987), South Fork Clearwater River Watershed Assessment (NPNF 1999), Crooked River Valley Rehabilitation Design Criteria Report (River Design Group (RDG) et al. 2012, Crooked River Valley Rehabilitation Final Design Report (RDG et al. 2013), and Crooked River Valley Rehabilitation 95 percent Design (RDG et al. 2013), as well the supplemental reports from River Design Group (2013).

## 1.2 PURPOSE AND NEED

The purpose and need of the proposed actions is to restore channel and floodplain functions, restore fish habitat complexity, and improve water quality in Crooked River. The habitat needs to be improved due to degradation from historic mining activities and due to inadequate densities of anadromous and resident fish species in Crooked River (USDA FS 1998).

The Crooked River watershed contains important aquatic resources and has high aquatic potential. Crooked River provides habitat for steelhead and bull trout, which are listed as threatened species under the ESA, and is designated as critical habitat for both species. It also provides habitat for westslope cutthroat trout, resident rainbow trout (redband), and spring/summer Chinook salmon, all considered by the Forest Service to be sensitive fish species in the Nez Perce National Forest (USDA Forest Service 1987a; USDA Forest Service 2011). Crooked River also supports whitefish and nongame species such as sculpin. Pacific lamprey (*Entosphenus tridentatus*) have not been found in the project area in recent years (T. Gross, IDFG, Pers. Communication, 2014). The restoration of Crooked River could provide appropriate sand beds for lamprey spawning and rearing habitat.

The goals of the project area to create natural stream sinuosity and morphology, channel structures for spawning and rearing, and restore floodplain and hydrologic process and riparian areas. Bull trout use lower Crooked River as a migration corridor between the upper Crooked River watershed and the South Fork Clearwater River.

## 1.3 BIOLOGICAL ASSESSMENT OBJECTIVES

The BA objective is to analyze actions that may affect listed aquatic T&E species and critical habitat that occur in the project area (based on suitable habitat, designated status, and/or documented occurrence). Information for this analysis has been gathered from a variety of sources. The Tribe and NPCWNFs have conducted site-specific inventories of fish habitat conditions and population status throughout the watershed. Several studies that directly relate to Crooked River and its aquatic resources were completed, including the Crooked River Design Criteria Report (River Design Group [RDG] et al. 2012), Crooked River Wetland Delineation Report (Geum 2012), and the Crooked River Final Design Report (RDG et al. 2013). The Design Criteria Report summarizes an investigation and evaluation of approximately 2 miles and 115 acres of lower Crooked River valley being considered for restoration. Additional temperature data were collected through the summer of 2013 by the Tribe. In addition, peer-reviewed scientific literature has been used as the primary source of information regarding the life histories and habitat requirements of the aquatic organisms of Crooked River and the effect of natural and human-caused disturbance upon those organisms.

## 1.4 ACTION AREA

For this BA, the Action Area is defined under the ESA as “all areas that would be affected directly or indirectly (and not merely the immediate area involved in the action) as a result of the proposed federal action (50 CFR 402.02).” Figure 1 shows the location of the proposed project, which is the lower two valley miles of Crooked River, and the action area, which is the entire Crooked River watershed and approximately 1,000 feet

downstream into the South Fork Clearwater River. The action area was designated based on construction limits as well as the potential disturbance to listed species and critical habitat resulting from the proposed project construction activities. The downstream limit in the project area is based on potential sediment effects as noted from other similar projects (Fornander and Ferguson 2012). The entire watershed was chosen to analyze the potential effect of creating a fish passage barrier (subsurface flow) to the upper watershed. The South Fork Clearwater River is a part of the action area in order to analyze potential disturbance impacts from construction, specifically downstream sediment impacts from watering the bypass channel and constructed channel.

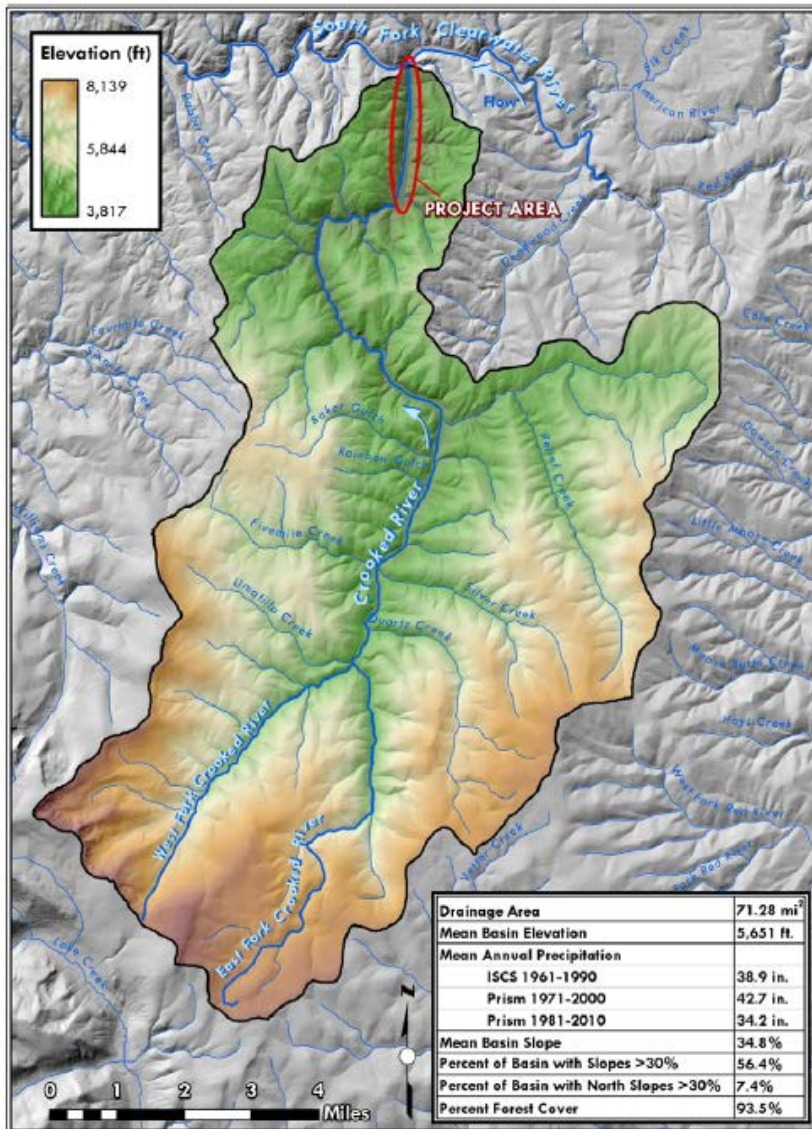


FIGURE 1. CROOKED RIVER VALLEY REHABILITATION PROJECT AREA AND ACTION AREA (FROM RDG ET AL. 2012).



## 1.5 ENDANGERED, THREATENED, EXPERIMENTAL, PROPOSED AND CANDIDATE SPECIES

In accordance with the ESA, the NPCWNFs is requesting written agreement from the USFWS and NMFS for this BA with respect to determinations of potential effects to listed aquatic T&E species and their critical habitat for the action area. As a cooperating agency, the USACE also seeks written agreement, and permitting under the Clean Water Act 404 permit would be covered by this BA and subsequent BOs. The USFWS has developed a list of Idaho's Endangered, Threatened, Proposed, and Candidate species and their critical or proposed critical habitat by county within the state. Updates to this list (dated August 17, 2011) are required every 180 days until the project decision is made. NMFS has a similar list for salmon and steelhead protected by the ESA (dated August 11, 2011). Table 2 includes listed aquatic T&E species and their status, as well as designated critical habitat that occurs in the project area, as identified by USFWS and NMFS. All species identified in Table 2 below are discussed in detail in Section 3.0.

TABLE 2. THREATENED AND ENDANGERED FISH SPECIES, LISTING STATUS, AND CRITICAL HABITAT.

Fish Species	Status	Known Occurrence	Habitat Present	Critical Habitat
Fall Chinook salmon <i>Oncorhynchus tshawytscha</i>	T	No	No	NE
Snake River steelhead trout <i>Oncorhynchus mykiss gairdneri</i>	T/MIS	Yes	Yes	LAA
Columbia River bull trout <i>Salvelinus confluentus</i>	T	Yes	Yes	LAA
Spring Chinook salmon <i>Oncorhynchus tshawytscha</i>	S/MIS	Yes	Yes	EFH

**T = Threatened, S = Sensitive, MIS = Management Indicator Species, EFH=Essential Fish Habitat**

**Threatened Species Determination:** NE = No Effect; NLAA = May Affect, Not Likely to Adversely Affect;

LAA = May Affect, Likely to Adversely Affect.

**Sensitive Species Determination:** NI = No Impact; MI = May impact individuals or habitat but not likely to cause trend toward federal listing or reduce viability for the population or species; LI = Likely to impact individuals or habitat with the consequence that the action may contribute towards federal listing or result in reduced viability for the population or species.

## 2.0 PROJECT DESCRIPTION

The proposed rehabilitation project consists of restoring and improving 2.0 miles (up to 115 acres) of valley bottom (Crooked River Meanders). The project boundary (construction limits) extends from 0.1 miles upstream from the mouth of Crooked River (at the Idaho Department of Fish and Game (IDFG) intake weir) to approximately 2.1 miles upstream. The project would restore Crooked River and its floodplain that have been significantly degraded by past land management activities, most importantly dredge mining. These activities affected instream, riparian, floodplain, and hydrologic functions, and sediment regimes in the mainstem of Crooked River. Fire suppression, mining, road construction, and timber harvest have caused a shift in many of the natural hydrologic and geomorphic processes in the watershed. Over the long term, this shift has led to changes in streamflows and a reduction in the amount of large pieces of wood and rock in the stream. The area surrounding Crooked River was mined for mineral resources from the early 1900s through the 1950s. Mining waste (also referred to as mine tailings) is concentrated in the valley bottom, altering the physical condition of the stream system. The natural migration pattern of the stream and other changes in

channel morphology (channel size, form, and function) is restricted, and the recolonization of riparian vegetation and function is impaired. These alterations have resulted in a significant reduction of productive aquatic habitat for listed Snake River Basin steelhead and bull trout in lower Crooked River.

## 2.1 PROPOSED ACTION

The proposed action for the Crooked River Valley Rehabilitation project includes multiple activities and will be implemented in 4 separate Phases and 2 Options. The Phases must be completed in order, where the Options were developed to be constructed at any time during construction of the Phases or separately without compromising the design. Each activity is listed here, by phasing and option, and in Section 2.2.1.

The primary actions include: bypass channel construction, floodplain construction, and channel construction. Each of these action types have a series of sub-actions that are described in detail below. The project would be phased over 4 to 6 years (Table 3).

TABLE 3. PROJECT PHASING BY YEAR AND SCOPE (FROM RDG ET AL. 2013).

Phase	Year	Scope
Phase 1	2015	Bypass channel construction between bypass channel stations 0+00 and 40+00. Temporary haul road/levee construction. New channel construction and floodplain grading between channel stations 31+00 and 74+00 including grading of secondary floodplain features (swales, depressions, wetlands and side channels). Material stockpiling, including large woody debris, rock, woodchips and soil. Salvage wood and herbaceous plants and sod.
Phase 2	2016	Bypass channel construction between bypass channel stations 40+00 and 60+00. Temporary haul road/levee construction. New channel construction and floodplain grading between channel stations 74+00 and 106+00 including grading of secondary floodplain features (swales, depressions, wetlands and side channels). Material stockpiling, including large woody debris, rock, woodchips and soil. Salvage wood and herbaceous plants and sod.
Phase 3	2017	Bank treatments and floodplain roughness between channel stations 31+00 and 106+00. New channel activation. Re-vegetation of floodplain. Stockpile LWD material.
Phase 4	2018	Bypass channel and temporary haul road/level reclamation, floodplain roughness and upland floodplain grading including grading of secondary floodplain features (swales, depressions, wetlands and side channels) between channel stations 31+00 and 106+00. Re-vegetation of floodplain.
Option 1	Any year 2015 to 2018	Floodplain grading and habitat structures between channel stations 0+00 and 31+00. Plant floodplain and revegetation maintenance.
Option 2	Any year 2015 to 2018	Floodplain grading and habitat structures between stations 106+00 and 129+00. Plant floodplain and revegetation maintenance.

### 2.1.1 BYPASS CHANNEL CONSTRUCTION

#### 2.1.1.1 Construct a 5,700 foot temporary by-pass channel

Construction of the floodplain and new river channel in Phases 1 through 4, would require Crooked River to be diverted around the construction area for the duration of the project. Options 1 and 2 would be constructed without a bypass channel. A bypass channel is a temporary channel that would be constructed down the east side of the project area that would route the flow and aquatic organisms through the project area. The bypass channel would be constructed over two years. The bypass channel is expected to be in place for up to 4 years during construction of the floodplain and new channel. The temporary bypass channel alignment would be offset from the toe of the Crooked River Road (Road 233) embankment and routed

through a series of existing ditches and ponds on the east side of the valley. The Crooked River Road is about 10-15 feet above the valley bottom, which would reduce impacts from the bypass channel to the road.

Construction of the bypass channel would occur in Phase 1 and Phase 2 of the project. Construction for Phase 1 would begin at channel station 0+00 (see bypass designs) through station 40+00 (95 percent Designs, Sheet Number 4.0). Approximately 10,500 cubic yards of material would be excavated in Phase 1. The material excavated from the bypass channel would be used to construct the temporary haul road, which would also serve as the levee to separate live water from the construction area.

A diversion structure on the mainstem channel would be installed in Phase 1. The structure could be a coffer dam constructed out of local material, substrate filled bags, or a combination of the two. The diversion structure would be designed with a hardened spillway (riprap-like material) that would pass flows greater than the  $Q_{10}$  (1,061 cfs). To reduce turbidity in the mainstem, large bulk bags filled with native material could be used as the coffer dam and placed in the river to divert the flow into the bypass channel. The bypass channel would be watered slowly; over several days to reduce turbidity. Sandbags and/or the substrate filled bags could be used to control flows if turbidity approaches 50 NTUs during rewatering to ramp down flows. Once the flow is routed into the bypass channel, cobble material and riprap would be placed on the outside of the bags to protect them during high flows and to provide a hardened spillway.

Full watering of the bypass channel would be delayed until July 15 to reduce impacts to juvenile steelhead. Dewatering and fish salvage operations in the mainstem channel would follow the procedures outlined in the fish salvage section of this BA. Information on degree days in the project area are described in Appendix B. The degree days provide justification that steelhead would be out of redds by July 15 if redds are found in the project area.

To keep fish from entering the mainstem channel during the dewatering process, the lower end of the mainstem channel would be blocked using a type of weir structure, such as a PVC weir, picket weir, cofferdam or combination thereof. The structure would allow small fish to pass through, but adult steelhead or Chinook would be blocked. Small fish would be able to swim out of the project area during the dewatering of the mainstem channel and any adult fish would need to be herded out of the project area or dip-netted and moved to the bypass channel. Because the flows would be split between the bypass channel and mainstem channel the water velocities would be low through the weir. Crews would remove any debris on the weir daily as needed.

The diversion structure and weirs would be evaluated by the contractor at the end of each construction season to ensure they are secure and in good condition prior to winter. Repairs, if needed, would be completed. The structures would be evaluated again in the spring, prior to high flows, for erosion potential and for any large woody debris being caught up on them. These measures are outlined in the Emergency Action Plan (EAP).

Bypass channel construction Phase 2 would begin at channel station 40+00 through 60+00. Approximately 12,700 cubic yards of material would be excavated in Phase 2. The bypass channel would be connected to the mainstem channel at the downstream end first. Once the bypass channel is complete, a notch would be excavated in the existing Phase 1 bypass channel to slowly water the new phase of bypass channel. The same turbidity monitoring protocols would be followed as outlined above. If turbidity approaches 50 NTUs, sandbags would be used at the "notch" to control flows. The Phase 2 bypass channel would be watered during high flows similar to the Phase 1 bypass channel. An exclusion structure for adult fish would also be

installed on the mainstem channel near the downstream end of the bypass channel to preclude fish passage in the mainstem, as described above. After July 15, the mainstem channel would be sandbagged to slowly dewater the mainstem channel. Fish salvage operation would occur in the mainstem channel. Once the mainstem channel is dewatered, the levee would be constructed across the mainstem channel and the sandbags would be removed.

Once the new channel is complete, the diversion structure would be slowly notched to rewater the new channel. Blocknets would be installed upstream of the diversion structure and bypass channel prior to rewatering to prevent fish from entering the new channel and bypass channel until the channel is fully rewatered. Rewatering the channel would occur during low flow. The structure would be removed once the newly constructed channel is rewatered and the bypass channel is deactivated. Large substrate filled bags could be used to dewater the bypass channel to reduce turbidity, similar to the dewatering of the mainstem channel.

When watering the bypass channel and newly constructed channel turbidity would be monitored upstream of the bypass channel to obtain background levels. If noticeable sediment plumes occur downstream, turbidity would be monitored 300 feet downstream of where the bypass channel reconnects to the mainstem. If turbidity levels approach 50 NTUs over background, flow outputs would be adjusted until levels drop close to background levels. Turbidity would be monitored regularly (e.g. 15 minute intervals), when turbidity plumes are noticeable.

The bypass channel would be constructed to contain a 10-year flow return interval (1,061 cfs) with an additional one-foot of freeboard from the levee/cofferdam, which would contain the  $Q_{25}$ . The  $Q_{25}$  would be a large flow event, and the probability of having this high of a flow event during the project is low. The bypass channel was modeled using a one-dimensional HEC-RAS model to simulate hydraulic conditions (RDG 2013b). Table 4 below provides a summary of the HEC-RAS outputs for the temporary channel at the  $Q_{10}$ .

TABLE 4. SUMMARY OF HEC-RAS OUTPUT FOR THE TEMPORARY BYPASS CHANNEL AT  $Q_{10}$  (RDG ET AL. 2013).

	Average	Minimum	Maximum	Standard Deviation
Flow Area (square feet)	207	94	825	122
Top Width (feet)	88	40	342	53
Mean Depth (feet)	2.4	1.1	6.3	0.7
Maximum Depth (feet)	6.6	2.9	11.2	1.8
Velocity (feet per second)	6.9	1.6	11.3	2.0
Shear Stress (lbs per square foot)	1.01	0.04	2.73	0.56
Mobile particle size <sup>1</sup> (mm)	128	5	342	N/A

1 A range of incipient motion methods were used to estimate riverbed mobility (Shields 1936, Leopold, et. al. 1964, and Rosgen 2006).

Since the bypass channel would be routed through existing ponds and ditches, some habitat complexity such as pools and riffles and LWD already exists. Ground disturbance between the Crooked River Road and bypass channel would be limited; therefore, much of the existing vegetation would remain undisturbed along the east side. Vegetation, such as alders and willows, would be salvaged in the project area and placed along the bypass channel where possible. This would provide some shade for the bypass channel.

**2.1.1.2 Construct Levee/6,000 Foot Long Temporary Haul Route**

A levee would be installed to isolate the construction area and reduce sediment impacts from construction of the floodplain and new stream channel. The location of the levee is on the west bank of the bypass channel between the bypass channel and mainstem river. The levee would also serve a temporary haul route for construction equipment through the project area.

The levee would begin at about mainstem channel station 30+00 and would be about 6,300 feet in length. The levee would vary up to 4 feet above the design surface and the top width would be about 16 feet wide with slopes of 2:1.

The purpose of the haul route is to reduce construction traffic on Crooked River Road as well as on the newly constructed floodplain. The haul road crosses the bypass channel in three locations. Two crossings would be installed in Phase 1 and the third crossing would be installed in Phase 2, prior to watering the bypass channel. The type of stream crossing structure used would be determined by the contractor. The crossings would be sized to pass the 25-year flow event, low flows, and fish at all flows.

**2.2.2 FLOODPLAIN CONSTRUCTION**

**2.2.2.1 Remove/salvage existing shrub, tree, and sod material to be used in final project (77 acres)**

Once the mainstem channel is dewatered, native materials would be salvaged from the tailings piles and floodplain and stockpiled above the ordinary high water mark (OHWM). The salvaged materials would be used in bank and floodplain treatments as well as for LWD in the channel. Salvageable shrub material would be planted along the bypass channel or saved for future planting when possible. Existing native materials needed for rehabilitation treatments include: cobbles, boulders, gravels, vegetative fill/soil, trees and herbaceous sod mats. Areas with reed canary grass would not be used as sod mats. Quantities for all of these materials are provided in Section 3 of the Final Design Report (RDG et al. 2013). Areas designated as preservation areas that currently support large shrubs: these areas would not be disturbed. Substrate materials would be excavated from dredge piles, and separated, and staged for use as riverbed fill and floodplain fill.

**2.2.2.2 Re-grade up to 115 acres of floodplain (190,000 cubic yards of material)**

Floodplain grading includes dredge pile excavation, pond filling, and upland (repository) construction. The total estimated earthwork quantity is 190,000 cubic yards. Earthwork and grading is required for new channels, bypass channel, streambank structures, secondary floodplain features, and materials sorting/staging. The materials used to construct the levee would serve as the backfill for the bypass channel and uplands. The earthwork specifications including a breakdown by construction phase and channel station can be found in the engineering designs (RDG et al. 2013). The substrate categories and their placement in the project area are shown in Table 5, below. Sand and gravel material would be fully mixed with the cobble materials in both the riverbed fill and floodplain fill to ensure adequate water holding capacity in both the river and floodplain.

TABLE 5. SUBSTRATE CATEGORIES FOR SORTING, STAGING AND PLACING MATERIAL DURING EARTHWORK AND GRADING ACTIVITIES (RDG ET AL. 2013).

Substrate Category	Description	Placement Location	Quantity Needed	Stability Criteria
--------------------	-------------	--------------------	-----------------	--------------------

Riverbed fill	Alluvium consisting of sand, gravel, cobble and boulders	Channel bed in riffles and runs (12-18 inches thick)	13,900 cy	D <sub>50</sub> stable for Q <sub>25</sub>
Streambank Fill	Alluvium consisting of sand, gravel and cobble	Point bars and streambank toe in structures	9,900 cy	D <sub>50</sub> stable for Q <sub>25</sub>
Floodplain fill	Alluvium consisting of sand, gravel and cobble	Bankfull floodplain and upland floodplain	135,700 cy	D <sub>50</sub> stable for over bank flow conditions for Q <sub>25</sub>
Vegetative fill	Fine-grained soils suitable for growing plants	Mixed into bankfull floodplain and upland floodplain backfill	26,700 cy	N/A
General fill	Excess soils or substrates that do not meet specifications for other categories	Bypass channel or mixed into other substrates to achieve specified gradations	56,900 cy	Surface erosion from runoff minimized

The design criteria for floodplain grading are provided in Table 6. There are two primary floodplain features: bankfull floodplain and upland floodplain. The bankfull floodplain would be about 300 feet wide on average and would correspond to the elevation of the top of the new channel banks. Bankfull floodplain would be inundated at flows with recurrence intervals over the Q<sub>1.1</sub>. The bankfull floodplain was designed to flood frequently to allow for moderate fluvial disturbance and distribution of sediment. The floodplain would slope gently away from the new river channel and transition to the upland floodplain. The upland floodplain is a transition area between the bankfull floodplain and existing ground. The upland floodplain would be inundated at flow return intervals greater than the Q<sub>25</sub>.

TABLE 6. DESIGN CRITERIA FOR PRIMARY FLOODPLAIN FEATURES (RDG ET AL. 2013).

<b>Metric</b>	<b>Bankfull Floodplain</b>	<b>Upland Floodplain</b>
Elevation relative to bankfull (ft)	0.0 to 1.5	1.5 to 2.0
Width (ft)	100 to 400	0 to 200
Inundation frequency	>Q <sub>1.1</sub>	>Q <sub>25</sub>
Slope	Gentle slope up away from river	Gentle slope down toward river with gradual transitions to adjacent features
Fluvial disturbance	Moderate	Low
Area of feature in design	43.1 acres	13.2 acres
Stability Criteria	Floodplain shear stress at Q <sub>25</sub>	Floodplain shear stress at Q <sub>10</sub>
Substrate amendment	Outside of meander belt width- 6 inches of vegetative fill mixed to a depth of 12 inches	6 inches of vegetative fill mixed to a depth of 12 inches

There are three tributaries in the project area that would be hydrologically reconnected to the mainstem channel. The tributaries are small (~ 1 cfs at baseflow) and may not have surface water connection due to the wetland conditions along the hillslopes. Two of the channels are on the east side of the valley and would be connected to the mainstem once the bypass channel is re-graded. One of the tributaries is on the west side of the valley and is currently routed through dredge ponds. The channel would be surveyed in the summer of

2014 and again during fish salvage operations to determine if steelhead are using the stream. If steelhead are found, the channel would be diverted downstream back to the mainstem channel to provide downstream fish passage. If steelhead are not found, the water from this tributary may need to be diverted or pumped during construction of the floodplain or routed around the project site if flows are too great to pump. If pumping is required, crews would follow protocols outlined in the Fish Salvage and Dewatering Sections below (NMFS 2011), and water would be pumped into settling basins. The tributaries are steep, small and not likely fish bearing streams. Any steelhead or bull trout found would be documented and reported to NMFS and USFWS in the annual report.

### 2.2.2.3 Construct secondary floodplain features, including swales, depressions, and wetlands

Secondary floodplain features include depressions and swales. Depressions are longitudinal low areas on the bankfull floodplain that reduce overbank flow velocities and trap sediment. Depressions create conditions that support natural recruitment and establishment of desired vegetation communities. Depressions would be about 1 foot deep.

Swales are smaller, though deeper, than depressions and are located in the bankfull floodplain outside of the meander belt width or on a transition area between the floodplain and existing upland. Swales depths are about two feet deep to allow for vegetation to access the late season water table. Depressions and swales would be spaced about 70 feet apart to reduce the potential for headcuts and erosion. Table 7 below provides the design criteria for floodplain depressions and swales and planted with wetland vegetation.

TABLE 7. DESIGN CRITERIA FOR SECONDARY FLOODPLAIN FEATURES (RDG ET AL. 2013).

	<b>Floodplain Depressions</b>	<b>Floodplain Swales</b>	<b>Upland Floodplain Swales</b>
Location	Bankfull floodplain	Bankfull floodplain	Upland floodplain
Elevation relative to bankfull (ft)	-1.0 to 0.0	-2.0 to 0.0	-0.5 to 1.5
Width (ft)	20 to 30	15 to 20	15 to 20
Horizontal spacing from other features	Min 70 ft	Min 70 ft	30 to 50 ft
Inundation frequency	> Q <sub>bankfull</sub>	> Q <sub>bankfull</sub>	> Q <sub>25</sub>
Area of feature in design	1.45 acres	0.99 acres	0.34 acres
Fluvial disturbance	Moderate	Moderate	Low

Two types of wetland features would be constructed; slope wetlands and side channel wetlands. Slope wetlands are lateral seeps entering the valley bottom from side drainages. The existing slope wetlands would be preserved and connected in to the bankfull floodplain design.

There are about 52 acres of wetlands in the project area (Geum Environmental Inc. 2012). About 30 acres of these wetlands would be filled, leaving 22 acres unimpacted, and 42 acres would be created. All of the created wetlands would be planted with sedges, rushes, willows and other appropriate wetland vegetation. Table 8 provides the expected wetland class and vegetation community, and their associated area. There are several large wetlands in the project area that would be preserved. Upon project completion, there is an expected net gain in wetlands in the project area. Wetlands are also expected to increase in diversity as a

result of the project, and associated wetlands and floodplain functions. Table 7 provides the design vegetation community and associated expected acres.

TABLE 8. DESIGN VEGETATION COMMUNITIES AND ASSOCIATED WETLAND CLASS POTENTIAL (RDG ET AL. 2013).

Design Vegetation Community or Water Feature	Expected Wetland Class <sup>1</sup>	Expected Wetland Area
Alder	Palustrine Scrub Shrub	32.6 ac
Bare colonizing	Riverine Unconsolidated Shore	1.1 ac
Conifer / Tall forb	-	-
Main channel	Riverine Unconsolidated Bed	6.7 ac
Mixed shrub	-	-
Alcove	Riverine Unconsolidated Shore	0.4 ac
Sedge	Palustrine Emergent	0.3 ac
Side channel	Riverine Unconsolidated Bed	0.9 ac
Spruce	-	-
	<b>Total</b>	<b>42.0 ac</b>

<sup>1</sup>Cowardin et al. (1979).

<sup>2</sup>These design vegetation communities are not included in the total expected wetland development area but portions of these areas may develop wetland characteristics over time.

#### 2.2.2.4 Roughen 49 acres of floodplain and add woody material

Floodplain surface roughness includes microtopography grading and large wood installation. Floodplain roughness includes adding LWD and creating ridges and furrows. Some of the woody debris would be partially buried to help create stability in the floodplain, provide organic material in the floodplain, and increase water holding capacity. These treatments create an uneven surface that helps provide microsites as well and break up flows across the surface. Treatment locations and construction details are provided in the construction drawings (95 Percent Designs Sheet 5.0 through 5.9). Table 9 provides a summary of roughness treatments by design floodplain feature.

TABLE 9. SUMMARY OF FLOODPLAIN ROUGHNESS TREATMENTS BY DESIGN FLOODPLAIN FEATURE (RDG ET AL. 2013).

Feature	Area	Total Brush Needed <sup>1</sup> (150 pieces/acre)	Total Small Logs <sup>2</sup> Needed (50 pieces/acre)
Bankfull Floodplain	43.1	6,461	2,154
Floodplain Depression	1.5	225	75
Floodplain Swale	1.0	149	50
Side Channel Wetland	0.6	84	28
Upland Flow Floodplain	13.2	1,980	660
Upland Swale	0.3	51	17



<b>Total</b>	<b>59.7</b>	<b>8,950</b>	<b>2,984</b>
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<sup>1</sup>Brush= 3-6 inches in diameter

<sup>2</sup>Small logs= 6-12 inches in diameter

### 2.2.2.5 Re-plant floodplain with native vegetation

Vegetation communities were identified that would fit the ecological site potential, maximize aquatic habitat function and can be sustained by channel processes and geomorphology. Rehabilitation treatments would create the conditions necessary to support development of vegetation communities over time. However, the floodplain would be replanted to speed up the recovery efforts. The floodplain would be planted with plants ranging from 1-gallon to 8-gallon using heavy equipment prior to and after rewatering, if possible, to reduce disturbance with the heavy equipment. Plants would be installed where the roots have access to the water table and the holes would be augmented with soil and woody materials, where possible, to provide a better growth medium.

Sedge plugs and willow cuttings would also be used in the depressions and swales to provide wetland habitats. Large plants (>5-gallon) would be planted on the southern banks of the new channel and at the areas on the meander bends that would have the greatest shear stress. Smaller plants (1- to 3-gallon) would be planted along the remaining banks and side channels. Planting efforts would focus on areas adjacent to the stream channel first, within the depressions and swales, and then on the upland areas last. The overall number of plants used in revegetation efforts depends on the size of individual plants. Larger plants (8- and 5-gallon) would be spaced at about 6 -8 feet apart and clumped. Smaller plants (1- and 3-gallon) plants would be spaced about 2-3 feet apart. Sedges and rushes (10-20 cubic inches) would be spaced at less than one-foot intervals and willow cuttings would be used along the banks. Approximately 20,000 plants of the various sizes would be planted.

Table 10 describes what species type would be planted and their location. Figure 2 below provides the areas where community types would be planted. Alders would be planted on the low floodplain along with black cottonwoods, a variety of willow species, red-oiser dogwood and spruce. The uplands would be planted with fir, spruce and pine species. The low lying areas, such as the swales and depression would be planted with sedges and rushes. To increase plant productivity, soil material would be salvaged during floodplain construction and used within the upper foot of the new floodplain to provide rooting material for the plants. Woody material and wood chips would be distributed throughout the site to improve soil productivity.

TABLE 10. VEGETATION COMMUNITIES, SPECIES TYPES AND THEIR LOCATION ON THE FLOODPLAIN.

<b>Community Type</b>	<b>Species</b>	<b>Location</b>
Bare colonizing	Herbaceous and woody species: coyote willows, Drummond willow, water sedge	Depositional area along the channel
Alder	Alders, various willow species, black cottonwood	Low floodplain and off channel wetlands with a focus on streambanks
Sedge	Native wetland plants including sedges, rushes and wetland forbs	Depressions, swales, streambanks, alcoves
Spruce	Moist conifer forest	Low floodplain
Conifer/Tall Forb	Firs, spruce and pine	Upland areas

Browse on woody vegetation may limit the establishment of desired vegetation communities on the floodplain. To protect vegetation from beaver and ungulate browse, many of the larger shrubs and trees would be caged, either individually or in groups. The cages would remain in place until plants are large enough to withstand browsing.

Noxious weeds found in the project area include Canada thistle, common mullein, common tansy, perennial pea, spotted knapweed and rush skeleton weed. Reed canarygrass is not a noxious weed, but it is highly invasive. Weed treatments in the project area would follow the Nez Perce National Forest Noxious Weed Biological Assessments (USDA Forest Service 2009) and Biological Opinions for Herbicide Treatment of Invasive and Noxious Weeds on the Nez Perce National Forest (2009). The methods and effects of treatment are incorporated by reference. If new Biological Assessments and Opinions are developed before the project is complete, weed treatment procedures would follow those specified in the most recent BA/BO. The use of herbicides would be minimized by planting large, trees and shrubs upon project completion. This should provide competition and less desirable conditions for noxious weed (e.g. shading) than if the site was not replanted.

### **2.2.3 CHANNEL CONSTRUCTION**

#### **2.2.3.1 Construct 7,400 feet of new river channel exhibiting instream habitat complexity**

About 7,400 feet of new channel would be constructed from river station 32+00 to 106+00 during Phases 1 and 2. An additional 5,800 feet of existing river channel in the project area would not be reconstructed but would receive LWD treatments. The new channel would exhibit a meandering planform, riffle-pool morphology, and a mobile gravel bed. The channel would be sized to convey the  $Q_{1.1}$  (300 cfs) within the banks before the floodplain would be activated. The new channel was developed to hold the  $Q_{1.1}$  to allow the new channel to adjust more naturally to existing flows. Since current bankfull indicators showed that flows are less than half of the flow regression analysis for the watershed, it was determined that a smaller channel would be able to adjust for higher flows, if necessary, rather than design a channel that was too large. Top of bank elevations would correspond to elevations of the bankfull floodplain. The new channel would contain an inset low-flow channel to facilitate fish migration during baseflow conditions, which is about 10 cfs (corresponding to the 5-year flow recurrence, 30-day mean baseflow discharge (RDG et al. 2012 and 2013a).

The proposed channel construction includes creating a longitudinal profile with 40 percent riffles, 10 percent runs, 30 percent pools and 10 percent glides. The planform of the new channel follows Rosgen 1996 design metrics, to develop the meander wavelength, belt width, radius of curvature, and sinuosity. These features would be supported and maintained by the variable hydraulics created through floodplain construction.

The design includes constructing 58 pools that would be 4 to 6 feet deep. Residual pool volumes would be between 1,000 and 2,000 cubic feet with depths of 2 to 4 feet. Most of the newly constructed pools would be on the outside of meander bends to promote maintenance through scouring during spring flows.

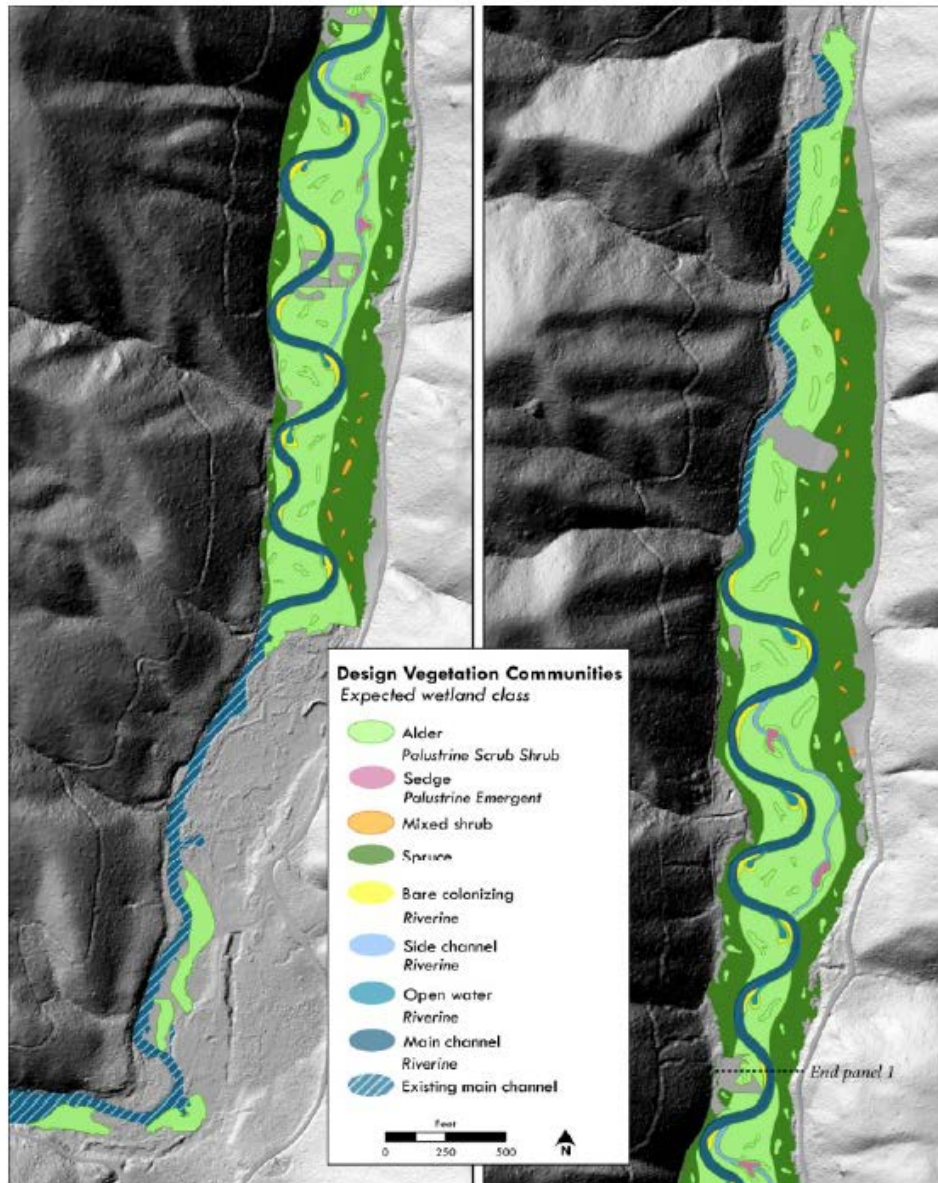


FIGURE 2. PROPOSED VEGETATION COMMUNITIES BASED ON FLOODPLAIN CHARACTERISTICS (FROM RDG ET AL. 2014).

The sinuosity of the channel would be reduced to range from 1.2 to 1.6 and the slope of the channel would be increased to 0.0084 to 0.0100 ft/ft (currently 0.0036 to 0.0086 ft/ft). The entrenchment ratio would be increased from 1.7- 2.5 to 3- 10.

### 2.2.3.2 Install 9,845 linear feet of bank treatments

Streambank structures are structures that are incorporated into the streambanks during construction along with sod mats, coir rolls, and fascines that are installed on the stream banks as well as LWD structures. Both the banks structures and LWD are intended to stabilize the newly constructed streambanks until vegetation

is established. The bank treatments were designed to be stable for several years, but allow the river to migrate over time once vegetation has become established (to create more stable banks).

The materials for the bank treatments would come from onsite (stockpiled material). The design drawings, Sheets 5.0 through 5.6, illustrate all of the bank treatment structure types and locations in the project area. Most of the in-bank structures would be installed in areas that would see higher shear stress along the banks, such as at the upper end of a meander. The River Design Group et al. (2013), Final Design Report, Section 3.3, describes in detail, all the various bank treatments and provides the specifications for each of these treatments.

Over 60 LWD structures would be installed in the newly constructed channel, as well as in the existing channel at the upper and lower ends of the project area. The structures in Reaches 2 and 3 would be installed when the channel is dewatered during Phases 1, 2, and 3. The structures in Options 1 and 2 would be installed in the wet; however, equipment would not be used in the river. Turbidity would be monitored during the installation of structures in Options 1 and 2 to ensure levels do not exceed 50 NTUs. Approximately 400 large trees would be imported for the structures. LWD structures would be installed using an excavator with a thumb or using helicopter techniques depending on proximity of the source of trees to the site and cost. The woody debris jams would be constructed with large enough trees that would remain in place with higher flows (2 times channel width without rootwad or 1.5 times channel width with rootwad). Large wood structures would be anchored in at the lower end of the project area (above the IDFG intake structure) to serve as catchments for woody debris that does move during high flows. These structures would incorporate large boulders and be designed to withstand large flows ( $>Q_{50}$ ). Examples of these types of catchments have been constructed on the Tucannon River in Washington and can be seen in Figure 3. This would help prevent LWD from interfering with the fish weir and any structures downstream of the project area.



FIGURE 3. LWD CATCHMENT ON THE TUCANNON RIVER, WASHINGTON.

### **2.2.3.3 Construct 2,725 Linear Feet of Side Channels**

Off-channel habitat in the form of two side channels would be constructed in the low floodplain. The purpose of the side channels is to provide refuge for salmonids during high flow events. The side channel would be active above approximately 50 cfs and would have the outlet of the pool low enough to allow fish to move out of the channel as water levels recede. The side channel, therefore, would be active during spring flows and in the late fall. The side channel could potentially provide spawning areas for steelhead if the ideal substrate is provided. The channel would not support fish at summer low flows nor capture water from the mainstem. The inlet of the side channels would be constructed on the outer meander bends to reduce the amount of sediment that would be trapped in the channel. The side channels would be planted with alders and willows upon completion to provide stability and shade.

## **2.3 CONSERVATION MEASURES**

This section describes conservation measures that would be applied to this project during implementation. Conservation measures for this project include measures to minimize the potential for detrimental effects to aquatic species and their habitat.

All listed fish species in the project vicinity require similar habitat quality for survival and reproduction. Conservation measures in this BA were designed to minimize potential detrimental effects to steelhead and bull trout and their critical habitat as well as sensitive species and their habitat. Two major components associated with these conservation measures are to reduce the potential for deleterious materials from entering the water and reduce impacts associated with construction.

### **2.3.1 Project Implementation Timing**

The proposed project would begin with construction of the bypass channel June to July, with the dewatering of the bypass channel occurring after July 15. The timing of implementation would allow for adult and juvenile bull trout to move out of the project area and for steelhead to emerge from redds if they are present. Work would occur until the Phase is complete or snow levels are such that work could not continue.

### **2.3.2 FISH SALVAGE (SEINING, DIP-NETTING, ELECTROFISHING)**

To reduce potential impacts to fish from the proposed construction activities, fish salvage operations would occur in the ponds and the mainstem Crooked River prior to dewatering in Phase 1 and 2, and prior to regrading the temporary bypass channel in Phase 4 (Table 11). There are numerous off-channel and open-water areas in the project area consisting of small and large ponds as well as a few interconnected channels. The majority of the ponds do not have surface water connection to Crooked River. Other ponds have connection during high spring flows but few are connected perennially. Habitat conditions for steelhead are generally poor in the ponds.

The dredge ponds in the project area are not suitable for spawning due to high water temperatures, increased sediment and stagnant water. Most of the ponds are shallow have higher water temperatures and high sedimentation. Dace have been observed by Tribe staff in a few of the ponds that would be used for the bypass channel. Once the ponds are salvaged, the ponds would be blocked using native materials to plug inlets and outlets of the ponds.

The areas of fish removal have been divided into phases by year and are described in Table 11 and are shown in Figure 5. The conditions of the ponds are described in the Environmental Baseline Section, below. The

mainstem channel in Phase 1 and 2 could have juvenile steelhead present during dewatering. The mainstem channel in Option 1 and 2 would not be dewatered and equipment would not be working in channel, therefore fish removal would not occur Reaches 1 and 4. The ponds in Option 2, with the exception of one large pond, are not connected via surface flow, and would not be defished.

TABLE 11. POTENTIAL FISH SALVAGE AREA IN EACH OF THE PROJECT PHASES.

Year/Phase	Location of Fish Salvage	Activity	Total Area (m <sup>2</sup> )
2014	Dredge Ponds	Block Dredge Ponds	18,873
2015/Phase 1	Mainstem River/Side Channel	Construct Bypass Channel, Floodplain, New Channel	24,261
2016/Phase 2	Mainstem River	Construct Bypass Channel, Floodplain, New Channel	16,072
2017/Phase 3	No fish salvage would occur for this activity	Install LWD and bank stabilization structures	0
Phase 4	Bypass Channel	Complete Phase 3, Re-grade Bypass Channel	7,943

The bypass channel would be constructed in late June and July and in two phases as described above. Water would be passed through the bypass channel prior to dewatering the mainstem channel to provide continuous fish passage through the project area during the dewatering phase. The mainstem would be dewatered after July 15. A fish exclusion structure (weir or picket fence) would be installed on the downstream end of the channel to block adult fish passage once the bypass channel is watered. At this time, the upstream end of the mainstem channel would be slowly closed (over several days) to dewater the mainstem channel. Fish would likely move out of the mainstem channel with the receding water; however, some fish may remain in the cobbles. Crews would use seine nets, where possible, to herd fish out of the project area. Once the water is completely turned off in the mainstem, crews would ensure that all stranded fish are dip-netted and moved to the bypass channel. Since the pools are deep (4 to 6 feet deep) and would likely retain water due to high groundwater levels, fish would be able to hold up in these areas. Pumps would be used to dewater the pools. NMFS (2011) pumping procedures that outline screen intakes and pumping rates, would be followed. Fish would be dip-netted as the water recedes in the pools. The pools would then be electrofished to remove any remaining fish. Fish would be placed in the bypass channel or in a downstream reach.

Dewatering the mainstem channel in Phase 2 would require the use of sandbags to slowly dewater the mainstem channel. This would occur after July 15. Sandbags would be placed in the channel a row at a time to allow the water to drop and fish to move out of the channel. The same procedures outlined above to remove fish from the project area would be followed for Phase 2 and bypass channel. Work area isolation, dip-netting, and electrofishing operations are described in detail below. Operations would be supervised by qualified personnel from the USFS and Tribe experienced with work area isolation and competent to ensure the safe handling of all fish.

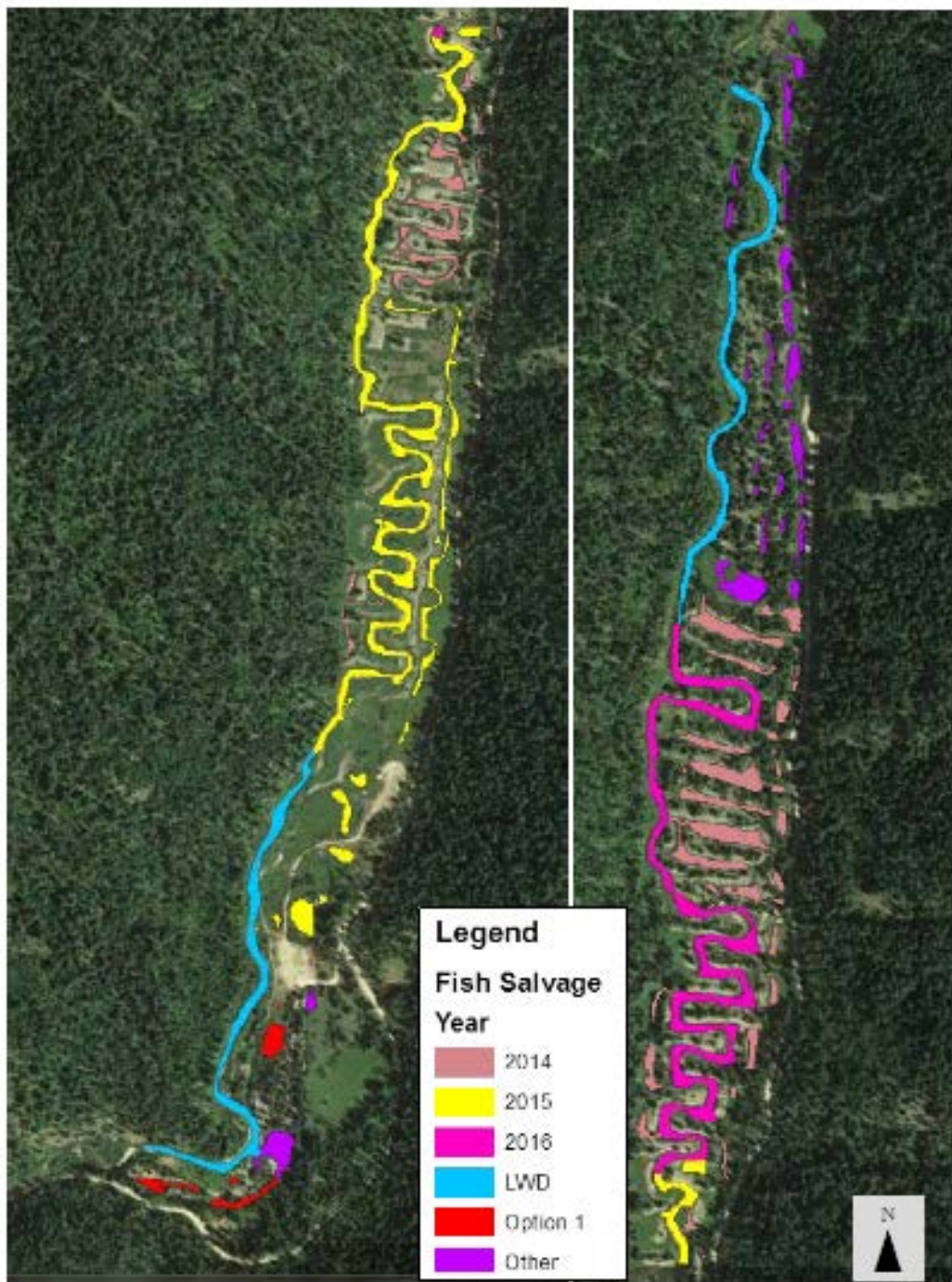


FIGURE 4. FISH SALVAGE AREAS BY YEAR FOR THE CROOKED RIVER PROJECT.

**2.3.2.1 Work Area Isolation**

1. Work area isolation and fish capture activities would occur during periods of the coolest air and water temperatures possible, normally early in the morning versus late in the day, and during

conditions appropriate to minimize mortality for the species present. Electrofishing during cooler water temperatures would reduce the stress levels of salmonids.

2. Salvage operations would follow the ordering, methodologies, and conservation measures specified below in Steps 1 through 5. The dredge ponds would be isolated, seined, and electrofished prior to construction activities. Steps 1 and 2 would be implementing while dewatering the mainstem channel for Phases 1, 2 and 4.
3. Steps 1 and 2 would be implemented for all projects where work area isolation (Phase 1, 2, and 4). Electrofishing (Step 3) can be implemented to ensure all fish have been removed following Steps 1 and 2, or when other means of fish capture may not be feasible or effective (Phase 1, 2, and 4). Lamprey surveys would be conducted prior to dewatering to determine if lamprey are present in the project area, although lamprey have not yet been detected in the watershed (Tyler Gross, IDFG, Pers. comm. 2014). Dewatering would not be conducted in areas occupied by lamprey, unless lampreys are salvaged using guidance set forth in "USFWS Best Management Practices to Minimize Adverse Effects to Pacific Lamprey" (USFWS 2010).

***Step 1: Isolate***

1. Block nets would be installed at upstream and downstream locations and maintained in a secured position to exclude fish from entering the project area.
2. Nets would be secured to the stream channel bed and banks until fish capture and transport activities are complete.
3. If block nets remain in place more than one day, the nets and traps would be monitored at least daily to ensure they are secured to the banks and free of organic accumulation, and to minimize fish predation in the trap.
4. Nets would be monitored hourly anytime there is instream disturbance.

***Step 2: Seining/Dip-netting*** – As described below, fish trapped within the isolated work area would be captured to minimize the risk of injury, then released at a safe site:

1. Herd fish downstream as the area is slowly dewatered.
2. Use seines with a mesh size to ensure entrapment of the residing ESA-listed fish.
3. Dip-net fish remaining in shallow areas.
4. Transport fish in buckets using the following procedures:
  - a. The time fish are in a transport bucket would be limited, and would be released as quickly as possible into the nearest free-flowing waterbody that would not be disturbed. Crews would identify areas in the bypass channel that are cold water refugia, such as upwellings and tributary inputs and release fish in these areas, if possible.
  - b. Limit the number of fish within a bucket based on size, and fish would be of relatively comparable size to minimize predation;
  - c. Use aerators for buckets or change the water with cold clear water at 15 minute or more frequent intervals.
  - d. Keep buckets in shaded areas or cover by a canopy in exposed areas.
  - e. Dead fish would not be stored in transport buckets, but would be left on the stream bank to avoid mortality counting errors.
  - f. As rapidly as possible (especially for temperature-sensitive bull trout), release fish in an area that provides adequate cover and flow refuge. Upstream release is preferred, but fish released downstream would be sufficiently outside of the influence of construction.



**Step 3: Electrofishing** – Electrofishing would be used only after other salvage methods have been employed. The guidelines below would be followed:

1. Use the NMFS' electrofishing guidelines<sup>1</sup>.
2. Use direct current (DC) or pulsed direct current (PDC).
3. Use voltage less than 400 v. on the first passes to reduce injury to adult fish.
4. Increase voltage to ranges between 500 to 800 v if conductivity ranges between 100 to 300  $\mu$ s on the second or third pass.
5. Increase voltage if conductivity is less than 100  $\mu$ s, voltage ranges to ranges of 900 to 1100 v.
6. Begin electrofishing with a minimum pulse width and recommended voltage and then gradually increase to the point where fish are immobilized.
7. The anode would not intentionally contact fish.
8. If mortality or obvious injury (defined as dark bands on the body, spinal deformations, de-scaling of 25 percent or more of body, and torpidity or inability to maintain upright attitude after sufficient recovery time) occurs during electrofishing, operations would be immediately discontinued, machine settings, water temperature and conductivity checked, and procedures adjusted or postponed to reduce mortality.

**Step 4: Dewater** – Dewatering, when necessary, would be conducted over a sufficient period of time (several days) to allow species to naturally migrate out of the work area.

1. Pump deep ponds to reduce the water levels.
2. Use fish screens to avoid juvenile fish entrainment, and operate in accordance with current NMFS fish screen criteria (NMFS 2011, or most recent version).
3. Provide safe reentry of fish into the stream channel, preferably into pool habitat with cover, if the diversion allows for downstream fish passage.
4. Pump seepage water to a temporary storage and treatment site or into upland areas to allow water to percolate through soil or to filter through vegetation prior to reentering the stream channel. Areas in the bypass channel downstream and adjacent to the storage and filter sites would be monitored for turbidity. If turbidity is seen in the channel then pumping would stop and the site be relocated.

**Step 5: Re-watering** – Upon project completion and prior to removing the diversion structure, the construction site would be slowly re-watered to prevent loss of surface flow downstream and to prevent a sudden increase in stream turbidity. The cofferdam would be slowly opened on the mainstem at the upper end of the project area to begin the re-watering. Blocknets would be secured above the cofferdam to prevent fish from entering the new channel until it is fully rewatered. The new channel would be 7,500 feet in length, which, if the water is ramped up slowly (several days), would allow for sediment to infiltrate into the cobbles and settle out within the new channel. Slowly watering the new channel would allow crews to watch for areas where the flow may go subsurface. If these areas are found, the substrate would be reworked and fines would be added to help seal the channel. Crews would watch for any signs of water loss over the several days before fully re-watering the channel. Turbidity would be monitored during the re-watering process to ensure turbidity does not exceed 50 NTUs above background levels 300 feet downstream of the new channel construction in Crooked River. If turbidity levels approach the 50 NTUs above background, the flow would be ramped down (sandbags placed) until turbidity levels are reduced. Since the river substrate would be sorted

<sup>1</sup> NMFS 2000 - <http://www.nwr.noaa.gov/ESA-Salmon-Regulations-Permits/4d-Rules/upload/electro2000.pdf>

and placed, the amount of fines in the newly constructed river channel would be low. Fish salvage operations would occur in the bypass channel as outlined above. During re-watering, the bypass channel would be monitored to prevent stranding of aquatic organisms through the construction site. Once the bypass channel is de-watered, the channel would be filled and graded to match newly created floodplain characteristics.

**Step 6: Salvage Notice** – Once salvage operations are completed, for each phase salvage operations occurred, a salvage report would document procedures used, any fish injury or mortality (including numbers of fish affected), and a description of the causes for mortality.

### **2.3.3 POLLUTION CONTROL MEASURES**

The following measures would be implemented in association with activities within the action area, including waste and source material sites: compliance with federal laws; spill prevention containment, and reporting; and minimization of exposure to hazardous materials. These are described below.

#### **2.3.3.1 Compliance with Federal Laws**

Project actions would follow all provisions of the Clean Water Act (CWA) and provisions for maintaining water quality standards as described by the Idaho Department of Environmental Quality (IDEQ). Project activities would comply with all applicable federal laws and processes as administered in Idaho (e.g., Section 404 permits, NPDES permit, Stormwater Pollution Prevention Plan).

#### **2.3.3.2 Spill Prevention, Containment, and Reporting**

All vehicles carrying fuel would have specific equipment and materials needed to contain or clean up any incidental spills at the project site. Equipment and materials would be specific to the project site and would include a spill kit appropriately sized for specific quantities of fuel (absorbent pads, straw bales, containment structures and liners, and/or booms). Containment structures would be required to reduce the potential for spilled material from reaching live water. All pumps and generators would have appropriate spill containment structures and/or absorbent pads in place during use.

Federal and Idaho state regulations regarding spills would be followed (see [http://www.deq.state.id.us/water/data\\_reports/storm\\_water/catalog/index.cfm](http://www.deq.state.id.us/water/data_reports/storm_water/catalog/index.cfm)). Any spills resulting in a detectable sheen on water shall be reported to the USEPA National Response Center (1-800-424-8802). Any spills over 25 gallons would be reported to the IDEQ (1-800-632-800), and clean-up would be initiated within 24 hours of the spill.

#### **2.3.3.3 Hazardous Materials Exposure Minimization**

Methods to minimize fuel and/or oil leakage from construction equipment into the stream channel and measures taken in the case heavy metals are found would include the following:

- All equipment used for in-stream work would be cleaned of external oil, grease, dirt, and mud and leaks would be repaired prior to arriving at the project site. All equipment would be inspected before unloading at site. Any leaks or accumulations of grease would be corrected before entering streams or areas that drain directly to streams or wetlands. Equipment shall not have damaged hoses, fittings, lines, or tanks with the potential to release pollutants into any waterway.
- Oil-absorbing floating booms and other equipment, such as absorbent pads appropriate for the stream size, would be available onsite during all construction phases. Booms would be placed in a location that facilitates an immediate response to potential petroleum leakage.

- Spill containment kits (including instructions for cleanup and disposal) adequate for the types and quantity of hazardous materials used at the site would be available at the work site.
- Workers would be trained in spill containment procedures and would be informed of the location of spill containment kits.
- Gas-powered equipment with tanks larger than 5 gallons would be refueled in a vehicle staging area placed 150-feet or more from a natural waterbody or wetland, or in an isolated hard reach, such as an established road. Equipment used for in-stream or riparian work would be fueled and serviced in an established staging area. When not in use, vehicles would be parked in the designated staging area.
- All vehicles and other mechanized equipment would be inspected daily for fluid leaks before leaving the vehicle staging and thoroughly cleaned before operation below ordinary high water, and as often as necessary during operation, to remain grease free.
- A description of hazardous materials that would be used, including inventory, storage, and handling procedures would be available on-site.
- Written procedures for notifying environmental response agencies would be posted at the work site.
- Any waste liquids generated at the staging areas would be temporarily stored under an impervious cover, such as a tarpaulin, greater than 150 feet from water until they can be properly transported to and disposed of at a facility that is approved for receipt of hazardous materials.
- Follow measures outlined in Appendix C if mercury is found in the project area.

#### **2.3.3.4 Staging**

Four staging areas have been identified in the project area: A1- in the designated camping area in the upper end of the project area; A2- in the middle of the project area at river station 87+00; A3- in the lower end of the project area at river station 113+00; and, A4- in Campground 3 on east side of Crooked River Road. All of the staging areas have existing access roads and all are in designated or non-designated campsites that have existing disturbance. All of the staging areas are out of the OHWM. With the exception of A2, all of the staging areas would be greater than 150 feet from live water. Equipment storage and fueling would not occur in A2. Sheet 4.1 in 95 percent designs depicts staging areas except A-4.

The following procedures apply to all of the staging areas:

- Staging areas (used for construction equipment storage, vehicle storage, fueling, servicing, and hazardous material storage) would be 150-feet or more from any natural water body or wetland, or on an adjacent, established road area in a location and manner that would preclude erosion into or contamination of the stream or floodplain.
- Natural materials used for implementation of aquatic restoration, such as large wood, gravel, and boulders, may be staged within the 100-year floodplain.
- Any large wood, topsoil, and native channel material displaced by construction would be stockpiled for use during site restoration at a specifically identified and flagged area.
- Any material not used in restoration, and not native to the floodplain, would be removed to a location outside of the 100-year floodplain for disposal.

## **2.4 AQUATIC INVASIVE CONTROL MEASURES**

Many streams have invasive aquatic species, such as the New Zealand mudsnail, and whirling disease. Many of these species are practically invisible to the naked eye and impossible to detect if attached to heavy equipment. Equipment used to draft, dip, store, or deploy water can be exposed to a variety of invasive

organisms. To reduce the spread of invasive species from contaminated to uncontaminated sources, equipment would be sanitized, cleaned, and inspected. Methods to further reduce the spread of aquatic invasive organisms include the following: prevention, cleaning and sanitation, and disposal; these are described below.

#### **2.4.1 Prevention, Cleaning and Sanitation**

Following are the proposed methods to reduce the further spread of aquatic invasive organisms/diseases:

- Do not dump water from water tenders directly from one stream or lake into another.
- Minimize driving equipment through or wading across water bodies whenever possible.
- Disinfect all equipment prior to bringing equipment to the forest.
- Keep equipment and supplies as clean as possible to reduce the spread of undesirable aquatic organisms; thoroughly clean equipment if it gets used in another area.
- Remove all plant parts, soil, and other materials that may carry noxious weed seeds from all equipment and vehicles before entering the forest or moving from one forest to another.
- Conduct cleaning and sanitation in areas where there is no potential to deliver effluent to waterways.

## **2.5 EROSION CONTROL MEASURES**

Appropriate stormwater prevention techniques would be implemented according to the 404 permit, NPDES permit or Stormwater Pollution Prevention Plan (SWPPP), which may include, but are not limited to, the following measures: site preparation impacts minimization and earth moving related erosion minimization. These measures, described below, would be implemented in association with all activities within the action area, including all waste and source material sites.

- Identify site clearing, staging areas, access routes, stockpile areas, and material handling areas to minimize overall disturbance, minimize disturbance to riparian vegetation, and preclude sediment delivery to stream channels.
- Place silt fences, straw bales, straw wattles, or other sediment barriers prior to construction to reduce the potential for sediment to enter a stream directly or indirectly, including from roads and ditches.
- Keep on hand a supply of erosion control materials (e.g., silt fence and wattles) to respond to sediment emergencies.
- Ensure that all erosion control materials are certified weed free, including straw bales, wattles, straw, and seed mixes.
- Confine ground-disturbing activities to the minimum area necessary to complete the project.
- Use methods of dewatering, excavation, and stockpiling earth and rock materials which include prevention measures to control erosion and intercept and settle runoff of sediment laden waters.
- Prepare construction site when a threat of storm activity is foreseen. Halt activities when wet conditions exist when erosion may occur.
- Monitor and inspect erosion controls and repair, replace, or install new erosion control measures as necessary to control erosion.

#### **2.5.1 Sedimentation Reduction through Dewatering and Construction Activity**

Following are the proposed sedimentation minimization and dewatering measures:

- Construct levee to isolate the work areas prior to any in-stream construction activity taking place, with the exception of constructing the bypass channel.
- Possible materials for construction of the levee would be native material from onsite; however, the ways and means would be decided by the construction contractor. The levee would be constructed in a manner that would reduce turbidity and other adverse impacts to aquatic species. Surface water flow into the floodplain would be restricted by the levee, but it is likely water would still seep into the construction area from groundwater inputs and the porosity of the substrate.
- To reduce erosion from the levee, silt fences, wattles, and other erosion control devices may be installed along the slopes as needed. Since the levee would be constructed from native material, which is primarily cobble, erosion potential is limited. If clays and silts are found while excavating the bypass channel, these materials would be stockpiled out of the OHWM to use as floodplain mix.
- Use water to reduce dust from use of the levee as a temporary haul road. Water drafting would follow NMFS water drafting guidelines (NMFS 2011).
- Install settling ponds in the construction area to keep the dewatered area dry during construction and pump water from the dewatered work area prior to water reentering the stream channel. The settling ponds would be isolated from the bypass channel to reduce the potential for turbidity. If turbidity is seen in the bypass channel from seepage through the cobbles, then turbidity would be monitored to ensure levels do not exceed 50 NTUs instantaneously or 25 NTUs for 10 days. If levels exceed these limits, then settling basin may be moved or lined.

## 3.0 LISTED SPECIES

This section provides information about habitat requirements, distribution, and the available habitat within the action area for ESA-listed fish species.

### 3.1 STEELHEAD TROUT

The B-run summer steelhead trout (*Oncorhynchus mykiss*) found in the Clearwater River and Salmon River subbasins, including Crooked River, are part of the Snake River ESU listed as threatened under the Endangered Species Act (62 FR 43937). Steelhead trout in the South Fork Clearwater River are listed as threatened under the ESA, and the population risk is inherently increased by their limited abundance in the Crooked River watershed. The South Fork Clearwater River subbasin and all accessible tributaries were designated as critical habitat for steelhead (65 FR 7346). Steelhead are considered a Management Indicator Species in the Nez Perce National Forest. Steelhead use Crooked River watershed for both spawning and rearing purposes and maintain a naturally reproducing (although small) population, and were influenced by hatchery production. Steelhead supplementation by Idaho Department of Fish and Game in Crooked River began in the 1980s and lasted until the early 1990s (Kiefer and Lockhart 1992).

Adult steelhead trout generally arrive at the mouth of the Clearwater River from September through November, and migrate to tributary streams from January through May. Spawning occurs from mid-March through early June, on a rising hydrograph and prior to peak stream flows (Thurow 1987; Columbia River DART 2013). Fry emergence occurs around June in the upper South Fork tributaries, and juveniles would rear for 2 or 3 years (Mullan et al. 1992) in freshwater, and outmigrating in the spring high flows.

Redband trout are the non-anadromous form of this same species and, in the Crooked River drainage, have evolved in sympatry with the anadromous population. Resident redband trout are morphologically

indistinguishable from juvenile steelhead trout. It is unknown if a reproducing population of redband trout exists within Crooked River.

Crooked River historically had a very high inherent capacity to support steelhead trout spawning and rearing, and likely contained some of the most optimal habitats for this species within the South Fork Clearwater River Subbasin (USDA Forest Service 1998). The highest habitat potential was likely associated with stream channels located in the canyon reaches, with moderate habitat potential realized in the upper main stem and tributary reaches (USDA Forest Service 1998).

The South Fork Clearwater River has very high habitat potential for steelhead (USDA Forest Service 1998). The Crooked River is believed to have been a historic stronghold for steelhead spawning and early rearing. Habitat degradation, including changes in aquatic habitat related to mining activity and road building, are believed to be limiting habitat potential for steelhead in lower Crooked River.

Threats to steelhead include predation, competition, migration barriers, habitat degradation, and harvest. Habitat degradation is probably the most substantially limiting factor to steelhead trout within the Crooked River watershed. Much of the accessible habitat area for steelhead has undergone extensive alteration through dredge mining, resulting in a loss of complex habitats suitable for both adult and juvenile rearing. Alteration of riparian communities and function from mining and other disturbances results in altered instream habitats through loss of woody debris recruitment, lost floodplain function, and altered hydrologic regimes.

### 3.3 BULL TROUT

The Columbia River Basin bull trout (*Salvelinus confluentus*) distinct population segment was listed as Threatened under the ESA on June 10, 1998 (64 FR 58909). Broad scale bull trout declines in distribution and abundance over the past century led to no harvest regulations and the Threatened ESA listing in 1998. All populations of this char in the contiguous 48 states were designated with Threatened status on November 1, 1999 (64 FR58910). On October 18, 2010, the USFWS designated critical habitat for bull trout throughout their U.S. range, which included the Clearwater River including many of its tributaries, such as Crooked River (50 CFR 17).

Bull trout (*Salvelinus confluentus*) are widely distributed throughout the South Fork Clearwater River (SFCLW), including parts of the Crooked River. To date, the South Fork Clearwater has the most comprehensive data set for bull trout with in the Clearwater recovery unit. Five local populations have been identified (Red River, Crooked River, Newsome Creek, Tenmile and Johns Creek) along with 2 potential populations (American River and Mill Creek). The trend in data for the SFCLW indicate that bull trout were declining in the mid 1990's but, appear to be stable (IDFG 2005, Meyer et al. 2013 and Ardren et al. 2011) in most core areas in Idaho. Although considered stable, the USFWS 2002 recovery plan states that due to large migratory component (fluvial life-history) of bull trout in the SFCLW core areas, these populations are considered at intermediate risk. Although research is limited on certain tributaries such as Crooked River itself, many are considered to have very high habitat potential for bull trout (USDA Forest Service 1998, CBBTTAT 1998d, IDFG 2001 and 2005(Appendix D)). Upper Crooked River (East and West Forks of Crooked River) is considered a habitat stronghold for bull trout spawning and early rearing.

Screwtrap data collected from IDFG (Appendix B, IDFG unpublished data 2014) indicates that there is a strong fluvial life-history component present within the Crooked River bull trout population. This is also consistent with Ardren et al. 2011 genetics' study as well. This data suggests that bull trout rear in headwater streams, and migrate to larger rivers at ages one to four years to mature, which, is generally consistent with

many other studies documented in Rieman and McIntyre 1993. Most likely, adult bull trout in Crooked River begin to migrate to natal streams to spawn beginning in early summer with higher flows to avoid migration during low flow and high summer water temperatures. This migration behavior has also been well documented in Schoby and Keeley (2011) in the Upper Salmon River system. Spawning usually occurs during late summer and early fall, with young emerging the following spring (Ratliff, 1992). Spawning typically begins when water temperatures reach 5 to 9 °C, along with stream flow and photoperiod conditions (Shepard et al., 1984). Suitable water temperatures for spawning range from approximately 2 to 4 °C and should not exceed 8 °C (Weaver and Fraley, 1991). Optimal spawning conditions occur in lower gradients, typically in pool tailouts in loose gravels and cobbles, with water depths averaging 12 inches (Fraley and Shepard, 1989). Schoby and Keeley 2011 also document that spawning bull trout may quickly return to lower stream reaches by early fall to take advantage of egg deposition from the spawning Chinook Salmon. Egg and carcass material are rich in nutrients and lipids, which, are important for overwintering salmonids (Bilby et al. 2001, Wipfli et al. 2010).

Along with cold water temperatures, bull trout require complex habitat with large wood contributing to pool formation. Large wood provides cover, which, is very important for bull trout of all different age classes and provides substrate for increased invertebrate production and nutrient inputs to the stream. Large wood can promote floodplain interaction during high spring flows and contribute to bank stability of a stream channel (Bjornn and Reiser 1991). Ideal juvenile rearing occurs throughout a drainage where suitable water temperatures (< 15 °C) and overhead cover (LWD) are present (Leider et al., 1986, Fraley and Shepard, 1989, McPhail and Murray 1979, Liknes and Graham 1988, Saffel and Scarnecchia 1995). Bonneau and Scarnecchia 1997 document that juvenile bull trout have a strong affiliation with stream substrate. The interstitial space between substrate was highly utilized by juvenile bull trout particularly during the winter months and primarily during the day. Macroinvertebrate production and sediment levels (impairment of interstitial space within the substrate) can also dictate available bull trout rearing habitat within a stream. There is limited snorkel survey data in the lower reaches of Crooked River but, it is assumed that the pool habitat that is present provides overwintering/rearing habitat for juvenile and adult bull trout and serves as a migration corridor for spawning adult bull trout during the early summer months and fall when they return from their spawning grounds. Lower Crooked River, including the project area, has had a significant reduction in habitat quality that provides a strong migration corridor to overwintering/rearing grounds downstream in the SFCLW River and spawning sites in the Upper Crooked River Watershed.

Maintaining this migration corridor is essential, considering the additional threats to Bull Trout. Changes in stream morphology, habitat complexity, temperature, and LWD and pool quality (lack of cover), are believed to be limiting habitat potential for bull trout in the lower Crooked River. There are few additional anthropogenic barriers in the watershed that interfere with bull trout migration. Additional threats to bull trout in the Crooked River and the greater SFCLW include possible hybridization and competition with brook trout, isolation/fragmentation of populations from anthropogenic barriers across the SFCLW watershed, and threats from wildfire disturbance given isolated populations within many of the smaller tributaries. Climate change is an uncertainty when considering threats to bull trout in the SFCLW. Climate change has been warming stream temperatures in portions of the Bull trout's range in Idaho since at least 1980 and bull trout are expected to have the greatest sensitivity to warming stream given their need for cold water temperatures (Isaak et al. 2010, Rieman and Isaak 2010, Wenger et al. 2011, Isaak and Rieman 2013). There has been some research that has shown that milder winter conditions over the last several decades and possibly into the near future may result in increased fall-to-spring growth, however, increased winter flow from intense precipitation events can cause amplified flow regimes causing streambed scour and disturbance to spawning sites (Isaak et al. 2012).

## 4.0 AFFECTED ENVIRONMENT

This section describes the environmental baseline conditions in the project action area and the Crooked River watershed as they relate to the habitat requirements of ESA-listed species.

### 4.1 BASELINE CONDITIONS

Effect determinations (found in Section 5.0) for listed fishes and their designated critical habitat are based largely on existing (baseline) conditions. Aquatic and riparian habitat elements in the Matrix of Pathways and Indicators (USFWS, 1998) were used to describe the environmental baseline condition for steelhead and bull trout and the designated critical habitat for these species.

#### *4.1.1 STEELHEAD SUBPOPULATION SIZE:*

Steelhead trout runs were eliminated in the South Fork Clearwater River in 1927 by the construction of the Harpster Dam. The dam was removed in 1962 and B-run steelhead, along with Chinook salmon populations were reestablished in the watershed. Steelhead and Chinook salmon populations were studied in Crooked River by the IDFG beginning in the early 1980s and continuing into the 1990s (Kiefer and Lockhart 1992). These studies noted that salmonid populations in the lower Crooked River were much lower than what is typical for Idaho streams. In the mid-1980s stream restoration work, including installation of log and rock structures, streambank stabilization, and side channel and pond reconnection, occurred to improve habitat for salmonids. The purpose of connecting the ponds and side channels was to provide continuous water supply during low flows.

During these periods, the IDFG stocked steelhead juveniles and adults in Crooked River with up to 200,000 smolts each year between 1986 and 1989 (Keifer and Lockhart 1992). In 1991, 776 adults of which 516 were female, were stocked in Relief Creek and the mainstem Crooked River and there were 49 (22 female) naturally returning steelhead. From those, 80 percent of the female carcasses recovered (353) were pre-spawning mortalities. A total of 50 redds were counted in May of 1991 from the mouth of Crooked River to the Orogrande Town site (12 miles). The study did note that most of the outplanted steelhead that did not spawn were planted in the lower Crooked River.

In 1992, 23 female steelhead returned to Crooked River during the end of March through the first of May (Kiefer and Lockhart 1994). Of these, 6 were left in the mainstem of Crooked River above the weir, while the remaining 17 were transported to West Fork Crooked River and Relief Creek. An additional 10 steelhead pair were released in Fivemile Creek. Almost all of the fish transported to the West Fork Crooked River and Fivemile Creek returned to the mainstem Crooked River to spawn as identified by the number of redds in Crooked River.

As a part of these studies, the project area was snorkeled in the 1990s as a part of the Habitat/Natural Production Monitoring project (Hall-Griswold and Petrosky 1998, 2002) as well as the Intensive Evaluation and Monitoring of Chinook Salmon and Steelhead Trout Production study (Kiefer and Lockhart 1990, 1992, 1994, 1997, 1999). Two river sections were snorkeled in the project area; an upper section, documented as well as throughout the watershed. A set of ponds were also snorkeled in the project area but. The report does not specify the exact ponds surveyed. Table 12 provides the data for Year 1+ and Year 2+ steelhead densities in the project area from 1987 to 1996 for the watershed. Year 0+ or young of year data were not provided.



TABLE 12. PARR DENSITIES OF YEAR 1+ AND YEAR 2+ IN CROOKED RIVER (HALL-GRISWOLD AND PETROSKY 2002, KEIFER AND LOCKHART 1990, 1992, 1994, 1997, 1998, 1999).

Age 1+ Steelhead / 100m <sup>2</sup>											
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Average
Headwaters	-	1.5	0.2	0.4	0.1	0.1	-	0.4	0.6	0.0	0.4
Smile to Relief	4.3	5.2	1.9	0.2	0.7	3.9	1.7	1.8	2.8	0.8	2.3
Relief to Narrows	10.8	8.8	4.4	1.5	7.3	10.5	1.5	1.2	4.3	1.8	5.2
Narrows	-	11.4	4.1	1.0	4.7	8.4	0.7	1.3	6.4	3.0	4.6
Upper Project Area	6.1	10.3	6.5	2.5	2.8	13.3	1.2	1.1	2.6	0.5	4.7
Mid Project Area	7.2	7.5	3.4	1.5	3.7	11.4	0.1	3.2	0.7	0.3	3.9
Project Area Ponds	-	-	10.1	0.1	1.7	8.3	0.0	1.6	3.4	0.3	3.2

Age 2+ Steelhead / 100m <sup>2</sup>											
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Average
Headwaters	-	0.2	0.3	0.1	0.0	0.1	-	0.1	0.3	0.5	0.2
Smile to Relief	0.7	0.2	0.8	0.3	0.1	0.8	1.3	0.2	1.0	0.1	0.6
Relief to Narrows	3.7	0.4	1.4	1.3	0.4	2.0	1.7	0.2	1.7	0.3	1.3
Narrows	-	1.2	2.1	1.2	0.4	2.2	1.8	1.3	0.7	1.1	1.3
Upper Project Area	2.8	0.5	1.8	1.4	0.1	2.4	1.4	0.7	0.4	0.1	1.2
Mid Project Area	1.5	7.1	1.5	1.1	0.1	1.7	0.2	1.4	0.2	0.0	1.5
Project Area Ponds	-	-	2.2	0.3	0.2	0.8	0.0	0.4	1.0	0.1	0.6

With the studies conducted in Crooked River, parr density curves were developed based on the number of returning/outplanted adult female steelhead (Kiefer and Lockhart 1998, 1999). Figure 6 is rating curve of parr density of year 1+ steelhead to number of spawned adult females per hectare in Crooked River (Kiefer and Lockhart 1998). These studies looked at the entire Crooked River watershed.

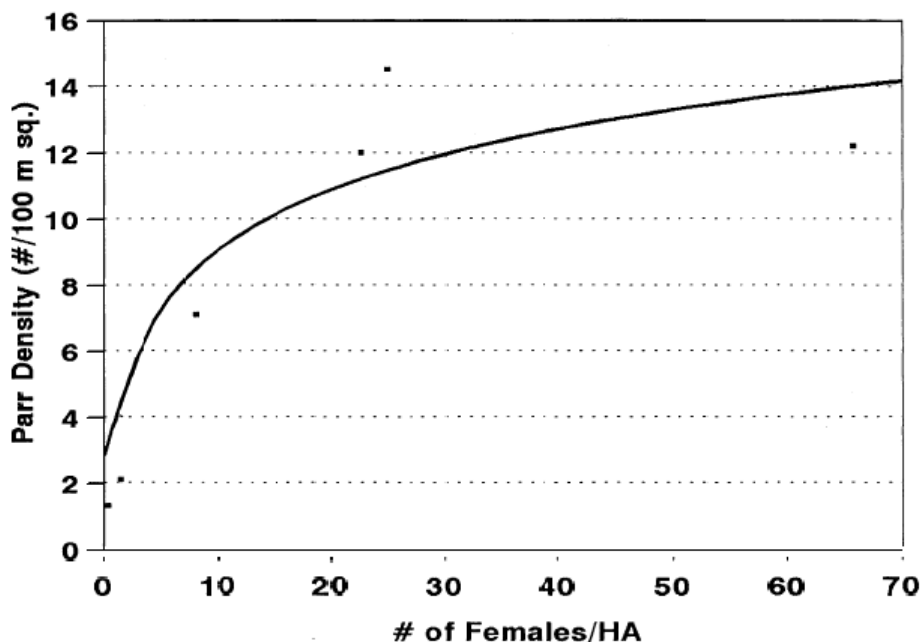


FIGURE 5. CROOKED RIVER STEELHEAD ADULT ESCAPEMENT RESULTING IN YEAR 1+ PARR DENSITIES (BROODYEARS 1985, 1987, 1990-1993).

Adult data from 1992 through 1995 and 2009 through 2013 is provided in Table 13 (IDFG Unpublished Data). Using the graph in Figure 5, the number of parr can be estimated in Crooked River by using the number of returning adult females to the watershed. The adult females are not likely spawning in the project areas that would be dewatered since spawning habitat is generally unsuitable; however, assuming that the highest number of returning adult female steelhead spawn in the project area, parr densities would be about 8 age 1+ steelhead per 100 m<sup>2</sup>.

TABLE 13. CROOKED RIVER ADULT STEELHEAD RETURNS DATA (IDFG ANNUAL REPORTS AND UNPUBLISHED DATA).

Year	Adults	Wild	Females	Date Range
1992	53	19	6 <sup>1</sup>	3/27-5/2
1993	48	16	7	4/15-5/7
1994	6	5	3	4/24-5/15
1995	17	13	3	4/8-5/24
2009	5	4	0	4/28-6/15
2010	83	71	7	4/16-5/26
2011	9	5	5	4/13-5/13
2012	44	42	3	4/12-5/23
2013	17	17	1	4/21-5/28

<sup>1</sup>Wild females returning to Crooked River.

Emigration data for the screw trap at the mouth of Crooked River is provided in Table 14 for 2007 through 2012. These numbers, however, are less than half the number of emigrating steelhead counted in the early 1990 during supplementation (approximately 3,000 to 7,000 smolts).

TABLE 14. EMIGRATION ESTIMATES FOR STEELHEAD IN CROOKED RIVER (IDFG UNPUBLISHED DATA).

	<b>Captured</b>	<b>Emigration Estimate</b>	<b>Lower CI (95%)</b>	<b>Upper CI (95%)</b>	<b>SE</b>
2007	146	561	400	790	99.2
2008	164	847	577	1281	176.8
2009	31	145	65	317	66
2010	144	394	304	510	52.7
2011	125	565	386	841	120
2012	402	1450	1227	1724	128.9

Currently, Snake River Basin steelhead subpopulation in the South Fork Clearwater River is listed as an intermediate sized population (NOAA 2012 DRAFT Recovery Plan CWR Steelhead Chapter 5.2). Redd data for steelhead is limited due to timing of spawning. Steelhead trout use Crooked River for both spawning and rearing purposes and maintain a naturally reproducing population, which has been supplemented with hatchery fish. Snorkeling surveys conducted in September 2013, in the proposed project area observed no steelhead, however it is potential that abundance is underestimated in late summer and fall surveys (Hall-Griswold and Petrosky 1996).

#### 4.1.2 LIFE HISTORY, DIVERSITY AND ISOLATION:

Most Clearwater River tributary steelhead are of the B-run life history. Fish passage in the South Fork Clearwater River was intermittently blocked or impaired by dams from 1910 to 1963. To this end, the lineages of steelhead in the South Fork Clearwater River are mostly from hatchery lines. Millions of eggs, fry, smolts, and even adults have been released into the Upper South Fork Clearwater River since 1969. Because of this long history of outplanting hatchery steelhead, genetic diversity is at risk. Minimal genetic analysis has been completed for the South Fork. Additionally, spawning areas in the SF Clearwater River are in the headwaters and a difficult journey to reach, isolating this population by distance from strays, and potential genetic diversification.

#### 4.1.3 BULL TROUT SUBPOPULATION SIZE:

IDFG surveys in 1993 resulted in observations of 24 bull trout, or 0.89 bull trout/100m<sup>2</sup> (USFWS 2002). It is likely that densities are higher in West Fork Crooked River. A total of 34 migratory bull trout were collected at the Crooked River trap in 1997. In 1998, bull trout captured at the weir were radio tagged and tracked over 25 miles as they migrated from the middle reaches of mainstem South Fork Clearwater River. All data strongly support high use of Crooked River by fluvial bull trout, perhaps the highest in the South Fork Clearwater subbasin (USFWS 2002). Refer to bull trout synopsis in section 3.3 for further discussion on bull trout population data and movement in the South Fork Clearwater and Crooked rivers.

Limited trend data exist for bull trout in Crooked River. These data are associated with capture of adults at the weir and juveniles in a trap (Table 15). Increasing numbers of adults are correlated with implementation of statewide no-harvest regulations on bull trout, which began in 1992. In 2003, however, only 2 adults were trapped. Juvenile trapping data are variable but suggest a possible increasing trend (IDFG data, 2004). Also refer to Appendix B for a summary of screw trap data (IDFG 2000-2013).

TABLE 15. BULL TROUT ADULT AND JUVENILE DATA AT CROOKED RIVER WEIR AND SCREW TRAP (IDFG 2004 AND USFWS 2002).

Year	Adult Bull Trout	Juvenile Bull Trout
1992	0	31
1993	2	2
1994	0	13
1995	15	33
1996	19	3
1997	15	3
1998	36	8
1999	NA	12
2000	NA	14
2002	19	27
2003	2	52

#### 4.1.4 LIFE HISTORY, DIVERSITY AND ISOLATION:

Bull trout migrate through the project area from late spring/early summer through late fall. Adult bull trout have been observed by USFS and Tribe staff in the project area in mid-September. Current (since 1985) spawning and rearing is known to occur in the upper Crooked River, West Fork and East Fork Crooked River, and Relief Creek. Upstream, a partial barrier at the mouth of Fivemile Creek may prevent adult bull trout movement later summer and early fall in this tributary. Bull trout have not been observed spawning in the project area; likely due to warm water temperatures and inadequate spawning substrate.

#### 4.1.5 WATER QUALITY:

##### Temperature:

Water temperature is a critical concern for cold water fish such as trout and salmon and is a primary indicator of habitat conditions in north central Idaho. The South Fork Clearwater River and Crooked River have a total maximum daily load (TMDL) for temperature that was established in the South Fork Clearwater River Subbasin Assessment and TMDL (IDEQ and USEPA 2003). Reduction in streamside shading can result in increases in water temperature. TMDL and percent effective shade is discussed in the Water Quality section of the Water Resources report. Changes in shading can be due to a variety of factors, including vegetative succession (the replacement of one plant community with another over time), mortality, and/or project activities.

Late-summer temperatures in lower Crooked River exceeded 20 degrees Celsius (°C) for numerous days when monitored in 2005, 2012, and 2013. The National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) developed a matrix of pathways and indicators of watershed condition for Chinook, steelhead, and bull trout (NMFS and USFWS 1998). The document provides appropriate temperature conditions for ESA-listed species adapted to the South Fork Clearwater River (Table 16). Temperatures in the Crooked River Meanders project area are well above temperature ranges considered optimal for steelhead and bull trout spawning, rearing, and migration (Figure 6). Monitoring also showed temperatures much greater than 13°C through September, during critical times for Chinook spawning. Bull trout are known to use the Crooked River Meanders reach for migration, juvenile rearing, and possibly overwinter habitat for the larger adults. However, the mean summer temperatures are higher than the cold water requirements for spawning and rearing.

TABLE 16. TEMPERATURE INDICATORS FOR STEELHEAD AND BULL TROUT (NMFS AND USFWS 1998).

Fish Species	Water Temperature and Habitat Condition Rating		
	High	Moderate	Low
Steelhead (Spawning)	14°C	14–15.5°C	>16.5°C
Steelhead (Rearing and Migration)	14°C	14–17.8°C	>17.8°C
Bull Trout	7-day average maximum temperature in a reach during the following life history stages: incubation = 2–5°C; rearing = 4–12°C; spawning = 4–9°C; also, temperatures do not exceed 15°C in areas used by adults during migration (no thermal barriers).	7-day average maximum temperature in a reach during the following life history stages: incubation ≤2 or ≥6°C; rearing ≤4 or 13–15°C; spawning ≤4 or ≥10°C; also, temperatures in areas used by adults during migration sometimes exceeds 15°C.	7-day average maximum temperature in a reach during the following life history stages: incubation ≤1 or >6°C; rearing ≥15°C; spawning ≤4 or >10°C; also, temperatures in areas used by adults during migration regularly exceed 15°C (thermal barriers present).

The elevated temperatures in Crooked River are due to the severely altered riparian condition throughout the watershed from past activities. Within the project area, the stream is over-widened with little riparian shade or cover in the stream. Due to the high hydraulic conductivity through the dredge tailings in the valley, temperatures are slightly lower at the downstream end; this is potentially an effect of groundwater influxes, side drainage inputs, and most likely from the near-constant subsurface temperature. River Design Group (2013a) collected water temperature at six location from August 1, 2012 through November 10, 2012 using standard hobo data loggers. Diurnal fluctuations of 10 to 15°C were common instream, as 5 to 8°C fluxes were recorded in the ponds in 2012 (RDG et al. 2013). Temperatures in the project area showed a cooling trend of about 1 °C from the upstream end to the downstream end of the project area (21.1 to 20 °C).

Although the ponds have lower temperatures and less diurnal flux than instream, their potential as rearing habitat for Chinook and steelhead is low due to access limited to only high flows. For the most part, ponds are not connected on an annual basis. Except for a few ponds that are connected year-round, fish could not escape if the temperatures were too warm or too cold; some ponds appear to freeze solid, as some are not very deep. During the winter, there is high likelihood that the conditions in the ponds are not conducive to fish survivability, such as low dissolved oxygen due to vegetation decay and ice. Very few ponds have fish. Ponds that do support fish are usually connected at all or most flows.

Temperature data were also collected in the mainstem of Crooked River and Relief Creek between June 6, 2013, and October 10, 2013 using HOBO Water Temp Pro v2 data loggers. Data were collected at six locations from below the confluence of the East and West Forks of Crooked River (upstream of Orogrande) to the IDFG weir intake structure near the mouth as shown in Figures 7 and 8.

Of particular interest is the data collected in the middle of the Meanders reach. Before July 25<sup>th</sup>, these data were very similar to the data from the other sites. About July 25<sup>th</sup>, the average daily temperature, and for the most part the maximum daily temperature, drop below 15°C and have less than 2°C/day variation in

temperature. As in 2012, a similar cooling trend was also observed from upstream to downstream in 2013, which suggests that groundwater in the project area has a strong influence on stream temperatures.

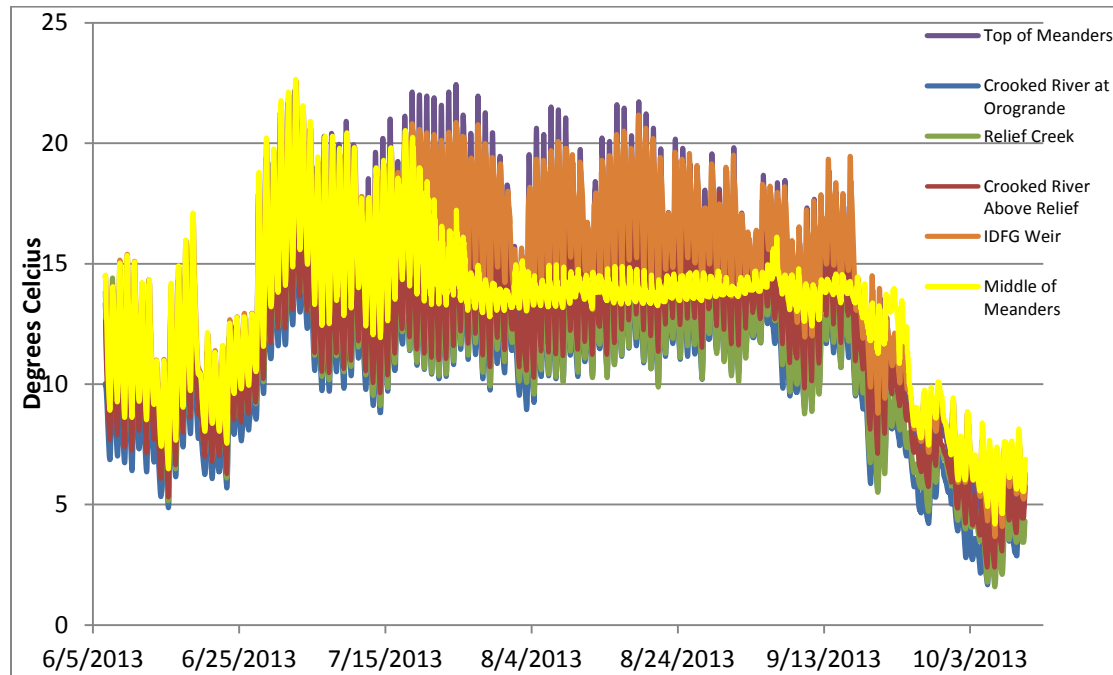


FIGURE 6. WATER TEMPERATURES IN CROOKED RIVER FROM JUNE 6, 2013 TO OCTOBER 10, 2013.

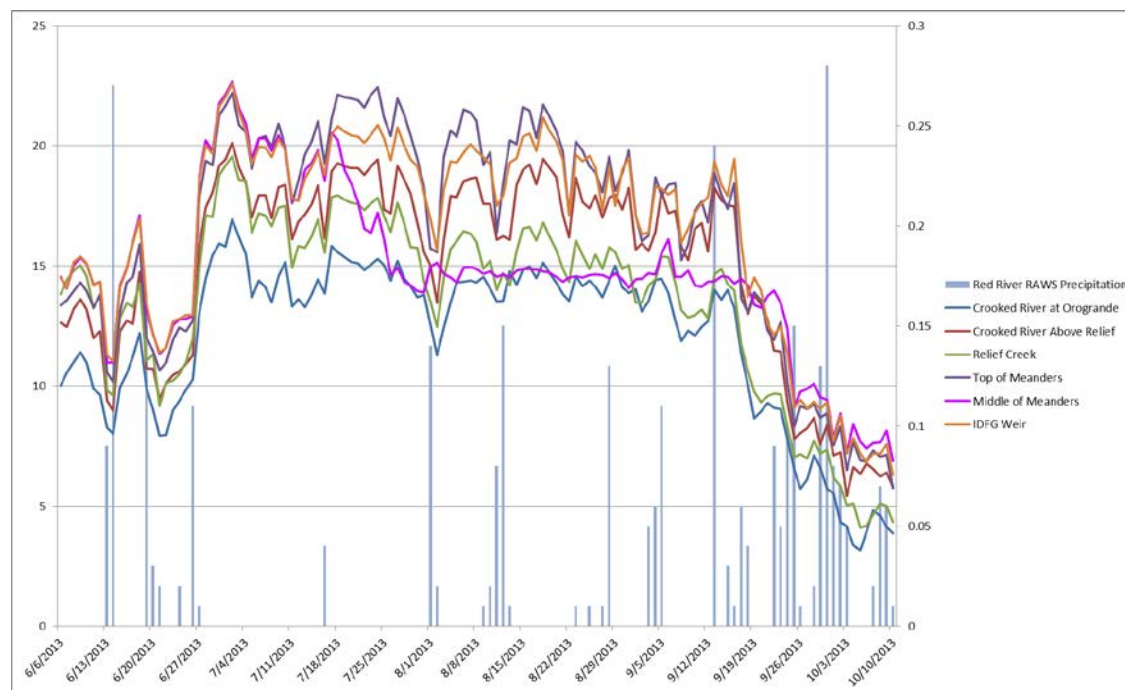


FIGURE 7. DAILY MAXIMUM WATER TEMPERATURES IN CROOKED RIVER FROM JUNE 6, 2013 TO OCTOBER 10, 2013.

TABLE 17. MAXIMUM DAILY MAXIMUM TEMPERATURES (MDMT), MAXIMUM WEEKLY MAXIMUM TEMPERATURES (MWMT), AND MAXIMUM DAILY AVERAGE TEMPERATURES (MDAT), DEGREES CELCIUS, FOR CROOKED RIVER AND RELIEF CREEK<sup>1</sup>.

Metric	Temperature °C and Collection Location						
	Crooked River upstream of Orogrande	Crooked River upstream from mouth of Relief	Relief Creek	Top of Meanders	Mid-Meanders	Mid-Meanders after July 24th	IDFG Weir Intake
MDMT	16.9	20.1	19.6	22.4	22.7	16.1	22.6
MWMT	15.7	19.1	18.4	22.0	21.3	15.0	21.1
MDAT	14.5	15.8	15.8	17.6	18.5	14.9	18.9

<sup>1</sup>MDMT is the maximum temperature reading within a given day from 000 hours to 2359 hours over the collection period. MWMT is the maximum 7-day running average of daily maximum temperatures observed. MDAT is the maximum average of all temperature observations collected from 000 hours to 2359 hours each day over the collection period.

Disturbed riparian conditions alongside Crooked River have resulted in altered plant communities and reduced canopy cover, which has contributed to elevated water temperatures by increasing solar radiation and decreasing effective shade. Disturbed riparian conditions alongside Crooked River include a lack of floodplain connectivity due to channel entrenchment, and extensive tailings piles with coarse, well-drained substrates. Lack of floodplain connectivity limits the interaction between Crooked River and its floodplain, which inhibits the process of sediment deposition along the river and within the floodplain that initiates woody plant community succession. The coarse, well-drained tailings piles lack sufficient fine-grained rooting material to support a healthy, diverse plant community, and their extent significantly limits the area available for woody plant communities to establish.

The existing plant communities within the project area are displayed in Figure 8, which shows the extent of reed canary grass located streamside along Crooked River, and herbaceous plants and conifers located streamside on the tailings piles along Crooked River. The existing percent composition of streamside plant communities and streamside average percent summer solar radiation are presented in Table 18. Currently, on average, about 70 percent of solar radiation reaches the stream; meaning the effective shade is only about 30 percent (RDG et al. 2013). This indicates surface water temperatures are elevated due to high solar radiation and low percent effective shade from disturbed riparian conditions.

TABLE 18. SOLAR RADIATION MEASUREMENTS WITHIN COMMUNITIES IN THE CROOKED RIVER PROJECT AREA (FROM RDG ET AL. 2012).

Community Type	Average Summer Radiation (%)	Minimum Summer Radiation (%)	Max Summer Radiation (%)
Alder	60	60	60
Colonizing Bare	93.2	93.2	93.2
Dredge-Conifer	40.1	37.2	43

Dredge-Herbaceous	79.9	63.2	94.8
Drummond's willow	87.2	87.2	87.2
Mesic Forb	73.3	62.8	83.8
Northwest Territory sedge	73	70	76
Reed Canary Grass	82.7	63.2	90.4
Spruce/bedstraw	41.8	16.4	67.2
Water Sedge	70.4	70.4	70.4
Average Project Area	<b>70.16</b>	<b>62.36</b>	<b>76.6</b>

#### 4.1.6 SEDIMENT:

In the Crooked River watershed, past land use included 1,400 acres of grazing and 36,500 acres of timber management (IDEQ & USEPA 2003); nearly half the watershed has had some timber harvest. Similar use levels are present in the other major South Fork Clearwater River drainage. Based on NEZSED calculations for the South Fork Clearwater River Subbasin Assessment and TMDL (IDEQ & USEPA 2003), 74 tons of sediment from human actions (roads, timber, etc) is delivered to Crooked River every year. Over 90 percent of which comes from the land draining to the mainstem and the Relief Creek subdrainage.

River Design Group and others (2012) detailed sediment supply and transport in the Crooked River drainage:

“Natural processes influencing sediment supply in the Crooked River watershed include geology, soils, hillslope mass wasting, forest fires and lateral migration/bank erosion. Quartz monzonites of the Idaho Batholith, and Prichard formation quartzite, gneiss and schists, are the dominant lithologies (USDA Forest Service 1992). Granitic geology, relatively stable hillslopes, infrequent fires and low bank erosion rates appear to be factors contributing to a low sediment supply. Sediment transport in the Crooked River is affected by valley gradient, stream type and supply. An evaluation of valley gradients and stream types indicates that sediment transport capacity likely decreases downstream of the narrows creating the potential for sediment deposition in the reach adjacent to the dispersed camping area (Reach 2). Similarly, past rehabilitation efforts to increase channel sinuosity by routing the river through large dredge ponds have reduced channel gradient and increased the potential for sediment storage, thus making the dredge ponds function as large sediment traps capable of depleting downstream reaches of sediment supply. Downstream, the reduced streampower through meandering channel segments combined with a lack of supply have resulted in static bed conditions and subsequent armoring of the riverbed with the over-sized remains of coarse dredging deposits.”

Results of sediment analysis indicate that channel gradients influence riffle substrate size, and a majority of the riffle streambed is cobble substrate greater than three inches. Results also show that the change in gradient in Reach 2 is affecting substrate size and trapping the gravel supply from upstream. Deprived of bedload supply, Reaches Reach 3 and 4 have scoured down to the largest substrate size classes thus causing the bed to become armored with cobble substrate that is not suitable for spawning. The low incoming sediment supply combined with the coarse channel margins and entrenchment due to the dredge material, also prohibits lateral migration, which could replenish the sediment supply in the lower reaches (RDG et al. 2012).



Sediment production can be described as turbidity or suspended sediment. Turbidity is measured by the amount of light passing through water that is scattered by suspended materials. Suspended sediment is measured by the actual weight of suspended material in water. For these measures, thresholds of 50 NTU instantaneous or 25 NTU for 10 consecutive days, and 25 mg/l – 80 mg/l, depending on duration, of suspended sediment are considered protective of salmonids (IDAPA 58.01.02).

Total suspended sediment (TSS) and was measured in the South Fork Clearwater River (South Fork) near Harpster, Idaho, which is about 50 miles downstream from the mouth of Crooked River (IDEQ 2003). Turbidity and TSS levels were collected during the spring months from 1989 through 1991 and again in 2001. The highest concentration of TSS in the South Fork at the Harpster site was 88 mg/l (IDEQ 2003). Because the sample locations were so far below the mouth of Crooked River, it is difficult to develop inferences on potential effects of increased sediment from the proposed action on background levels in the South Fork or to even understand what sediment levels look like in the South Fork within the action area.

For the TMDL, sediment modeling was evaluated in the South Fork Clearwater River. NEZSED modeling was used to estimate sediment in tons per year to compare to a background sediment estimate. The upper South Fork River was estimated to have loads of 417.69 tons/year where background levels should be 370.98 tons/year, meaning human caused activities are contributing an excess of ~47 tons/year (IDEQ 2003). American and Red rivers are shown to produce higher levels of sediment (50-100 tons/year) than Crooked River (<50 tons/year) (IDEQ 2003). Modeling inherently provides crude numbers and cannot be used to definitively determine sediment levels in the South Fork. The sediment modeling provided in the TMDL does provide a snapshot of where and how severe background sediment levels may be in the South Fork.

#### *4.1.7 CHEMICAL CHARACTERISTICS:*

There are no CWA 303d designated reaches (in regards to chemical contaminants) in the Crooked River drainage. Mine tailings have potential issues with soil and water contamination from heavy metals, and mercury is typically the heavy metal of concern. Although mercury was not used in dredge mining in the upper South Fork Clearwater, there is a small potential to find this element during restoration activities. Past geochemistry studies, including the *Crooked River Stream Survey and In-Situ Toxicity Results* (Baldigo 1986), *Water Quality Status Report 80: Crooked River* (Mann and Lindern 1988), and *Idaho Champion Group Lode and Pacific Group Load Claims: Preliminary Assessment and Site Inspection Report* (IDEQ 2011a), have all shown that concentrations of heavy metals in both soil and water are generally equivalent to background levels or below detection limits. Recent heavy metals monitoring data collected within the project area in 2013 by the Nez Perce Tribe did not exceed cold water biota water quality standards (Nez Perce Tribe 2013 unpublished data).

#### *4.1.8 HABITAT ACCESS:*

The severely dredged valley has areas of extremely low velocities during low flow and very warm temperatures (see Temperature section above). These two conditions could lead to lack of migration in the fall months.

The IDF&G constructed an acclimation facility on the mainstem of Crooked River about 7 miles upstream of the mouth. In the past, Chinook were acclimated at this facility then released into Crooked River. Survival rates of fish through the Meanders were so low the IDFG abandoned the acclimation facility and began releasing fish at the mouth (J. Dupont, IDFG, Pers. comm. 2013). It is speculated that the slow velocities coupled with poor habitat complexity through the Meanders were acting as a barrier for juvenile Chinook smolts emigrating out of the system.

#### 4.1.9 HABITAT ELEMENTS:

A fish technical advisory group (TAG) was assembled around 2000, to evaluate habitat potential for tributaries in the South Fork Clearwater River for the Subbasin Assessment and TMDL (IDEQ 2003). The TAG was composed of qualified personnel from the IDFG, Tribe, NMFS, USFWS, IDEQ, EPA and other agencies to evaluate the potential for habitat to support various species of fish including steelhead and bull trout. Table 19 provides the habitat ratings for the Crooked River watershed. The table shows that current habitat conditions in the project area are poor for salmonids but historically were good for these species. The following sections provide current habitat conditions for the lower Crooked River.

TABLE 19. HABITAT CONDITIONS RATINGS FOR FISH SPECIES IN CROOKED RIVER (IDEQ 2003).

WB ID	WATER BODY NAME	ACRES	Current Fish Population Presence*					Current Habitat Condition**	Natural Inherent Conditions**				Pollutant Problems			Conservation Preservation
			BUT	CUT	SCH	ST RBT	BRT	Salmonids	BUT	CUT	SCH	ST RBT	SED	TEMP	NUTR	Priority***
31	Lower Crooked River	9,480.90	Y	Y	Y+	Y	Y	P	F	G	G	G	Y	Y		H
32	Upper Crooked River	14,487.38	Y+	Y	Y+	Y	Y	F	G	G	G	G	Y	Y		H
33	West Fork Crooked R.	7,594.45	Y+	Y	Y	Y	Y+	G	G	G	G	G	N	N		C/H
34	East Fork Crooked R.	6,688.73	Y+	Y	Y	Y	N	G	G	G	G	G	N	N		C/H
35	Relief Creek	7,484.49	Y	Y	Y+	Y	N	F	F	G	G	G	Y	Y		M

\* Y+ = known spawning and rearing population; BUT = Bull Trout CUT = Cutthroat Trout SCH = Spring Chinook; ST RBT = Steelhead/Rainbow Trout BRT = Brook Trout; \*\* G = Good, F = Fair, P = Poor; \*\*\* L = Low, M = Medium, H = High; C/L, C/M, and C/H = ratings for conservation rather than restoration. All other ratings in this column are priorities for restoration

#### 4.1.10 SUBSTRATE DISTRIBUTION:

Sediment transport in the project area is affected by valley gradient, stream type and sediment supply. Sediment transport capacity is reduced in the project area (Reach 2) where the stream slope is reduced, causing sands and gravels to deposit, as described above. In Reach 3, fine sediment is captured by the dredge ponds that are connected to the river, further reducing sediment supply. The reduced streampower through the meandering channel coupled with the loss of smaller substrate area has resulted in a static bed condition and armoring of the riverbed with oversized coarse dredge deposits in Reaches 3 and 4. Table 20 provides the channel gradients and associated riffle substrates.

TABLE 20. CHANNEL GRADIENT AND RIFFLE SUBSTRATE BY PERCENT BASED ON WOLMAN PEBBLE COUNTS (RDG ET AL. 2012).

Reach	Channel Gradient (ft/ft)	Silt/Clay (<0.062 mm)	Sand (0.062-2 mm)	Gravel (2 - 64 mm)	Cobble (64 - 256 mm)	Boulder (256-2048 mm)
Reach 1	0.0086	2.8	2.8	37.7	54.7	1.9
Reach 2	0.0039	0.0	4.9	67.7	23.5	3.9
Reach 3	0.0036	0.0	4.8	38.5	57.0	0.0
Reach 4	0.0077	0.0	4.7	34.0	59.4	1.9

The Reaches 2, 3, and 4 have few potential spawning gravels due to the loss of substrate distribution. Existing condition spawning habitat, as modeled by using substrate size class 50–75 mm, is less than 2 acres (RDG et al. 2013). This is less than the potential for the area based on the altered flow velocities and habitat

complexity to transport and sort the necessary substrate sizes. Reach 2 supports the highest area for Chinook spawning based on substrate size.

#### *4.1.12 LARGE WOODY DEBRIS:*

The extreme level of past disturbance in Crooked River has left the project area devoid of LWD and recruitment potential. Stream surveys yielded 2–5 single pieces and 1–2 LWD aggregates per 100 meters of stream (RDG et al. 2012). Large woody debris increases the ability of stream habitat to support and produce salmonid species through pool creation and maintenance (Cederholm et al. 1997), added cover and hiding from predators (Fraser and Cerri 1982), refuge from high-velocity flows (Bustard and Narver 1975), and greater macro-invertebrate diversity (Hrodey et al. 2008; Rogers 2003).

The past dredge mining activities removed all of the woody debris and vegetation throughout the valley bottom. The highly disturbed valley and dredge tailing piles have naturally re-vegetated with lodgepole pine providing little shade or large wood recruitment (Geum 2012). Although conifers compose 30 percent of the project area, they are growing on top of the dredge piles and not recruiting wood or contributing shade to the stream. The three greenline surveys yielded seven mature trees (>10 years old) along the greenline of the stream, and in total only 18 conifers were counted in the greenline (Geum 2012). No dead trees, considered near-future LWD recruitment, were counted in the surveys.

#### *4.1.13 POOL FREQUENCY AND QUALITY:*

The quantity of pools in the 3.1-mile project area is fairly high ( $n > 70$ ) (RDG et al. 2012). Many are the result of past rehabilitation efforts of connecting dredge ponds or are legacy from the dredging activity. These pool types can be deep, but due to the lack of functioning hydraulics, most act as sediment traps for fine sediments and will eventually fill in. Additionally, the pools lack cover or complexity preferred by focal fish species.

Snorkeling observations in September 2013 (conducted by Nez Perce Tribe and Nez Perce – Clearwater National Forests) indicated very low numbers of all fish in the lower reaches of the project area. Reaches 2, 3, and 4 were snorkeled as a one-time observation and the species, number, and location of fish were recorded to provide a general overview of the habitat fish were using in the project area. In Reach 4, the most downstream reach, five larger westslope cutthroat trout were observed in a pool formed by a small LWD jam. Reach 4 had 5 pools/100 meters with an average residual pool volume of about 2,000 ft<sup>3</sup> (RDG et al. 2012a). In Reach 3, one large cutthroat was observed in a mid-channel scour pool, with a very small number of juvenile chinook and whitefish also in the lower portion of the pool. Reach 3 had 10 pools/100 meters with an average residual pool volume of about 9,500 ft<sup>3</sup>. Reach 2 had the highest density of fish observed and many of these fish were using pool habitat, with a much higher species and size class diversity. Two large bull trout, as well as juvenile bull trout were observed; all seemed to be association with LWD complexes. In addition, a very large school of adult whitefish ( $n > 40$ ), schools ( $n > 20$ ) of juvenile chinook, two adult cutthroat, and a few adult brook trout were all observed within one meander wavelength. Reach 2 had 9 pools/100 meters and an average residual pool volume of about 5,000 ft<sup>3</sup>.

Pool-forming and maintenance processes are lacking through most of the project area. The current conditions include: a disconnected floodplain; diminished LWD recruitment potential; limited lateral migration, and the inherent lateral scour is restricted due to the tailing piles; and lack of stream bed complexity. Field observations indicate the hydraulics, due to the dredge activity, are forced into 90-degree corners in these large meanders. The stream channel has been so drastically altered, standard pool-forming and maintenance processes are hardly present; water eddies on the outside corner and flows back upstream. This causes the majority of the flow to be pushed to the inside corner. This translates to fine sediment

settling on the upstream side of the outside of the bend. Snorkeling surveys indicated very little fish use in many of these large pools and eddy areas.

#### *4.1.14 BENTHIC INVERTEBRATES*

The IDEQ has sampled macroinvertebrates in the project area in 2007 and 2012. The Stream Macroinvertebrate Index (SMI) was used to rate the condition of the benthic community. The SMI score is compared to an index for the Northern Mountain region and provided a rating. Based on samples collected in 1996, 2007, and 2012, the SMI for Crooked River in the project area is good (scores= 72.65, 70.09, and 63.81 respectively) (<http://mapcase.deq.idaho.gov/wq2012/>).

#### *4.1.15 OFF CHANNEL HABITAT/REFUGIA:*

Rearing habitat, modeled with parameters of depth less than 1 foot and velocity less than 1 foot per second (Hillman et al. 1987), was quantified at 2.45 acres through the project area (RDG et al. 2013, Appendix C). The modeled juvenile-rearing area does not take into account overhead cover, temperature, and substrate; therefore, this number is likely high. Most of the ponds in the project area, created by past mining, are not connected at low flow, which limits juvenile rearing to the main channel. This can lead to much higher predation levels of juveniles leaving the system into the South Fork Clearwater River in the fall, instead of overwintering and migrating with the high flows in the spring.

#### *4.1.16 CHANNEL CONDITIONS AND DYNAMICS:*

##### **Width:Depth Ratio:**

The existing channel width-to-depth ratios for the four river reaches of Crooked River within the project area range from 17 to 31 (RDG et al. 2012). These width-to-depth ratios are moderate to high, indicating a wide, shallow channel shape.

##### **Streambank Condition:**

The steep dredge tailings do not create conducive streamside space for large shade and stability providing trees and shrubs. Moreover, there is largely gravel and cobble in the tailings piles, making poorer conditions for preferred riparian growth. The greenline surveys indicated that about 40 percent of the streambanks were vegetated with reed canarygrass and 16 percent of the streambanks were sparsely vegetated dredge material (Geum 2012). This suggests that over 50 percent of the streambanks in the project area have low stability based on the vegetation.

##### **Floodplain Connectivity:**

Entrenchment quantifies the accessibility of the floodplain; it is the ratio of the floodplain width to the bankfull width—the lower the number, the greater the entrenchment. Through the Crooked River project area, entrenchment varies from 1.7–2.5 (RDG et al. 2012). The greatest entrenchment value (1.7) was measured within the severely meandered section with the very high dredge piles. This accounts for approximately one-third of the project area. In a functioning system similar to Crooked River, entrenchment values would be greater than 2.4 (Rosgen 1994), indicating a low, wide floodplain. LiDAR analysis and geomorphic surveys showed more than 50 percent of the valley bottom was greater than 1.5 feet above bankfull indicators (RDG et al. 2012) suggesting little floodplain connection with Crooked River. Additionally, surveys and analysis showed 20 percent of the valley bottom was greater than 2 feet below bankfull indicators, flooded nearly year-round, and therefore, not suitable for preferred riparian vegetation (RDG et al. 2012).

#### **4.1.17 FLOW/HYDROLOGY:**

##### **Change in Peak/Base Flows:**

Watershed-scale disturbances resulting from mining impacts are influencing Crooked River hydrology and geomorphic processes in the project area. Crooked River is a 71 square mile watershed with a mean annual precipitation range of 34 to 43 inches; primarily in the form of snow (USDA 1998). Crooked River does not have long-term flow data, therefore, River Design Group used representative stream gauges in the Upper South Fork Clearwater River to estimate hydrologic statistics. The information for these sites can be found in Section 5.2.2 Hydrology, as well as in Appendix C in the Design Criteria Report (2012).

Storage of water and sediment in subsurface coarse materials and dredge ponds throughout the watershed may be responsible for reduced peak flows and extended duration runoff in the project area. River Design Group's (2012) analysis of flow attenuation is as follows:

"Hydrologic analyses identified a significant disparity amongst methods for estimates of bankfull discharge. Estimates of bankfull discharge using field data (bankfull indicators, channel cross section geometry, water surface slope and roughness derived from bed substrate) resulted in values that were one-quarter to one-half of those derived from regional regression equations and USGS gage data from nearby drainages. One possible reason for the disparity is flow attenuation caused by water storage in dredge ponds in the project area as well as the upper watershed near the town of Orogrande. Another possible reason for the disparity is subsurface flow through disturbed coarse deposits.

During spring runoff, lateral flow and sediment inputs from side drainages are being stored and routed through dredge ponds resulting in a slower release of water and sediment into the mainstem Crooked River. Similarly, coarse subsurface material may be capturing and conveying flow underground. The effect on the Lower Crooked River hydrograph is dampened mean annual peak flow and extended flow duration during runoff. These effects are causing the Lower Crooked River to behave similar to a spring creek, whereby the channel forming discharge is correlated with a lower recurrence interval ( $Q_{1.1}$  or less) versus a recurrence interval typically associated with bankfull discharge ( $\sim Q_{1.5}$ ). Encroachment of stable vegetation communities along the channel margins supports the premise that peak flows are dampened and channel capacity is responding to flow attenuation."

The valley bottom, from the mouth to Orogrande, has been so severely disturbed from dredge mining and left in such a completely unnatural state that the flows and how the valley passes water is completely different than any "normal" system.

#### **4.1.18 WATERSHED CONDITIONS:**

##### **Road Density and Location:**

Crooked River, with its long history of use in regards to mining and timber harvest, has many roads in the drainage. There are 148 miles of road, equal to 2 mi/mi<sup>2</sup> (ESRI GIS layers). However, the road distribution in the drainage is skewed toward the downstream end as the upper end is steep and rocky. If the East and West Forks are not calculated in, the road density is 3 mi/mi<sup>2</sup> in the lower subwatershed. Of these roads, 37.7 miles are within 300 feet of Crooked River or tributaries. The entire mainstem of the river, as well as most tributaries, have a road adjacent. There are 81 total road crossings within the drainage; 15 of those crossings are across stream reaches designated by NOAA as areas with intrinsic potential for steelhead spawning. Of those 15, 9 crossings are in areas of high intrinsic potential, 3 in moderate, and 3 in areas of low intrinsic

potential (Figure 8). The rest of the crossings in the drainage are outside of designated critical habitat or intrinsic potential.

**Disturbance History:**

Nearly the entire valley bottom of Crooked River has been severely disturbed from dredge mining and road building. There are placer mines in the hillsides of the drainage, and timber harvest has occurred numerous times in the past; the most recent harvest was completed in 2010. In addition a fuels reduction project for the watershed is in the NEPA process currently, with implementation planned for approximately the same time frame as the proposed restoration project. Fire is a natural part of the landscape in Crooked River; 9,800 acres have burned in 51 fires in the past 20 years. Most of those acres were burned in the remote East and West Forks with little access or other management in the Rattlesnake (3,250 acres in 2007) and McGuire (6,450 acres in 2012) fires.

**Riparian Habitat Conservation Areas:**

As stated above in the Roads section, most riparian areas either have been mined, either dredge or placer, or have a road within the riparian habitat conservation area. Most riparian areas in the mainstem Crooked River have been completely turned over in the past 80 years by dredge mining, so riparian areas are very limited to the margins of the stream bank and small areas of past restoration.

**Disturbance Regime:**

Environmental disturbance events are localized and occur throughout the Crooked River watershed. Such disturbance events include wildfires, high intensity rain events, and rain on snow events. Disruptions in natural fire regimes have decreased fire frequency, but increased fire intensity and size, as observed in the Rattlesnake and McGuire fires.

*4.1.19 DREDGE POND HABITAT*

Dredge ponds are common throughout the valley bottom. Some have been connected to the mainstem channel since the dredge mining occurred, some were connected through past restoration activities, and some are not connected.

Many of the dredge ponds were connected to the mainstem channel in the early 1980s. These ponds have served as settling basins over the past 30 plus years and have captured the very fine sediments and organic materials. The amount of fines in the ponds has not been measured, but field observations show that many of the connected ponds have about 4 -12 inches of fine sediment, that once disturbed, take about a day to resettle. In the early 1980s, when several of the larger ponds were first connected to the mainstem channel, high numbers of juvenile salmonids (primarily Chinook), were observed in the ponds (K. Thompson pers. comm. 2013). It is likely that the ponds had cobble substrate similar to that of the tailings piles and provided off channel rearing. However, after capturing fine sediment for three decades, the ponds are not likely to support high numbers of salmonids. Longnose dace have been observed in two of the ponds that would be excavated for the bypass channel (E. Grinde, Watershed Restoration Specialist, Pers. comm. 2013).

*4.1.20 CROOKED RIVER WATERSHED INTRINSIC POTENTIAL FOR STEELHEAD*

Intrinsic potential was mapped for Crooked River based on stream type, valley gradient and width, current habitat conditions, and potential habitat conditions that would support steelhead (Figure 9). About 200 foot sections were rated on a high, medium and low scale by comparing the habitat needs to support the full life history of steelhead with the current conditions. For example, habitat potential in the project area is high to medium based on stream attributes the valley could support. In the project area, the intrinsic potential for

steelhead spawning is about 2 acres, which is about 0.04% of the South Fork population intrinsic potential (A. Lamontagne, NMFS Hydrologist, Pers. comm. 2014).

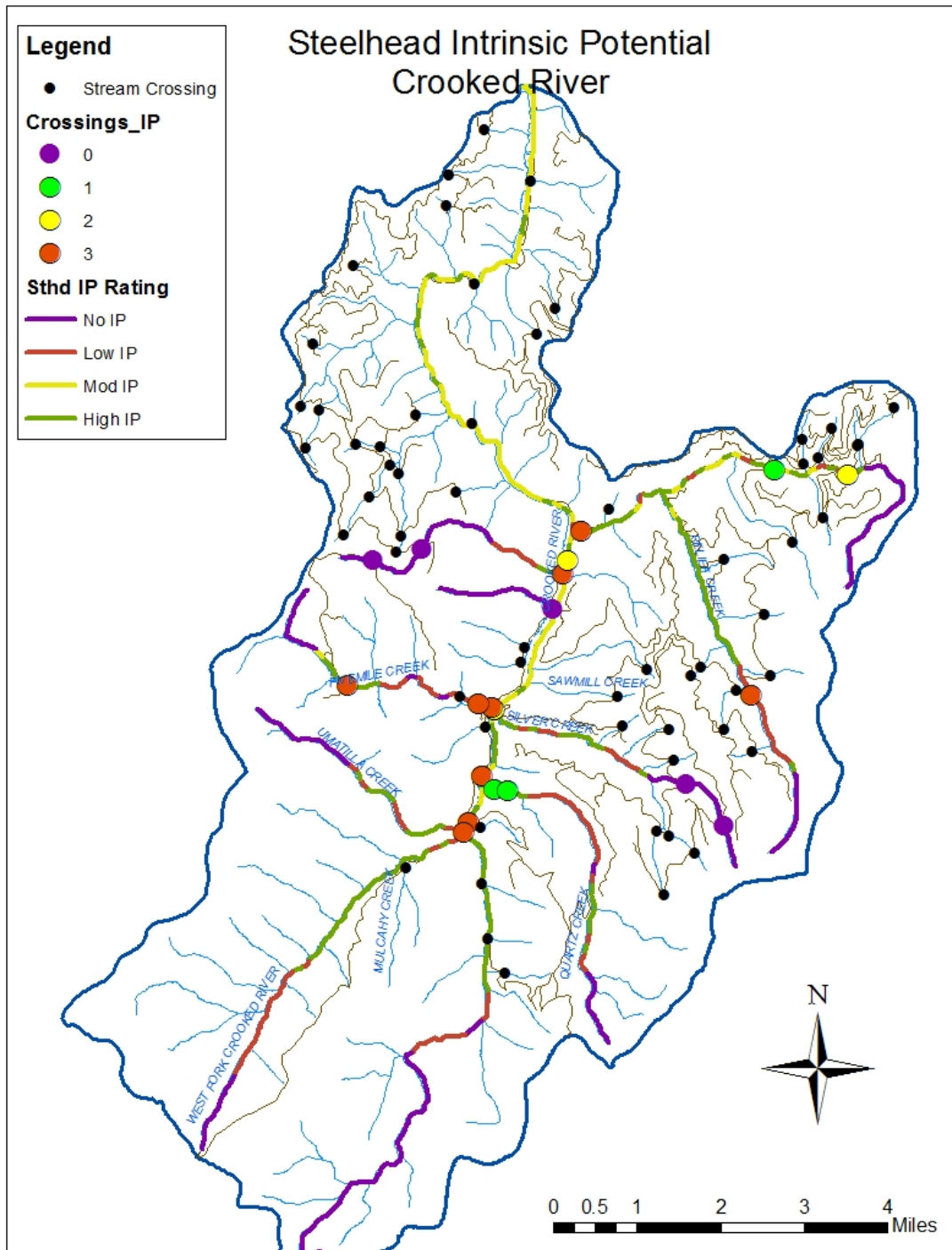


FIGURE 8. STEELHEAD INTRINSIC POTENTIAL (IP) IN CROOKED RIVER.

## 5.0 EFFECTS ANALYSIS

The proposed project activities are intended to improve aquatic habitat over the long term and minimize, to the extent possible, the risk of degrading fisheries habitat and water quality in the short-term. There are expected direct and indirect effects as well as long-term and short-term effects of the proposed project. Direct effects are those that would directly cause harm to or kill ESA-listed species. The indirect effects of the project are habitat improvements that are intended to provide significant benefits to salmonids in Crooked River. Long-term benefits are expected to be maintained through altering the hydrology to function more naturally. The direct and indirect benefits are discussed below.

### 5.1 Bypass Channel /HABITAT ACCESS

#### 5.1.1 FISH HABITAT ACCESS

A migration flow range is defined by a low and high passage flow, with fish passage desired at all flows between the low and high flows. The bypass channel would be constructed to route the  $Q_{10}$  flow return interval year round during construction as well as provide adult and juvenile fish passage. The bypass channel would be in place year-round, which means fish passage is needed during periods of adult and juvenile steelhead migration in the spring as well as for low base flows for bull trout migration.

The National Marine Fisheries Service Anadromous Salmonid Passage Facility Design (2011) states that “hydraulic design for juvenile upstream passage should be based on representative flows in which juveniles typically migrate.” A common passage flow for both juveniles and adult steelhead is the 10 percent exceedence flow during the period of migration. The 10 percent exceedence flow is the stream discharge that is equaled or exceeded an average of 10 percent of the days for the migration period.

PIT tag data was used to estimate the timing of steelhead returns to the upper South Fork Clearwater. Steelhead enter the South Fork Clearwater in mid-February to mid-March and are found at the Crooked River weir beginning at the end of April through May ([http://www.cbr.washington.edu/dart/query/pitadult\\_obsyr\\_detail](http://www.cbr.washington.edu/dart/query/pitadult_obsyr_detail)). The 10 percent flow exceedence in Crooked River is 493 cfs ( $Q_{1.5}$ ) (Figure 10) between April and May.

The velocities at which juveniles and adult steelhead can migrate are dependent on distance and fish size. Fish 45 to 65 mm can pass velocities of 1.5 to 2.5 ft/sec for about 1 foot in distance while fish 80-100 mm can pass velocities of 3 to 4.5 ft/sec for about 1 foot (NMFS 2008). Studies examining the swimming capabilities of adult steelhead include Paulik and DeLacy, 1957 and Weaver, 1963. Adult steelhead ranging in size between approximately 18 inches to 30 inches could swim in prolonged mode for up to 24 hours at velocities between 4 ft/sec and 10 ft/sec (Paulik and DeLacy 1957).

Figure 10 shows the velocities along the length of the channel at each modeled cross section. The cross sections are about 73 feet in length and are about 38 feet apart on average. The sections are overlapped to minimize variance, but knowing the velocity of every foot of the channel is impossible. Velocities near the margins of the channel are much lower than the thalweg. Velocities in the thalweg range from less than 1 foot per second to about 7.5 feet per second at the  $Q_{1.5}$ , and are less than 2 feet per second along most of the channel margins. Based on swimming capabilities of adult and juvenile steelhead, the bypass channel would not likely be a barrier during the migration period.



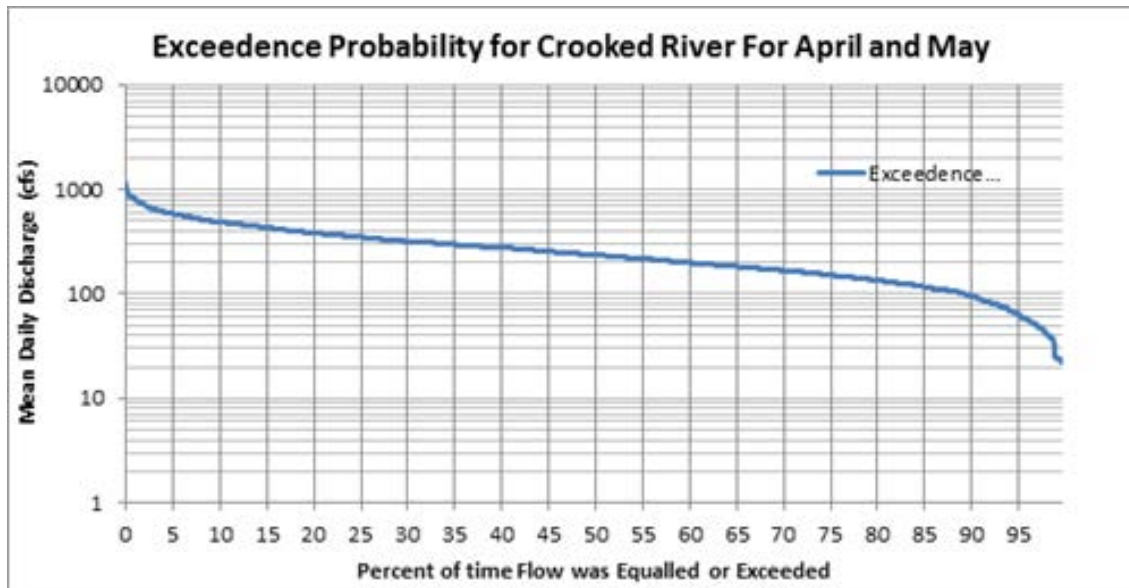


FIGURE 9. EXCEEDENCE PROBABILITY FOR CROOKED RIVER FLOWS IN APRIL AND MAY.

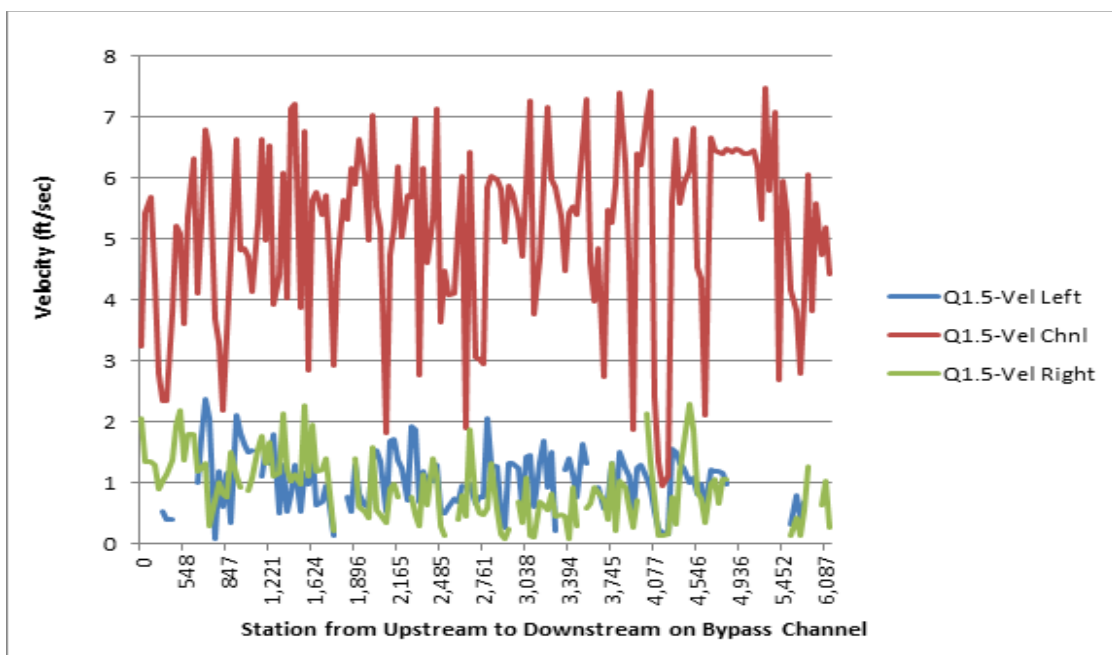


FIGURE 10. HEC-RAS MODEL FOR THE Q<sub>1.5</sub> IN THE BYPASS CHANNEL.

The bypass channel was designed to hold flows at low base flow as well as at the Q<sub>10</sub>. To ensure the bypass channel would not go dry during low flow, a series of observation wells were installed in the project area. Groundwater and surface water elevations were surveyed between June and September in 2013 (NPT unpublished data). The survey elevations were tied to the benchmark elevations used in the bypass design.

The groundwater slope, as calculated by elevation difference over valley length between wells 1-3 and 7-9, was 0.009 ft/ft. River Design Group et al. (2012) calculated valley slope and yielded the same slope, 0.009. This suggests the groundwater elevations are constant throughout the valley. Figures 11 and 12 show the location of the observation wells in the project area and the measured groundwater elevations relative to the thalweg of the bypass channel. The bypass channel would also capture groundwater from the east hillslopes, which would improve lateral connectivity during low flows.

Crooked River, through the project area, serves primarily as a migration corridor for bull trout. Bull trout migrate from the South Fork Clearwater River to the upper tributaries of the Crooked River watershed in late fall when flows are low. The bypass channel would retain water through low base flows since the thalweg of the channel would be lower than groundwater levels (see Figure 12), and the bypass channel would be capturing the majority of the water in the valley bottom (vs. currently being split between the river and the ponds). Much of this water could be routed from groundwater which may provide cooler water temperatures. However, the amount of large pools through the project area would be reduced, as well as the overall length of channel. Therefore, the effects of using a bypass channel on bull trout is likely minimal.

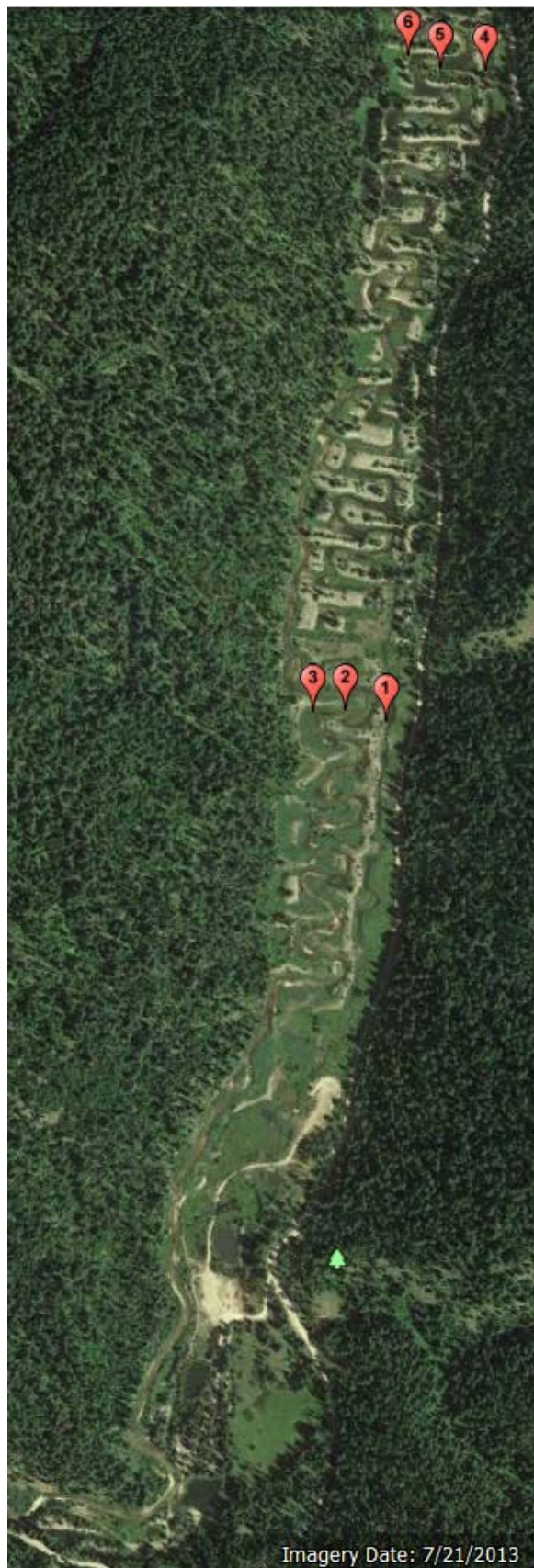
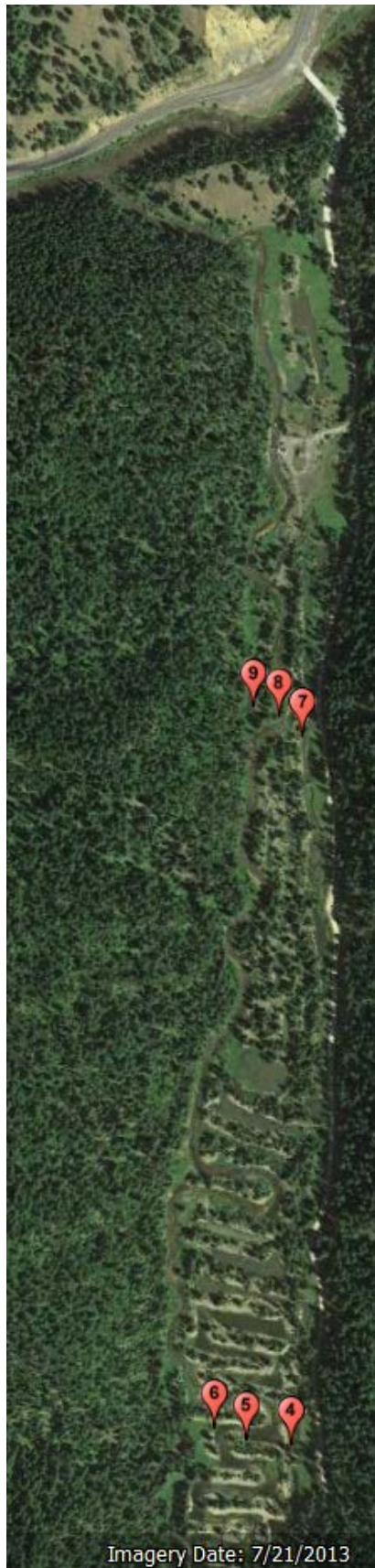


FIGURE 11. THE LEFT VIEW IS THE MOUTH OF CROOKED RIVER, SHOWING THE EXTENT OF THE PROJECT AREA AND WELLS 4-9. THE RIGHT VIEW SHOWS WELLS 1-6 AND THE UPPER EXTENT OF THE PROJECT AREA. SURFACE WATER ELEVATIONS WERE MEASURED IN THE ADJACENT PONDS AND RIVER CHANNEL NEAR EACH OBSERVATION WELL. WELLS 1-3 AND 4-6 ARE IN THE PROJECT AREA WITH THE BYPASS CHANNEL.

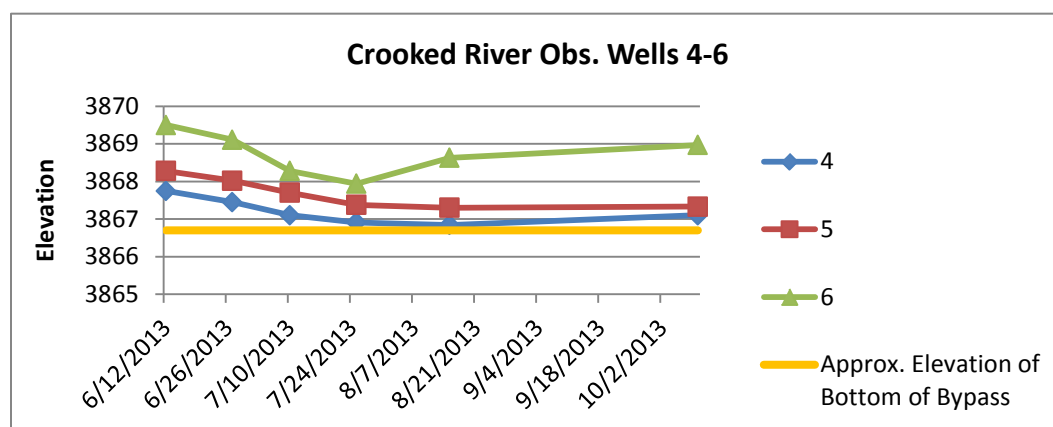
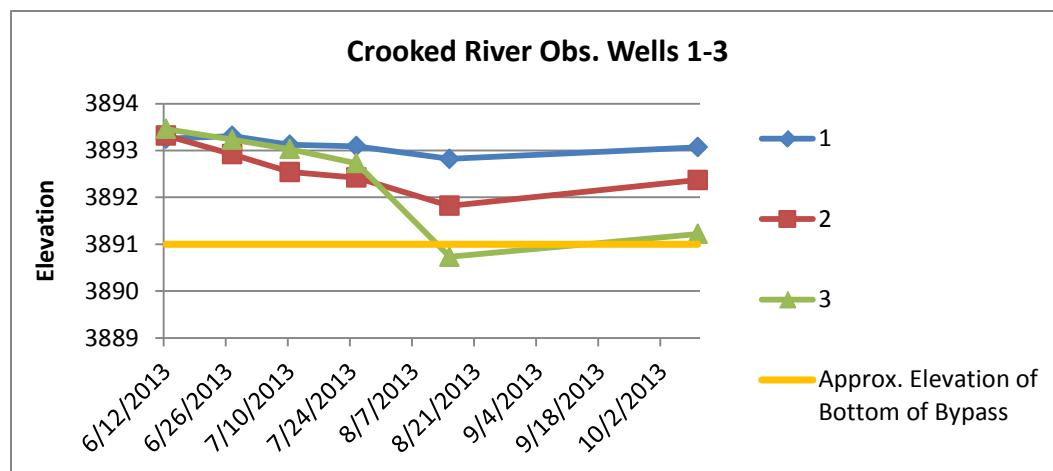


FIGURE 12. GROUNDWATER ELEVATIONS RELATIVE TO THE THALWEG OF THE BYPASS CHANNEL.

During construction of the new river channel (up to 4 years), the current river habitat would not be accessible to fish. Approximately 10,560 feet of river channel would be filled in in Phases 1 and 2. As stated in the Baseline Conditions section, the habitat in Reach 2 and 3 has a low gradient, poor substrate, warm water temperatures, and limited overhead cover. Steelhead could use the mainstem channel for rearing, and spawning could occur in the limited steeper gradient sections with suitable substrate; however, conditions are relatively poor. Bull trout primarily use the mainstem channel as a migration corridor, with some rearing. The bypass channel is about 6,000 feet in length through the project area. The bypass channel would provide a migratory corridor for both steelhead and bull trout. The bypass channel would have some complexity, including pools, riffles, and some large woody debris for overhead cover, but it is difficult to predict the quality of habitat and potential use of the channel by fish. The gradient of the bypass channel would be steeper than the current channel, which could potentially provide spawning areas if the substrate is suitable. Again, it is difficult to predict what the substrate conditions would be in the bypass channel and overall uses. It is not designed, nor expected to be used, as spawning and rearing habitat.

As stated in the Baseline Conditions section, the Narrows section and upper Crooked River is suitable habitat for steelhead spawning and rearing. The approximate 4 miles through the Narrows, as well as the 5 miles of

Crooked River from Relief Creek to Orogande currently supports steelhead spawning and rearing and is rated as fair to good habitat (IDEQ 2003). East and West Forks of Crooked River also support steelhead and are rated as good habitat. Excluding fish from the project area may displace steelhead that would otherwise spawn or rear in the project area; however, habitat and habitat access is available above the project area.

### 5.1.2 BYPASS CHANNEL STABILITY

The bypass channel was designed to hold the  $Q_{10}$  with an additional foot of freeboard. Velocities of the bypass channel as modeled by HEC-RAS ranged from 1.5 feet per second up to 11.4 feet per second during the 10-year flow event (bypass design for spring flows). These velocities were modeled for the thalweg of the channel, which exhibits the highest velocities of the channel. Some of the channel margins exhibit lower velocities and the modeling does not account for larger boulders and LWD in the bypass channel. Since the bypass channel would be constructed by connecting the existing ponds and ditches there would be pools that provide areas of lower velocities. Figure 13 below illustrates the velocities at the  $Q_{10}$  through the bypass channel.

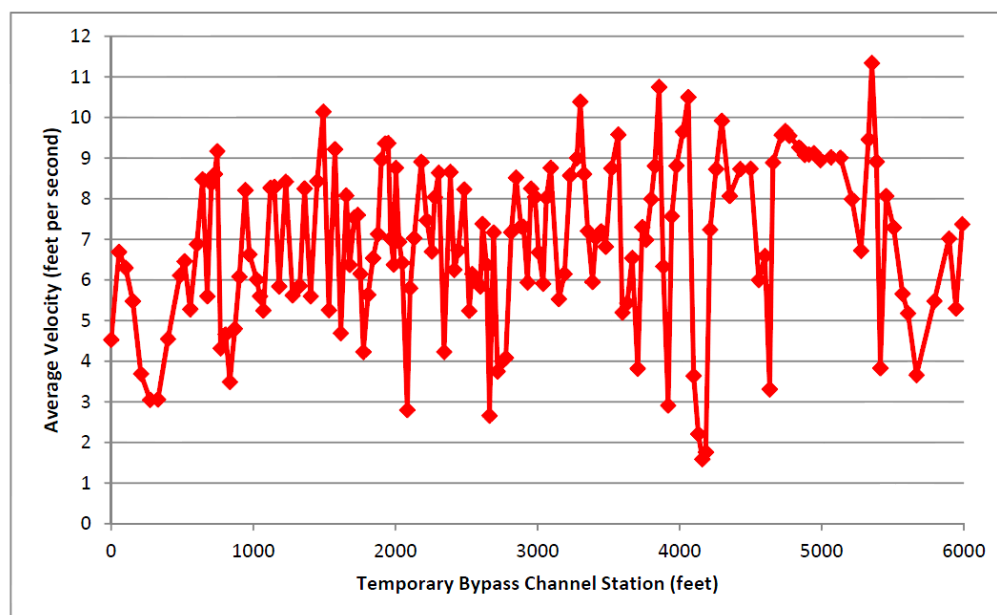


FIGURE 13. HEC-RAS SIMULATION OF AVERAGE VELOCITY FOR THE TEMPORARY BYPASS CHANNEL AT 1,061 CFS (RDG ET AL 2013B).

River Design Group et al. (2013b) provided HEC-RAS modeling of the bypass channel and a summary on the stability based on the  $Q_{10}$ . Model results show that the presence of large cobble (150mm/6-inches) with some larger material (300mm/12-inches) would result in fairly stable conditions (RDG et al. 2013b). As described in Section 2, this size of material is common through the project area and reinforcement would not be needed for the entire channel. An assessment would be conducted of the bypass channel during construction to ensure appropriately sized material is available in the channel and the assessment would entail conducting a longitudinal comparison of predicted mobile particle size with observed substrate.

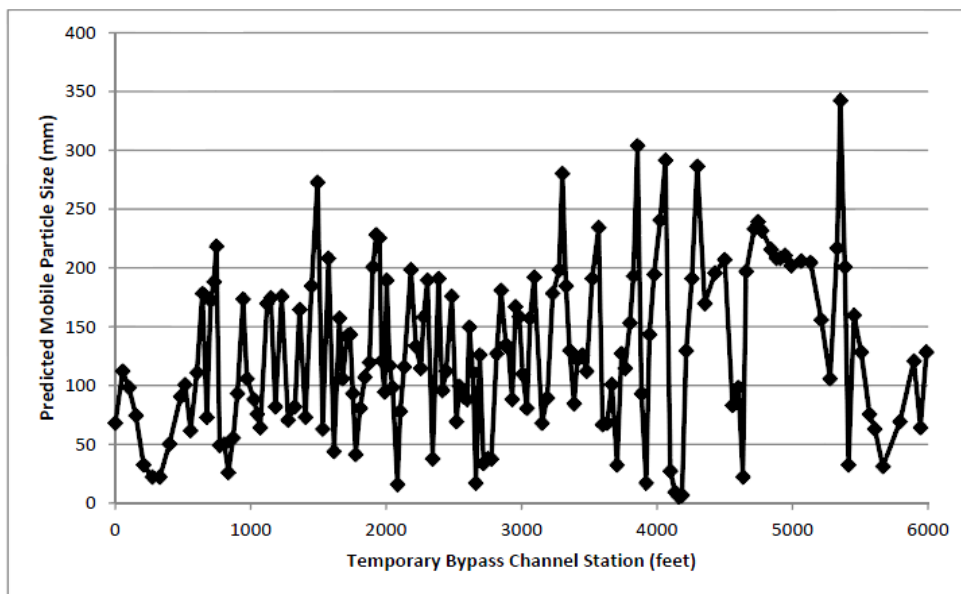


FIGURE 14. PREDICTED PARTICLE MOBILITY SIZE DERIVED FROM HEC-RAS SIMULATION OF AVERAGE SHEAR STRESS (RDG ET AL. 2013B).

To evaluate the potential to have flows at or above the  $Q_{10}$ , flows from the South Fork Clearwater River USGS gauge, about 0.34 miles above the mouth of Crooked River were examined. The gauge was operational from 1945-1974 and again from 2003-2012 ([http://waterdata.usgs.gov/id/nwis/uv?site\\_no=13337500](http://waterdata.usgs.gov/id/nwis/uv?site_no=13337500)). The  $Q_{10}$  was exceeded three times during the operational periods of the gauge (Table 21). The years of exceedence were calculated based on the annual peak flow from the South Fork Clearwater River gauge. The numbers are not cumulative but are the flows that were above listed  $Q$  and below the next highest  $Q$ .

TABLE 21. SOUTH FORK CLEARWATER RIVER FLOW RECURRENCE INTERVALS AND ASSOCIATED FLOW (STREAMSTATS) COMPARED TO THE USGS STREAM GAUGE ANNUAL MAXIMUMS THAT EXCEEDED THE RECURRENCE INTERVAL FROM 1945-1974 AND 2003-2012 (YEARS THE GAUGE WAS OPERATIONAL).

$Q_x$	Years Exceeded	Flow (cfs)
<1.5	12	<1580
1.5	10	1580
2	1	1930
2.33	9	2100
5	5	2840
10	3	3470
25	0	4330
50	0	4940
100	0	5570

The coffer dam that diverts the flows from the mainstem channel to the bypass channel would be developed with a spillway that is activated above the  $Q_{10}$  but below the  $Q_{25}$  (1,316 cfs). This would allow water to spill into the newly constructed channel to reduce the potential for failure of the bypass channel. Fish could spill into the newly constructed channel if this occurs but, flow if split between the bypass channel and mainstem channel at the  $Q_{25}$ , would be less than 300 cfs in the newly constructed channel, which, the channel is designed to hold. Fish would have to be re-salvaged from the newly constructed channel if this occurs. The probability of having a  $Q_{25}$  flow during construction is low, however, providing this fail safe would reduce the overall environmental damage if this flow occurs, and re-salvaging fish would be less harmful to the fish than having the bypass channel fail and erode at high flows.

## 5.2 FISH SALVAGE

Fish salvage operations, including seining, netting, and electrofishing, would have a direct effect on individual salmonids in the project area and could harm or kill listed fish. Fish salvage operations would likely begin in the fall of 2014 at low, base flow in Reaches 2 and 3 in the ponds. Fish would be removed through seining, netting, and electrofishing in the mainstem channel in Phases 1 and 2 as described in the Proposed Action Section. The mainstem would be dewatered and defished after July 15. Crews would attempt to remove most of the fish from the mainstem channel through slow dewatering (several days) and seining to reduce the overall number of fish that would be netted and electrofished. The bypass channel would require fish removal once as the new mainstem channel is rewatered in Phase 3. The same procedures of slow dewatering and seining would be used prior to electrofishing. The total area that would require fish salvage over the life of the project is 68,839 m<sup>2</sup>. By slowly dewatering, fish would be able to move out of the project. Weir-like structures would be installed in the mainstem channel to prevent fish from entering the mainstem once the bypass channel is in place.

There is a potential for age 0 steelhead to be in the project area if spawning has occurred. Age 0 fish would be more difficult to move from the project area, but dewatering slowly would help them move out of the channel margins. Extra care would be taken in areas with redds to remove the age 0 fish. Prior to electrofishing pools, the pools would be snorkeled to determine if adult bull trout are present. As stated in the Conservation Measures section, crews would dip-net adults prior to electrofishing. If this does not prove affective, a low voltage would be used when electrofishing to reduce the potential to kill adult bull trout. By following all of these conservation measures, as well as those outlined in the Conservation Measures section above, the number of salmonids handled and potentially killed would be greatly reduced.

Water quality and substrate conditions in many of the ponds do not likely support juvenile steelhead and bull trout, as described in the Environmental Baseline Section. Snorkeling data, as well as overall steelhead numbers found in Crooked River (IDFG unpublished data), and habitat/water quality data (see Baseline Section) from the project area show that steelhead and bull trout densities in the project area are very low.

During LWD installation in Options 1 and 2, fish may be harassed, which, could cause temporary movement to other areas of the stream. The displacement of fish would be temporary (few hours) and is not likely to cause mortality to listed fish.

## 5.3 SEDIMENT

Sediment effects on fish are dependent on duration of exposure, natural background levels, substrate material, frequency of exposure, toxicity, temperature, and the life stage of the species (Bash et al. 2001; Newcombe and MacDonald 1991). Increased sediment and turbidity affect fish through physiological

changes, behavioral changes, and changes to habitat. Salmonids in the Clearwater River Basin have evolved with some levels of turbidity during spring runoff.

Direct effects of sediment on fish include gill trauma, increased stress, and reduced reproduction and growth (Bash et al. 2001). Suspended sediment can displace juvenile fish (Bisson and Bilby 1982), which is one of the most important direct effects to fish. Sedimentation can affect fish habitat, such as filling pools and interstitial spaces in substrate (rearing areas), creating an armored streambed (reduce spawning areas) reducing the hyporheic/groundwater exchange, changing the benthic communities, and altering channel dynamics through increased sediment transport (width to depth ratios). Deposition of fine sediment in spawning substrate can cause embryo and larval mortality by reducing the supply of dissolved oxygen and smothering the eggs or swim-up fry in the gravels. As sediment becomes finer, the potential to cause mortality is increased (Bjornn and Reiser 1991).

Juvenile fish have been observed avoiding areas when turbidity levels ranged from 22 to 25 NTUs (Newcombe and MacDonald 1991). Increased stress and gill flaring has been observed from 30 to 60 NTUs. During similar construction activities in the Upper Crooked River, the NPCNF observed NTU levels of 233 (approximately 417 mg/L suspended sediment), which lasted less than 15 minutes (NMFS 2007). This was due to a pocket of clay within the project reach.

The primary actions that would increase sediment production in Crooked River is from watering the bypass channel and re-watering the newly constructed stream channel. Since LWD would be installed from the bank, increased turbidity is not expected from this action. Activities such as constructing the cofferdam and blocking passage in the ponds would have small levels of turbidity associated with them; however, conservation measures would keep turbidity below levels that would disrupt or harm fish.

Sediment effects from the proposed project could be seen in Crooked River and in the South Fork Clearwater River; however, the duration of sediment production would be short. Fine sediment and organic material has settled into the dredge ponds in the project area and would be the suspended material likely distributed to the lower end of Crooked River and the South Fork Clearwater River. Much of the sediment in the ponds for the bypass channel would be excavated, removed and stockpiled for future use as vegetative fill. It is difficult to determine how high sediment levels would be during this activity, however, sediment levels would not likely be increased to levels that would cause mortality to fish. Conservation measures would be in place to reduce sediment production if turbidity approaches 50 NTUs. Because minimization measures would be in place to keep turbidity below 50 NTUs, it is not expected that the sediment plume would encompass the entire width of Crooked River or the South Fork Clearwater River.

Increased sediment production could delay adult fish migration into Crooked River. The delay should be short; lasting only a day or two. There may be sediment production in the long term until stream banks are stabilized and the floodplain is re-vegetated; however, since the primary substrate materials are cobbles and gravels and the floodplain elevation is such that sediment would likely be stored rather than transported, this long term-effect is likely negligible.

Sediment delivery to Crooked River is not likely to occur during floodplain or channel construction since the river would be diverted into the bypass channel around the active construction area and for the duration of the project. Since groundwater levels are high through the Crooked River Valley, saturated conditions would likely occur in the construction area. Settling basins would be installed throughout the construction area.



## 5.4 HEAVY METALS/TOXINS

Although mercury was not used in dredge mining in the upper South Fork Clearwater, there is a small potential to find this element during restoration activities. Past geochemistry studies, including the *Crooked River Stream Survey and In-Situ Toxicity Results* (Baldigo 1986), *Water Quality Status Report 80: Crooked River* (Mann and Lindern 1988), and *Idaho Champion Group Lode and Pacific Group Load Claims: Preliminary Assessment and Site Inspection Report* (IDEQ 2011), have all shown that concentrations of heavy metals in both soil and water are generally equivalent to background levels or below detection limits. Recent heavy metals monitoring data collected within the Meanders project area in 2013 by the Nez Perce Tribe did not exceed cold water biota water quality standards (Nez Perce Tribe 2013 unpublished data). Based on these studies, mercury levels were not used as a water quality indicator.

In preparation for the 1980's channel rehabilitation work, the Idaho Division of Environmental Quality commissioned several investigations to monitor dissolved and total metal content and perform in-situ bioassays using 1 year old steelhead and Chinook salmon (Baldigo 1986, Mann and Von Lindern 1988). Testing took place in ponds and channel sections distributed throughout the proposed Meanders project to establish existing conditions. In addition, a pilot project analyzed the metal content in response to moving the tailings.

For the existing conditions, the studies (Baldigo 1986, Mann and Lindern 1988) found that water samples had metal contents within expected ranges using reference data from Red River, the American, Deadwood and Newsome Creek and comparing to EPA 95 percent thresholds (EPA 1986). The metal contents in sediment samples were also below the EPA's established 95 percent threshold values. These studies used young-of-year Chinook salmon and steelhead in the in-situ bioassays. All of the Chinook salmon survived the duration of the 144 hour test and 96 percent of the steelhead survived in the river, while 81 percent survived in the ponds. It is likely that sampling error is responsible for the survival rate of steelhead in the Mann and Lindern (1988) study, and high sediment levels in the pond was attributed to lower survival in the Baldigo (1986) study.

Results from the pilot study found that moving the tailings produced short term iron levels over the 95 percent for total iron but not dissolved iron (Baldigo 1986, Mann and Von Lindern 1988). The hazard was considered low since total iron is bioavailable and the effect was short term.

Even though mercury levels were below EPA's 95 percent thresholds (EPA 1986), BMPs have been established in the instance that elemental mercury is found in the project area. Mercury is naturally occurring in the environment and can be unearthed during construction activities. Appendix C provides the procedures that would be followed if mercury is found during construction.

Conservation measures would be implemented to reduce the potential of contamination from petroleum products and other chemicals as described in Section 2.3.

## 5.5 WATER TEMPERATURE

Stream and valley structure factors that influence water temperature include channel slope, width, streambed topography and substrate, channel pattern and width, and riparian vegetation. All of these factors have been adversely impacted by the historic dredge mining in the project area. As described in Section 3, water velocities in the project area have been greatly reduced through a reduction in channel slope. Slower water is exposed to solar radiation longer than fast water, which increases stream temperatures. This is also true for channels with high width to depth ratios. Channel pattern, streambed topography, and substrate influence

groundwater/surface water interactions, where groundwater and hyporheic exchange can provide areas of cooling. Riparian vegetation influences stream temperatures by reducing daily fluctuations through insulation in both summer and winter.

Because the proposed project would restore the factors that influence water temperatures, water temperature is not expected to be impacted relative to existing conditions in the short-term, and should be reduced in the long-term. Water temperatures would be affected in the short term by improving groundwater/surface water interactions (channel pattern, topography and substrate), reducing the surface area of the adjacent ponds exposed to solar radiation, improving width to depth ratios in the mainstem, and decreasing residence time of streamflow in the mainstem (increasing slope and decreasing length). Water temperatures would also be affected in the long term by improving riparian shade in the project area.

In the project area, there are over 20 acres of open water, primarily dredge ponds. These ponds intercept groundwater and hyporheic flow in the project area. The ponds, although warm in the summer months, have a less exaggerated diurnal flux that the river exhibits. This suggests that the ponds are influenced by groundwater. Since, the ponds are not well shaded, are generally stagnant and exposed to solar radiation, they heat up during the summer months. These ponds would be filled by the proposed project, which would greatly reduce the amount of surface water exposed to solar radiation, and thus, allow the cooler groundwater to be intercepted by the river rather than open ponds. Temperature data shows a slight decrease in water temperatures from upstream to downstream, likely from all of the groundwater. By reducing the surface area and improving groundwater interactions, the downstream cooling effect would likely become more pronounced.

The slope and length of the channel would be reduced by the proposed project, which would also reduce the amount of time surface water is exposed to solar radiation. The overall surface area in the new river channel would be reduced by providing a narrower and deeper river channel. The channel would be returned to a more natural sinuosity that would improve hyporheic exchange. By increasing water velocities and reducing the width to depth and improving hyporheic exchange, stream temperatures would not warm as quickly since it is not exposed to solar radiation as long.

Another factor in reducing stream temperatures in the project area is re-vegetation efforts. The proposed project would remove stream adjacent vegetation in Reaches 2 and 3. Stream adjacent vegetation would be left in place, where possible in Reaches 1 and 4. As described, current vegetation conditions provide little shading to Crooked River. Solar pathfinder data shows that effective shade is currently about 30 percent for the entire project area and only 3 percent is found in the greenline (RDG et al 2012) and therefore, the existing riparian vegetation is not effectively providing shade. By restoring the floodplain and re-planting the riparian areas with shrubs and trees, effective shade would be improved to about 83 percent, based on the areas developed that would support riparian vegetation. Removing vegetation in the project area is not expected to have an adverse effect on water temperature in Crooked River since only about 3 percent of greenline vegetation is providing shade.

The bankfull floodplain would be replanted with large woody vegetation, including alders, spruce, cottonwoods, red-osier dogwood and a variety of willow species. As described in Section 3, the streambanks

would be planted first, and with large vegetation (8-gallon- 5-6 feet high) that could begin providing effective shade within a couple of years.

There have been other similar restoration projects that have planted vegetation in cobble substrate; all of them using different planting techniques, and with varying success. Planting methods most similar to the proposed planting in Crooked River were used on the Clark Fork River in Montana, and on the Pine Creek, near Pinehurst, Idaho. Both projects planted dense willow cuttings along the banks. The Clark Fork project used vegetative soil lifts, where willow cuttings were planted between the lifts. Within two years, dense willow stands that are approximately 5 to 6 feet in height have formed along the banks. The Pine Creek project used 1-gallon willow and alder plants that were installed via trench planting. Two to three plants were installed per foot along the stream channel in cobble substrate. One-gallon plants are approximately 1 to 2 feet tall when planting. The plants grew about 4 to 5 feet within a couple years of plating (Mike Stevenson, BLM, Pers. comm., 2012).



Figure 15. Photos of riparian vegetation on the Clark Fork River, Montana, and Pine Creek in northern Idaho. Vegetation on the Clark Fork was planted in 2011 and the photo was taken in 2014. The vegetation on Pine Creek was planted in 2009 and the photo was taken in 2012.

Currently, water temperatures are not limiting steelhead spawning in the project area (lack of spawning substrate is the primary limiting factor). Temperatures in the project area are likely limiting juvenile salmonid summer rearing as well as the lack of complex habitat. The proposed project would improve all of these factors in lower Crooked River.

During fish salvage operations, temperatures in the mainstem channel and bypass channel may be high. Fish would already be stressed from fish salvage operations and high water temperatures could exasperate the harmful effects of handling and electrofishing. To reduce these effects, crews would look for areas of cold water refugia, such as groundwater upwelling or tributary inputs, and release fish in these areas. However, if these areas are not close to where fish salvage operation are occurring, then fish would be released adjacent to the salvage areas to reduce the amount of time fish are held in buckets.

## 5.6 HABITAT FEATURES

Instream habitat would be greatly improved by the completion of the Crooked River project. A more naturally sinuous channel would be constructed with floodplain connectivity, a more natural longitudinal profile and slope, woody debris habitat features, channel spanning woody debris cover, and re-vegetation of

native species. All of these elements would enhance pool habitat by increasing pool-forming processes, thermoregulation, and protective cover necessary for aquatic species.

The proposed design incorporates 30 percent pools, 40 percent riffles, 10 percent runs, and 20 percent glides, creating a much more diverse habitat structure with much more spawning habitat for Chinook salmon and steelhead (RDG et al 2013). Platts (1974) found in the South Fork Salmon River drainage that the highest numbers of salmonids were associated with a pool:riffle ratio of about 30:70. Glides, or in most cases, pool tailouts have the highest spawning site selection among Chinook salmon and steelhead (Sommer et al. 2001). Riffles are important macroinvertebrate producing habitat types, and are sometimes selected for spawning if not too shallow or fast (Platts et al. 1983).

Floodplain grading and channel reconstruction would increase the entrenchment value to 2.5 –10 throughout the project area, thus decreasing entrenchment (RDG et al. 2013). Floodplain access has many benefits, including deposition of fines, decreased shear stress in channel/on banks, off-channel refugia for juvenile salmonids, high potential for allochthonous inputs into the stream system, and seed dispersal. Studies by Sommer et al. (2005) have shown that floodplains provide viable rearing habitat for juvenile salmonids. The shallow water depth on the floodplain provides areas of low velocities in which salmonids seek refuge, forage, and reduced competition and predation from the main channel habitats.

Large woody debris provides habitat complexity and cover, and assists in pool creation and maintenance in stream systems. It also has the added benefit of increasing diversity in the macro-invertebrate habitat and species (Hrodey et al. 2012). The extreme level of past disturbance in Crooked River has left the project area devoid of LWD and recruitment potential.

Stream surveys yielded 2–5 single pieces and 1–2 LWD aggregates per 100 meters of stream. Large woody debris increases the ability of stream habitat to support and produce salmonid species through pool creation and maintenance (Cederholm et al. 1997), added cover and hiding from predators (Fraser and Cerri 1982), refuge from high-velocity flows (Bustard and Narver 1975), and greater macro-invertebrate diversity (Hrodey et al. 2008; Rogers 2003).

The hydraulic complexity created through a more natural meandering pattern would increase spawning habitat from less than 2 acres to nearly 3.5 acres through the project area; juvenile-rearing habitat would be decreased from 2.45 acres of low- to marginal-quality habitat to 1.94 acres of substantially better rearing habitat. The reduction of habitat modeled for juvenile rearing is simply from the reduction of the overall length of stream channel (3.1 to 2.6 miles) (RDG et al. 2013). Off-channel alcoves and side channels would offer higher-quality rearing potential than the margins of the current condition of Crooked River. As described in Section 3, slow velocities seem to limit habitat potential for juvenile Chinook in the lower Crooked River. Increasing velocities by increasing slope and decreasing stream length would improve habitat potential for juvenile Chinook and improve survival if the acclimation facility is used in the future.

The rearing areas modeled by RDG do not include side channels that are connected or the connection of the existing ponds that would remain. The quality of rearing habitat would also be increased due to proper substrate sorting, overhanging riparian vegetation, reduced instream temperatures, and improved instream complexity from increases in LWD (Fraser and Cerri 1982, Bustard and Narver 1975). Additionally, 2,700 linear feet of side channels and about 10 off-channel alcoves would be constructed, both for the purpose of increasing beneficial juvenile rearing habitat and high flow refugia. The side channels would be constructed to provide high flow refugia and are connected at low base flows.

Spawning areas could potentially be created in the side channel if the ideal substrate is present. Since the side channel is only active when flows are approximately 50 cfs and greater, redds in the side channel could become dewatered if flows recede quickly in the spring/early summer, prior to emergence. Flows are likely to persist in the side channel into early July, which is when the mainstem reaches baseflow. Depending on when steelhead spawn in the project area (see Appendix B), emergence would likely occur prior to the water receding.

## 5.7 HYDROLOGY

One of the primary purposes of the Crooked River project is to restore more natural hydrologic functions that, in turn, would maintain the processes to support appropriate instream habitat conditions for salmonids. As mentioned above, Crooked River is currently functioning similar to a spring-fed system where it should be functioning as a snow-melt dominated system. The current hydrologic conditions are provided in the Design Criteria Report (RDG et al. 2012) and briefly summarized in the Environmental Baseline Section.

The new channel is designed to hold the  $Q_{1.1}$  (300 cfs), which means the floodplain would be inundated each year, and possibly twice a year. This design would allow the channel to adjust its shape more naturally and for substrate to be deposited on the floodplain. This design would improve water storage in the floodplain as well as help capture seeds and propagules.

Altering the current hydrology has the potential to adversely affect salmonids if channel and floodplain conditions allow the river to go subsurface. The floodplain and new river channel would be regraded to have an appropriate mix of fill that would improve water retention in the floodplain. The river channel and streambanks would consist of about 30 percent sand and gravel mixed in with larger cobbles and boulders. Floodplain fill consists primarily of sands, gravels, and cobbles six inches or less. Fines and organic materials would be mixed in the floodplain substrate as well. Typical flow rates through alluvial materials (hydraulic conductivity) are about 0.0012 ft/s for a sand and gravel mix and up to 0.01 ft/s for gravel. Multiplying the groundwater flow rate by the area of floodplain fill layer at the maximum thickness the expected flow rate through the sand and gravel mix is about 1.25 cfs (0.0012 ft/s \* 400 ft wide by 2.7 ft deep) and 12.5 cfs for gravel (M. Daniels, RDG, Pers. comm, 2014). This means that only about 1.25 cfs would be able to pass through the sand and gravel substrate material in the riverbed; and flows should be even less through the floodplain fill. However, if the riverbed material consisted of only gravels and cobbles, the loss of flow could be about 12.5 cfs from the river. Baseflow in Crooked River was measured at about 25 cfs in 2012 (RDG et al. 2012). Base flow estimates for the 7 day  $Q_2$  is about 12.3 cfs. We can assume that if only about 1.25 cfs can pass through the substrate materials, the remaining flows would be retained as surface flows, but again, if the substrate is not mixed and consists of only gravel or larger sized substrate, there would be a high potential of the river channel going subsurface.

Tribe and USFS staff would survey the new channel during re-watering for potential subsurface flow. If areas are found where the river goes subsurface, the substrate would be reworked and fines added to help seal the channel. Since the new channel would be watered over the course of several days, crews should be able to determine if flows would remain in the new channel. If areas are found to lose water even after re-mixing the substrate and using pumps to work in smaller substrate, bentonite may be used to prevent this loss. Flow levels in the new channel would be lower than baseflow when initially re-watering the new channel since sufficient flows would need to remain in the bypass channel until it can be salvage (approximately 6-10 cfs). The Tribe and USFS would survey the new channel as it is being rewatered over a 48 hour period. If the new channel sinks immediately upon rewatering, crews would wait 24-48 hours to allow for adjustments in the

groundwater table (Matt Daniels, River Design Group, Pers. comm., 2014). If the water in the new channel does not resurface, then the substrate would be remixed. This process would be repeated until there is surface water throughout the new channel.

Increasing the floodplain area through the valley bottom should raise the ground water table. The floodplain volume would be increased by grading tailings piles and filling in dredge ponds. This would provide large areas of new surface floodplain area available for inundation above the  $Q_{1.1}$ , and decreasing the pore sizes of the floodplain, especially through the dredge ponds, would increase the retention time of groundwater (increase lateral flow path). Increasing the length of lateral flow paths and amount of area inundated would back-up the water flowing through the valley and essentially raise the water table.

Even if the groundwater table is raised in the valley bottom, assurances are still necessary to prevent the river from going subsurface. To provide this assurance, sands and gravels would be mixed into the riffles, and crews would wash these fines into riffle areas using pumps if the potential for subbing is apparent. Water would be pumped from the stilling basins within the isolated floodplain area. Since the new river channel would not be reconnected to the mainstem channel or bypass channel during construction, sediment from this activity would be filtered into catchment areas. Washing in smaller substrates would help ensure that the appropriate mixture of fines is achieved, thus reducing the potential for loss of surfacewater. An Emergency Action Plan is provided in Appendix A that describes the measures taken if flows are lost.

If flows are lost in the mainstem channel post construction, approximately 10 miles of medium to high quality habitat would be unavailable to migrating fish. This could occur during low base flows and could last until fall when streamflows increase. Actions outlined in the Emergency Action Plan would be followed to reduce and prevent this potential.

Long term benefits of altering the hydrology of Crooked River are creating conditions that continue to support pool-forming processes and substrate routing that provides spawning gravels. The new channel would be constructed with about 58 pools that would be 4 to 6 feet deep and have a residual pool volume of 1,000 to 2,000 cubic feet. Processes for maintaining these pools includes lateral scour caused by meander migration, contraction scour (riffles), and vertical scour caused by obstacles such as LWD and boulders. These processes are not currently available due to the severe meanders (90 degree angles) and loss of lateral migration processes as stated in Section 3.

The stream slope would be doubled, from the existing 0.003 to 0.006 through the valley. By increasing the slope towards the natural slope of the valley, sediment transport processes would be regained in the system; proper slope for sediment transport processes is important to minimize aggradation or down-cutting in a stream system, as well as creating clean, un-embedded spawning gravels. This design creates the opportunity for variable hydraulics to maintain the bedform and a highly complex habitat to increase spawning potential and higher-quality rearing sites. By providing connected floodplain throughout the project area as well as increasing the slope, thus streampower, sands, fines and gravels should dissipate throughout the length of the channel.

## 5.8 EMERGENCY ACTION PLAN EFFECTS

During construction of the project, there are a few mechanisms for failure that would create an emergency (Appendix A). For the Crooked River project there is a potential, though low, to see flows greater than the  $Q_{25}$  while the bypass channel is in operation; the levee through the project area could fail at high flows; and, surface flow can go subsurface in the newly constructed bypass or river channels during flow introduction.

High flows in the bypass channel have the potential to erode the toe of Crooked River Road or the levee through the project area. The contractor, Tribe (Project Manager) and USFS (Fish Biologist or Hydrologist) staff would evaluate the bypass channel after watering the channel and after any high flow event for damage to the toe of the road or the levee. Areas that appear to be damaged or that could become damaged would be riprapped. The riprap would be installed so that it does not impede fish passage. The rocks would be buried in the upland floodplain (above OHWM) or removed when bypass channel is filled in.

If the bypass channel fails during high spring flows, there is a potential to strand fish in the newly constructed floodplain. The bypass channel was designed to hold a large flow event, and a spillway would be constructed on the coffer dam to spill flow greater than the  $Q_{10}$ . Although fish would have to be re-salvaged from the newly constructed channel, the effects from re-salvaging fish would be much less than if the levee failed. If fish are spilled into the newly constructed channel or on the floodplain, they would likely be able to find their way back to the mainstem channel downstream. Tribe and USFS staff would survey ponded areas in the floodplain and new channel for stranded fish if the bypass channel fails, and salvage these fish.

## 5.9 DIRECT AND INDIRECT EFFECTS TO PRIMARY CONSTITUENT ELEMENTS

In Crooked River, the main stem, East and West Forks, Relief Creek and the East Fork, and the lower end of Fivemile Creek are Designated Critical Habitat for steelhead and bull trout. Of the six primary constituent elements listed in the proposed rule for steelhead, three elements pertain to the Snake River subbasin (freshwater spawning sites, freshwater rearing sites, and freshwater migration corridors). All Any potential impacts, regarding these three primary constituent elements requires the Forest to confer with the NOAA Fisheries and U.S. FWS. The baseline information for Crooked River and potential impacts for the proposed Crooked River Valley Rehabilitation Project are summarized below:

### Primary Constituent Elements:

#### **STEELHEAD:**

- 1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development. These features are essential to conservation because without them the species cannot successfully spawn and produce offspring.***

Steelhead spawning is mostly unknown in the Crooked River drainage, though redd surveys were conducted in 1990-1997 and began at river mile 8.3, 5 miles upstream from the project area. The habitat through the project area is currently not conducive to steelhead spawning due to the unnatural flow paths, armored channel substrate and lack of bed complexity. Short-term impacts to this PCE would be from increased sedimentation from rewatering the channel that could temporarily fill in spawning substrate in the project area. Long-term, there is potential for suitable spawning areas to become available in the project area due to slightly increased slope, more natural sediment transport to bring in spawning gravels, and flow paths desirable to steelhead for spawning.

- 2. Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks. These features are essential to conservation because without them, juveniles cannot access and use the areas needed to forage, grow, and develop behaviors (e.g., predator avoidance, competition) that help ensure their survival.***

As described in the Temperature section, the water through the project area is currently very warm. In the Pool Frequency and Quality section, numbers of fish were described as seen in a snorkel survey, with no juvenile steelhead observed. Shade, large woody debris, channel complexity, floodplain connection and off channel refugia are all lacking in the valley. Again, no juvenile steelhead were observed in the project area in snorkel surveys in September. This project has potential to impact some potential rearing sites in the short-term. Long-term, the project will increase rearing area substantially. The quality of rearing habitat would also be increased due to proper substrate sorting, overhanging riparian vegetation, reduced instream temperatures, and improved instream complexity from increases in large woody debris (Fraser and Cerri 1982, Bustard and Narver 1975). Additionally, 2,700 feet of side channels and about 10 off-channel alcoves would be constructed, both for the purpose of increasing beneficial juvenile rearing habitat and high flow refugia. Moreover, temperatures are expected to decrease over the long term with increased groundwater connectivity and decreased solar radiation from riparian vegetation.

*3. Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival. These features are essential to conservation because without them juveniles cannot use the variety of habitats that allow them to avoid high flows, avoid predators, successfully compete, begin the behavioral and physiological changes needed for life in the ocean, and reach the ocean in a timely manner. Similarly, these features are essential for adults because they allow fish in a non-feeding condition to successfully swim upstream, avoid predators, and reach spawning areas on limited energy stores.*

The current channel is free of migration barriers currently. The short term could have an impact on some migration, but as described in the Bypass Channel section above, there is very low probability that there will be flows that could hinder juvenile or adult migratory behaviors. Long-term, the channel would provide a more natural flowpath for upstream and downstream migration, as well as potentially lower temperatures and greater habitat complexity, such as large wood, side channels, and undercut banks. Conservation measures and the Emergency Action Plan would be implemented if there is loss of surface water in the new channel or the bypass channel; therefore, the project is not likely to create a migration barrier. The proposed project has the potential to create migration delays in the short-term (days) during construction of the bypass channel. The amount of spawning habitat in the project area is about 2 acres, which is less than 1 percent of the spawning area in the South Fork Clearwater population area (A. Lamontagne, Pers. comm., NMFS Hydrologist, 2014). This project would have short-term adverse effects on this PCE due to the potential loss of spawning areas in the project area during construction. Long-term, the project would improve migration corridors by provide overhead cover and instream complexity in the migratory corridor.

#### **BULL TROUT:**

1. *Sufficient water quality and quantity having low levels of contaminants such that normal reproduction, growth and survival are not inhibited.*

As discussed above, steps would be taken to reduce sediment production during construction activities as well as prevent contaminants from entering live water. Flushing of sediment from the bypass channel could have impacts on fish in the lowest reaches of Crooked River and potentially in the South Fork Clearwater River. Heavy metals have not been found in the project area in past monitoring efforts and are not likely to have an effect on listed fish from the proposed action. The new channel and floodplain construction would regrade the slope of the channel and floodplain. By regrading the valley bottom, the potential exists to cause



the river to go subsurface in riffle sections. As described in Section 5 above, groundwater elevations have been observed to be roughly at the same height as surface water elevations. By reconnecting hillslope water, increasing the groundwater flow path, and incorporating fines into the floodplain and river channel during construction, the potential to lose surface water is minimal. This PCE has minimal potential to have a short-term adverse effect, but would be beneficially affected over the long-term.

- 2. 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 would 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.*

Currently, water temperatures are too warm to support bull trout spawning in the project area. Restoring the stream channel morphology would allow for more groundwater surface water exchange, rather than the groundwater being captured by the ponds. It is difficult to determine if water temperatures would be reduced or remain the same from increases this interaction. Removing vegetation is not expected to have a measurable impact on water temperatures since 75% of the river channel currently receives solar radiation. The areas where trees are providing shade, the river would not be reconstructed and the vegetation preserved where possible. The floodplain and streambanks would be replanted with appropriate riparian community types. This would reduce the amount of time needed to develop a functioning riparian area that can effectively provide shade. This PCE would be beneficially affected over the long-term as a result of the proposed action.

- 3. Complex stream channels with features such as woody debris, side channels, pools, and undercut banks to provide a variety of depths, velocities, and instream structures.*

As described in Section 3 above, the current instream habitat lacks complexity. Installing large woody debris, creating a longitudinal profiles that supports an appropriate pool:riffle ratio, and an appropriate meandering planform would greatly improve the migration corridor for bull trout. The river channel length would be decreasing, which would shorten the amount of time and effort for migrating bull trout. Macroinvertebrate communities would be improved by improving substrate quality in riffles, providing woody debris, and allochthonous inputs from riparian vegetation. Off channel habitat would be improved through the creation of two side channels that are connected to the mainstem river. The bypass channel, however, would likely have less complexity during construction. This PCE would be beneficially affected over the long-term as a result of the proposed action, but may be adversely affected over the short-term.

- 4. Substrate of sufficient amount, size, and composition to ensure success of egg and embryo over winter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine substrate less than 0.63 cm (0.25 in) in diameter and minimal substrate embeddedness are characteristic of these conditions.*

Bull trout do not currently spawn in the lower Crooked River project area; however they do spawn in the headwaters. It is difficult to say whether the overall project would improve habitat conditions such that bull trout would be able to use the project area for spawning and rearing due to high water temperatures, but the headwaters would continue to be available in their current condition. More watershed restoration would be needed in the mid and upper reaches of the mainstem Crooked River to reduce water temperatures such that bull trout spawning could be supported. The proposed action would not change the spawning distribution of bull trout; however, the proposed project may improve rearing habitat, thus this PCE may be beneficially affected by the proposed action.

**5. A natural hydrograph, including peak, high, low, and base flows within historic ranges or, if regulated, a hydrograph that demonstrates the ability to support bull trout populations.**

The current morphology of the valley bottom creates conditions where peak spring flows are truncated over the floodplain causing Crooked River to behave more like a spring-fed river rather than a snow melt dominated system as described in Section 3, above. Regional regression curves show bankfull in Crooked River at about 600 cfs, where current bankfull indicators show bankfull at 300 cfs. Constructing a floodplain that would be inundated above the  $Q_{1.1}$ , Crooked River would begin to demonstrate a snow-melt dominated hydrograph. Although instream peak flows would be reduced by having a floodplain that is inundated often, these conditions would be able to change over time while the river channel and floodplain “reset” to a more natural condition. This PCE would be beneficially affected over the long-term as a result of the proposed action.

**6. Springs, seeps, and groundwater sources, and subsurface water connectivity to contribute to water quality and quantity.**

Springs, seeps and groundwater connection likely occur in the project area. The project would likely reconnect groundwater and surface water connectivity in the mainstem channel that is currently captured by the ponds. By removing tailings piles and filling dredge ponds, lateral groundwater flow from hillslope groundwater would be slower to percolate and likely reconnect to the mainstem channel. This PCE would be beneficially affected by the proposed action.

## 6.0 EFFECTS DETERMINATION

### 6.1 SNAKE RIVER BASIN DISTINCT POPULATION SEGMENT STEELHEAD

The proposed action warrants and effects determination of May Affect, Likely to Adversely Affect for steelhead of the Snake River Basin DPS.

A determination of May Affect is warranted for the Crooked River Valley Rehabilitation Project based on the following rationale:

- The occurrence of steelhead is documented in Crooked River, within the project area.
- The proposed Crooked River project would require in-water work and could affect habitat conditions for steelhead in the project action area over both the short-term (construction) and the long-term (floodplain and channel reconstruction and changes to the hydrology).

A determination of Likely to Adversely Affect is warranted based on the following rationale:

- A bypass channel would be constructed that would provide habitat access for adult and juvenile steelhead for the majority of its life-span.
- All in river work would occur during the approved work window beginning July 15.
- Steelhead occurring in the action area may be exposed to fish removal and exclusion activities, suspended sediment pulses, and construction-related disturbance.
- Fish salvage, including removal and exclusion would involve capture and handling that may result in stress, injury and/or mortality of juvenile steelhead.
- Construction activities may cause habitat disturbance sufficient to alter normal behavior.

- Construction activities would create suspended sediment pulses sufficient to cause effects ranging from behavioral alteration to moderate physiological stress.

## 6.2 CRITICAL HABITAT

The information and analysis presented in this Biological Assessment indicate that the proposed action warrants May Affect, Likely to Adversely Affect determination for Snake River Basin DPS critical habitat based on the following rationale:

- Designated critical habitat does occur in Crooked River in the project area.
- The Crooked River project involved modification of this designated critical habitat.

A determination of Likely to Adversely Affect is warranted based on the following rationale:

- The project would result in temporary exclusion of habitat in the project area and modification of migration corridors for up to four years.
- The project would result in temporary degradation of water quality in the action area through increased sediment production.
- The project would have long-term positive benefits of providing spawning habitats and improving rearing habitat through habitat enhancement.

Adverse effects on critical habitat would be short-term in nature. Over the long-term, the proposed action will beneficially improve the condition of all essential components of designated critical habitat in the action area.

## 6.3 BULL TROUT

The proposed action warrants and effects determination of May Affect, Likely to Adversely Affect for bull trout.

A determination of May Affect is warranted for the Crooked River Valley Rehabilitation Project based on the rationale provided for steelhead.

A determination of Likely to Adversely Affect is warranted based on the same rationale as for steelhead.

## 7.0 ESSENTIAL FISH HABITAT EFFECTS DETERMINATION

Public Law 104-297, the Sustainable Fisheries Act of 1996, amended the Magnuson-Stevens Fishery Conservation and Management Act to establish new requirements for essential fish habitat (EFH) descriptions in federal fishery management plans and to require federal agencies to consult with NMFS on activities that may adversely affect EFH.

The Magnuson-Stevens Act requires consultation for all federal agency actions that may adversely affect EFH. EFH consultation with NMFS is required by federal agencies undertaking, permitting, or funding activities that may adversely affect EFH, regardless of its location. Under Section 305(b)(4) of the Magnuson-Stevens Act, NMFS is required to provide EFH conservation and enhancement recommendation to federal and state agencies for actions that adversely affect EFH. Wherever possible, NMFS utilizes existing interagency coordination processes to fulfill EFH consultations with federal agencies. For the covered actions, this goal is

being met by incorporating EFH consultation to the ESA Section 7 consultation, as represented by this Biological Assessment.

The proposed action and action are the same for EFH as for ESA Section 7 consultation. The proposed action may have short-term adverse effects on spring/summer Chinook habitat, primarily during construction of the floodplain and new channel. Spawning areas used by spring Chinook salmon in Reach 2 would be unavailable during construction of Phases 1 and 2. The number of spring Chinook returning to Crooked River has been low over the past 10 years; however, many spring Chinook were not passed above the weir due to the Idaho Supplementation Study (ISS) (IDFG 2009-2011). As a part of this study, only non-fin clipped females were passed above the weir. The greatest number of females passed above the weir in the past 10 years was 6. Redd counts were also conducted in Crooked River as a part of the above mentioned ISS. The number of redds counted each year corresponded to the number of females passed above the weir.

Reach 2 in the project area supported the highest number of spawning Chinook in the lower Crooked River. One redd was counted in Reach 3 in 2010. There is a mile stretch of river above the narrow canyon that also supports spring Chinook salmon spawning. These are the only reaches within Crooked River that currently support spring Chinook spawning.

Although the proposed project would limit spawning area during construction, the number of spawning fish has been so low over the past 10 years that spawning areas would still be available even if more females are passed above the weir. The proposed project would improve spring Chinook habitat in the long term by providing more spawning areas throughout lower Crooked River through substrate distribution. Altering the hydrology to allow for scour would also help clean gravels that would support Chinook spawning.

## 8.0 CUMULATIVE EFFECTS

The cumulative effects for fisheries resources include the effects of future State, tribal, or private actions that are reasonably certain to occur in the project area. The action area considered in this biological assessment is detailed above. Future federal actions that are unrelated to the proposed action are not considered because they require separate consultation. There are some past, current, and future planned actions in Crooked River that may impact listed fish.

State actions in the project include operations of the weir at the mouth. These actions, however, have been consulted on since they are federally funded, and will not be described as cumulative effects in this BA.

There are private lands in Crooked River. Most of the private lands are developed for primary or secondary residents. Effects from private, developed lands could include increased nutrients from septic systems, loss of shade from development along the creek, and increased sediment from roads.

There are two larger parcels of private land that were historically or are currently mined. The Champion Mine is about 6 miles upstream from the mouth of Crooked River and has not been developed. No known mining or development is proposed for this land. Premium Exploration owns about 1 square mile near the town of Orogrande. The mining company has been conducting exploration activities on this land for the past few years. Activities include building roads and drilling test pits (Figure 16). These activities have the potential to increase sediment to Quartz Creek and Crooked River. Currently the full scale mining operations have been proposed on these lands; however, it is likely full scale mining operations could occur on these lands.



FIGURE 6. GOOGLE EARTH IMAGES OF OROGRANDE IN 2008 AND 2013, RESPECTIVELY. THE ROAD CONSTRUCTION IS FROM MINING EXPLORATION.

The proposed action would have cumulative effects with the past, present, and reasonably foreseeable activities in Crooked River. Sediment inputs of the Meanders project, along with land development, mining, and road building. The sediment inputs of the Meanders actions would be at discrete times, as permitted by regulatory agencies. Potential sediment inputs could overlap with the implementation of this project from other private activities, as well as Federal activities. However, though the projects would overlap in time, there would be very little direct overlap in space. The Meanders would improve sediment transport processes to deposit sediment in the most natural, beneficial locations in the stream system. The short-term impacts of sediment should be outweighed by the long-term benefits of more naturally functioning instream and floodplain processes. Impacts are expected to decrease, and condition is expected to improve in the ensuing years, resulting in a habitat condition that is improved compared to the current condition. The proposed action, while presenting a moderately high short-term increased risk of sediment inputs, would have a long-term benefit of proper sediment transport processes and long-term improvement in watershed condition.

Stream temperature is also an indicator at high risk of cumulative impacts, given the stream's existing condition. The project could have a negative effect on temperature, but it is difficult to predict changes due to groundwater influence. There could be potential short-term increases in temperature but with long-term reduction in temperature through increased floodplain function, groundwater connection, and increased riparian and instream cover.

### **SOUTH FORK CLEARWATER RIVER**

Findings for aquatic resources in Crooked River and the South Fork Clearwater River include substantial physical changes since the initiation of human disturbances in the 19<sup>th</sup> century. Specific activities included mainstem dams, in-channel mining in the mainstem rivers and tributaries, timber harvest throughout the subbasin, road construction and encroachment on streams, domestic livestock grazing, home construction and private land development, agriculture and cultivation, fire suppression, and many other activities. It is generally accepted that water quality and habitat in the South Fork Clearwater River is in a degraded

condition, both from sediment and temperature impacts (USDA Forest Service 1998; USDA Forest Service 1999).

As described in this section, dredge mining and hydraulic mining caused significant erosion in the tributaries, and accelerated sediment deposition in the mainstem of the South Fork of the Clearwater River.

Fish passage in the South Fork Clearwater River has been impacted by mainstem dams since the early days of settlement. The first dam reported in the South Fork Clearwater River was the Dewey Mine Dam, which was in place by about 1895. This dam was reported to be 6 to 8 feet high and located about 3.3 miles above the Harpster Bridge. The dam was in place for a few years with no documentation of fish passage conditions. Lower in the South Fork, near the town of Kooskia, was the site of the Kooskia Flower Mill Dam. This dam was in place from 1910 into the 1930s. The dam was estimated to be about 6 feet high. The Washington Water Power Dam was reportedly built in 1911 (Siddall 1992). This dam was a total barrier to fish migration; a fish ladder was constructed in 1935 but was washed out in 1949. This dam was reported to be 33 or 56 feet high, depending on the source. It was removed on August 3, 1963. The existing salmon and steelhead populations are a result of fish stocking, likely supplemented by straying adults from the Clearwater River.

Current land uses occurring on private lands include livestock grazing, timber harvest, agriculture, residence construction, road construction, sewage treatment, and water withdrawals for domestic use and irrigation. It is estimated that increases in general land uses would occur in the next decade. Additional information on private land activities is found in the South Fork Clearwater River Biological Assessment (USDA Forest Service 1999).

Given all the above information, the South Fork Clearwater River is at high risk for cumulative impacts, especially from additional sediment and increased water temperature. The Crooked River Valley Rehabilitation project is designed to improve overall fish habitat by reducing non-point sediment sources and improving instream fish habitat. Sediment increases from instream restoration and road improvement activities would, however, increase sediment in the short term. In general, the level of activity on federal lands is currently substantially less than in recent decades, and many federal actions contain watershed improvements as part of the project. Proposed mining activities may contribute to the conditions in the subbasin, but mitigation for these projects is expected to reduce some of these impacts. Proposed timber sales on National Forest lands are subject to similar mitigation and upward trend requirements as the Crooked River Valley Rehabilitation project, and although spikes of sediment may occur, in general stream habitat is expected to improve at least locally.

The South Fork Clearwater River TMDL for sediment and water temperature would govern activities on state and private lands as well as federal lands (IDEQ and USEPA 2003). Under this guidance, aquatic conditions should continue to improve in the South Fork Clearwater River.

## 9.0 MONITORING

Monitoring includes implementation and compliance monitoring as well as action effectiveness monitoring. Implementation and compliance monitoring includes monitoring turbidity during watering of the bypass channel and newly constructed river channel, monitoring the newly constructed floodplain, depressions and swales, monitoring turbidity while installing LWD in Options 1 and 2, and monitoring planted vegetation.

Action effectiveness monitoring looks at whether or not the project met its purpose and goals of restoring fish habitat.

## 9.1 IMPLEMENTATION AND COMPLIANCE

A fish biologist, watershed restoration specialist or project manager from either the NPCNF or Tribe would ensure that conservation measures are being adequately followed during construction. Any site specific adjustments made during the construction process must be within the effects analyzed in this biological assessment.

Turbidity would be monitored for potential effects on fish. Turbidity would be monitored according to the following methods: turbidity samples would be taken above the work site to determine the background level using a DH48 depth integrated sampler. The samples are taken across the width of the channel and samples would be analyzed using a field turbidimeter. During rewatering activities, turbidity would be taken 300 feet and 600 feet and 1,000 feet below the point where the rewatered channel meets the existing channel or below where instream work is taking place if sediment plumes are observed. If turbidity levels approach 50 NTUs above background water levels would be reduced until turbidity levels return to background levels or 10 NTUs. Turbidity would be monitored regularly (e.g. every 15 minutes) if there is a visible turbidity plume.

Re-vegetation would be monitored for survival by the Tribe and USFS. Vegetation would be monitored using circle plot surveys as outlined in Monitoring Restoration Effectiveness (McRoberts and Tomkins 2008). Circle plot surveys are conducted by attaching a measuring tape to a permanent marker and exiting it to create a 15 foot radius, which is then used to describe a circle 30 feet in diameter. Vegetation along four transects, two oriented towards the water's edge and two away, would be inventoried by genus, height, conditions, and distance from centerpoint. Several permanent plots would be surveyed throughout the project area for 10 years after project completion. Notes would be taken if the plant is caged, or if there is browse on the plant. If survival rates drop below 80 percent, the site conditions would be evaluated and areas would be replanted.

"As-built" assessments would be conducted on all the wetlands constructed in the project area upon completion of the project by the USFS and Tribe. The assessments would document if the wetlands were constructed as specified in the designs. The wetlands would be mapped using GPS equipment and initial site conditions (i.e. plant communities) would be documented to provide baseline conditions. After the "as-built" is complete select wetlands would be monitored long-term. Permanent photopoint locations for wetlands would be set up at several randomly selected sites. Photopoints would be taken yearly, during the growing season using a platform or flat surface on top of a four-foot staff using recorded azimuth readings so that the same location is photographed each year. Species composition of each wetland would be recorded and the perimeter of the wetland would be documented by GPS. The permanent wetland sites would be monitored for 10 year post construction by the USFS and Tribe.

Upon completion of Phases 1 through 3, the side channel would be surveyed for fish after high flows to ensure fish are not being stranded. Crews would walk the side channels as the flows approach base flow and look for fish. If stranding is found in the side channel the outlet of the channel would be adjusted to allow fish to pass out of the channel. If fish are stranded each year over a few years, the side channel would be converted to wetlands.

An annual monitoring report that includes turbidity results, fish salvage, vegetation data, and BMP effectiveness would be provided to the Services in January each year.

## 9.2 ACTION EFFECTIVENESS MONITORING

The Nez Perce Tribe, in coordination with BPA and TetraTech, would monitor the project for action effectiveness following Columbia River Habitat Monitoring Program (CHaMP) (NOAA and BPA 2014). CHaMP is designed to monitor status and trend of habitat restoration project in the Columbia River basin. The CHaMP efforts would be funded by BPA. The protocol

“employs spatially continuous sampling strategies using well-established surveying techniques to conduct precise topographic surveys from which digital elevation models (DEMs) can be produced. These topographic surveys are augmented by auxiliary data (e.g., channel classification, fish cover, substrate composition, distribution and embeddedness, large woody debris (LWD), solar input and water temperature, stream discharge, water chemistry, riparian structure, and site-level human influence) that help to characterize aspects of channel units that influence site-scale fish production potential” (NOAA and BPA 2014).

The project site is monitored two years prior to implementation to gather baseline data, then the site is monitored for three, three-year cycles post project. Parameters monitored and their protocols can be found at [www.champmonitoring.org](http://www.champmonitoring.org).

## REFERENCES

- 50 CFR 17. “Endangered and Threatened Wildlife and Plants.” *Code of Federal Regulations*. U.S. Fish and Wildlife Service, Department of the Interior.  
<http://www.fws.gov/pacific/bulltrout/pdf/BTCHFR101810.pdf>
- 50 CFR 600.920. Magnuson-Stevens Fishery Conservation and Management Act. *Code of Federal Regulations*. Public Law 94-265. As amended through October 11, 1996. An act to provide for the conservation and management of the fisheries, and for other purposes.
- 65 FR 7346. “Endangered and Threatened Species; Extension of Comment Periods and Notice of Additional Public Hearings for Proposed Rules Governing Take of West Coast Chinook, Chum, Coho and Sockeye Salmon and Steelhead Trout.” *Federal Register*. Department of Commerce, National Oceanic and Atmospheric Administration. pp. 7346–7347.
- Ardren, W.R., P.W. DeHaan, C.T. Smith, E.B. Taylor, R. Leary, C.C. Kozfkay, L. Godfrey, M. Diggs, W. Fredenberg, J. Chan, C.W. Kilpatrick, M.P. Small, D.K. Hawkins. 2011. Genetic Structure, Evolutionary History, and Conservation Units of Bull Trout in the Coterminous United States. *Transactions of the American Fisheries Society*, 140:2, 506-525.
- Baldigo, Barry P. 1986. *Crooked River and In-Situ Toxicity Results*. Lockheed Engineering and Management Services Company. Las Vegas, NV.
- Bash, J., C. Cerman, and S. Bolton. 2001. *Effects of Turbidity and Suspended Solids on Salmonids*. Center for Streamside Studies, University of Washington. 74 pp.  
<http://www.wsdot.wa.gov/research/reports/fullreports/526.1.pdf>
- Bilby, R.E., B.R. Fransen, J.K. Walter, C.J. Cederholm, and W.J. Scarlett. 2001. Preliminary evaluation of nitrogen stable isotope ratios to establish escapement levels for Pacific Salmon. *Fisheries* 26:6-14.



- Bisson, P. A., and R. E. Bilby. 1982. "Avoidance of Suspended Sediement by Juvenile Coho Salmon." *North American Journal of Fisheries Management*. 4: 371–374.  
[http://www.fs.fed.us/pnw/lwm/aem/docs/bisson/1982\\_bisson\\_avoidance\\_of\\_suspended\\_sediment.pdf](http://www.fs.fed.us/pnw/lwm/aem/docs/bisson/1982_bisson_avoidance_of_suspended_sediment.pdf)
- Bjornn, T.C. and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. In W.R. Meehan (ed). *Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitat*. American Fisheries Society Special Publication. Pp 83-138.
- Bonneau, J.L. and D.L. Scarnecchia. 1998. Seasonal and diel change in habitat use by juvenile bull trout (*Salvelinus confluentus*) and cutthroat trout (*Oncorhynchus clarki*) in a mountain stream. *Canadian Journal of Zoology*. 76: 783-790.
- Bustard, D. R., and D. W. Narver. 1975. "Aspects of the winter ecology of juvenile coho salmon (*Oncoryhnchus kisutch*) and steelhead trout (*Salmo gairdneri*)." *Journal of the Fisheries Research Board of Canada*. 32: 667–680.
- Byrne, A. 1994. *Steelhead supplementation studies – Annual Performance Report*. Idaho Department of Fish and Game, Boise, Idaho.
- Cederholm, C. J., R. E. Bilby, P. A. Bisson, T. W. Bumstead, B. R. Fransen, W. J. Scarlett, and J. W. Ward. 1997. "Response of juvenile coho salmon and steelhead to placement of large woody debris in coastal Washington stream." *North American Journal of Fisheries Management*. 17: 947–963.
- Clear Creek Hydrology and North Wind. 2004. *Newsome Creek Feasibility Study*. Final Report. Volume I. Prepared for Nez Perce National Forest, Grangeville, Idaho, by Clear Creek Hydrology, Inc., Bozeman, Montana and North Wind, Inc., Idaho Falls, Idaho in cooperation with Nez Perce Tribe, Lapwai, Idaho.
- Close, D. A., M. Fitzpatrick, H. Li, B. Parker, D. Hatch, and G. James. 1995. *Status Report of the Pacific Lamprey (Lampetra Tridentata) in the Columbia River Basin*. U.S. Department of Energy, Bonneville Power Administration, Project Number 94-026.
- Cochnauer, Tim, and Christopher Claire. 2001. *Evaluate Status of Pacific Lamprey in the Clearwater River Drainage, Idaho*. 2001 Annual Report, Project No. 200002800.
- Cochnauer, Tim, and Christopher Clair. 2002. *Evaluate Status of Pacific Lamprey in the Clearwater River Drainage, Idaho*. 2002 Annual Report, Project No. 200002800.
- Cochnauer, Tim, and Christopher Claire. 2003. *Status and Distribution of Pacific Lamprey (Lampetra Tridentata) in Idaho*. Idaho Department of Fish and Game.
- Columbia River DART, Columbia Basin Research, University of Washington. (2013). Available from <http://www.cbr.washington.edu/dart>
- Columbia River Inter-Tribal Fish Commission. 2013. "Lamprey Restoration." Website accessed at: <http://www.critfc.org/advocacy/lamprey-restoration/>
- Cross, D. and L. Everest. 1995. Fish habitat attributes of reference and managed watersheds with special reference to the location of bull char (*slavelinus confluentus*) spawning sites in the Upper Spokane River system, Northern Idaho. USDA Forest Service, Fish and Habitat Relationships Currents, Technical Bulletin 17.
- Environmental Protection Agency (EPA). 1986. Quality Criteria for Water. EPA 400/86-001. Office of Water Regulations and Standards, Washington, DC.

- Ford, M. J. (ed). 2011. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Pacific Northwest. U.S. Dept. Commerce, NOAA Tech. Memo. NMFS-NWFSC-113, 281pp.
- Fornander, D.E. and Ferguson, J.L. 2012. Biological Assessment Yankee Fork Habitat Improvement Project PS3 Side Channel. Prepared by CH2MHILL, Boise, ID.
- Fraley, J.J. and B.B. Shepard. 1989. Life History, Ecology, and Population Status of Bull Trout (*Salvelinus confluentus*) in the Flathead Lake and River system, Montana. *Northwest Science* 63:133-143.
- Fraser, D. F., and R. D. Cerri. 1982. "Experimental evaluation of predator-prey relationships in a patchy environment: consequences for habitat use patterns in minnows." *Ecology*. 63: 307–313.
- Great West Engineering. 2013. *Lower Crooked River Narrows Road Relocation Study, Alternative 5 submittal*. Prepared for Nez-Perce Clearwater NF. 11 pp.
- Gross, Tyler. 2014. Idaho Department of Fish and Game, Personnel communication.
- Hillman, T. W., J. S. Griffith, and W. S. Platts. 1987. "Summer and winter habitat selection by juvenile Chinook salmon in a highly sedimented Idaho stream." *Transactions of the American Fisheries Society*. 116: 185–195.
- Hrodey, P. J., B. J. Kalb, and T. M. Sutton. 2008. "Macroinvertebrate community response to large-woody debris additions to small warmwater streams." *Hydrobiologia*. 605: 193–207.
- Idaho Department of Environmental Quality (IDEQ)
- 1988. *Water Quality Status Report No. 80: Crooked River, Idaho County, Idaho, 1987*. Prepared by H. Mann and M. P. Von Lindern. Lewiston, ID. 39 pp.
  - 2003. *South Fork Clearwater River Subbasin Assessment and TMDL*. Boise, ID.
  - 2011a. *Idaho Champion Group Lode and Pacific Group Lode Claims; Preliminary Assessment and Site Inspection Report*. Grangeville, ID.
  - 2011b. *Idaho Department of Environmental Quality Final 2010 Integrated Report*. Boise, ID: Idaho Department of Environmental Quality.
  - 2013. Idaho Water Quality Standards and Wastewater Treatment Requirements (IDAPA 58.01.02). 180 pp. Accessed July 28, 2013. Available online at <http://adminrules.idaho.gov/rules/current/58/0102.pdf>.
- Idaho Department of Environmental Quality and USDI Environmental Protection Agency (IDEQ and USEPA). 2003. *Clearwater River Subbasin Assessment and Total Maximum Daily Load*. Available online at: [http://www.deq.idaho.gov/media/453550-water\\_data\\_reports\\_surface\\_water\\_tmdls\\_clearwater\\_river\\_sf\\_clearwater\\_river\\_sf\\_entire.pdf](http://www.deq.idaho.gov/media/453550-water_data_reports_surface_water_tmdls_clearwater_river_sf_clearwater_river_sf_entire.pdf)
- Idaho Department of Fish and Game
- 2005. Bull Trout Status Review and Assessment in the State of Idaho. Grant # F-73-R-27, Report Number 05-243.
  - 2010. *Idaho Supplementation Studies: Brood Year 2007 Cooperator Report*. IDFG Report number 10-14.

2011. *Idaho Supplementation Studies: Brood Year 2008 Cooperator Report*. IDFG Report number 11-19.
2012. *Idaho Supplementation Studies: Brood Year 2009 Cooperator Report*. IDFG Report number 12-13.
- IDEQ, Nez Perce Tribe, and U.S. Environmental Protection Agency. 2004. *South Fork Clearwater River Subbasin Assessment and TMDLs*. Idaho Department of Health and Welfare, Boise, ID. 276 pp. + appendices.
- Isaak, D.J., C.H. Luce, B.E. Rieman, D.E. Nagel, E.E. Peterson, D.L. Horan, S. Parkes, and G.L. Chandler. 2010. Effects of climate change and wildfire on stream temperatures and salmonid thermal habitat in a mountain river network. *Ecological Application* 20 (5): 1350-1371.
- Isaak, D.J., C.C. Muhfeld, A.S. Todd, R. Al-Chokhachy, J. Roberts, J.L. Kershner, K.D. Fausch, S.W. Hostetler. 2012. The Past as Prelude to the Future for Understanding 21<sup>st</sup>-Century Climate Effects on Rocky Mountain Trout. *Fisheries Management*. 37(12): 544-556.
- Isaak, D.J., B.E. Rieman. 2013. Stream isotherm shifts from climate change and implications for distributions of ectothermic organisms. *Global Change Biology* 19, 742-751.
- Jackson, A. D., P. D. Kissner, D. R. Hatch, B. L. Parker, D. A. Close, M. S. Fitzpatrick, and H. Li. 1996. *Pacific Lamprey Research and Restoration Annual Report 1996*. Annual report to Bonneville Power Administration, Project Number 94-026.
- Jackson, A. D., D. R. Hatch, D. A. Close, and H. Li. 1997. *Pacific Lamprey Research and Restoration Annual Report 1997*. Annual report to Bonneville Power Administration, Project Number 1994-026, BPA Report DOE/BP-39067-3. January.
- Kiefer, R.B., and J.N. Lockhart.
1992. *Idaho Habitat and Natural Production Monitoring: Part II*. Fisheries Research Station, Idaho Department of Fish and Game. Project Number 91-73, Contract Number DE-BI79-91-BP21182.
1994. *Intensive Evaluation and Monitoring Of Chinook Salmon And Steelhead Trout Production, Crooked River And Upper Salmon River Sites*. Annual Progress Report. Idaho Department of Fish and Game. Project Number 9 1-73, Contract Number DE-BI79-9-BP21182.
1997. *Intensive Evaluation and Monitoring Of Chinook Salmon And Steelhead Trout Production, Crooked River And Upper Salmon River Sites*. Annual Progress Report. Idaho Department of Fish and Game. Project Number 9 1-73, Contract Number DE-BI79-9-BP21182.
1999. *Intensive Evaluation and Monitoring Of Chinook Salmon And Steelhead Trout Production, Crooked River And Upper Salmon River Sites*. Annual Progress Report. Idaho Department of Fish and Game. Project Number 9 1-73, Contract Number DE-BI79-9-BP21182.
- Leider, S.A., M.W. Chilcote, and J.J. Loch. 1986. Movement and survival of presmolt steelhead in a tributary and the mainstem of a Washington River. *North American Journal of Fisheries Management*. 6:526-531.

- Main, M. and M. Johnson. 2014. Meadow Creek Watershed Monitoring Report, 2013. Nez Perce Tribe Department of Fisheries Resources Management, Watershed Division. BPA Project # 2010-003-00.
- Meyer, K.A., E.O. Garton, and D.J. Schill. 2014. Bull Trout Trends in Abundance and Probabilities of Persistence in Idaho. *North American Journal of Fisheries Management*. 34:202-214.
- Montana Field Guide. 2013. Western Pearlshell – *Margaritifera Falcata*. Montana Natural Heritage Program. Retrieved on August 7, 2013, from [http://FieldGuide.mt.gov/detail\\_IMBIV27020.aspx](http://FieldGuide.mt.gov/detail_IMBIV27020.aspx)
- Mullan, J. W., A. Rockhold, and C. R. Chrisman. 1992. "Life Histories and Precocity of Chinook Salmon in the Mid-Columbia River." *The Progressive Fish-Culturist* 54: 25–28.
- National Marine Fisheries Service. 2010. *2010 Supplemental Federal Columbia River Power System (FCRPS) Biological Opinion (BiOp)* (National Oceanic and Atmospheric Administration's [NOAA] National Marine Fisheries Service [NMFS] [NOAA Fisheries], 2010)
- Newcombe, C.P. and D.D. MacDonald. 1991. Effects of suspended sediments on aquatic ecosystems. *North American Journal of Fisheries Management*. 11: 72-82.
- NMFS (National Marine Fisheries Service). 2008. Anadromous Salmonid Passage Facility Design. NMFS, Northwest Region, Portland, Oregon.
- National Marine Fisheries Service, USDC-NOAA. 2011. *Draft Snake River Steelhead Recovery Plan – Chapter 5. Clearwater River MPG Steelhead Status and Recovery.* [http://www.westcoast.fisheries.noaa.gov/protected\\_species/salmon\\_steelhead/recovery\\_planning\\_and\\_implementation/snake\\_river/current\\_snake\\_river\\_recovery\\_plan\\_documents.html](http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/snake_river/current_snake_river_recovery_plan_documents.html)
- NMFS and USFWS. 1998. *Matrix of Pathways and Indicators of Watershed Condition for Chinook, Steelhead, and Bull Trout*. Local adaptation for the Clearwater Basin and Lower Salmon. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Environmental and Technical Services Division, Habitat Conservation Branch.
- NMFS and USFWS. 2009. Biological Opinion for Herbicide Treatment of Invasive and Noxious Weeds on the Nez Perce National Forest. Grangeville, Id.
- Nez Perce Tribe (NPT). 2013. "Pacific Lamprey Restoration Project." Nez Perce Tribe, Department of Fisheries Resources Management. Website, accessible at: <http://www.nptfisheries.org/ResidentFish/ResidentFishProjects/RF000002.aspx>
- Northwest Power and Conservation Council. 2005. *Clearwater River Subbasin Management Plan*. In Columbia River Basin Fish and Wildlife Program. Portland, Oregon.
- Matthews, G. M., and R. S. Waples. 1991. Status review for Snake River spring and summer Chinook salmon. NOAA technical memorandum NMFS F/NWC-200. Seattle, WA. U.S. Department of Commerce, NOAA Fisheries.
- Mullan, J. W., A. Rockhold, and C. R. Chrisman. 1992. "Life Histories and Precocity of Chinook Salmon in the Mid-Columbia River." *The Progressive Fish-Culturist* 54: 25–28.
- Paulik, Gerald J. and Allan C. DeLacy. June 1957. Swimming abilities of upstream migrant silver salmon, sockeye salmon and steelhead at several water velocities. School of Fisheries, University of Washington, Technical Report 44.

- Platts, W. S. 1974. "Geomorphic and aquatic conditions influencing salmonids and stream classification with application to ecosystem classification." Billings, MT: U.S. Department of Agriculture, Forest Service, SEAM Project. 404 pp.
- Platts, W. S., W. F. Megahan, and G. W. Minshall. 1983. "Methods for evaluating stream, riparian and biotic conditions." Gen. Tech. Rep. INT-138. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 70 pp.
- Pratt, K. 1985. Rend Oreille Trout and Char Life History Study, IDFG, Boise, ID. 105 pp.
- Ratliff, D.E. 1992. Bull trout investigations in the Metolius River-Billy Chinook System. In P.J. Howell and D.V. Buchanan (eds.) Proceedings of the Gearhart Mountain Bull Trout workshop. Oregon Chapter of the American Fisheries Society. Corvallis Or. Pp 37-44.
- Rieman, B. E., and J. D. McIntyre. 1993. *Demographic and Habitat Requirements for Conservation of Bull Trout*. U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, Utah. [http://www.fs.fed.us/rm/pubs\\_int/int\\_gtr302.pdf](http://www.fs.fed.us/rm/pubs_int/int_gtr302.pdf)
- Rieman, B.E., and D.J. Isaak. 2010. Climate Change, Aquatic Ecosystems, and Fishes in the Rocky Mountain West: Implications and Alternatives for Management. USDA RMRS General Technical Report RMRS-GTR-250.
- River Design Group, Inc., Geum Environmental Consulting, Inc., and TerraGraphics Environmental Engineering, Inc.
2012. *Design Criteria Report: Crooked River Valley Rehabilitation Design*. September. 73 pp. + appendices.
2013. *Final Design Report: Crooked River Valley Rehabilitation Design*. March. 145 pp. + appendices.
- 2013a. *Crooked River Temperature Summary*. Memo. March 7.
- 2013 b. *Temporary Bypass Channel Evaluation*. Memo. Modification 002 to Contract AG-02RC-C-12-0038. May 14.
- Rogers, M. B. 2003. "Woody debris and macroinvertebrate community structure of low-order streams in Colville National Forest, Washington." Master's Thesis, Washington State University, Pullman, WA. 93 pp.
- Rosgen, D. L. 1994. A Classification of Natural Rivers, Catena, Vol. 22, pp. 169–199.
- Sacry, Amy. 2014. Geum Environmental Inc. Personal communication.
- Schoby, G.P and E.R. Keeley. 2011. Home Range Size and Foraging Ecology of Bull Trout and Westslope Cutthroat Trout in the Upper Salmon River Basin, Idaho. *Transactions of the American Fisheries Society*. 140:636-645.
- Siddall, P. 1992. *South Fork Clearwater River Habitat Enhancement: Nez Perce National Forest*. Nez Perce National Forest. Prepared for Bonneville Power Administration.
- Shepard, B, S.A. Leathe, T.M. Weaver and M.D. Enk. 1984. Monitoring levels of fine sediment within tributaries to Flathead Lake, and Impacts of Fine Sediment on Bull Trout Recruitment. Unpublished paper presented at the Wild Trout III Symposium, Yellowstone National Park, WY. On file at Montana Department of Fish, Wildlife and Parks. Kallispell, MT.

Sommer, T., D. McEwan, and R. Brown. 2001. "Factors affecting Chinook salmon spawning in the lower Feather River." In *Contributions to the biology of Central Valley salmonids*, R. L. Brown, ed. California Department of Fish and Game Fish bulletin 179. pp. 269–297.

Stevenson, Mike. 2012. Bureau of Land Management. Personal communication.

Thurow, R. 1987. *Evaluation of the South Fork Salmon River Steelhead Trout Fishery Restoration Program*. Lower Snake River Fish and Wildlife Compensation Plan. Job Completion Report, Contract No 14-16-0001-86505. Idaho Department of Fish and Game.

United States Department of Agriculture – Forest Service (USDA Forest Service).

1987. *Nez Perce National Forest Land and Resource Management Plan*, as amended. USDA-FS, Northern Region, Nez Perce National Forest, Grangeville, Idaho. 174 pp. + appendices. This information is available online at: <http://www.fs.usda.gov/detail/nezperceclearwater/landmanagement/planning/?cid=stelprd5404075>

1995. *Nez Perce National Forest Plan, Amendment 20 (PACFISH)*. U.S. Department of Agriculture, Forest Service, Nez Perce National Forest, Grangeville, Idaho.

1999. *South Fork Clearwater River Biological Assessment*. U.S. Department of Agriculture, Forest Service, Nez Perce National Forest, Grangeville, Idaho.

1998. *South Fork Clearwater River Landscape Assessment*. Volume 1. Narrative. Nez Perce National Forest, Idaho County, Idaho.

2005. *American and Crooked River Project Final Environmental Impact Statement and Record of Decision*. USDA-FS, Northern Region, Nez Perce National Forest, Red River Ranger District, Grangeville, Idaho.

2009. *Biological Assessment – Herbicide Treatment of Invasive and Noxious Weeds on the Nez Perce National Forest (2009-2012)*. Document available at: Nez Perce – Clearwater National Forests Office, Grangeville, ID.

2011. *Region 1 Sensitive Species list*. Fish, Wildlife and Plants. USDA, Forest Service, Northern Region, Missoula, MT. Available online at: <http://fsweb.r1.fs.fed.us/wildlife/wwfrp/TESnew.htm>.

U.S. Fish and Wildlife Service, USDI-FWS.

2002. *Draft Bull Trout Recovery Plan*, Chapter 16. Clearwater River. Region 1, U.S. Fish and Wildlife Service, Portland, OR. <http://www.fws.gov/pacific/bulltrout/Recovery.html>

2010. *Best Management Practices for Pacific Lamprey*. Compiled by: J. Brostrom, C. Luzier, and K. Thompson. <http://www.fws.gov/pacific/Fisheries/sphabcon/Lamprey/index.cfm>

Weaver, Charles R. 1963. Influence of water velocity upon orientation and performance of adult migrating salmonids. US Fish and Wildlife Service, Fishery Bulletin 63(1):97-121.

Weaver T.M., and J. Fraley. 1991. Fisheries habitat and Fish populations, Flathead Basin Forest Practices. Flathead Basin Commission Water Quality and Fisheries Cooperative Program, Kallispell, MT.

Wenger S.J., D.J. Isaak, C.H. Luce, H.M. Neville, K.D. Fausch, J.B. Dunham, D.C. Dauwalter, M.K. Young, M.M. Elsner, B.E. Rieman, A.F. Hamlet, J.E. Williams. 2011. Flow regime, temperature, and biotic

interactions drive differential declines of trout species under climate change. *Proceedings of the National Academy of Sciences of the United States* 108(34): 14175-14180.

Wipfli, Charles R. 1963. Influence of water velocity upon orientation and performance of adult migrating salmonids. US Fish and Wildlife Service, Fishery Bulletin 63(1):97-121.

Wipfli, Mark S, J.P. Hudson, J.P. Caouette, N.L. Mitchell, J.L. Lessard, R.A. Heintz, D.T. Chaloner. 2010. Salmon Carcasses Increase Stream Productivity More than Inorganic Fertilizer Pellets: A Test on Multiple Trophic Levels in Streamside Experimental Channels. *Transactions of the American Fisheries Society* 139: 824-839.

## APPENDIX A

### EMERGENCY ACTION PLAN

As with any large restoration project, the potential for problems to arise during construction exists. For the Crooked River project there is a potential, though low, to see flows greater than the  $Q_{25}$  while the bypass channel is in operation; spring flows or high snow pack could preclude constructing the bypass channel in early spring; the levee through the project area could fail at high flows, the diversion structure could fail during high flows; and surface flow in the newly constructed bypass channel could go subsurface when the new channel is rewatered. Conservation measures are in place to reduce impacts during construction; however, contingencies are needed to change how the project is implemented if problems arise. The Nez Perce Tribe and USFS are responsible for following the Emergency Action Plan. NMFS and USFWS would be notified if any of the following emergencies occur, or if other unforeseen emergencies occur within 48 hours. The procedures followed to address any emergency would be documented and sent to NMFS and USFWS via email.

#### **Bypass Channel Failure**

To reduce the potential for bypass failure, a hardened spillway would be constructed on the coffer dam that would allow flows greater than the  $Q_{10}$  to spill into the newly constructed channel. Splitting the flows between the bypass channel and the new channel would reduce the velocities in the bypass channel and prevent water from overtopping the levee in an undesirable area. Since the new channel would be constructed to hold up to 300 cfs, potential impacts of water flowing over a raw floodplain would also be reduced. .

There is potential for the water in the bypass channel to go subsurface during the project. Since groundwater levels are higher than the thalweg of the bypass channel, the potential to lose the water is low (see Effects Section 5.1.1). When the bypass channel is watered, crews would evaluate the bypass channel for signs of subbing. The bypass channel would be evaluated at low flow to ensure that there is enough water for adult fish to migrate upstream. If flow in the bypass channel were to become low enough to preclude adult fish passage, those sections that are too high would be excavated. Fish salvage operations would have to occur in the adjacent areas prior to excavation. Fish salvage operation outlined above would be followed. The bypass channel would be evaluated throughout the year, and each year it is in operation to ensure adequate fish passage.

Watering the bypass channel and fish salvage operations would all occur as described above. Watering the bypass channel at lower flows may not flush sediments as quickly as would occur during high flows. The mainstem channel downstream of Phase 1 would be reconstructed in Phase 2, making the impacts of cobble embeddedness limited to less than one year. If the impacts occur below Phase 2, the fines would likely be flushed from the cobbles spring flows, once the project is complete.

#### **Loss of Water in Mainstem Channel**

There is a potential for the loss of water in the mainstem channel when it is rewatered due to the porosity of the valley substrate. During construction of the mainstem channel, crews would evaluate the flows in the channel since it is likely to capture groundwater. Because the slope of the channel would be increased, it is expected that the groundwater that is intercepted would flow and crews would be able to observe how the



new channel would function, prior to rewatering the channel. Groundwater elevations in the project area are currently exhibited at or near surface water elevations. Since the floodplain elevations would be raised relative to the current floodplain elevation, it is uncertain as to where groundwater would be intercepted. If water loss is observed in the channel then more fines would be mixed into the substrate, depending on the severity of the loss. For example, if only a couple of inches of the top of a riffle are dry, and water is flowing out of the other side, then more fines would probably not be added since the flows observed would be less than baseflow, but if the depth of water loss is more than a foot, then more fines would be added. Since most of the flow would be in the bypass channel at the time of the observations crews would take into consideration how much groundwater is observed in the bypass channel. These precautions need to be considered to keep from cementing in the channel by adding too much fines and reducing the potential for hyporheic exchange.

Another precaution would be to observe the new channel for loss of water while rewatering the channel. Since the new channel would be rewatered slowly (several days), we would be able to determine if flow loss would occur prior to fully rewatering the channel. The diversion structure at the top of the channel would slowly be removed. Once 6 to 10 cfs are flowing through the new channel for at least 48 hours, the project manager and fish biologist/hydrologist would survey the new channel to determine if there is water loss. If water is lost, then flows would be turned off using substrate filled bags and fines would be remixed into the channel with an excavator.

During at least the first year of construction, the USFS and Tribe would contract a stream restoration specialist to oversee the construction. The stream restoration specialist would have an experienced hydrologist on site to direct construction crews in the event that water in the channel is lost.

#### **Diversion Structure Failure**

There is the potential for the diversion structure to fail during the project period. Headgate failure could be from high flow events. The diversion structure would be evaluated by the contractor at the end of each construction season to ensure it is secure and in good condition prior to going into winter. Repairs, if needed, would be completed. The structures would be evaluated again in the spring, prior to high flows, for erosion potential and for any large woody debris being caught up on them.

APPENDIX B

CROOKED RIVER FISH WINDOW

The latest steelhead in the Crooked River weir was May 28, 2013, but last fish in the weir ranged from May 2 – May 23, from IDFG data from 1992-95 (Keifer and Lockhart 1996, 1997; Hall-Griswold and Petrosky 1999) and 2010-2013 (IDFG unpublished data, 2014). Most likely, steelhead move into the narrows reach upstream of the Crooked River Valley Rehabilitation project area, or into the upper watershed to find suitable spawning areas. As discussed in Section 3 (steelhead spawning), there is very little suitable spawning habitat through the project area. Intensive literature research yielded no results as to steelhead spawning timing after entering the spawning tributaries, so it is unknown when the steelhead would spawn in Crooked River. A table outlining when steelhead and bull trout are present during construction is provided in Table 22.

TABLE 22. SPECIES LIFE STAGE DURING PROJECT CONSTRUCTION

Species		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Construction	Dry	[Shaded]												
	In-water	[Shaded]							[Shaded]		[Shaded]			
Steelhead	Adult	[Shaded]			migration/spawning			[Shaded]						
	Juvenile	present year-round												
Bull Trout	Adult	[Shaded]									migration		[Shaded]	
	Juvenile	present year-round												

To understand the potential for timing of steelhead eggs and alevins in the gravel, temperature data were analyzed from Crooked River and the South Fork Clearwater River. Temperature data were collected in Crooked River in 2012 and 2013; however, collection started in July in 2012 and June in 2013, neither capturing all of the time steelhead could be in redds. The gauge in the South Fork Clearwater River recorded temperature for 2005-2008. In reviewing temperatures in June and July with Crooked River, the temperatures at the gauges appear to be similar. Using the South Fork Clearwater River temperature data and degree-day calculations, fish that spawn in mid-May would be close to emergence, if not emerged, by July 1. However, fish that spawn in late May, early June would not be emerged until around July 15. Therefore, dewatering the mainstem channel would not occur until July 15 to ensure steelhead would be emerged from redds. Table 2 shows degree days for two sets of dates, 5/15-6/30 and 5/30-7/15. Steelhead need approximately 1200 degree-days to emerge from the substrate (R2 Resource Consultants, Inc, 2008). Other than 2008 (which by looking at the average temperature, was a cold or late spring year), about 1200 degree-days were met before July 15.

TABLE 23. DEGREE-DAYS AND AVERAGE TEMPERATURE CALCULATED FROM TEMPERATURE DATA ON THE SOUTH FORK CLEARWATER RIVER, JUST UPSTREAM FROM THE MOUTH OF CROOKED RIVER.

Degree Days (year)	Dates Calculated: 5/15-6/30	Dates Calculated: 5/30-7/15	Average Temperature (°C) 5/15-7/15

<b>2005</b>	944	1154	12.6
<b>2006</b>	1083	1331	14.4
<b>2007</b>	1077	1382	14.8
<b>2008</b>	718	981	10.2

To minimize potential for steelhead spawning in the project area, an isolation structure such as a weir would be constructed at the lower end of the main channel after the bypass channel was constructed to discourage adult steelhead, bull trout, and chinook from utilizing the main channel before and during construction; structure would also be a permanent barrier, unlike a net, to keep fish out of the project area once fish salvage had occurred.

R2 Resource Consultants, Inc. 2008. *Snohomish Basin Steelhead Trout (Oncorhynchus mykiss) "State of the Knowledge"*. Technical Memorandum. Prepared for Snohomish Basin Recovery Technical Team Snohomish County by R2 Resource Consultants, Inc., Redmond, Washington.

TABLE 24. BULL TROUT SCREWTRAP DATA (IDFG 2000-2013)

Size Class (mm)	March	April	May	June	July	August	Sept	Oct
50	0	0	0	3	0	0	0	0
100	0	3	5	6	1	0	0	0
150	8	15	167	230	123	10	0	0
200	2	1	33	69	59	4	19	5
300	0	1	6	7	8	0	40	9
400	0	0	2	6	1	1	2	0
500	0	0	5	12	4	0	0	0
600	0	0	1	1	1	0	0	0

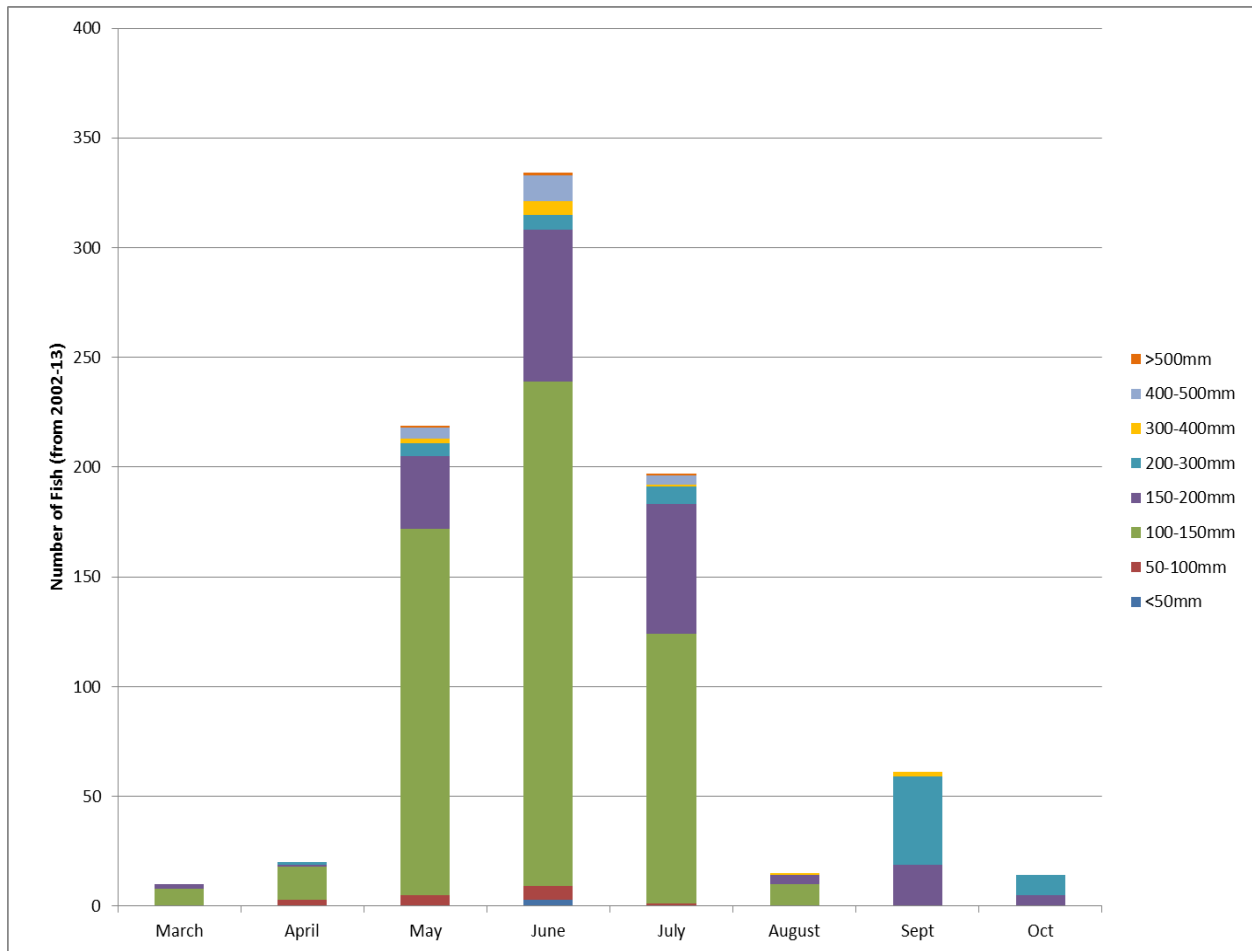


FIGURE 15 BULL TROUT AGE CLASS DATA (IDFG SCREWTRAP DATA 2000-2013)

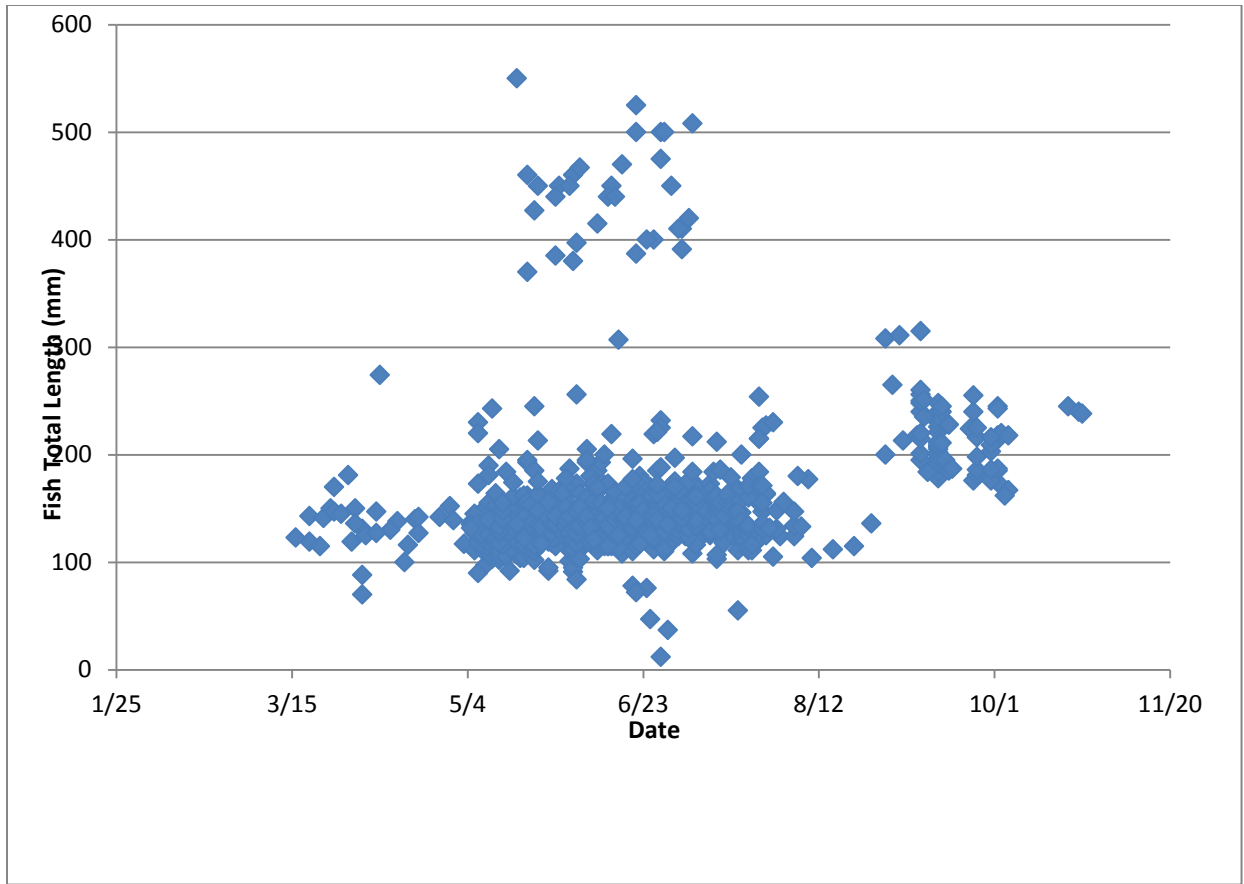


Figure 16. Bull trout Crooked River Screw trap data (IDFG 2000-2013).

## APPENDIX C

### BEST MANAGEMENT PRACTICES FOR MERCURY COLLECTION FROM RESTORATION ACTIVITIES IN CROOKED RIVER

#### **Background**

Mercury is a naturally occurring element in the environment that has several forms. Metallic mercury is a shiny, silver-white, odorless liquid. Metallic mercury (inorganic mercury and its compounds) enters the air from mining and manufacturing activities and from burning coal and waste. It has also been added to the environment from historic gold mining activities. Although mercury was not used in dredge mining in the upper South Fork Clearwater, there is a small potential to find this element during restoration activities. Soil and water samples have been collected in the project area by the US Geologic Survey, Idaho Department of Environmental Quality, and the Nez Perce Tribe over the past 10 years to test for mercury. Thus far, mercury either has not been detected or levels have been considered non-significant based on Idaho's Water Quality standards.

#### **Collection**

During floodplain and stream channel reconstruction, mercury may be found by the contractor. If this occurs, work in the immediate vicinity will stop and every reasonable effort to contain the material in such a manner that it will not reach surface or groundwater will be made. The mercury will be transferred into a vapor-proof, sturdy, unbreakable container by the Fish Biologist or qualified personnel to be safely stored and disposed of or recycled. Rubber, nitrile or latex gloves will be kept on site and used when handling mercury to prevent adverse health impacts from mercury exposure to the skin. Depending on the amount of mercury collected, the mercury can either be poured directly into a container or an eye dropper can be used to transfer the residual mercury beads to the container. A secondary, unbreakable container will be used when storing and transferring mercury from the project site to a disposal to an approved disposal site. If clothing or other items come into contact with mercury, they should be considered contaminated. Contaminated clothes and shoes brought may release mercury vapors. The recommended practice is to properly dispose of contaminated clothing and shoes.

The Fish Biologist or qualified personnel on site will notify Idaho State Communication Center at (800) 632-8000 or (208) 846-7610 if an amount greater than what is contained in a thermometer is found. The amount and location of mercury will be documented, even if less than what is contained in a thermometer, and reported to the Idaho Department of Environmental Quality Lewiston Field Office. Any other mercury data collection during implementation of the project will be documented and shared with the Idaho Department of Environmental Quality.

#### **Transportation**

Transporting the secondary container of mercury from the field or mining collection site to the disposal site or temporary storage site should be done in a manner that does not compromise the containers. It is suggested that the secondary container of mercury be placed in a secure location in the vehicle so it doesn't

tip over. This will minimize shifting or sliding during sudden stops or turns. Transport containers in the back of a pick-up truck or in a car trunk.

**Storage**

Mercury and mercury wastes (items contaminated by mercury) should be put in a vapor-proof, sturdy, unbreakable container and stored in secondary containment, such as a second, larger unbreakable container. Anything that touched the liquid mercury should be considered contaminated. Contaminated clothes and shoes may release mercury vapors after touching the element. The recommended practice is to properly dispose of contaminated clothing and shoes. Label the container: “DANGER Toxic Mercury – DO NOT OPEN.”

**Mercury Waste Management/Recycling**

Mercury will be disposed of at one of the following companies. The handling, treatment, and disposal or recycling practice of the facility will be verified prior to transporting mercury to the facility.

<b>Company</b>	<b>Phone Number</b>
Able Clean-up Technologies	(509) 466-5255
Environmental Management Solutions	(208) 895-0326
H2O Environmental Services	(208) 343-7867
Safety Kleen	(208) 234-4002
Specialty Environmental Services	(208) 327-9977

**Risk Assessment**

Additional mercury monitoring may be required in the project area if significant amounts of mercury are found.

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## USDA - Forest Service – Request for concurrence with USDI- Fish and Wildlife Service



United States  
Department of  
Agriculture

Forest  
Service

Nez Perce-Clearwater National Forests  
Forest Supervisor's Office

903 3<sup>rd</sup> Street  
Kamiah, ID 83536  
Telephone: 208-935-2513  
Fax: 208-935-4275  
Grangeville Office: 208-983-1950

File Code: 2670

Date:

AUG 4 2014

Ben Conard  
Field Supervisor  
USDI Fish and Wildlife Service  
11103 E. Montgomery Drive  
Spokane, WA 99206


Dear Mr. Conard:

Enclosed is the biological assessment for the Crooked River Valley Rehabilitation Project.

As regulated by 50 CFR 402.14, please consider this a request for formal consultation. The biological assessment concludes that the action is "likely to adversely affect" ESA listed Columbia River bull trout and their critical habitat.

This action has been addressed by the Level I interagency team under the guidance of the streamlining process. If you have any questions or need further information regarding the activities submitted for consultation, please contact Michele Windsor, Ecosystems Staff Officer at (208) 935-4282.

Sincerely,

  
for RICK BRAZELL  
Forest Supervisor

Enclosure

Cc:  
Terry Nevius, District Ranger  
Shawna Theisen, NMFS, Grangeville  
Aurele LaMontagne, NMFS, Boise  
Allison Johnson  
Jenifer Harris, NPT  
Bryon Holt, USFWS, Spokane  
Jennie Fischer




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# USDA - Forest Service – Request for concurrence with NOAA-National Marine Fisheries Service

 United States Department of Agriculture  
Forest Service  
Nez Perce-Clearwater National Forests  
Forest Supervisor's Office  
903 3<sup>rd</sup> Street  
Kamiah, ID 83536  
Telephone: 208-935-2513  
Fax: 208-935-4275  
Grangeville Office: 208-983-1950

File Code: 2670

Date: AUG 4 2014

David Mabe  
Idaho State Director  
NOAA-Fisheries  
10095 W. Emerald  
Boise, ID 83709

Dear Mr. Mabe:

Enclosed is the biological assessment for the Crooked River Valley Rehabilitation Project.

As regulated by 50 CFR 402.14, please consider this a request for formal consultation. The biological assessment concludes that the action is "likely to adversely affect" ESA listed Snake River steelhead and their critical habitat. As required by the Magnuson-Stevens Act, we have determined that the proposed activities may adversely affect Essential Fish Habitat (EFH) for Chinook salmon.

This action has been addressed by the Level 1 interagency team under the guidance of the streamlining process. If you have any questions or need further information regarding the activities submitted for consultation, please contact Michele Windsor, Ecosystems Staff Officer at (208) 935-4282.

Sincerely,

  
for RICK BRAZELL  
Forest Supervisor

Enclosure

Cc:  
Terry Nevius, District Ranger  
Shawna Theisen, NMFS, Grangeville  
Aurele LaMontagne, NMFS, Boise  
Allison Johnson  
Jenifer Harris, NPT  
Bryon Holt, USFWS, Spokane  
Jennie Fischer



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## USDI - Fish and Wildlife Service - Concurrence Letter and Biological Opinion

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# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

### Idaho Fish and Wildlife Office

#### Northern Idaho Field Office

11103 East Montgomery Drive  
Spokane Valley, Washington 99206



March 23, 2015

Cheryl Probert  
Nez Perce-Clearwater National Forests  
Forest Supervisor  
903 3<sup>rd</sup> Street  
Kamiah, ID 83536

Subject: Biological Opinion for Crooked River Valley Rehabilitation Project  
(FWS Reference: 01EIFW-2015-F-191; File No. Cons 100(b))

Dear Ms. Probert:

This letter transmits the Biological Opinion (Opinion) for the Crooked River Valley Rehabilitation (Project) in Idaho County, Idaho in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended.

This Opinion, which is based on the biological assessment and associated addendums, determines that implementation of the proposed Project is not likely to jeopardize the continued existence of the bull trout (*Salvelinus confluentus*), or destroy or adversely modify bull trout designated critical habitat. We have provided an incidental take statement (ITS) to exempt the potential incidental take of bull trout that may occur as a result of Project implementation.

Thank you for your continued interest in the conservation of threatened and endangered species. Please contact me or Laura L. Williams (509) 893-8022 if you have questions concerning this Opinion.

Sincerely,

Ben Conard  
Field Supervisor

Enclosure

**BIOLOGICAL OPINION  
FOR THE  
Crooked River Valley Rehabilitation Project  
Nez Perce-Clearwater National Forests**

FWS Reference: 01EIFW00-2015-F-0191



**U.S. DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
IDAHO FISH AND WILDLIFE OFFICE  
NORTHERN IDAHO FIELD OFFICE  
SPOKANE VALLEY, WASHINGTON**

Biologist *Laura J. Wilson*  
Date *March 23, 2015*

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# 1. BACKGROUND

## 1.1 Introduction

The U.S. Fish and Wildlife Service (Service) has prepared this Biological Opinion (Opinion) based on our review of the Crooked River Valley Rehabilitation (Project) and its potential effects on bull trout (*Salvelinus confluentus*) and its critical habitat. In a cover letter dated August 4, 2014, and received by the Service on August 6, 2014, the Nez Perce-Clearwater National Forest (Forest), in cooperation with the Nez Perce Tribe (NPT), requested formal consultation with the Service under section 7 of the Endangered Species Act of 1973, as amended (Act), (16 U.S.C. 1531 et seq.) for its proposal to implement the project. As described in this Opinion, and based on the biological assessment (BA) developed by NPT and the Forest, and other information (including but not limited to supplemental documents provided by the Forest, emails and phone calls), the Service has concluded that the Project, as proposed, is not likely to jeopardize the continued existence of bull trout or adversely modify designated bull trout critical habitat. A complete administrative record of this consultation is on file at this office.

## 1.2 Consultation History

The Service, the Forests, and the NPT have had the following communication/coordination on the proposed action.

May 16, 2012	Field trip with Central Idaho Interagency Level I and 2 Teams with National Marine Fisheries Service, US Fish and Wildlife Service and Bureau of Land Management. Discussed Crooked River Valley Rehabilitation Design and Narrows Road Feasibility study
January 6, 2013:	Forest requests review draft Phase I of project.
February 4, 2013	Service participated in Level 1 meeting and discussed the project
July 20, 2013	Discussion with Service on phasing of project and bypass channel.
June 19, 2013	Field trip to project area for agencies. Agencies that attended included: USDA Forest Service, Nez Perce Tribe, USACE, NMFS, USFWS, BLM, US Environmental Protection Agency, Idaho Water Resource Board, IDFG, and Idaho Department of Environmental Quality
November 19, 2013	The Service participated in a Level 1 meeting and discussed the project.
January 28, 2014	The Service participated in a Level 1 meeting and discussed the project
February 12, 2014	The Service participated in a Level 1 meeting and discussed the project
February 25, 2014	Meeting with NMFS and USFWS to discuss Fisheries Biological

	Assessment
March 10, 2014:	Service received second draft BA via email.
March 17, 2014:	The Service participated in a Level 1 meeting and discussed the project.
May 16, 2014:	Service received updated draft BA via email.
June 28, 2014:	Service received final draft BA via email.
August 6, 2014:	Service Received request for formal consultation.
September 15, 2014:	The Service sent email requesting maps and diagrams depicting the Project action area.
September 25, 2014:	The Service received supplemental information which included Project action area action design drawings and further written description of project action via email from the Forest and NPT.
September 24, 2014:	Service participates in Level 1 meeting in which Project is discussed.
September 25, 2014:	Service clarified authorized biologist from the Forest and NPT to contact regarding the Project.
September 30, 2014:	Service receive notice from the Forest via the NPT that project implementation will not be scheduled for 2015 however Option 2 of the project could be performed.
October 1, 2014:	The Service requested clarification regarding construction of the bypass channel, the location of the 'Reaches' referred to in the BA and the sequence of project construction as described in supplemental information.
October 8, 2014:	The Service received requested bull trout data from Idaho Fish and Game (IDFG) weir and map of reaches referred to in BA.
October 20, 2014:	The Service and NPT held conference call to clarify aspects of the project action. The Service provided minutes to the Forest and NPT via email of the phone conference.
November 20, 2014:	The Service provided a draft of the Project Action section of the Biological Opinion (Opinion) to the Forest and NPT for comment.
December 5, 2014:	The Service participates in a Level 1 meeting and discusses the Project.
December 10, 2014:	The Service, Forest and the NPT conduct a second conference call to further review and clarify the project action.
January 22, 2015:	Service provided draft Opinion to Forest for comment.
February 24, 2015:	Forest provides comments on draft Opinion.
February 26, 2015	Service requests clarification on several comments made by the Forest and NPT.
February 27, 2015	NPT responds to February 25, 2015 email.

March 6, 2015	Final draft with comments shared between Forest/NPT and Service.
March 9, 2015	Conference call between Service, Forest and NPT to discuss Final Draft Opinion.

## **2. BIOLOGICAL OPINION**

### **2.1 Description of the Proposed Action**

This section describes the proposed Federal action, including any measures that may avoid, minimize, or mitigate adverse effects to listed species, and the extent of the geographic area affected by the action (i.e., the action area). The term "action" is defined in the implementing regulations for section 7 as "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas." The term "action area" is defined in the regulations as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action."

#### **2.1.1 Action Area**

The Action area, as defined by the Act, is the entire area to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. For the purposes of this Opinion, the Service considers the Forest's project area definition (as defined in the BA) to adequately define the action area. The action area encompasses the lower 2 miles of the Crooked River Valley including 1000 feet to the confluence with and downstream of the South fork of the Clearwater River (Figure 1). The proposed action will begin 0.1 miles upstream from the confluence with the South Fork of the Clearwater River and extend 2.10 miles upstream along Crooked River. The action area also includes an additional 1000 feet downstream in Crooked River extending into the South Fork of the Clearwater River is intended to account for potential additional affects (i.e. turbidity, sediment, or hazardous spills) to bull trout and its habitat.

#### **2.1.2 Proposed Action**

A discussion of the action that will be implemented is as follows (as excerpted from the BA, as well as supplemental documents and plans submitted by the Forest Service, and emails and phone conversations providing further required information on the proposed action and biological baseline):

The Forest, in conjunction with the Nez Perce Tribe (NPT), proposes to restore channel and floodplain functions, restore fish habitat complexity, and improve water quality in Crooked River. The Crooked River Valley, composed of the Crooked River and its floodplain (Figure 1), has been significantly altered and degraded by past land use activities which include heavy

dredge mining, road construction and timber harvest. For example, dredge mining has resulted in a highly modified stream bed with unnatural meanders (Figure 1), high banks and low complexity that contribute to watershed and fish habitat degradation. These deleterious activities have affected instream, riparian, floodplain, hydrologic functions and sediment regimes throughout the mainstem and floodplain of Crooked River. There has been a shift in the natural hydrologic and geomorphic processes of the watershed, changing the stream flows and reducing the amount of large pieces of wood (LPW) and rock throughout the stream. Mining tailings left behind from the mining activities that occurred from the early 1900's through the 1950's are concentrated throughout the valley bottom and have contributed to altering the physical condition of the stream system. The natural migration pattern of the stream and channel morphology including size, form and function is restricted and riparian vegetation and function has become impaired. Consequently the quality of the aquatic habitat has been significantly reduced for bull trout in the lower Crooked River.

The intent of the proposed rehabilitation action is to restore and improve 2.0 miles (up to 115 acres) of the Crooked River Valley bottom (Figure 2). The goal of the project is to restore this portion of Crooked River and the floodplain that have been significantly degraded especially due to dredge mining. Thereby, restoring the natural hydrologic functions as well as steelhead, bull trout and other fish habitats.

The proposed action will include multiple activities and be implemented in four sequential phases over the course of 4 to 6 years (Table 1). In addition, project components Option 1 and 2 can be implemented at any time during the project (Figure 3). The primary actions implemented throughout the phases include the following: construction of a bypass channel; floodplain construction and restoration; and channel construction and restoration (Figure 4). The primary actions implemented in the Options are floodplain construction, restoration and installation of large woody debris (LWD). The actions which will occur throughout the four phases and two Options are described in greater detail below and summarized in Table 1.

#### *Bypass Channel Construction (Phase 1 & 2)*

The bypass channel, as described in the BA, is a temporary channel which will divert water and aquatic organisms from Crooked River around the construction area during the Project. The bypass channel will be 5,700 feet, constructed over two years during Phases 1 and 2, and will be in place up to four years. The bypass channel will be constructed on the east side of the project area, be offset from the toe of the Crooked River Road (Road 233) embankment and routed through a series of existing ditches and ponds. Construction for Phase 1 would begin at channel station 0+00 (Figure 1 & 2) through station 40+00. Approximately 10,500 cubic yards of material would be excavated in Phase 1. Phase 2 construction of the bypass channel will occur the following year, begin at channel station 40+00 through 60+00 (Figure 2). Approximately 12,700 cubic yards of material would be excavated in Phase 2.

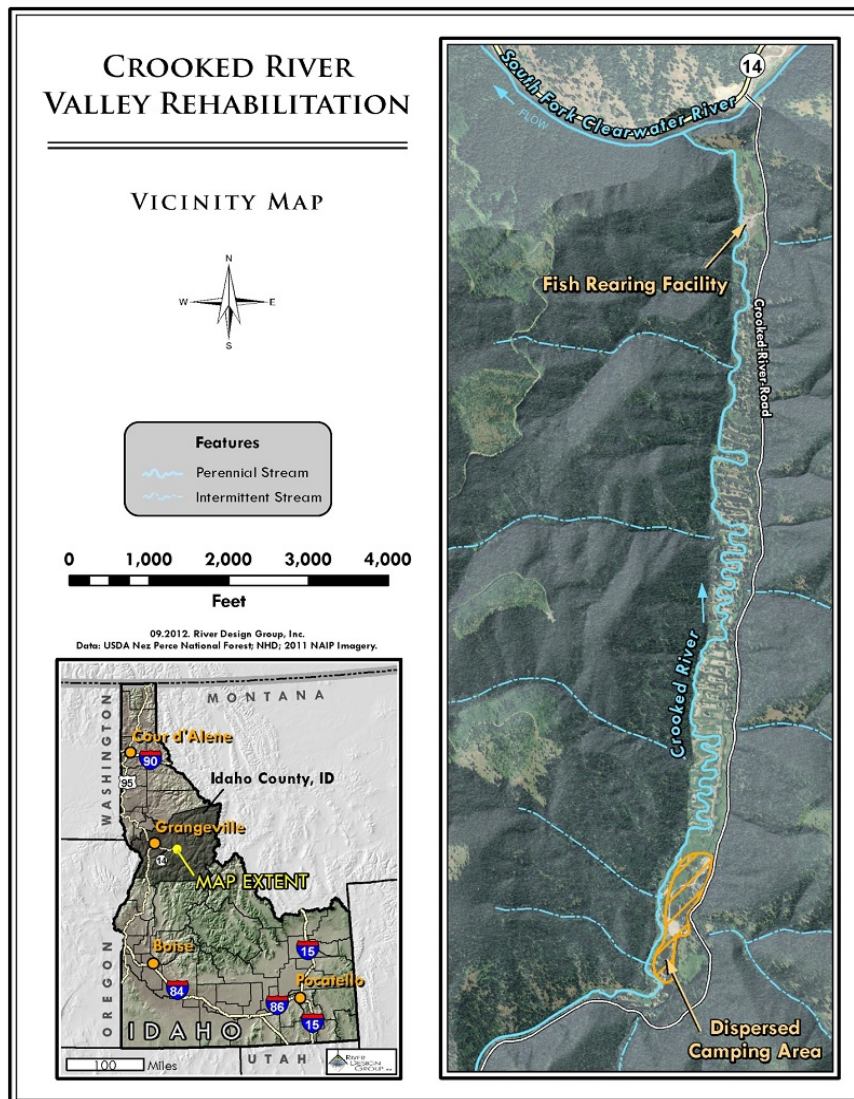


Figure 1. Proposed Action Area. The proposed action will occur from 0.10 miles upstream from the mouth of the Crooked River at the fishing rearing facility, to upstream 2.10 miles just below the camping area. The total action area will include an additional 1,000 feet from the fish rearing facility downstream into the South Fork of the Clearwater River.

A coffer dam will be constructed in Phase 1 to divert the water in the mainstem channel. The coffer dam will be constructed out of local material, substrate filled bags or a combination of the two. The coffer dam will have a hardened spillway (riprap like material) and will pass flows greater than  $10Q$  (1,061 cfs). The bypass channel will then be partially watered slowly over several days to reduce turbidity and ensure that water will not go sub-surface. The bypass channel will be watered without dewatering the mainstem channel. The mainstem will not be dewatered or defished until July 15. The process of full dewatering and defishing (i.e. moving fish to the bypass channel) will not take more than 4 days. Sandbags and/or substrate filled bags will be used to control water flow if turbidity exceeds 50 NTU's (nephelometric turbidity unit).

Once the water is rerouted into the bypass channel cobble and riprap material will be placed on the outside of the bags to protect them during high flows.

Table 1. Project Phases. Project actions will occur in four Phases and two Options over the course of 4 to 6 years.

Phase	Year	Scope
Phase 1	2015	Bypass channel construction between bypass channel stations 0+00 and 40+00. Temporary haul road/levee construction. New channel construction and floodplain grading between channel stations 31+00 and 74+00 including grading of secondary floodplain features (swales, depressions, wetlands and side channels). Material stockpiling, including large woody debris, rock, woodchips and soil. Salvage wood and herbaceous plants and sod.
Phase 2	2016	Bypass channel construction between bypass channel stations 40+00 and 60+00. Temporary haul road/levee construction. New channel construction and floodplain grading between channel stations 74+00 and 106+00 including grading of secondary floodplain features (swales, depressions, wetlands and side channels). Material stockpiling, including large woody debris, rock, woodchips and soil. Salvage wood and herbaceous plants and sod.
Phase 3	2017	Bank treatments and floodplain roughness between channel stations 31+00 and 106+00. New channel activation. Re-vegetation of floodplain. Stockpile LWD material.
Phase 4	2018	Bypass channel and temporary haul road/level reclamation, floodplain roughness and upland floodplain grading including grading of secondary floodplain features (swales, depressions, wetlands and side channels) between channel stations 31+00 and 106+00. Re-vegetation of floodplain.
Option 1	Any year 2015 to 2018	Floodplain grading and habitat structures between channel stations 0+00 and 31+00. Plant floodplain and revegetation maintenance.
Option 2	Any year 2015 to 2018	Floodplain grading and habitat structures between stations 106+00 and 129+00. Plant floodplain and revegetation maintenance.

Figure 2. Crooked River Phase 1 and 2 areas. Phase 1, 2 and river stations (note that the stations begin upstream and move downstream towards the confluence with the South Fork Clearwater).

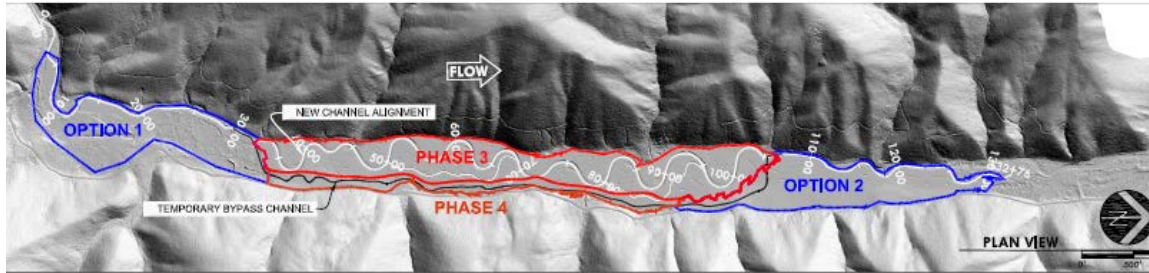


Figure 3. Crooked River Phase 3, 4 and Options 1 and 2.

Figure 4. The major Project actions: construction of the bypass Channel (yellow); new channel construction (blue); floodplain swales and depressions (blue shapes), and side channels (green).

During the dewatering of the mainstem (and watering of the bypass channel), a weir structure will be installed between the Phase 1 and 2 areas to block entry of larger fish. Dewatering and salvaging fish (capturing and moving to non-action areas which are appropriate habitat) will occur using methods described in detail in the Conservation Measures section of the BA and this Opinion. During the dewatering process smaller fish are expected to be able to move from the area and any large fish will be either herded downstream or transferred to the bypass channel using a dip-net according to the protocol described in the Conservation Measures section of the BA.

In Phase 2 another coffer dam will be built between the Phase 1 and 2 construction area and the bypass channel will be expanded from stations 40+00 through 60+00 (Table 1; Figure 2 & 4). The bypass channel will be connected to the mainstem channel at the downstream end. The dewatering will occur as in Phase 1. The bypass channel will be watered during high flows, a weir will be placed on the mainstem to keep large fish from gaining access and finally after July 15 the mainstem will be completely dewatered. Fish will be rescued from the mainstem as needed and transferred to the bypass channel. Finally, a notch will be made in the coffer dam between the Phase 1 and 2 bypass channels to water the Phase 2 channel. Watering will occur very slowly in order to minimize turbidity.

In order to maintain some habitat complexity the bypass channel will be routed through some existing ponds and ditches and much of the existing vegetation will remain undisturbed along the east side. Additionally, vegetation such as alders and willows will be salvaged in the project area and placed along the bypass channel, to keep the water temperature cool, where possible.

During Phase 4 the mainstem of Crooked River will be rewatered during low flows as described in greater detail in the BA. The existing diversion structure will be notched to rewater the new Crooked River channel. Blocknets will be installed upstream of the diversion structure and bypass channel to prevent fish from entering the new channel or bypass channel until it is completely rewatered.

Turbidity will be monitored during all Phases when watering and dewatering the bypass and main channels. If turbidity approaches 50 NTU's sandbags or bags with similar substrate will be used to slow water flow.

A 6,300 long levee will be constructed on the west side of the bypass channel and east of the mainstem of Crooked River (i.e. between the mainstem and the bypass channel) and begin at approximately station 30+00 (Figure 2) of the mainstem of Crooked River. The levee will be constructed as the bypass channel is constructed; in two Phases. The levee will be about 4 feet above the flood plain construction area and 16 feet wide. The levee will further isolate the bypass channel from the construction area. The levee will also serve as a haul road to move supplies and equipment. There will be two bypass channel crossings installed in Phase 1 and a third in Phase 2. At the end of the Project the material used to construct the levee will be backfill for the bypass channel.

### *Floodplain Construction*

Floodplain construction as described in the BA and supplemental material includes the following: removing and salvaging vegetation and sod; regrading of the existing floodplain and construction of secondary floodplain features (swales, depressions and wetlands); roughing the floodplain with woody material; and replanting with native vegetation. Floodplain construction for Phases 1-4 will begin with regrading in Phase 1 and 2 (Figure 2) and the restoration and insertion of LWD in Phases 3 and 4 (Figure 3). Option 1 and 2 will include all the above floodplain activity in the Option areas and will occur at any time during Project (discussed in further detail below).

Native material will be salvaged throughout the project area and stockpiled above the ordinary high water mark (OHWM) for use in the bank and floodplain treatment and as LWD treatment in the channel as well as for plantings in the Options. Salvaged materials that will be reused in the treatments include cobbles, boulders, gravels, soils and vegetation. Some salvage vegetation will be planted along the bypass channel temporarily while it is in use over the course of the Project. Areas containing high value vegetation communities or floodplain features, such as large shrubs and trees, will be designated and preserved. Additionally, substrate will be excavated from the dredge piles and used as riverbed and floodplain fill.



There will be a total of 115 acres of floodplain regrading for the whole project (including Options 1 and 2). Grading and additional earthmoving is required to construct the new channels, the bypass channel, levee, stream bank structures, floodplain features and to sort and stage the necessary materials for these activities. There will be an estimated 190,000 cubic yards of earthwork material moved throughout the whole project (including Options 1 and 2).

The overall floodplain will consist of two primary types, bankfull and upland floodplain (Figure 5). The bankfull floodplain will be developed adjacent to the river channel at the same elevation although gently sloping away and approximately 300 feet wide. The upland floodplain, will be developed adjacent to the bankfull floodplain and is a transition between the bankfull floodplain and the existing ground elevation. The grading for both will begin during Phase 1 between stations 31+00 and 74+00 (Figure 2) and then during Phase 2 between 74+00 and 106+00 (Table 1; Figure 2). The floodplain areas will include floodplain features such as swales, depressions and wetlands.

Additionally, there are three tributaries which will be reconnected to the mainstem channel. The tributaries are small (1 cfs at baseflow) and two are on the east side and one on the west side. The eastside tributaries would be connected after Phase 4 and the bypass channel is re-graded. The west side tributary is currently connected through dredge ponds. The tributaries will be surveyed prior to commencing work in the Phase. If fish are not found the tributary may be diverted or pumped during floodplain construction. If fish are found the protocols for fish salvaging and dewatering will be followed as addressed in the BA and later in this Opinion.

Figure 5. The proposed floodplain: bankfull immediately adjacent to the new channel and the upland floodplain, a transition area between the bankfull and the upland.

The secondary floodplain features which will be constructed in both the bankfull and upland floodplains include depressions, swales and wetlands (Table 3). Depressions are longitudinal low areas about 1 foot deep by 20-30 feet wide on the bankfull floodplain and promote and maintain desired vegetation communities. Swales are smaller and deeper features that occur in bankfull and upland floodplains and encourage a more diverse vegetative landscape. Swales are

approximately 2 feet deep by 15-20 feet wide and allow vegetation to access the late season water table. Both features will be spaced approximately 70 feet apart on the bankfull floodplain and 50 feet apart on the upland floodplain.

As described in the BA there are 52 acres of wetlands in the project area. Thirty acres of wetland are proposed to be filled, 22 acres will remain and 42 acres will be recreated (Table 2). The project will create both slope and side channel wetlands and preserve many of the existing wetlands. The majority of wetland to be created will be palustrine scrub dominated by alder (Table 2).

Table 2. Existing wetland area expected to be impacted and wetland area expected to be created.

Wetland Class <sup>1</sup>	Existing Wetlands <sup>2</sup>	Existing Wetlands Impacted	Wetland Area Created	Total Wetland Area Post-Project <sup>3</sup>
Palustrine Aquatic Bed	9.7 ac	7.9 ac	0.0 ac	1.8 ac
Palustrine Emergent	28.1 ac	14.3 ac	0.3 ac	13.9 ac
Palustrine Scrub Shrub	1.7 ac	0.3 ac	32.6 ac	34.3 ac
Palustrine Forested	0.5 ac	0.0 ac	0.0 ac	0.5 ac
Riverine	12.5 ac	8.1 ac	9.1 ac	13.6 ac
<b>Totals</b>	<b>52.6 ac</b>	<b>30.6 ac</b>	<b>42.0 ac</b>	<b>64.1 ac</b>

<sup>1</sup>Cowardin et al. (1979).

<sup>2</sup>Existing wetlands are described in the *Crooked River Valley Rehabilitation Project Wetland Delineation Report* (2012).

<sup>3</sup>This estimate includes existing wetlands that will not be impacted by project actions combined with wetlands expected to be created by the project.

Table 3. Summary of floodplain roughness treatments by design floodplain feature.

Feature	Area	Total Brush Needed <sup>1</sup> (150 pieces/acre)	Total Small Logs <sup>2</sup> Needed (50 pieces/acre)
Bankfull Floodplain	43.1	6,461	2,154
Floodplain Depression	1.5	225	75
Floodplain Swale	1.0	149	50
Side Channel Wetland	0.6	84	28
Upland Flow Floodplain	13.2	1,980	660
Upland Swale	0.3	51	17
<b>Total</b>	<b>59.7</b>	<b>8,950</b>	<b>2,984</b>

Fifty-nine acres of the floodplain both bankfull and upland will be treated in Phase 3 (Table 3). The treatment is designed to increase water holding capacity in the floodplain. It will include grading, creating ridges and furrows and adding LWD and other organic material such as brush and small logs. The LWD will be both Type 1 and Type 2 (Figure 6 and 7). Large wood structure type 1 will be placed on outer banks of meander bends with the purpose of maintaining

a deep pool (will be installed during channel construction discussed below) (Figure 6). Large wood structure type 2 is designed to establish roughness along the bank margin and to establish vegetation back from the bank (Figure 7). Vegetative fill of fine grained soil will be mixed into the top 12 inches of the soil in both floodplain areas.

Finally, the floodplain will be replanted with material salvaged during the reconstruction and other native vegetation. New vegetation communities will include alder, sedge, mixed shrubs and spruce. Trees and vegetation that will most effectively provide shade will be planted along the new channel bank.

### *Channel Construction and Restoration*

Construction on the Crooked River channel will occur in Phase I and II (Table 1), will include 7,400 feet of new channel from river stations 32+00 to 106+00 (Figure 2) and will connect the channel to the new floodplain. The new channel will be constructed to have natural meanders, riffle pool morphology, and a mobile gravel bed. The new channel design features will include 40 % riffles (shallow areas, slower velocity, steeper slopes), 10% runs (deeper less slope in river bed), 30% pools and 10% glides (downstream of pools great water velocity from pool). The new channel will contain an inset low flow channel for fish migration. There will be 58 pools, 4 feet by 6 feet wide and 2 to 4 feet deep and they will be on the outside of the meanders bends (Figure 4). Large woody debris treatments will be applied to 5,800 feet of the new channel will receive LWD treatments.

There will be 9,845 feet of total stream bank treatments in the entire project (all phases and Option 1 and 2) which will include 60 LWD structures, sod mats, coir rolls and fascines. Much of the material for the bank treatments will be onsite salvaged material. The LWD will be installed with an excavator or using a helicopter technique depending on where and how the trees are imported. As discussed in the previous section, there are two types of LWD structures which are designed and constructed with large enough trees to remain in places with high water flows. Large wood structure type 1 will be placed on outer banks of meander bends with the purpose of maintaining a deep pool (Figure 6). Large wood structure type 2 is designed to establish roughness along the bank margin and to establish vegetation back from the bank (Figure 7). Additionally, a large wood structure will be placed upstream of the fish weir and act as a catchment for debris that are transported during high water flows. The catchment wood structure will include large logs and boulders.

Finally, there will be 2 side channels constructed which will provide an additional 2,725 feet of salmonid habitat. The side channels will be constructed low enough to allow fish to move out of the channel as water levels recede during spring and late fall flows. The channel will not support fish at summer low flows or capture water from the mainstem. The inlet to the side channels will be constructed at the outer meander bends to reduce sediment being trapped, (Figure 4).

### *Options 1 and 2*

Both Options 1 and 2 (Figure 3) can be executed at any time during the Project. Option 1 and 2 will not include new channel creation as the existing channel in these areas (Figure 3) does not

exhibit unnatural meanders. Both Options will include floodplain roughness treatments, 4 acres and 14 acres respectively for Options 1 and 2. Option 1 will require 14,600 cubic yards (cy) of earthmoving and Option 2 will require 48,100 cy. Both Options will incorporate 10 Type 1 LWD structures into the existing stream bank. This will be accomplished by pushing the logs in with an excavator from the outside of the bank (not instream).

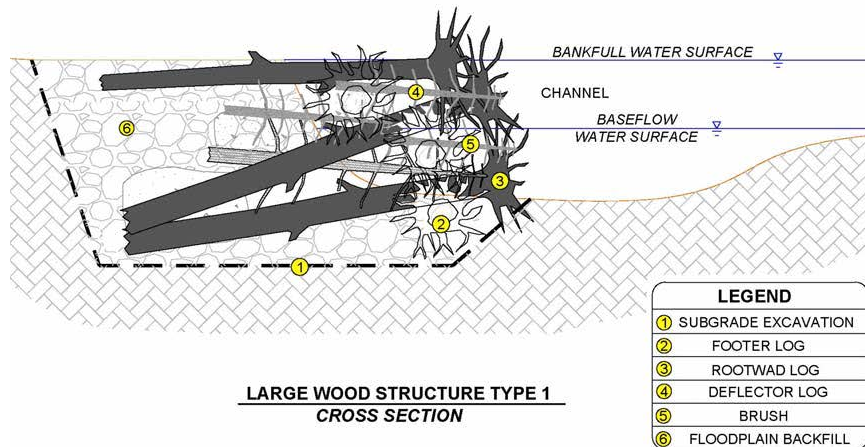


Figure 6. Large wood structure type 1 to be placed in the new channel after channel construction, establish and maintain pools.

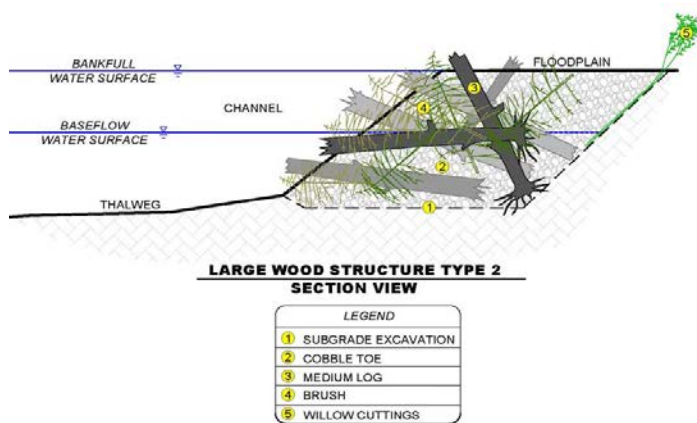


Figure 7. Large woody structure type II used to stabilize bank, trap sediment and establish vegetation.

### Conservation Measures

In general, in channel work will be timed to occur after work areas have been de-watered and fish have been removed to suitable locations to minimize impact. The dewatering, work area isolation and fish salvage will occur in Phases 1, 2 & 3 (Table 4; Figure 4).

### Work schedule and timing:

The bypass channel in Phase 1 and Phase 2 will begin construction between June and July and dewatering will occur after July 15 in all years and during all Phases. This includes the dewatering of the bypass channel in Phase 4; likewise, it will not occur until after July 15. The timing will minimize the likelihood that fish are present in the project.

### Work site isolation, Dewatering and Fish Salvage:

The areas that will be dewatered, as described in the BA project description, include the mainstem channel, dredge pools and interconnected channels. The timing of the initiation (described above) and rate of the dewatering of the bypass channel and pools will allow fish to migrate out of the area prior to construction activities. Dewatering of all areas will occur early in the morning when the air and water temperature are coolest. Isolating the work area, dewatering and fish salvage will occur during Phases 1-2 and 3 (Table 4). The BA describes an extensive six step process of isolating the work area and removing fish to minimize impact prior to construction that will be instituted. All fish salvage operations will be supervised by qualified personnel from the USFS and NPT experienced with work area isolation and fish salvage procedures. The protocol is described in detail in the BA and summarized below:

1. Isolate - There are four individual steps (described in the BA) that will be followed to isolate the work area which include installing block nets up and downstream to exclude fish; securing nets to the stream channel bed and bank and monitoring nets for fish that may become lodged.
2. Seining/Dip-netting - The BA describes an extensive four step process for using seines and dip-nets to capture and remove fish with several specific methods for transporting fish to minimize harm. Fish will be herded downstream as the area is slowly dewatered. Remaining fish will be removed using a dip-net and buckets (as described in the BA) and transported as rapidly as possible to a safe location. Time in the bucket will be limited as will the number of fish in each bucket simultaneously. Buckets will be kept in shaded areas and either aerators will be used or the water will be changed every 15 minutes.
3. Electrofishing - Electrofishing will be used only if other methods have not cleared all threatened fish and will follow the National Marine Fisheries Service (NMFS) electrofishing guidelines which are summarized in the BA.
4. Dewater - dewatering will occur over several days, but not more than 4, to allow fish to move out of the area. Deep ponds will be pumped to reduce water levels and ensure all fish are removed. Additionally, fish screens will be used to avoid juvenile entrapment in accordance with the NMFS fish screen criteria.
5. Re-watering – Re-watering of the main channel, from the bypass channel will occur over the course of several days by slowly opening the coffer dam upstream. Blocknets will be used above the coffer dam to exclude fish during this period. As the water will be let in slowly the sediment will settle and infiltrate out into the cobbles. Turbidity will be monitored to ensure it does not reach levels greater than 50 NTU's above background. If it does the flow will be ramped down using sandbags. Additionally, during this period crews will monitor water levels to detect if the flow goes subsurface and if it does rework the substrate and take measures to seal the channel. The bypass channel will not be dewatered while water is run through the new channel. Once the new channel is deemed operational, then the mainstem will be rewatered. Fish will be moved back to the mainstem through electrofishing efforts, which will not take more than 4 days. The by-pass channel will be monitored for stranded aquatic organisms and fish will be transferred back into the main channel using the steps identified above.

6. Salvage Notice - Once the fish salvage operations are complete, for each Phase (Phase 1, 2 & 4) in which salvage operations occur, a report will be completed which documents the following: methods and procedures used; the number of fish moved (i.e. salvaged); the number of injuries and mortality and the cause of each.

Additional further measures will occur when dewatering the bypass channel and the dredge ponds. Water will be passed through the bypass channel prior to dewatering the mainstem channel to allow for continuous fish passage through the project area. A fish exclusion structure (weir or picket fence) will be installed on the downstream end of the main channel to block adult fish passage once the mainstem is dewatered and the bypass channel fully flooded and operational. Simultaneously, the upstream end of the mainstem channel will be slowly closed, over several days, while dewatering. Fish are expected to move out of the mainstem channel with the slowing receding water. Crews will use seine nets, where possible, to herd fish out of the project area and into the bypass channel. Once the mainstem is dewatered stranded fish will be dip-netted and moved to the bypass channel. In Phase 2, when the bypass channel from river stations 40+00 to 60+00 (Figure 2) are being dewatered sandbags will be used to slowly dewater the mainstem channel. Sandbags will be placed in the channel a row at a time to allow the water to drop and fish to move out of the channel. Fish salvage will occur in the both areas of the bypass channel during both Phase 1 and 2.

Table 4. Potential fish salvage area in each of the project phases.

<b>Year/Phase</b>	<b>Location of Fish Salvage</b>	<b>Activity</b>	<b>Total Area (m<sup>2</sup>)</b>
2015	Dredge Ponds	Block Dredge Ponds	18,873
2015/Phase 1	Mainstem River/Side Channel	Construct Bypass Channel, Floodplain, New Channel	24,261
2016/Phase 2	Mainstem River	Construct Bypass Channel, Floodplain, New Channel	16,072
2017/Phase 3	No fish salvage would occur for this activity	Install LWD and bank stabilization structures	0
Phase 4	Bypass Channel	Complete Phase 3, Re-grade Bypass Channel	7,943

As water recedes from pools during dewatering, any fish will be dip-netted and removed to the bypass channel or downstream reach (using procedures described previously). Pools which are over 4 feet deep will have water pumped out. Pumping procedures developed by the National Marine Fisheries Service 2011 (NMFS), referenced in the BA, and include screen intakes and pumping rates, will be followed. Finally, the pools will be electrofished (according to protocols described above and in the BA) to remove any remaining fish and transfer them to the bypass channel or downstream reach.

Erosion control conservation measures will be implemented in association with all activities in the action area. As described in the BA the eight separate erosion control measures include the following: avoiding disturbance to riparian areas; using sediment barriers prior to construction; ensuring erosion control materials are weed free; having additional erosion control materials

onsite; prepare construction site to minimize erosion during severe weather events and monitoring effectiveness of erosion control measures.

Sediment will also be controlled during the dewatering process through instituting five practices as described in the BA which include constructing the levee to isolate work areas prior to instream work, use of erosion control devices such as silt fences and waddles, and install settling ponds in the construction area to keep the dewatered areas dry.

Additional conservation measures, extensively described in the BA include (but are not limited to) pollution control, spill and other contaminant prevention measures, procedures to minimize exposure to hazardous material, placement of staging areas, aquatic invasive species control measures, and sanitation and cleaning practices.

### Monitoring and Compliance

#### **Turbidity Monitoring**

Turbidity will be monitored throughout the project to prevent and minimize effects on fish as described in the BA. To ensure turbidity is accurately and effectively monitored the following procedure will be followed: turbidity samples will be taken above the work site to determine the background levels using a DH48 depth integrated sampler. The samples will be taken across the width of the channel and analyzed using a field turbidimeter. During rewatering activities turbidity measurements will be taken 300, 600 and 1,000 feet below the point where the rewatered channel meets the existing channel or below where the instream work is taking place if sediment plumes are observed. If turbidity levels approach 50 NTU's above background, water levels will be reduced until turbidity levels return to background levels or 10 NTU's. Turbidity will be monitored regularly (e.g. every 15 minutes) if there is a visible turbidity plume.

#### **Vegetation Monitoring**

The revegetation of the project area will be monitored by the NPT and the Forest using 15 foot radius circle plots as described in the BA. Several permanent plots will be established and monitored for 10 years. Additionally, permanent wetland photoplots will be established and monitored for 10 years by surveying species composition and monitoring size and perimeter of the wetland using a geographic position system unit and geospatial analysis.

#### **Fish Monitoring**

Fish presence will be monitored in the side channels upon completion of Phases 1 through 3 to ensure they are not stranded after high flows.

#### **Monitor Reporting**

An annual report will be provided to the services which includes turbidity and fish salvage results and data, Best Management Practices (i.e. the Conservation measures) effectiveness and vegetation data.

#### **Action Effectiveness Monitoring**

The NPT in coordination with Bonneville Power Administration (BPA) and Tetrattech will use the Columbia River Habitat Monitoring Protocol to monitor and compare baseline with post

project conditions two years prior and three years post project. Metrics monitored as described in the BA include a variety of biotic and abiotic environmental and fish habitat parameters.

#### Emergency Action Plan

In the event that any of the following events occur the applicable emergency action plan as described in the BA will be implemented and the Service and NMFS notified.

#### **Bypass Channel Failure**

Bypass channel failure is unlikely but if it did occur would be either from flows that are too large or low and insufficient. If the water velocity and flow is too great in the bypass channel a spillway will be constructed on the coffer dam to split the flow between the bypass channel and the new channel so that water does not move into an undesirable location. If the flow in the bypass channel were to become too low for adult fish to migrate portions of the bypass channel will be excavated. The fish salvage operations outlined previously would be followed.

#### **Loss of water in the Mainstem channel**

There is a potential for a loss of water in the new channel when it is rewatered due to the porosity of the valley substrate. To determine if there is a potential for this to happen ground water flows will be evaluated during construction of the new channel. If a loss of water is occurring the new channel substrate will be remixed with more fine particles. The proportion will depend on the severity of water loss observed. Additionally, the new channel will be carefully and specifically observed for water loss during the rewatering process. The new channel will be rewatered slowly allowing for the evaluation of potential water loss after 48 hours of flows at 6 to 10 cfs in the new channel.

#### **Diversion structure failure**

In order to prevent diversion structure failure, it will be evaluated for strength and structural integrity by the contractor at the end of each construction season prior to winter and then in the spring prior to beginning work. Repairs will be performed when needed. In the spring it will also be evaluated for erosion potential and any debris that needs removal.

#### Best Management Practices for Mercury Collection

Although not expected, as explained in the BA, if mercury is found in the project area the following action will be performed: all work will cease and every effort to contain the material will be made; the mercury will be contained in a vapor proof container by qualified personnel; as described in the BA an appropriate disposal site will be identified, and the mercury will be transferred and handled as outlined therein. The proper regulatory state and federal agencies will be notified.



## 2.2 Analytical Framework for the Jeopardy and Adverse Modification Determinations

### 2.2.1 Jeopardy Determination

In accordance with policy and regulation, the jeopardy analysis in this Opinion relies on four components:

1. The *Status of the Species*, which evaluates the bull trout's rangewide condition, the factors responsible for that condition, and its survival and recovery needs.
2. The *Environmental Baseline*, which evaluates the condition of the bull trout in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the bull trout.
3. The *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the bull trout.
4. *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the bull trout.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the bull trout's current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the bull trout in the wild.

As discussed below under the *Status of the Species*, interim recovery units have been designated for the bull trout for purposes of recovery planning and application of the jeopardy standard. Per Service national policy (USFWS 2006, entire), it is important to recognize that the establishment of recovery units does not create a new listed entity. Jeopardy analyses must always consider the impacts of a proposed action on the survival and recovery of the species that is listed. While a proposed Federal action may have significant adverse consequences to one or more recovery units, this will only result in a jeopardy determination if these adverse consequences reduce appreciably the likelihood of both the survival and recovery of the listed entity; in this case, the coterminous U.S. population of the bull trout.

The joint Service and National Marine Fisheries Service (NMFS) *Endangered Species Consultation Handbook* (USFWS and NMFS 1998, p. 4-38), which represents national policy of both agencies, further clarifies the use of recovery units in the jeopardy analysis:

When an action appreciably impairs or precludes the capacity of a recovery unit from providing both the survival and recovery function assigned to it, that action may represent jeopardy to the

species. When using this type of analysis, include in the Biological Opinion a description of how the action affects not only the recovery unit's capability, but the relationship of the recovery unit to both the survival and recovery of the listed species as a whole.

The jeopardy analysis in this Opinion conforms to the above analytical framework.

### **2.2.2 Adverse Modification Determination**

This Opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to critical habitat.

In accordance with policy and regulation, the adverse modification analysis in this Opinion relies on four components:

1. The *Status of Critical Habitat*, which evaluates the rangewide condition of designated critical habitat for the bull trout in terms of primary constituent elements (PCEs), the factors responsible for that condition, and the intended recovery function of the critical habitat overall.
2. The *Environmental Baseline*, which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area.
3. The *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the PCEs and how that will influence the recovery role of affected critical habitat units.
4. *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how that will influence the recovery role of affected critical habitat units.

The analysis in this Opinion places an emphasis on using the intended rangewide recovery function of bull trout critical habitat and the role of the action area relative to that intended function as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the adverse modification determination.

## **2.3 Status of the Species and Critical Habitat**

This section presents information about the regulatory, biological and ecological status of the bull trout and its critical habitat that provides context for evaluating the significance of probable effects caused by the proposed action.

## 2.3.1 Bull Trout

### 2.3.1.1 Listing Status

The coterminous United States population of the bull trout (*Salvelinus confluentus*) was listed as threatened on November 1, 1999 (64 FR 58910). The threatened bull trout occurs in the Klamath River Basin of south-central Oregon, the Jarbidge River in Nevada, north to various coastal rivers of Washington to the Puget Sound, east throughout major rivers within the Columbia River Basin to the St. Mary-Belly River, and east of the Continental Divide in northwestern Montana (Cavender 1978, pp.165-166; Bond 1992, p. 4; Brewin and Brewin 1997, pp. 209-216; Leary and Allendorf 1997, pp.715-720). The Service completed a 5-year Review in 2008 and concluded that the bull trout should remain listed as threatened (USFWS 2008a, p. 53).

The bull trout was initially listed as three separate Distinct Population Segments (DPSs) (63 FR31647, 64 FR 17110). The preamble to the final listing rule for the U.S. coterminous population of the bull trout discusses the consolidation of these DPSs, plus two other population segments, into one listed taxon and the application of the jeopardy standard under Section 7 of the Act relative to this species (64 FR 58930):

Although this rule consolidates the five bull trout DPSs into one listed taxon, based on conformance with the DPS policy for purposes of consultation under Section 7 of the Act, we intend to retain recognition of each DPS in light of available scientific information relating to their uniqueness and significance. Under this approach, these DPSs will be treated as interim recovery units with respect to application of the jeopardy standard until an approved recovery plan is developed. Formal establishment of bull trout recovery units will occur during the recovery planning process.

Thus, as discussed above under the *Analytical Framework for the Jeopardy and Adverse Modification Determinations*, the Service's jeopardy analysis for the proposed Plan will involve consideration of how the Plan is likely to affect the Columbia River interim recovery unit for the bull trout based on its uniqueness and significance as described in the DPS final listing rule cited above, which is herein incorporated by reference. However, in accordance with Service national policy, the jeopardy determination is made at the scale of the listed species, in this case, the coterminous U.S. population of the bull trout.

### 2.3.1.2 Reasons for Listing

Though wide ranging in parts of Oregon, Washington, Idaho, and Montana, bull trout in the interior Columbia River basin presently occur in only about 45 percent of the historical range (Quigley and Arbelbide 1997, p. 1177; Rieman et al. 1997, p. 1119). Declining trends due to the combined effects of habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, angler harvest and poaching, entrainment into diversion channels and dams, and introduced nonnative species (e.g., brook trout, *Salvelinus fontinalis*) have resulted in declines in range-wide bull trout distribution and abundance (Bond 1992, p. 4; Schill 1992, p. 40; Thomas 1992, pp. 9-12; Ziller 1992, p. 28; Rieman and McIntyre 1993, pp. 1-18; Newton and Pribyl 1994, pp. 2, 4, 8-9). Several local extirpations have been reported, beginning in the 1950s

(Rode 1990, p. 1; Ratliff and Howell 1992, pp. 12-14; Donald and Alger 1993, p. 245; Goetz 1994, p. 1; Newton and Pribyl 1994, p. 2; Berg and Priest 1995, pp. 1-45; Light et al. 1996, pp. 20-38; Buchanan and Gregory 1997, p. 120).

Land and water management activities such as dams and other diversion structures, forest management practices, livestock grazing, agriculture, road construction and maintenance, mining, and urban and rural development continue to degrade bull trout habitat and depress bull trout populations (USFWS 2002a, p. 13).

### **2.3.1.3 Species Description**

Bull trout, member of the family Salmonidae, are native to the Pacific Northwest and western Canada. The bull trout and the closely related Dolly Varden (*Salvelinus malma*) were not officially recognized as separate species until 1980 (Robins et al. 1980, p. 19). Bull trout historically occurred in major river drainages in the Pacific Northwest from the southern limits in the McCloud River in northern California (now extirpated), Klamath River basin of south central Oregon, and the Jarbidge River in Nevada to the headwaters of the Yukon River in the Northwest Territories, Canada (Cavender 1978, p. 165-169; Bond 1992, p. 2-3). To the west, the bull trout's current range includes Puget Sound, coastal rivers of British Columbia, Canada, and southeast Alaska (Bond 1992, p. 2-3). East of the Continental Divide bull trout are found in the headwaters of the Saskatchewan River in Alberta and the MacKenzie River system in Alberta and British Columbia (Cavender 1978, p. 165-169; Brewin and Brewin 1997, pp. 209-216). Bull trout are wide spread throughout the Columbia River basin, including its headwaters in Montana and Canada.

### **2.3.1.4 Life History**

Bull trout exhibit resident and migratory life history strategies throughout much of the current range (Rieman and McIntyre 1993, p. 2). Resident bull trout complete their entire life cycle in the streams where they spawn and rear. Migratory bull trout spawn and rear in streams for 1 to 4 years before migrating to either a lake (adfluvial), river (fluvial), or, in certain coastal areas, to saltwater (anadromous) where they reach maturity (Fraley and Shepard 1989, p. 1; Goetz 1989, pp. 15-16). Resident and migratory forms often occur together and it is suspected that individual bull trout may give rise to offspring exhibiting both resident and migratory behavior (Rieman and McIntyre 1993, p. 2).

Bull trout have more specific habitat requirements than other salmonids (Rieman and McIntyre 1993, p. 4). Habitat components that influence bull trout distribution and abundance include water temperature, cover, channel form and stability, valley form, spawning and rearing substrate, and migratory corridors (Fraley and Shepard 1989, p. 137; Goetz 1989, pp. 23, 25; Hoelscher and Bjornn 1989; Sedell and Everest 1991; Pratt 1992, p. 6; Rieman and McIntyre 1993, pp. 5-6, 1995; Rich 1996; Watson and Hillman 1997). Watson and Hillman (1997, p. 248) concluded that watersheds must have specific physical characteristics to provide habitat requirements for bull trout to successfully spawn and rear. It was also concluded that these characteristics are not necessarily ubiquitous throughout these watersheds, thus resulting in patchy distributions even in pristine habitats.

Migratory corridors link seasonal habitats for all bull trout life histories. The ability to migrate is important to the persistence of bull trout (Rieman and McIntyre 1993, pp. 2, 4; Gilpin 1997; Rieman et al. 1997, pp. 1121-1122). Migrations facilitate gene flow among local populations when individuals from different local populations interbreed, or stray, to nonnatal streams. Local populations that are extirpated by catastrophic events may also become reestablished by bull trout migrants.

Bull trout are found primarily in colder streams, although individual fish are migratory in larger, warmer river systems throughout the range (Fraley and Shepard 1989, pp. 135-137; Rieman and McIntyre 1993, p. 2 and 1995, p. 288; Buchanan and Gregory 1997, pp. 121-122; Rieman et al. 1997, p. 1114). Water temperature above 15°C (59°F) is believed to limit bull trout distribution, which may partially explain the patchy distribution within a watershed (Fraley and Shepard 1989, p. 133; Rieman and McIntyre 1995, pp. 255-296). Spawning areas are often associated with cold water springs, groundwater infiltration, and the coldest streams in a given watershed (Pratt 1992, p. 6; Rieman and McIntyre 1993, p. 7; Rieman et al. 1997, p. 1117). Spawning habitats are generally characterized by temperatures that drop below 48 degrees Fahrenheit in the fall (Fraley and Shepard 1989, p. 133; Pratt 1992, p. 7; Rieman and McIntyre 1993, pp. 2, 7). Goetz (1989, pp. 22, 24) suggested optimum water temperatures for rearing of less than 10°C (50°F) and optimum water temperatures for egg incubation of 2 to 4°C (35 to 39°F).

All life history stages of bull trout are associated with complex forms of cover, including large woody debris, undercut banks, boulders, and pools (Goetz 1989, pp. 22-25; Pratt 1992, p. 6; Thomas 1992, pp. 4-5; Rich 1996, pp. 35-38; Sexauer and James 1997, pp. 367-369; Watson and Hillman 1997, pp. 247-249). Jakober (1995, p. 42) observed bull trout overwintering in deep beaver ponds or pools containing large woody debris in the Bitterroot River drainage, Montana, and suggested that suitable winter habitat may be more restrictive than summer habitat. Bull trout prefer relatively stable channel and water flow conditions (Rieman and McIntyre 1993, p. 6). Juvenile and adult bull trout frequently inhabit side channels, stream margins, and pools with suitable cover (Sexauer and James 1997, pp. 368-369). These areas are sensitive to activities that directly or indirectly affect stream channel stability and alter natural flow patterns. For example, altered stream flow in the fall may disrupt bull trout during the spawning period, and channel instability may decrease survival of eggs and young juveniles in the gravel from winter through spring (Fraley and Shepard 1989, p. 141; Pratt 1992, p. 6; Pratt and Huston 1993, pp. 73, 90). Pratt (1992, p. 6) indicated that increases in fine sediment reduce egg survival and emergence.

The size and age of bull trout at maturity depend upon life history strategy. Growth of resident fish is generally slower than migratory fish; resident fish tend to be smaller at maturity and less fecund (Goetz 1989, p. 15). Bull trout normally reach sexual maturity in 4 to 7 years and live as long as 12 years. Bull trout are iteroparous (they spawn more than once in a lifetime), and both repeat- and alternate-year spawning has been reported, although repeat-spawning frequency and post-spawning mortality are not well documented (Leathe and Graham 1982, p. 95; Fraley and Shepard 1989, p. 135; Pratt 1992, p. 8; Rieman and McIntyre 1996, p. 133).

Bull trout typically spawn from August to November during periods of decreasing water temperatures. Migratory bull trout frequently begin spawning migrations as early as April, and

have been known to move upstream as far as 250 kilometers (km) (155 miles (mi)) to spawning grounds (Fraley and Shepard 1989, p. 135). Depending on water temperature, incubation is normally 100 to 145 days (Pratt 1992, p.1) and, after hatching, juveniles remain in the substrate. Time from egg deposition to emergence may exceed 200 days. Fry normally emerge from early April through May depending upon water temperatures and increasing stream flows (Pratt 1992, p. 1).

The iteroparous reproductive system of bull trout has important repercussions for the management of this species. Bull trout require two-way passage up and downstream, not only for repeat spawning, but also for foraging. Most fish ladders, however, were designed specifically for anadromous semelparous (fishes that spawn once and then die, and therefore require only one-way passage upstream) salmonids. Therefore, even dams or other barriers with fish passage facilities may be a factor in isolating bull trout populations if they do not provide a downstream passage route.

Bull trout are opportunistic feeders with food habits primarily a function of size and life history strategy. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macro zooplankton and small fish (Boag 1987, p. 58; Goetz 1989, pp. 33-34; Donald and Alger 1993, pp. 239-243). Adult migratory bull trout are primarily piscivores, known to feed on various fish species (Fraley and Shepard 1989, p. 135; Donald and Alger 1993, p. 242).

#### **2.3.1.4.1 Population Dynamics**

The draft bull trout Recovery Plan (USFWS 2002a, pp. 47-48) defined core areas as groups of partially isolated local populations of bull trout with some degree of gene flow occurring between them. Based on this definition, core areas can be considered metapopulations. A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meefe and Carroll 1994, p. 188). In theory, bull trout metapopulations (core areas) can be composed of two or more local populations, but Rieman and Allendorf (2001, p. 763) suggest that for a bull trout metapopulation to function effectively, a minimum of 10 local populations are required. Bull trout core areas with fewer than 5 local populations are at increased risk of local extirpation, core areas with between 5 and 10 local populations are at intermediate risk, and core areas with more than 10 interconnected local populations are at diminished risk (USFWS 2002a, pp. 50-51).

The presence of a sufficient number of adult spawners is necessary to ensure persistence of bull trout populations. In order to avoid inbreeding depression, it is estimated that a minimum of 100 spawners are required. Inbreeding can result in increased homozygosity of deleterious recessive alleles which can in turn reduce individual fitness and population viability (Whitesel et al. 2004, p. 36). For persistence in the longer term, adult spawning fish are required in sufficient numbers to reduce the deleterious effects of genetic drift and maintain genetic variation. For bull trout, Rieman and Allendorf (2001, p. 762) estimate that approximately 1,000 spawning adults within any bull trout population are necessary for maintaining genetic variation indefinitely. Many local bull trout populations individually do not support 1,000 spawners, but this threshold may be met by the presence of smaller interconnected local populations within a core area.

For bull trout populations to remain viable (and recover), natural productivity should be sufficient for the populations to replace themselves from generation to generation. A population

that consistently fails to replace itself is at an increased risk of extinction. Since estimates of population size are rarely available, the productivity or population growth rate is usually estimated from temporal trends in indices of abundance at a particular life stage. For example, redd counts are often used as an indicator of a spawning adult population. The direction and magnitude of a trend in an index can be used as a surrogate for growth rate.

Survival of bull trout populations is also dependent upon connectivity among local populations. Although bull trout are widely distributed over a large geographic area, they exhibit a patchy distribution even in pristine habitats (Rieman and McIntyre 1993, p. 7). Increased habitat fragmentation reduces the amount of available habitat and increases isolation from other populations of the same species (Saunders et al. 1991, p. 22). Burkey (1989, p. 76) concluded that when species are isolated by fragmented habitats, low rates of population growth are typical in local populations and their probability of extinction is directly related to the degree of isolation and fragmentation. Without sufficient immigration, growth of local populations may be low and probability of extinction high. Migrations also facilitate gene flow among local populations because individuals from different local populations interbreed when some stray and return to nonnatal streams. Local populations that are extirpated by catastrophic events may also become reestablished in this manner (Rieman et al. 1997).

In summary, based on the works of Rieman and McIntyre (1993, pp. 9-15) and Rieman and Allendorf (2001, pp 756-763), the draft bull trout Recovery Plan identified four elements to consider when assessing long-term viability (extinction risk) of bull trout populations: (1) number of local populations, (2) adult abundance (defined as the number of spawning fish present in a core area in a given year), (3) productivity, or the reproductive rate of the population, and (4) connectivity (as represented by the migratory life history form).

### **2.3.1.5 Status and Distribution**

As noted above, in recognition of available scientific information relating to their uniqueness and significance, five population segments (also considered as interim recovery units)<sup>1</sup> of the coterminous United States population of the bull trout are considered essential to the survival and recovery of this species and are identified as: (1) Jarbidge River, (2) Klamath River, (3) Coastal-Puget Sound, (4) St. Mary-Belly River, and (5) Columbia River. Each of these segments is necessary to maintain the bull trout's distribution, as well as its genetic and phenotypic diversity, all of which are important to ensure the species' resilience to changing environmental conditions.

A summary of the current status and conservation needs of the bull trout within these units is provided below. A comprehensive discussion of these topics is found in the draft bull trout Recovery Plan (USFWS 2002a, entire; 2004a, b; entire).

Central to the survival and recovery of the bull trout is the maintenance of viable core areas (USFWS 2002a, p. 54). A core area is defined as a geographic area occupied by one or more local bull trout populations that overlap in their use of rearing, foraging, migratory, and overwintering habitat, and, in some cases, their use of spawning habitat. Each of the population

<sup>1</sup> The Service's 5 year review (Service 2008, p. 9) identifies six draft recovery units. Until the bull trout draft recovery plan is finalized, the current five interim recovery units are in affect for purposes of section 7. The adverse modification analysis does not rely on recovery units.

segments listed below consists of one or more core areas. One hundred and twenty one core areas are recognized across the United States range of the bull trout (USFWS 2005, p. 9).

A core area assessment conducted by the Service for the 5 year bull trout status review determined that of the 121 core areas comprising the coterminous listing, 43 are at high risk of extirpation, 44 are at risk, 28 are at potential risk, 4 are at low risk and 2 are of unknown status (USFWS 2008a, p. 29).

#### **2.3.1.5.1 Klamath River**

This population segment currently contains three core areas and 12 local populations. The current abundance, distribution, and range of the bull trout in the Klamath River Basin are greatly reduced from historical levels due to habitat loss and degradation caused by reduced water quality, timber harvest, livestock grazing, water diversions, roads, and the introduction of nonnative fishes. Bull trout populations in this unit face a high risk of extirpation (USFWS 2002b, p. iv). The draft bull trout Recovery Plan (USFWS 2002b, p. v) identifies the following conservation needs for this unit: (1) maintain the current distribution of the bull trout and restore distribution in previously occupied areas, (2) maintain stable or increasing trends in bull trout abundance, (3) restore and maintain suitable habitat conditions for all life history stages and strategies, and (4) conserve genetic diversity and provide the opportunity for genetic exchange among appropriate core area populations. Eight to 15 new local populations and an increase in population size from about 3,250 adults currently to 8,250 adults are needed to provide for the persistence and viability of the three core areas (USFWS 2002b, p. vi).

#### **2.3.1.5.2 Jarbidge River**

This population segment currently contains a single core area with six local populations. Less than 500 resident and migratory adult bull trout, representing about 50 to 125 spawners, are estimated to occur within the core area. The current condition of the bull trout in this segment is attributed to the effects of livestock grazing, roads, angler harvest, timber harvest, and the introduction of nonnative fishes (USFWS 2004a, p. iii). The draft bull trout Recovery Plan identifies the following conservation needs for this segment: (1) maintain the current distribution of the bull trout within the core area, (2) maintain stable or increasing trends in abundance of both resident and migratory bull trout in the core area, (3) restore and maintain suitable habitat conditions for all life history stages and forms, and (4) conserve genetic diversity and increase natural opportunities for genetic exchange between resident and migratory forms of the bull trout. An estimated 270 to 1,000 spawning fish per year are needed to provide for the persistence and viability of the core area and to support both resident and migratory adult bull trout (USFWS 2004a, p. 62-63). Currently this core area is at high risk of extirpation (USFWS 2005, p. 9).

Since the draft recovery plan was written, updated information is available on the bull trout population in the Jarbidge River Distinct Population Segment (Allen et al. 2010, entire). The most recent study, conducted by the U.S. Geological Survey (USGS) in 2006 and 2007 to examine the distribution and movement of bull trout in the Jarbidge River system, captured 349 bull trout in 24.8 miles of habitat in the East and West Forks of the Jarbidge River, and in Fall, Slide, Dave, Jack, and Pine creeks. In 2007, they captured 1,353 bull trout in 15.5 miles of habitat in the West Fork Jarbidge River and its tributaries and 11.2 miles of habitat in the East



Fork Jarbidge River and its tributaries (Allen et al. 2010, p. 6). The study results indicate that almost four times the number of bull trout estimated in the draft Recovery Plan inhabit the Jarbidge core area; and that these fish show substantial movements between tributaries, increased abundance with increasing altitude, and growth rates indicative of a high-quality habitat (Allen et al. 2010, p. 20).

#### **2.3.1.5.3 Coastal-Puget Sound**

Bull trout in the Coastal-Puget Sound population segment exhibit anadromous, adfluvial, fluvial and resident life history patterns. The anadromous life history form is unique to this unit. This population segment currently contains 14 core areas and 67 local populations (USFWS 2004b, p. iv; 2004c, pp. iii-iv). Bull trout are distributed throughout most of the large rivers and associated tributary systems within this unit. With limited exceptions, bull trout continue to be present in nearly all major watersheds where they likely occurred historically within this unit. Generally, bull trout distribution has contracted and abundance has declined, especially in the southeastern part of the unit. The current condition of the bull trout in this population segment is attributed to the adverse effects of dams, forest management practices (e.g., timber harvest and associated road building activities), agricultural practices (e.g., diking, water control structures, draining of wetlands, channelization, and the removal of riparian vegetation), livestock grazing, roads, mining, urbanization, angler harvest, and the introduction of nonnative species. The draft bull trout Recovery Plan (USFWS 2004b, pp. ix-x) identifies the following conservation needs for this unit: (1) maintain or expand the current distribution of bull trout within existing core areas, (2) increase bull trout abundance to about 16,500 adults across all core areas, and (3) maintain or increase connectivity between local populations within each core area.

#### **2.3.1.5.4 St. Mary-Belly River**

This population segment currently contains six core areas and nine local populations (USFWS 2002c, p. v). Currently, bull trout are widely distributed in the St. Mary River drainage and occur in nearly all of the waters that were inhabited historically. Bull trout are found only in a 1.2-mile reach of the North Fork Belly River within the United States. Redd count surveys of the North Fork Belly River documented an increase from 27 redds in 1995 to 119 redds in 1999. This increase was attributed primarily to protection from angler harvest (USFWS 2002c, p. 37). The current condition of the bull trout in this population segment is primarily attributed to the effects of dams, water diversions, roads, mining, and the introduction of nonnative fishes (USFWS 2002c, p. vi). The draft bull trout Recovery Plan (USFWS 2002c, pp. v-ix) identifies the following conservation needs for this unit: (1) maintain the current distribution of the bull trout and restore distribution in previously occupied areas, (2) maintain stable or increasing trends in bull trout abundance, (3) maintain and restore suitable habitat conditions for all life history stages and forms, (4) conserve genetic diversity and provide the opportunity for genetic exchange, and (5) establish good working relations with Canadian interests because local bull trout populations in this unit are comprised mostly of migratory fish whose habitat is mainly in Canada.

#### **2.3.1.5.5 Columbia River**

The Columbia River population segment includes bull trout residing in portions of Oregon, Washington, Idaho, and Montana. Bull trout are estimated to have occupied about 60 percent of

the Columbia River Basin, and presently occur in 45 percent of the estimated historical range (Quigley and Arbelvide 1997, p. 1177). This population segment currently contains 97 core areas and 527 local populations. About 65 percent of these core areas and local populations occur in Idaho and northwestern Montana.

The condition of the bull trout populations within these core areas varies from poor to good, but generally all have been subject to the combined effects of habitat degradation, fragmentation and alterations associated with one or more of the following activities: dewatering, road construction and maintenance, mining and grazing, blockage of migratory corridors by dams or other diversion structures, poor water quality, incidental angler harvest, entrainment into diversion channels, and introduced nonnative species (USFWS 2002a, p. 2).

The Service (USFWS 2005, pp. 1-94) has determined that of the total 97 core areas in this population segment, 38 are at high risk of extirpation, 35 are at risk, 20 are at potential risk, 2 are at low risk, and 2 are at unknown risk.

The draft bull trout Recovery Plan (USFWS 2002a, p. v) identifies the following conservation needs for this population segment: (1) maintain or expand the current distribution of the bull trout within core areas, (2) maintain stable or increasing trends in bull trout abundance, (3) maintain and restore suitable habitat conditions for all bull trout life history stages and strategies, and (4) conserve genetic diversity and provide opportunities for genetic exchange.

The action area is located in the Columbia River Management Unit of the Columbia River population segment.

#### **2.3.1.5.5.1 Columbia River Recovery/Management Units**

Achieving recovery goals within each management unit is critical to recovering the Columbia River population segment. Recovering bull trout in each management unit would maintain the overall distribution of bull trout in their native range. Individual core areas are the foundation of management units and conserving core areas and their habitats within management units preserves the genotypic and phenotypic diversity that will allow bull trout access to diverse habitats and reduce the risk of extinction from stochastic events. The continued survival and recovery of each individual core area is critical to the persistence of management units and their role in the recovery of a population segment (USFWS 2002a, p. 54).

The draft bull trout Recovery Plan (USFWS 2002a, p. 2) identified 22 recovery units within the Columbia River population segment. These units are now referred to as management units. Management units are groupings of bull trout with historical or current gene flow within them and were designated to place the scope of bull trout recovery on smaller spatial scales than the larger population segments.

The action area is located within the Columbia River Management Unit, but more specifically within the Clearwater River Management Unit.

#### **2.3.1.5.5.1.1 Clearwater River Management Unit**

Bull trout are distributed throughout most of the large rivers and associated tributary systems within the Clearwater River Management Unit (USFWS 2002d, p. 16) and exhibit adfluvial, fluvial, and resident life history patterns. There are two naturally occurring adfluvial bull trout populations within the Clearwater River Management Unit; one is associated with Fish Lake in the upper North Fork Clearwater River drainage, and the other is associated with Fish Lake in the Lochsa River drainage (USFWS 2002d, p. 16). The Bull Trout Recovery Team has identified seven core areas and 35 local bull trout populations within the Clearwater Management Unit (USFWS 2002d, p. 17). The core areas include the North Fork Clearwater River, Lochsa River, South Fork Clearwater River, Selway River, and Lower and Middle Fork Clearwater Rivers.

The action area is located in the South Fork Clearwater River Core Area, a subunit of the Clearwater River Management Unit.

#### **2.3.1.5.5.1.1.1 Bull Trout Status and Distribution within the South Fork of the Clearwater River Core Area**

The South Fork Clearwater River Core Area is located in Idaho County and encompasses an area of approximately 304,522 hectares (752,474 acres). The core area extends from the headwaters above Elk City and Red River to the confluence with the Middle Fork of the Clearwater River at Kooskia. Included in the area are 13 major watersheds, plus numerous face drainages (streams that are very small and steep, and generally provide very little habitat for fish, except possible seasonal habitat near their mouths) that flow into the mainstem South Fork Clearwater River (USFWS 2002e). Major tributaries within the core area include: American River, Mill Creek, Red River, Newsome Creek, Crooked River, Johns Creek, Tenmile Creek, Meadow Creek, Leggett Creek, Cougar-Peasley creeks, Silver Creek, Wing Creek, and Twentymile Creek (USFWS 2002e).

This core area has the most comprehensive data collected for bull trout of the seven core areas within the Clearwater River management unit due to a multi-year study by the Idaho Department Fish and Game, Forest Service, and Bureau of Land Management which documented juvenile distribution in most tributaries and headwater streams (USFWS 2002e). There are five historically known local spawning and rearing populations within the South Fork Clearwater River Core Area: Red River, Crooked River, Newsome Creek, Tenmile Creek, and John's Creek. Three potential local populations in this core area include: Mill Creek, American River, and Meadow Creek. As there are only five local populations this core area is at risk of extirpation due to local stochastic events.

Mining in the South Fork of the Clearwater core area has been extensive in Crooked, Red and American Rivers and Newsome Creek watersheds which resulted in significant habitat degradation (USFWS 2002e). Habitat degradation is primarily a result of historic dredge mining of streams and road construction associated with mining and timber sales. The greatest intensity of dredge mining activity was in Newsome Creek and Crooked River with over 40 and 23 kilometers of dredge mining activity respectively (USFWS 2002e).

The bull trout population in the South Fork Clearwater River core area is considered at increased risk for several reasons. There are only five local populations within the core area causing it to be vulnerable to extirpation due to stochastic events. Despite the survey efforts there is not long term trend data indicating an increase in population (recovery plan p. 98) however the population is considered to be far less than historic levels. There are estimated to be approximately 500 adult spawning individuals within the core area causing an increasing risk of genetic drift (2002 recovery plan pp 97-98). The Five Year Status Review (USFWS 2008a) concluded that the core area is at risk of extirpation as the threats are substantial and imminent and include roads, forestry, grazing, residential development, brook trout and angling.

### **2.3.1.6 Previous Consultations and Conservation Efforts**

#### **2.3.1.6.1 Consultations**

Consulted-on effects are those effects that have been analyzed through section 7 consultation as reported in a Biological Opinion. These effects are an important component of objectively characterizing the current condition of the species. To assess consulted-on effects to bull trout, we analyzed all of the Biological Opinions received by the Region 1 and Region 6 Service Offices from the time of bull trout's listing until August 2003; this is summed to 137 Biological Opinions. Of these, 124 Biological Opinions (91 percent) applied to activities affecting bull trout in the Columbia Basin population segment, 12 Biological Opinions (9 percent) applied to activities affecting bull trout in the Coastal-Puget Sound population segment, 7 Biological Opinions (5 percent) applied to activities affecting bull trout in the Klamath Basin population segment, and one Biological Opinion (< 1 percent) applied to activities affecting the Jarbidge and St. Mary-Belly population segments (Note: these percentages do not add to 100, because several Biological Opinions applied to more than one population segment). The geographic scale of these consultations varied from individual actions (e.g., construction of a bridge or pipeline) within one basin to multiple-project actions occurring across several basins.

Our analysis showed that we consulted on a wide array of actions which had varying levels of effect. Many of the actions resulted in only short-term adverse effects, some with long-term beneficial effects. Some of the actions resulted in long-term adverse effects. No actions that have undergone consultation were found to appreciably reduce the likelihood of survival and recovery of the bull trout. Furthermore, no actions that have undergone consultation were anticipated to result in the loss of local populations of bull trout.

#### **2.3.1.6.2 Regulatory mechanisms**

The implementation and effectiveness of regulatory mechanisms vary across the coterminous range. Forest practices rules for Montana, Idaho, Oregon, Washington, and Nevada include streamside management zones that benefit bull trout when implemented.

#### **2.3.1.6.3 State Conservation Measures**

State agencies are specifically addressing bull trout through the following initiatives:

- Washington Bull Trout and Dolly Varden Management Plan developed in 2000.
- Montana Bull Trout Restoration Plan (Bull Trout Restoration Team appointed in 1994, and plan completed in 2000).

- Oregon Native Fish Conservation Policy (developed in 2004).
- Nevada Species Management Plan for Bull Trout (developed in 2005).
- State of Idaho Bull Trout Conservation Plan (developed in 1996). The watershed advisory group drafted 21 problem assessments throughout Idaho which address all 59 key watersheds. To date, a conservation plan has been completed for one of the 21 key watersheds (Pend Oreille).

#### **2.3.1.6.4 Habitat Conservation Plans**

Habitat Conservation Plans (HCPs) have resulted in land management practices that exceed State regulatory requirements. Habitat conservation plans addressing bull trout cover approximately 1,357 stream miles of aquatic habitat, across Montana, Idaho, Oregon, Washington, and Nevada. These HCPs include: Plum Creek Native Fish HCP, Washington Department of Natural Resources HCP, Washington Forests Practice Lands HCP, Plum Creek Central Cascades HCP, City of Seattle Cedar River Watershed HCP, Tacoma Water HCP, and Green Diamond HCP.

#### **2.3.1.6.5 Federal Land Management Plans**

PACFISH is the “Interim Strategy for Managing Anadromous Fish-Producing Watersheds and includes Federal lands in Western Oregon and Washington, Idaho, and Portions of California.” INFISH is the “Interim Strategy for Managing Fish-Producing Watersheds in Eastern Oregon and Washington, Idaho, Western Montana, and Portions of Nevada.” Each strategy amended Forest Service Land and Resource Management Plans and Bureau of Land Management Resource Management Plans. Together PACFISH and INFISH cover thousands of miles of waterways within 16 million acres and provide a system for reducing effects from land management activities to aquatic resources through riparian management goals, landscape scale interim riparian management objectives, Riparian Habitat Conservation Areas (RHCAs), riparian standards, watershed analysis, and the designation of Key and Priority watersheds. These interim strategies have been in place since 1992 and are part of the management plans for Bureau of Land Management and Forest Service lands.

The Interior Columbia Basin Ecosystem Management Plan (ICBEMP) is the strategy that replaces the PACFISH and INFISH interim strategies when federal land management plans are revised. The Southwest Idaho Land and Resource Management Plan (LRMP) is the first LRMP under the strategy and provides measures that protect and restore soil, water, riparian and aquatic resources during project implementation while providing flexibility to address both short- and long-term social and economic goals on 6.6 million acres of National Forest lands. This plan includes a long-term Aquatic Conservation Strategy that focuses restoration funding in priority subwatersheds identified as important to achieving Endangered Species Act, Tribal, and Clean Water Act goals. The Southwest Idaho LRMP replaces the interim PACFISH/INFISH strategies and adds additional conservation elements, specifically, providing an ecosystem management foundation, a prioritization for restoration integrated across multiple scales, and adaptable active, passive and conservation management strategies that address both protection and restoration of habitat and 303(d) stream segments.

The Southeast Oregon Resource Management Plan (SEORMP) and Record of Decision is the second LRMP under the ICBEMP strategy which describes the long-term (20+ years) plan for managing the public lands within the Malheur and Jordan Resource Areas of the Vale District.

The SEORMP is a general resource management plan for 4.6 million acres of Bureau of Land Management administered public lands primarily in Malheur County with some acreage in Grant and Harney Counties, Oregon. The SEORMP contains resource objectives, land use allocations, management actions and direction needed to achieve program goals. Under the plan, riparian areas, floodplains, and wetlands will be managed to restore, protect, or improve their natural functions relating to water storage, groundwater recharge, water quality, and fish and wildlife values.

The Northwest Forest Plan covers 24.5 million acres in Washington, Oregon, and northern California. The Aquatic Conservation Strategy (ACS) is a component of the Northwest Forest Plan. It was developed to restore and maintain the ecological health of watersheds and the aquatic ecosystems. The four main components of the ACS (Riparian Reserves, Watershed Analysis, Key Watersheds, and Watershed Restoration) are designed to operate together to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems.

It is the objective of the Forest Service and the Bureau of Land Management to manage and maintain habitat and, where feasible, to restore habitats that are degraded. These plans provide for the protection of areas that could contribute to the recovery of fish and, overall, improve riparian habitat and water quality throughout the basin. These objectives are accomplished through such activities as closing and rehabilitating roads, replacing culverts, changing grazing and logging practices, and re-planting native vegetation along streams and rivers.

### **2.3.1.7 Conservation Needs**

The recovery planning process for the bull trout (USFWS 2002a, p. 49) has identified the following conservation needs (goals) for bull trout recovery: (1) maintain the current distribution of bull trout within core areas as described in recovery unit chapters, (2) maintain stable or increasing trends in abundance of bull trout as defined for individual recovery units, (3) restore and maintain suitable habitat conditions for all bull trout life history stages and strategies, and (4) conserve genetic diversity and provide opportunity for genetic exchange.

The draft bull trout Recovery Plan (USFWS 2002a, p. 62) identifies the following tasks needed for achieving recovery: (1) protect, restore, and maintain suitable habitat conditions for bull trout; (2) prevent and reduce negative effects of nonnative fishes, such as brook trout, and other nonnative taxa on bull trout; (3) establish fisheries management goals and objectives compatible with bull trout recovery; (4) characterize, conserve, and monitor genetic diversity and gene flow among local populations of bull trout; (5) conduct research and monitoring to implement and evaluate bull trout recovery activities, consistent with an adaptive management approach using feedback from implemented, site-specific recovery tasks; (6) use all available conservation programs and regulations to protect and conserve bull trout and bull trout habitats; (7) assess the implementation of bull trout recovery by management units; and (8) revise management unit plans based on evaluations.

Another threat now facing bull trout is warming temperature regimes associated with global climate change. Because air temperature affects water temperature, species at the southern margin of their range that are associated with cold water patches, such as bull trout, may become

restricted to smaller, more disjunct patches or become extirpated as the climate warms (Rieman et al. 2007, p. 1560). Rieman et al. (2007, pp. 1558, 1562) concluded that climate is a primary determining factor in bull trout distribution. Some populations already at high risk, such as the Jarbidge, may require “aggressive measures in habitat conservation or restoration” to persist (Rieman et al. 2007, p. 1560). Conservation and restoration measures that would benefit bull trout include protecting high quality habitat, reconnecting watersheds, restoring flood plains, and increasing site-specific habitat features important for bull trout, such as deep pools or large woody debris (Kinsella 2005, entire).

## **2.3.2 Bull Trout Critical Habitat**

### **2.3.2.1 Legal Status**

Ongoing litigation resulted in the U.S. District Court for the District of Oregon granting the Service a voluntary remand of the 2005 critical habitat designation. Subsequently the Service published a proposed critical habitat rule on January 14, 2010 (75 FR 2260) and a final rule on October 18, 2010 (75 FR 63898). The rule became effective on November 17, 2010. A justification document was also developed to support the rule and is available on our website (<http://www.fws.gov/pacific/bulltrout>). The scope of the designation involved the species’ coterminous range, which includes the Jarbidge River, Klamath River, Coastal-Puget Sound, St. Mary-Belly River, and Columbia River population segments (also considered as interim recovery units).

Rangewide, the Service designated reservoirs/lakes and stream/shoreline miles in 32 critical habitat units (CHU) as bull trout critical habitat (Table 5). Designated bull trout critical habitat is of two primary use types: (1) spawning and rearing; and (2) foraging, migrating, and overwintering (FMO).

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<sup>1</sup> The Service’s 5 year review (USFWS 2008a, p. 9) identifies six draft recovery units. Until the bull trout draft recovery plan is finalized, the current five interim recovery units are in affect for purposes of section 7 jeopardy analysis and recovery. The adverse modification analysis does not rely on recovery units.

Table 5. Stream/shoreline distance and reservoir/lake area designated as bull trout critical habitat by state.

State	Stream/Shoreline Miles	Stream/Shoreline Kilometers	Reservoir/Lake Acres	Reservoir/Lake Hectares
Idaho	8,771.6	14,116.5	170,217.5	68,884.9
Montana	3,056.5	4,918.9	221,470.7	89,626.4
Nevada	71.8	115.6	-	-
Oregon	2,835.9	4,563.9	30,255.5	12,244.0
Oregon/Idaho	107.7	173.3	-	-
Washington	3,793.3	6,104.8	66,308.1	26,834.0
Washington (marine)	753.8	1,213.2	-	-
Washington/Idaho	37.2	59.9	-	-
Washington/Oregon	301.3	484.8	-	-
<b>Total</b>	<b>19,729.0</b>	<b>31,750.8</b>	<b>488,251.7</b>	<b>197,589.2</b>

Compared to the 2005 designation, the final rule increases the amount of designated bull trout critical habitat by approximately 76 percent for miles of stream/shoreline and by approximately 71 percent for acres of lakes and reservoirs.

This rule also identifies and designates critical habitat by state (Table 5) resulting in approximately 1,323.7 km (822.5 miles) of streams/shorelines and 6,758.8 ha (16,701.3 acres) of lakes/reservoirs of unoccupied habitat in total to address bull trout conservation needs in specific geographic areas in several areas not occupied at the time of listing. No unoccupied habitat was included in the 2005 designation. These unoccupied areas were determined by the Service to be essential for restoring functioning migratory bull trout populations based on currently available scientific information. These unoccupied areas often include lower mainstem river environments that can provide seasonally important migration habitat for bull trout. This type of habitat is essential in areas where bull trout habitat and population loss over time necessitates reestablishing bull trout in currently unoccupied habitat areas to achieve recovery.

The final rule continues to exclude some critical habitat segments based on a careful balancing of the benefits of inclusion versus the benefits of exclusion. Critical habitat does not include: (1) waters adjacent to non-Federal lands covered by legally operative incidental take permits for habitat conservation plans (HCPs) issued under section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended, in which bull trout is a covered species on or before the publication of this final rule; (2) waters within or adjacent to Tribal lands subject to certain commitments to conserve bull trout or a conservation program that provides aquatic resource protection and restoration through collaborative efforts, and where the Tribes indicated that inclusion will impair their relationship with the Service; or (3) waters where impacts to national security have been identified (75 FR 63898). Excluded areas are approximately 10 percent of the stream/shoreline miles and 4 percent of the lakes and reservoir acreage of designated critical habitat. Each excluded area is identified in the relevant CHU text, as identified in paragraphs (e)(8) through (e)(41) of the final rule. It is important to note that the exclusion of water bodies from designated critical habitat does not negate or diminish their importance for bull trout



conservation. Because exclusions reflect the often complex pattern of land ownership, designated critical habitat is often fragmented and interspersed with excluded stream segments.

### **2.3.2.2 Conservation Role and Description of Critical Habitat**

The conservation role of bull trout critical habitat is to support viable core area populations (75 FR 63898:63943 [October 18, 2010]). The core areas reflect the metapopulation structure of bull trout and are the closest approximation of a biologically functioning unit for the purposes of recovery planning and risk analyses. Critical habitat units (CHUs) generally encompass one or more core areas and may include FMO areas, outside of core areas, that are important to the survival and recovery of bull trout.

As previously noted, 32 CHUs within the geographical area occupied by the species at the time of listing are designated under the revised rule. Twenty-nine of the CHUs contain all of the physical or biological features identified in this final rule and support multiple life-history requirements. Three of the mainstem river units in the Columbia and Snake River basins contain most of the physical or biological features necessary to support the bull trout's particular use of that habitat, other than those physical biological features associated with Primary Constituent Elements (PCEs) 5 and 6 (described below), which relate to breeding habitat.

The primary function of individual CHUs is to maintain and support core areas, which 1) contain bull trout populations with the demographic characteristics needed to ensure their persistence and contain the habitat needed to sustain those characteristics (Rieman and McIntyre 1993 pp. 19-23); 2) provide for persistence of strong local populations, in part, by providing habitat conditions that encourage movement of migratory fish (MBTSG 1998; Rieman and McIntyre 1993 pp. 19-23); 3) are large enough to incorporate genetic and phenotypic diversity, but small enough to ensure connectivity between populations (Hard 1995; Healey and Prince 1995; MBTSG 1998; Rieman and McIntyre 1993 pp. 19-23); and 4) are distributed throughout the historic range of the species to preserve both genetic and phenotypic adaptations (Hard 1995; MBTSG 1998; Rieman and Allendorf 2001, pp. 762-763; Rieman and McIntyre 1993 pp. 19-23).

The Olympic Peninsula and Puget Sound CHUs are essential to the conservation of amphidromous bull trout, which are unique to the Coastal-Puget Sound population segment. These CHUs contain marine nearshore and freshwater habitats, outside of core areas, that are used by bull trout from one or more core areas. These habitats, outside of core areas, contain PCEs that are critical to adult and subadult foraging, migrating, and overwintering. In determining which areas to propose as critical habitat, the Service considered the physical and biological features that are essential to the conservation of bull trout and that may require special management considerations or protection. These features are the PCEs laid out in the appropriate quantity and spatial arrangement for conservation of the species. The PCEs of designated critical habitat are:

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

2. Migration 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.
3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.
4. Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.
5. Water temperatures ranging from 2 °C to 15 °C (36 °F to 59 °F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.
6. In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.
7. A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.
8. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.
9. Sufficiently low levels of occurrence of non-native predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.

### **2.3.2.3 Current Rangewide Condition of Bull Trout Critical Habitat**

The condition of bull trout critical habitat varies across its range from poor to good. Although still relatively widely distributed across its historic range, the bull trout occurs in low numbers in many areas, and populations are considered depressed or declining across much of its range (USFWS 2002a). This condition reflects the condition of bull trout habitat.

The primary land and water management activities impacting the physical and biological features essential to the conservation of bull trout include timber harvest and road building, agriculture and agricultural diversions, livestock grazing, dams, mining, urbanization and residential development, and nonnative species presence or introduction (75 FR 2282).

There is widespread agreement in the scientific literature that many factors related to human activities have impacted bull trout and their habitat, and continue to do so. Among the many factors that contribute to degraded PCEs, those which appear to be particularly significant and have resulted in a legacy of degraded habitat conditions are as follows:

- Fragmentation and isolation of local populations due to the proliferation of dams and water diversions that have eliminated habitat, altered water flow and temperature regimes, and impeded migratory movements (Dunham and Rieman 1999, pp. 643, 646; Rieman and McIntyre 1993, p. 8);
- Degradation of spawning and rearing habitat and upper watershed areas, particularly alterations in sedimentation rates and water temperature, resulting from forest and rangeland practices and intensive development of roads (Fraley and Shepard 1989, p. 141; MBTSG 1998);
- The introduction and spread of nonnative fish species, particularly brook trout and lake trout, as a result of fish stocking and degraded habitat conditions, which compete with bull trout for limited resources and, in the case of brook trout, hybridize with bull trout (Leary et al. 1993; Rieman et al. 2006, p. 73);
- In the Coastal-Puget Sound region where amphidromous bull trout occur, degradation of mainstem river FMO habitat, and the degradation and loss of marine nearshore foraging and migration habitat due to urban and residential development; and
- Degradation of FMO habitat resulting from reduced prey base, roads, agriculture, development, and dams.

The bull trout critical habitat final rule also aimed to identify and protect those habitats that provide resiliency for bull trout use in the face of climate change. Over a period of decades, climate change may directly threaten the integrity of the essential physical or biological features described in PCEs 1, 2, 3, 5, 7, 8, and 9. Protecting bull trout strongholds and cold water refugia from disturbance and ensuring connectivity among populations were important considerations in addressing this potential impact. Additionally, climate change may exacerbate habitat degradation impacts both physically (e.g., decreased base flows, increased water temperatures) and biologically (e.g., increased competition with nonnative fishes).

## **2.4 Environmental Baseline of the Action Area**

This section assesses the effects of past and ongoing human and natural factors that have led to the current status of the species, its habitat and ecosystem in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal plans in the action area that have already undergone section 7 consultations, and the impacts of state and private actions which are contemporaneous with this consultation.

## 2.4.1 Bull Trout

### 2.4.1.1 Status of Bull Trout in the Action Area

The Crooked River watershed extends south from the confluence with the South Fork Clearwater River to the Orogrande summit and includes the West and East Fork Crooked River and Relief Creek. This watershed is known as one of only five spawning and rearing habitats for bull trout within the South Fork Clearwater Core Area (USFWS 2002e). Since 1985 spawning and rearing has been known to occur in West and East Fork Crooked River, Relief Creek and Silver Creek (CBBTTATb 1998; USFWS 2010; USFWS 2002e). Lower Crooked River, in which the project area is located, has been extremely degraded primarily due to past mining activities which have completely altered the natural meanders, reduced habitat complexity and removed the previously vegetated floodplain. No spawning or rearing has been documented to occur in the lower mainstem river (CBBTTATb 1998; USFWS 2002e).

In 1993, IDFG documented 24 bull trout while surveying 2,688 meters of Crooked River and calculated a relative abundance of 0.89 fish/m<sup>2</sup> (CBBTTATb 1998). However, the exact location of the survey is not clear. At that time, it was estimated that the abundance of bull trout upstream in the West Fork Crooked River were ten times greater (CBBTTATb 1998; USFWS 2002e). From June to August of 1997, 34 bull trout were captured in a chinook weir on Crooked River (CBBTTATb 1998; USFWS 2002e). These data coupled with IDFG and U.S. Forest Service observations of bull trout greater than 300 mm (12 inches) in the mainstem and the West Fork may suggest that the Crooked River harbors the greatest number of migratory bull trout in the South Fork Clearwater River watershed (CBBTTATb 1998).

More recently, rotary screw trap data collected from 2002-2013 by IDFG near the confluence of Crooked River and the South Fork Clearwater River confirmed the continued use of Crooked River as a migratory corridor to and from headwater spawning areas in Crooked River (NPT-DFRMWD 2014). A total of 870 bull trout were detected over the 11 year period of which 63% were 150 mm (6 in) and 22 % were 200 mm (7.87 in). Of the remaining bull trout 2% were smaller than 50-100 mm (1.9 – 3.9 in) and 12% were 300-600 mm (12-24 in).

The annual number of bull trout detected at the rotary screw trap ranged from a low of 47 in 2006 to a high of 191 in 2012 (Figure 8). For all years surveyed 59% or more of bull trout were detected from May through July. The greatest number of migrating bull trout have been detected in June (for 70% of years surveyed). However, the number of bull trout migrating in either May or July (at the beginning or the end of peak migration) is variable. Between May and July, 50% of the years surveyed had higher bull trout migrating in May and 50% of the years had higher migration in July. The highest number of migrating bull trout in July was 55, detected in 2012. However, the highest annual July percentage of the total number of migrating bull trout was 41% in July 2009 (Table 6) (NPT-DFRMWD 2014).

The population of juvenile and adult bull trout estimated to be within the action area during July when dewatering and fish salvage will occur is based on the maximum number of 191 bull trout caught in the screw trap during migration and the largest observed proportion of a population migrating in July which was 41% (Table 6). Additionally, to accurately estimate the number of

migrating bull trout, rotary screw trap efficiency should be used to convert raw catch data to estimates of total migrating bull trout (USFWS 2008b). Trap efficiency studies were not conducted at the Idaho Fish and Game rotary screw trap when this data was collected. However, rotary screw trap efficiency mark/recapture studies conducted from 2010-2012 in five tributaries to the Clark Fork River yielded an average trap efficiency of 5% (McCubbins et al 2012; Moran et al 2014). Given this is the best available average rotary screw trap efficiency data, it can be used to estimate the actual bull trout migrating population from the IDFG rotary screw trap raw data in Crooked River. Therefore, using the largest annual population of 191 bull trout (Table 6) detected at the rotary screw trap and using the trap efficiency of 5% there were an estimated 3,820 bull trout migrating through the Crooked River that year. As the largest annual percent of bull trout detected at the screw trap in July was 41% (Table 6), it is estimated that 1,566 bull trout could migrate through the action area in July. Dewatering of the main and bypass channel are the primary project actions that will affect bull trout in the Project area. Dewatering is expected to occur over a period of 4 days after July 15 in three different years. Therefore, given that there are 31 days in July there would be an estimate 51 bull trout per day in the project area. Over a 4 day period a total of 204 bull trout could be present. Over the course of the whole project, which includes three separate dewatering events the Service estimates a total of 612 bull trout could occur in the project area.

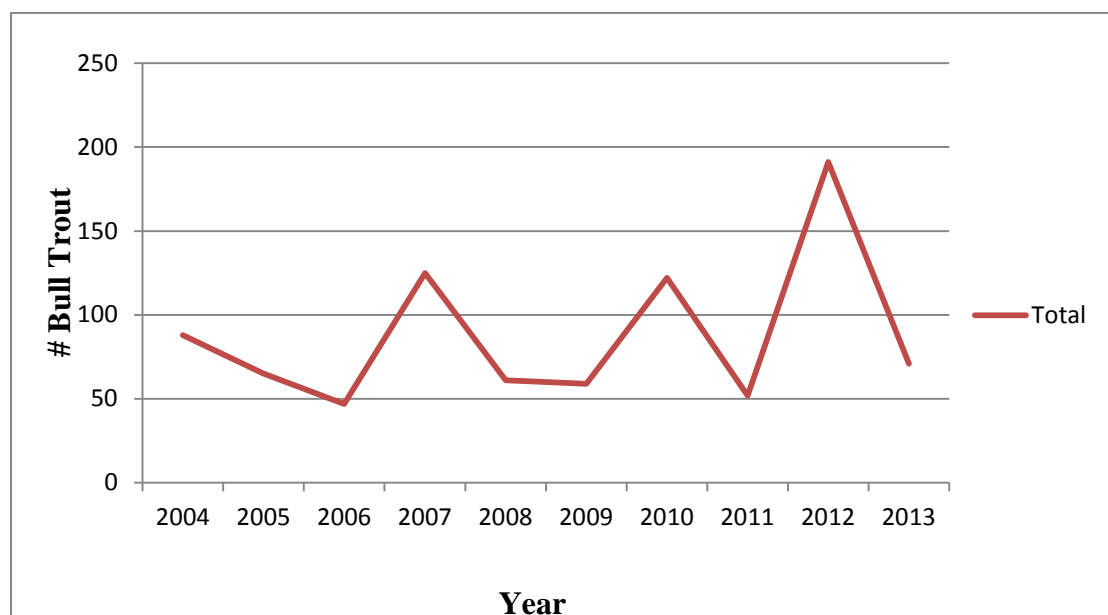


Figure 8. Idaho Fish and Game bull trout detections. Screw trap detections recorded near the confluence of the Crooked River and the South Fork Clearwater River from 2002-2013 (USFS 2014).

Table 6. Bull trout data collected by IDFG. The total number of bull trout (ranging in size from 50mm to 600 mm) detected annually and the percentage of that population in May-July and in July only, at the Idaho Fish and Game screw trap near the confluence of Crooked River and South Fork Clearwater River which is immediately adjacent to the Project Area.

Year	Bull Trout Migrating Population					% of Total Population	
	Total Annual	May	June	July	Total May-Jul	% May-Jul	% Jul
2004	88	31	13	4	48	59%	5%
2005	65	18	26	8	52	80%	12%
2006	47	12	26	9	47	100%	19%
2007	125	66	43	12	121	97%	10%
2008	61	2	35	21	58	95%	34%
2009	59	2	27	24	53	90%	41%
2010	122	21	35	47	103	84%	39%
2011	52	9	13	12	34	65%	23%
2012	191	49	65	55	169	88%	29%
2013	71	6	42	5	53	75%	7%

## 2.4.2 Bull Trout Critical Habitat

### 2.4.2.1 Status of Bull Trout Critical Habitat in the Action Area

The action area is within Crooked River, which is designated Critical Habitat within the South Fork Clearwater River Critical Habitat Subunit (CHSU). The South Fork Clearwater River CHSU is one of five subunits in the Clearwater River Critical Habitat Unit within the larger Mid-Columbia Recovery Unit. Located within Idaho and Nez Perce Counties, the South Fork Clearwater River CHSU includes the entire stream network, a total of 508.0 km (315.6 mi), of the South Fork Clearwater River. The South Fork Clearwater River CHSU is essential to bull trout conservation because both migratory and resident life histories are known to occur within the CHSU. Although the overall core area population level is considered to be moderate, bull trout are distributed among most of the major watersheds within the CHSU. Located downstream of the Lochsa River CHSU and Selway River CHSU and upstream of the North Fork Clearwater CHSU, the South Fork Clearwater River CHSU provides additional habitat for foraging and thermal refuge for bull trout that disperse from these other CHSUs.

Crooked River from its confluence with the South Fork Clearwater River upstream 3.5 km (2.2 miles) provides foraging, migrating and overwintering habitat. Spawning and rearing habitat occurs upstream 15.3 km (9.6 m) outside the Project area in the tributaries which include Relief Creek, Silver Creek and the West and East Fork Crooked River (USFWS 2010).

Crooked River critical habitat in the project area has been severely degraded and modified from its historical state. Dredge mining has created unnatural meanders, high banks, a wide channel and artificial floodplains. Additionally, there has been grazing, timber harvest and road

construction. The results of these activities do not support a healthy riparian ecosystem and bull trout habitat. The water temperature within the action area are above optimum for not only rearing and spawning but also migration especially during key fall migration when it has been recorded over 20 degrees C (USFS 2014). The elevated temperatures are mainly due to the widening of the river, lack of bank vegetation canopy cover and river complexity caused by the previous dredge mining activities. The floodplain does not function either; therefore there is not natural nutrient recycling nor the perpetuation of bank vegetation to provide canopy cover.

#### **2.4.2.2 Factors Affecting Bull Trout and Bull Trout Critical Habitat in the Action Area**

As previously described in the *Status of the Species* section of this Opinion, bull trout distribution, abundance, and habitat quality have declined rangewide primarily from the combined effects of habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, angler harvest, poaching, entrainment, and introduced non-native fish species.

Although the Crooked River watershed has been known as one of the only five occupied in the South Fork Clearwater area historic conditions have been radically altered by fifty years of dredge mining, timber harvest and roads. Historic mining has affected stream, riparian, floodplain and hydrologic functions and sediment regimes in the mainstem Crooked River. The dredging has decreased the complexity of the channel, widened and lowered the channel disconnecting it from the floodplain. This has resulted in very warm temperatures, low water flow and minimal habitat complexity. Additionally, the timber harvest, land grazing, fire suppression and road construction have contributed to the degradation of the natural hydrologic and geomorphic processes in the watershed. An estimated 74 tons of sediment from human actions (road, timber harvest, etc) is delivered into the Crooked River every year (USFS 2014).

There have been minimal restoration efforts to date in Crooked River. In the 1980's and 1990's a modest restoration effort was undertaken. Some tailing piles were spread out to restore the floodplain and former dredge ponds were connected to the mainstem (CBBTTATb 1998). These ponds have subsequently accumulated approximately 4-12 inches of sediment that if disturbed take a day to resettle (USFS 2014).

Additionally, there are other ongoing activities which may affect bull trout in the action area. The mining company Premium Explorations, which owns 1 square mile near the town of Orogrande has been conducting exploratory activities on their land for the past few years. Activities include building roads and drilling test pits. These activities are likely contributing to sediment in Crooked River. The IDFG also operates a weir near the confluence of Crooked River with the South Fork Clearwater River which may cause handling stress to migrating adult and juvenile bull trout (USFS 2014).

Changes in hydrology and temperature caused by changing climate have the potential to negatively impact aquatic ecosystems in Idaho, with salmonid fishes being especially sensitive. Average annual temperature increases due to increased carbon dioxide are affecting snowpack,

peak runoff, and base flows of streams and rivers (Mote et al. 2003, p. 45). Increases in water temperature may cause a shift in the thermal suitability of aquatic habitats (Poff et al. 2002, p. iii). For species that require colder water temperatures to survive and reproduce, warmer temperatures could lead to significant decreases in available suitable habitat. Increased frequency and severity of flood flows during winter can affect incubating eggs and alevins in the streambed and over-wintering juvenile fish. Eggs of fall spawning fish, such as bull trout, may suffer high levels of mortality when exposed to increased flood flows (Independent Scientific Advisory Board 2007, p. iv).

## **2.5 Effects of the Proposed Action**

Effects of the action consider the direct and indirect effects of an action on the listed species and/or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action. These effects are considered along with the environmental baseline and the predicted cumulative effects to determine the overall effects to the species. Direct effects are defined as those that result from the proposed action and directly or immediately impact the species or its habitat. Indirect effects are those that are caused by, or will result from, the proposed action and are later in time, but still reasonably certain to occur. An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. The impacts discussed below are the result of direct and indirect impacts of implementing the proposed Project, as described in the Assessment and associated addendums.

### **2.5.1 Direct and Indirect Effects of the Proposed Action**

The status of the Crooked River local bull trout population within the South Fork Clearwater Core Area may be affected by impacts to critical habitat or migrating adult or juvenile bull trout. The action area occurs through several reaches of Crooked River that are utilized by adult and juvenile bull trout mainly during key migratory times (e.g., spring freshet and fall). However bull trout may utilize habitat within the project area for migration or foraging during other times of year (provided water temperatures are appropriate) or possibly overwintering. Bull trout present or migrating through the area during Project implementation will be affected, primarily through delays in migration (either upstream or downstream) and sediment production, as well as during capture, handling, and relocation of fish. Sediment produced from project activities could affect migrating adults or juveniles within the action area; however, conservation measures are in place to minimize sediment exposure to flowing water. Spawning does not occur in this area, therefore project implementation will not affect bull trout spawning habitat or redds.

#### **1. Bypass channel**

Bull trout use the reaches of Crooked River in the action area primarily as a migratory route to spawning and rearing grounds upstream in the upper watershed. Rerouting of the mainstem of the Crooked River into a bypass channel could affect individual migrating adult or juvenile bull



trout if the bypass channel does not hold water or the flow velocity is not within an adequate range for migration. The bypass channel is being constructed to maintain flows required by migrating bull trout and to enable monitoring. Observation wells were installed in the project area and used to ensure that ground water levels are higher than the thalweg of the bypass channel. Additionally, the bypass channel will capture ground water from the east hillslopes. Consequently, as the bypass channel will remain watered, given the hydrology of the ground water, the effect of the bypass channel to bull trout is insignificant.

## 2. Fish capture, handling and relocation

It is possible that juvenile and/or sub-adult bull trout could become stranded as the mainstem channel or bypass channel in Phases 1, 2 or 4 are being dewatered and diverted. It is also possible that bull trout could be injured or killed during herding, capture and relocation efforts. To minimize the potential for and magnitude of adverse effects to bull trout, a qualified fisheries biologist will be present during diversion of the creek, and will conduct and/or supervise the capture and relocation activities. Removal and relocation of trapped bull trout will be conducted via backpack electroshocker and dip nets for those that do not swim into the newly watered channel. Based on observations from previous capture and relocation activities, it is entirely possible that not all bull trout will be captured and relocated to safe areas. Fish that are hiding within the interstices or complex cover at the time of capture activities or are missed by the netter will likely be killed once the area is dewatered if they are not subsequently detected during the final capture run.

Handling stress and the use of dip nets may result in some injury and death, although this is believed to be rare. Fish handling in general can result in numerous detrimental physiological stressors in salmonids. Individual fish could be harmed should descaling or other injury occur during dip netting or handling. Thus, although injury or death of fish from these activities is believed to be rare, bull trout may nonetheless be injured or killed during capture and removal from the work zone.

Electrofishing attempts will use the minimum voltage, pulse width, and rate settings necessary to immobilize fish. Fish capture and removal operations will be planned and conducted so as to minimize the amount and duration of handling. Captured fish will be kept in water to the maximum extent possible during seining/netting, handling, and transfer for release. In the event fish are observed dying or in distress, all activities that may exacerbate these suboptimal conditions will cease and remedial actions will be taken as necessary.

The Service anticipates that not all bull trout will be captured during relocation activities which may result in their mortality as a result of stranding. We estimate that roughly 20 percent of the bull trout will not be captured during the multiple pass rescue efforts along the stream margins and within the coffer dams. This is based on IDFG work which indicates that typically no more than 20 percent of a species is present after multiple pass capture and removal efforts (Ryan and Jakubowski 2012, p. 4).

As stated previously in the *Status of Bull Trout in the Action Area* section, we expect up to 612 bull trout will be adversely affected by dewatering activities. Therefore, based on the 20% IDFG

estimate for stranding, we estimate 122 bull trout ( $612 \text{ bull trout} \times 20\% = 122 \text{ bull trout}$ ) mortalities will occur as a result of stranding. Additionally, we estimate 61 bull trout mortalities will occur due to relocation activities ( $612 \text{ bull trout} \times 10\% = 61 \text{ bull trout}$ ). The remaining 429 bull trout will be harassed as a result of relocation activities.

As explained above, bull trout are likely to be present in the Project area during Project implementation. However, due to the fact that diversion and dewatering will take place during Service-prescribed work windows (which are crafted specifically to avoid peak pre-spawning and out-migration periods), and that dewatering BMPs (e.g., supervision by a qualified fisheries biologist) will be followed, the number of bull trout that may experience migratory delays, or be trapped, captured, handled, and relocated, and thus adversely affected during dewatering has been minimized to the reasonable practicable extent.

The Project will likely have short-term impacts on the distribution of bull trout in Crooked River. It also may have short-term minor impacts to the bull trout populations in Crooked River related to loss of a small number of individuals from the capture, handling, and relocation of bull trout from the dewatered channel. Long-term, however, these effects will not impact the distribution, numbers, and reproduction of bull trout in Crooked River or the South Fork Clearwater River. On the contrary, the proposed action will lower the water temperature in the project area and possibly downstream, create river complexity, and bull trout habitat which will have a beneficial effect on the Crooked River and South Fork Clearwater bull trout populations.

### 3. Turbidity and sedimentation

Turbidity (measured by the amount of suspended solids) is caused by organic and inorganic particles in water. Some causes of increased turbidity could include floods, dredging or other in-water work activities. For salmonids, water turbidity has been linked to a number of behavioral and physiological responses (i.e., gill flaring, coughing, avoidance, and increase in blood sugar levels) which indicate some level of stress (Sigler et al. 1984, p.149-150; Berg and Northcote 1985, p 1416; Servizi and Martens 1992, p. 1392). The magnitude of these stress responses is generally higher when turbidity is increased and particle size decreased (Gregory and Northcote 1993, p. 1393). When the particles causing turbidity settle out of the water column in quiescent zones (slow moving pools, stream margins), they can contribute to sediment on the riverbed margins.

Turbidity and sedimentation resulting from Project implementation, is likely to have short-term adverse impacts to several bull trout critical habitat PCEs including PCEs 2, 3, 4, 5, and 6. Actions which could cause increased turbidity include the watering and dewatering of the bypass and mainstem channel and placing LWD into the channel during Options 1 and 2. In the short-term, increased turbidity and sedimentation could displace bull trout, especially juvenile bull trout, from utilizing designated critical habitat that will otherwise provide suitable rearing habitat. However, because the action area comprises only a small fraction of the overall habitat available to bull trout, the primary spawning and rearing habitats are located further up in the watershed far away from the Project area, and adequate conservation measures will be utilized (i.e. turbidity monitoring), Project implementation is expected to adversely affect very few bull trout and have only minimal and short-term adverse effects to a limited amount of critical habitat

and the associated PCEs. Furthermore, these short-term adverse effects in the action area will not impact the PCEs for bull trout elsewhere in the Crooked River or the South Fork Clearwater River Core Area.

In the long-term the project actions will reduce sedimentation and turbidity in the project area by restoring the floodplain and channel to resemble its natural pre-mining historical condition. Currently, sediment runs through the floodplain which is not properly sloped or vegetated and down the steep stream banks ponding in old pools that formed due to mining activities. The pools have collected deep deposits of silt which result in increased turbidity during rain events. The project will grade, properly slope and vegetate the whole floodplain and bank, reducing sedimentation and runoff from land. Additionally, the project will restore the mainstem channel and pools by laying the bed with various size stones and gravel, and installing large woody debris in the channels to facilitate the formation of natural pools. These measures will reduce sedimentation and turbidity as well as improve PCE's 1 through 7.

A thousand feet of the South Fork Clearwater River from the confluence with Crooked River is included within the Project action area. The Project action however occurs within the lower two miles of Crooked River and not in the South Fork Clearwater River. The South Fork Clearwater River is a migratory corridor for bull trout. Spawning and rearing habitat is found in the upper watersheds of the South Fork Clearwater River. The population of migrating bull trout is very low at any one area and particularly during the timeframe that dewatering will be occurring in the Crooked River (i.e. after July 15). As this section of the South Fork Clearwater River is downstream of the project action, and there are minimization measures to reduce sedimentation as well as turbidity monitoring, the effects to bull trout in the South Fork Clearwater River will be minimal. Any potential effects would be limited to minimal increased turbidity which will be much diluted and reduced when it reaches the South Fork Clearwater and migrating fish will be able to move away from any small sediment plumes. Therefore, effects to bull trout within the South Fork Clearwater River are considered insignificant and discountable

#### 4. Streambank and riparian area

There will be minor impacts to the existing riparian area in the short-term when implementing the project. During new channel construction the existing vegetation will be removed. However, it will be replaced with native shrubs and trees once the channel is complete which will provide shade to keep water temperatures low and nutrients for the invertebrate community within the river. Additionally, an integral part of the project is to grade the existing floodplain and restore the natural floodplain. The existing floodplain is not contributing to PCE's in this reach of the Crooked River as it consists of tailing pilings and dredge ponds. The tailing pilings will be graded and the dredge ponds filled which will increase the floodplain surface area and retention time and quantity of water. This is expected to result in raising the ground water table. This will increase the water in the new channel. Therefore, the new floodplain will contribute to the enhancement of PCE's 1 through 7. While the floodplain and the main channel are undergoing restoration, bull trout will have migratory passage through the bypass channel. The bypass channel and the main channel will be separated by a levee. This will ensure that bull trout are isolated from the project area while migrating. The bypass channel will be planted with shrubs and trees salvaged from the banks of the main channel. This will serve to keep runoff and

turbidly low as well shade the bypass channel so that the aquatic environment is more favorable for bull trout. Thus, due to the scale of the project and implementation of BMPs, streambank and riparian area effects upon bull trout and bull trout critical habitat are expected to be insignificant

#### 5. Disturbance

Heavy equipment operations in the action area, especially near the bypass channel, will create noise and vibrations. The disturbance will be short-term and include mostly trucks driving across the levee delivering supplies or distant heavy equipment working in the floodplain. A reasonable expectation would be that, in order to avoid adverse disturbance effects due to noise, bull trout would move away from areas with elevated levels of suspended sediment and construction noise to suitable habitat downstream or upstream of the activity. Although fish are expected to temporarily move away from the disturbance; they are also expected to migrate only short distances to adjacent habitat and only for a few hours in any given day. Also, bull trout migrate predominately during the night (Homel and Budy 2008, p. 876), therefore potential for disturbance or displacement is unlikely as heavy equipment use will only occur during daylight hours. Consequently, as the noise disturbance will be short-term and during daylight hours when bull trout are not likely to migrate the impacts will be insignificant.

#### 6. Chemical contamination

Levels of contaminants in the form of fuels and hydraulic fluid from equipment may be elevated during the short term. There is potential for spillage of fuel or hydraulic fluid from equipment during construction activities. Fish, their habitat, and aquatic organisms can be harmed or killed by accidental release of fuel or oil from vehicles and equipment, or other contaminants that may occur through project activities.

The potential risk of construction related petroleum products spilling during construction activities is reduced because the proposed action includes precautionary conservation measures that help safeguard against spillage and runoff. For example, the Forest will review the contractors hazardous spill plan before construction, which contains actions to minimize spills and contain spills, and the Forest requires a Spill Containment Kit be present at all times. Additionally, erosion control measures, such as coffer dams that will be utilized to reduce delivery of sediment, will also help minimize chemical contamination to flowing water. Furthermore, machinery will be fuelled or lubricated outside of riparian areas at a distance of 100 feet or greater from flowing water. The bypass channel is being installed not only to allow for passage of migratory fish but also to separate the work area and any hazards from bull trout. As the work area will be in the main channel and fish will be migrating in the bypass channel the potential for petroleum contamination is minimal.

Investigations by the NPT and the USGS and ID DEQ have not detected mercury or levels have been considered non-significant in the project area. Although mercury was not used in dredge mining and has not been found in the action area there is a small chance that mercury could be present in harmful levels. If mercury is found in the project area it will not likely affect Critical Habitat or the bull trout population, however potential effects to individual bull trout could be significant. If mercury is present the short-term effects to an individual is possible but unlikely

as the BMP will ensure mercury is contained and removed by qualified professionals immediately. Because the action area comprises only a small fraction of the overall habitat available to bull trout, the primary spawning and rearing habitats are well upstream of the Project area, and because adequate conservation measures are in place, the proposed Project is expected to adversely affect very few bull trout and have only minimal and short-term adverse effects to a limited amount of critical habitat and the associated PCEs.

## 7. Temperature

Water temperature is influenced by channel slope, width, streambed topography and substrate, channel pattern and width, and riparian vegetation. All these factors have been altered by the historic dredge mining of Crooked River so that the temperatures in the project area exceed ideal bull trout migration temperature as discussed previously in the *Life History* section of *The Status of the Species and Critical Habitat*. Temperatures in Crooked River during the summer months (June-August) are routinely higher than 15° C, which may reduce or limit bull trout migration. The proposed action is expected to have insignificant effects upon water temperatures in the short-term. In the long-term, however, re-establishment of riparian vegetation along the river channel may result in decreased water temperatures, improving PCE 5 and providing benefits to bull trout. The bypass channel will also be connected to ponds which are fed by cooler ground water. In the long-term the channel will be deeper, the water velocity will be faster and bank vegetation and large woody debris will provide shade. These project actions will be beneficial to bull trout critical habitat PCE 5 and bull trout in the Crooked River and South Fork Clearwater Core Area. Consequently, Project implementation is expected to result in insignificant effects to bull trout and designated bull trout critical habitat in the short-term and may result in beneficial effects to bull trout and its designated critical habitat in the long-term.

## Summary of Effects on Bull Trout and its Critical Habitat

The action is expected to improve the condition of designated critical habitat for bull trout, and thus increase bull trout production, in the long term; however, it will have localized adverse effects on fish and habitat in the short term. Short-term, direct effects from fish removal activities will result in harm, harassment, and mortality of bull trout. Water turbidity and deposited sediment will result in harassment of fish both through direct exposure and displacement from preferred habitat. Other modes of effects (i.e. exposure to chemical contaminants; visual and noise disturbance; stream temperature changes; and streambank alterations) are minor and will not likely lead to harm or harassment of bull trout.

In general, the overall impact of this action is expected to be beneficial over the long term, with improvements in the condition of critical habitat resulting in benefits to the species. The proposed action is expected to: (1) improve water quality in the Crooked River by reducing the amount of fine sediment from the eroding streambank and road prism; (2) provide a more natural streambank by relocating the road away from the bank and reestablishing a properly functioning riparian area; (3) provide more pools and cover for salmonids; and (4) improve the overall stream dynamic with structures that direct the high energy of the stream into the thalweg and high flows into the ephemeral channel, which will function as off-channel rearing habitat.

## 2.5.2 Effects of Interrelated or Interdependent Actions

An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. No effects from interrelated or interdependent actions are anticipated.

## 2.6 Cumulative Effects to Bull Trout and Bull Trout Critical Habitat

### Bull Trout

The implementing regulations for section 7 define cumulative effects to include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this Opinion. 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 Act.

There are several primary or secondary residences along Crooked River. The effects from these private lands include increased nutrients from septic systems, loss of shade from development along the creek and increased sediment from the roads. There are also two larger parcels of private lands that were historically or are currently mined. The Champion Mine is about 6 miles upstream from the mouth of Crooked River and has not been developed and there is no known mining or development proposal. Premium Exploration owns about 1 square mile near Orogrande and the mining company has been conducting exploration activities, on the land, the past few years. These activities could increase the sediment to Quartz Creek and Crooked River. It is likely that full scale mining activities will occur.

Crooked river road runs adjacent to the Crooked River until beyond the confluence with Relief Creek where it forks into Buffalo Hump Road and Orogrande Dixie Road. Annual runoff during high seasonal rains and periodic maintenance which may include grading, ditching cleaning and other similar activities increase sediment into the Crooked River. This may have long-term negative-impacts but are limited seasonally primarily when there are heavy rains. Additionally, road use is minimal as development is limited and not expected to increase in the foreseeable future. Although these activities may increase sediment and possibly water temperature given the scope and magnitude are negligible and immeasurable.

Illegal and inadvertent harvest of bull trout is also considered a cumulative effect. Harvest can occur through both misidentification and deliberate catch. Schmetterling and Long (1999, p. 1) found that only 44 percent of the anglers they interviewed in Montana could successfully identify bull trout. Being aggressive piscivores, bull trout readily take lures or bait (Ratliff and Howell 1992, pp. 15-16). Idaho Department of Fish and Game report that 400 bull trout were caught and released in the regional (Clearwater administrative region) waters of the Salmon and Snake

Rivers during the 2002 salmon and steelhead fishing seasons. In the Little Salmon River, 89 bull trout were caught and released during the same fishing seasons (Idaho Department of Fish and Game 2004, p. 11 ). Spawning bull trout are particularly vulnerable to harvest because the fish are easily observed during-autumn low flow conditions. Hooking mortality rates range from 4 percent for non-anadromous salmonids with the use of artificial lures and flies (Schill and Scarpella 1997, p. 1) to a 60 percent worst-case scenario for bull trout taken with bait (Cochner et al. 2001, p. 21). Thus, even in cases where bull trout are released after being caught, some mortality can be expected.

An additional cumulative effect to bull trout is global climate change. Warming of the global climate seems quite certain. Changes have already been observed in many species' ranges consistent with changes in climate (ISAB 2007, p. iii; Hansen et al. 2001, p. 767). Future climate change may lead to fragmentation of suitable habitats that may inhibit adjustment of plants and wildlife to climate change through range shifts (ISAB 2007, p. iii; Hansen et al. 2001, pp. 768-773). Changes due to climate change and global warming could be compounded considerably in combination with other disturbances such as fire and invasive species. Fire frequency and intensity have already increased in the past 50 years, particularly in the past 15 years, in the shrub steppe and forested regions of the west (ISAB 2007, p. iii). Larger climate driven fires can be expected in Idaho and Montana in the future. Small isolated bull trout populations will be at increased risk of extirpation in the event of larger and more numerous fires. In addition, the preference of bull trout for colder water temperatures gives them a competitive advantage over invasive species, such as brook trout, inhabiting warmer stream reaches. Rahel et al. (2008, p. 552) state that "Climate change will produce a direct threat to bull trout through thermally stressful temperatures and an indirect threat by boosting the competitive ability of other trout species present."

Although cumulative effects can be identified, we cannot quantify the magnitude of their impacts on bull trout populations. Except for climate change, we do not expect cumulative effects to appreciably alter the existing baseline condition in the action area. We cannot be so certain on the effects of climate change.

## **Bull Trout Critical Habitat**

We assume that many of the threats to critical habitat identified previously in this Opinion will continue to impact critical habitat, including climate change.

Warming of the global climate seems quite certain. Changes have already been observed in many species' ranges consistent with changes in climate (ISAB 2007, p. iii; Hansen et al. 2001, p. 767). Global climate change threatens bull trout throughout its range in the coterminous United States. Downscaled regional climate models for the Columbia River basin predict general air temperature warming of 1.0 to 2.5 °C (1.8 to 4.5 °F) or more by 2050 (Rieman et al. 2007, p. 1552). This predicted temperature trend may have important effects on the regional distribution and local extent of habitats available to salmonids (Rieman et al. 2007, p. 1552), although the relationship between changes in air temperature and water temperature are not well understood. Bull trout spawning and early rearing areas are currently largely constrained by low fall and winter water temperatures that define the spatial structuring of local populations or habitat

patches across larger river basins; habitat patches represent networks of thermally suitable habitat that may lie in adjacent watersheds and are disconnected (or fragmented) by intervening stream segments of seasonally unsuitable habitat or by actual physical barriers (Rieman et al. 2007, p. 1553). With a warming climate, thermally suitable bull trout spawning and rearing areas are predicted to shrink during warm seasons, in some cases very dramatically, becoming even more isolated from one another under moderate climate change scenarios (Rieman et al. pp. 1558-1562; Porter and Nelitz 2009, pp. 5-7). Climate change will likely interact with other stressors, such as habitat loss and fragmentation (Rieman et al. 2007, pp. 1558-1560; Porter and Nelitz 2009, p. 3); invasions of nonnative fish (Rahel et al. 2008, pp. 552-553); diseases and parasites (McCullough et al. 2009, p. 104); predators and competitors (McMahon et al. 2007, pp. 1313-1323; Rahel et al. 2008, pp. 552-553); and flow alteration (McCullough et al. 2009, pp. 106-108), rendering some current spawning, rearing, and migratory habitats marginal or wholly unsuitable. Over a period of decades, climate change may directly threaten the integrity of the essential physical or biological features described in PCEs 1, 2, 3, 5, 7, 8 and 9.

## 2.7 Conclusion

After reviewing the current status of the species, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's Opinion that the action, as proposed, is not likely to jeopardize the continued existence of bull trout. Bull trout critical habitat has been designated for the species and occurs within the Project area. As a result designated critical habitat will be affected by Project implementation. It is our conclusion that the proposed action is not likely to destroy or adversely modify designated critical habitat for bull trout. Furthermore, the Project will not impact the distribution of bull trout in the South Fork Clearwater River Core Area. While we do expect some individual bull trout and a limited amount of designated critical habitat will be adversely affected, we do not anticipate that this will translate to local spawning population level affects.

A variety of impacts from the activities implemented in accordance with the Project are possible. These include short term impacts to bull trout and their habitat. These impacts include: noise, disturbance and turbidity from watering of the bypass channel the main channel, flood plain restoration including grading and the installation of LWD, and disturbance during fish relocation, disturbance during excavation, and mortality and/or injury to bull trout as a result of capture and handling during fish relocation. The Project is expected to have beneficial impacts from anticipated reductions in sediment input and water temperature as well as increased floodplain connectivity, riparian shading, habitat complexity and large woody debris density. A number of conservation measures designed to minimize these impacts have been included as part of the Project. When implemented correctly, these measures will significantly reduce potential impacts to bull trout and their designated critical habitat, but some adverse effects are still expected.

Our conclusions are based on the following:

1. This action will not prevent the ability of bull trout to migrate between the South Fork Clearwater River Core Area and spawning and rearing habitat upstream in Crooked River.



2. The diversion of the river into the bypass channel during Phase 1 and 2 and back to the mainstem in Phase 4 will take place during Service-identified work windows that are specifically designed to minimize the number of bull trout present in the area, thus minimizing potential effects such as exposure to turbidity and migratory delays.
3. A bypass channel will be put in place so that migration upstream in Crooked River to spawning and rearing habitat is not inhibited throughout this Project area.
4. Fish capture, handling, and relocation activities will be conducted according to established protocols that are specifically designed to minimize impacts to salmonids.
5. The mitigation and conservation measures specifically identified for the implementation of this Project reduce the potential for causing short-term adverse effects (i.e. sediment introduction) to bull trout and designated critical habitat.

## 2.8 Incidental Take Statement

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without specific 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 in the definition of take in the Act means an act which actually kills or injures wildlife. Such act may 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 by the Service as an intentional or negligent act or omission which creates the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering.

Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The Forest and NPT have a continuing duty to regulate the activity covered by this incidental take statement. If the Forest and NPT fail to assume and implement the terms and conditions the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest and NPT must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

## 2.8.1 Amount or Extent of Take Anticipated

Based on bull trout data collected by the IDFG weir at the mouth of Crooked River and previous surveys reporting spawning and rearing in the upper Crooked River watershed bull trout have been documented throughout the watershed and in the immediate project location. These data as well as research on migration timing, spawning, rearing, temperature regimes and habitat quality demonstrates that the presence of migrating bull trout during the implementation of the Project is likely. As discussed in the Status of the Species in the Action Area section in the accompanying Opinion, Crooked River is inhabited by migratory bull trout almost year round. However, as the project will avoid peak migratory periods for the construction of the bypass channel and re-watering of the main channel the overall density of bull trout in the project area is expected to be relatively low. Because of this, the Service believes the potential for high numbers of migrating bull trout to be present during the establishment of the bypass channel to be low. Additionally, bypass and main channel watering activities will occur during daylight hours, when bull trout are less inclined to move through the area. These factors combined reduce the likelihood of high numbers of adult or juvenile bull trout being present during Project implementation.

As discussed previously in the *Status of the Species in the Action Area* section, based on estimated bull trout densities, the size of the Project area, and considering the factors described in the preceding paragraph, it is expected that as many as 612 juvenile and/or adult bull trout will occur in the action area during Project implementation.

More specifically, the Service estimates 204 bull trout to be present in the action area during each dewatering event for a total of 612 bull trout present and impacted during the whole project period. As the dewatering will occur gradually some bull trout are expected to evacuate the area of their own volition while others will remain and require capture, handling, and release. An evaluation of a large-scale fish salvage operation in British Columbia showed that for the majority of species (salmonids, sculpins, whitefish, and sucker species), mortality rates of less than 1% were the norm (red sided shiners were an exception at ~20%) (Higgins and Bradford 1996, p. 670). Given that trained fisheries biologists will be conducting the fish salvage activities, and the smaller scale of the fish salvage activities associated with this proposed Project compared to the above large-scale study, direct mortality from fish salvage activities is expected to be no more than 10 percent. Therefore, we expect that 61 bull trout (10% of 612 = 61 bull trout) will be injured or killed during fish relocation activities.

The Service anticipates that not all bull trout will be captured during relocation activities and may result in mortalities as a result of stranding. We estimate that roughly 20 percent of the bull trout will not be captured during the multiple pass rescue efforts along the stream margins and within the coffer dams. This is based on IDFG work which indicates that typically no more than 20 percent of a species is present after multiple pass capture and removal efforts (Ryan and Jakubowski 2012, p. 4). Therefore, based on the 20% IDFG estimate for stranding, we estimate 122 bull trout (612 bull trout x 20% = 122 bull trout) mortalities will occur as a result of stranding. The remaining 429 bull trout will be harassed as a result of relocation activities. In total, we estimate 612 bull trout will be incidentally taken due to stream dewatering, capture and relocation activities.

In summary, the Service therefore estimates that implementation of the proposed Project will take:

Fish Relocation:

- In the form of injury or mortality related to stranding: 122 bull trout
- In the form of injury or mortality related to relocation (capture and removal): 61 bull trout
- In the form of harassment: 429 bull trout

Because individuals could be affected by fish relocation and sediments/turbidity, effects to an individual bull trout will only be counted one time. Therefore, no more than 612 individual bull trout are expected to be harmed or harassed as a result of this Project implementation.

The amount of incidental take analyzed and exempted by this Opinion will be exceeded if project duration exceeds the proposed project duration/work window which would result in the harm or harassment of more than 612 bull trout.

## **2.8.2 Effect of the Take**

In the accompanying Opinion, the Service determined that this level of anticipated take is not likely to jeopardize the continued existence of the bull trout across its range.

The Service anticipates that up to 612 juvenile and/or adult bull trout may be captured and/or harassed, and, of these 612 fish, up to 183 may be injured or killed during implementation of the proposed Project.

In the Service's opinion, harassing and/or capturing up to 612 juvenile and/or adult bull trout with potential injury or mortality of 183, over a 3-year period, will not appreciably affect the distribution, numbers or reproduction of bull trout in the South Fork Clearwater River Core Area. Additionally, impacts from the proposed activities should be short-term in nature and will be minimized by implementation of the Project during Service-identified work windows, which are specifically designed to minimize the likelihood of bull trout presence. The magnitude of the effects from implementing the proposed Project will not significantly affect the distribution, numbers or reproduction of bull trout within the South Fork Clearwater River Core Area, the Columbia River Population Segment, or the species.

### **2.8.3 Reasonable and Prudent Measures**

The Service believes no additional reasonable and prudent measures are available or necessary to further reduce the incidental take of bull trout as a result of implementing this action. The Forests and NPT have incorporated conservation and mitigation measures and best practices, as described in their BA and in the *Conservation Measures* section of this Opinion, into the projects' designs to minimize to the greatest extent practicable the potential for take of bull trout. Following of those measures, as described herein, constitutes the reasonable and prudent measures.

### **2.8.4 Terms and Conditions**

To be exempt from the prohibitions of section 9 of the Act, the Forest must comply with the following terms and conditions. The terms and conditions are non-discretionary.

1. Comply with an implement the reasonable and prudent measures as described above.
2. An annual report describing the results of the turbidity data, monitoring, turbidity generated by the different project actions and actions taken to resolve turbidly that exceeds levels allowable by this Opinion and described in the BA. The results from turbidity monitoring will be collected during the project and a report will be provided annually to the Service. The report will include the following: location of the turbidity monitoring station; location of the project action being monitored by each turbidity station; a description of the project action; the turbidity data collected; if turbidity levels exceed levels allowable by this Opinion as described in the BA then a discussion of what actions were taken and how the situation was resolved. The report can be in a simple written format that includes a map of the turbidity stations, Project actions which are being monitored and the inclusion of pictures is highly encouraged.
3. An annual report of the numbers of fish harassed in each category (mortality due to stranding, relocation or simply harassed). This should include a census of all fish present in the Project area, prior to each dewatering event, to the extent possible; however a reasonable effort should be made and documented. The report should include the methods of fish 'salvage' used and the number of bull trout present during each method as well as the kind and nature of the take.
4. The above reports can be submitted together, at the Forest's discretion, and should be provided to the Service no later than 60 days after the end of the year in which the Project action occurred.

### **2.8.5 Reporting and Monitoring Requirement**

In order to monitor the impacts of incidental take, the Federal agency or any applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [(50 CFR 402.14 (i)(3)].

## 2.9 Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends that:

1. The Forest and NPT maintain migratory corridors for bull trout and their forage fish base within the Clearwater River subbasin through protecting the integrity of the riparian and upland habitats.
2. The Forest and NPT support research to better understand the use, migration and movement patterns of bull through the Crooked River Project action area before and after project implementation.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of the conservation recommendations.

## 2.10 Reinitiation Notice

This concludes formal consultation for the potential effects of the proposed Crooked River Valley Rehabilitation Project on bull trout and bull trout critical habitat. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if:

1. The amount or extent of incidental take is exceeded.
2. New information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion.
3. The agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this Opinion.
4. A new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

### 3. LITERATURE CITED

#### 3.1 Published Literature

- Allen, M.B., P.J. Connolly, M.G. Mesa, J. Charrier, C. Dixon. 2010. Distribution and movement of bull trout in the upper Jarbidge River watershed, Nevada. U.S. Geological Survey, Reston, Virginia. 80 pp.
- Berg, L., and T.G. Northcote. 1985. Changes in Territorial, Gill-Flaring, and Feeding Behavior in Juvenile Coho Salmon (*Oncorhynchus kisutch*) Following Short-Term Pulses of Suspended Sediment. Canadian Journal of Fisheries and Aquatic Sciences.42:1410-1417
- Berg, R.K. and E.K. Priest. 1995. Appendix Table 1: A list of stream and lake fishery surveys conducted by U.S. Forest Service and Montana Fish, Wildlife and Parks fishery biologists in the Clark Fork River Drainage upstream of the confluence of the Flathead River from the 1950s to the present. Montana Fish, Wildlife, and Parks, Job Progress Report, Project F-78-R-1, Helena, Montana.
- Boag, TD. 1987. Food habits of bull char, *Salvelinus Confluentus*, and rainbow trout, *Salmo Gairdneri*, coexisting in a foothills stream in northern Alberta. Ont. Field-Nat. Vol. 101, no. 1, pp. 56-62.
- Bond, C.E. 1992. Notes on the nomenclature and distribution of the bull trout and the effects of human activity on the species. Pages 1-4 in Howell, P.J. and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis, Oregon.
- Bonneau, J.L., R.F. Thurow, and D.L. Scarnecchia. 1995. Capture, marking, and enumeration of juvenile bull trout and cutthroat trout in small, low-conductivity streams. North American Journal of Fisheries Management 15:563-568.
- Brewin, P.A. and M.K. Brewin. 1997. Distribution for bull trout in Alberta. Pp. 209-216 in Friends of the Bull Trout Conference Proceedings (Mackay, W.C., M.K. Brewin, and M. Monita, eds.) Bull Trout Task Force (Alberta), c/o Trout Unlimited Canada, Calgary, Alberta.
- Buchanan, D.V. and S.V. Gregory. 1997. Development of water temperature standards to protect and restore habitat for bull trout and other cold water species in Oregon. Pp. 119-126 in Friends of the Bull Trout Conference Proceedings (Mackay, W.C., M.K. Brewin, and M. Monita, eds.) Bull Trout Task Force (Alberta), c/o Trout Unlimited Canada, Calgary, Alberta.
- Burkey, T.V. 1989. Extinction in nature reserves: the effect of fragmentation and the importance of migration between reserve fragments. Oikos 55:75-81.
- Cavender, T.M. 1978. Taxonomy and distribution of the bull trout, *Salvelinus confluentus* (Suckley), from the American northwest. California Fish and Game 64:139-174.
- CBTTATA. Clearwater Basin Bull Trout Technical Advisory Team. 1998. North Fork Clearwater River Basin Bull Trout Problem Assessment. Prepared for the State of Idaho,

May 1998.

- CNNTTATb. Clearwater Basin Bull Trout Advisory Team. 1998. South Fork Clearwater River Subbasin Bull Trout Problem Assessment. Prepared for the State of Idaho, November 1998.
- Covel, T. & R. Santos. 2012. Nez Perce Tribe Field Studies of Spring/Summer Chinook Salmon from 'Imnaamatnóon & Waw'áalamnime from 1992-2012. (Draft) Unpublished raw data.
- Donald, D.B. and D.J. Alger. 1993. Geographic distribution, species displacement, and niche overlap for lake trout and bull trout in mountain lakes. *Canadian Journal of Zoology* 71:238-247.
- Dunham, J.B. and B.E. Rieman. 1999. Metapopulation structure of bull trout: Influences of physical, biotic, and geometrical landscape characteristics. *Ecological Applications* 9:642-655.
- Fraleigh, J.J., and B.B. Shepard. 1989. Life history, ecology and population status of migratory bull trout (*Salvelinus confluentus*) in the Flathead Lake and River system, Montana. *Northwest Science* 63(4):133-143.
- Gilpin, M., University of California. 1997. Letter concerning connectivity and dams on the Clark Fork River in Montana. Addressed to Shelly Spalding of the Montana Department of Fish, Wildlife, and Parks. August 16, 1997.
- Goetz, F.A. 1989. Biology of the bull trout (*Salvelinus confluentus*) a literature review. Willamette National Forest, Eugene, Oregon.
- Goetz, F.A. 1994. Distribution and juvenile ecology of bull trout (*Salvelinus confluentus*) in the Cascade Mountains. M.S. thesis. Oregon State University, Corvallis, Oregon.
- Gregory, R.S. and T.G. Northcote. 1993. Surface, planktonic, and benthic foraging by juvenile Chinook salmon (*Oncorhynchus tshawytscha*) in turbid laboratory conditions. *Canadian Journal of Fisheries and Aquatic Sciences* 50: 233-240.
- Hanson, J. and E. Schriever. 2006. Regional Fisheries Management Investigations: Lochsa River Bull Trout Distribution, Abundance and Life History Characteristics of Bull and Brook Trout in The Lochsa River Basin. Annual Report 2005. Idaho Department of Fish and Game, PO Box 25, Boise, ID 83707. USDA Forest Service, Contract Number 00-CS-11010500-015. IDFG 06-12. 30 Pp.
- Hard, J. 1995. A quantitative genetic perspective on the conservation of intraspecific diversity. *American Fisheries Society Symposium* 17:304-326.
- Healy, M.C. and A. Prince. 1995. Scales of variation in life history tactics of Pacific salmon and the conservation of phenotype and genotype. *American Fisheries Society Symposium* 17:176-184.
- Higgins, P. S. and Bradford, M. J. 1996. Evaluation of a Large-Scale Fish Salvage to Reduce the Impacts of Controlled Flow Reduction in a Regulated River. *North American Journal of Fisheries Management*, 16:3, 666 — 673.
- Hoelscher, B. and T.C. Bjornn. 1989. Habitat, densities, and potential production of trout and

- char in Pend Oreille Lake tributaries, Idaho Department of Fish and Game, Federal Aid to Fish and Wildlife Restoration, Job Completion Report, Project F-71-R-10, Boise, Idaho.
- IDEQ. Idaho Department of Environmental Quality. 1999. Lochsa River Subbasin Assessment. Prepared by: Nicholas Bugosh, Department of Environmental Quality, 1410 N. Hilton, Boise, ID 83706. 96 Pp.
- Independent Scientific Advisory Board (ISAB). 2007. Climate Change Impacts on Columbia River Basin Fish and Wildlife. Portland, Oregon. 136 pp.
- Jakober, M. 1995. Autumn and winter movement and habitat use of resident bull trout and westslope cutthroat trout in Montana. M.S. Thesis, Montana State University, Bozeman, Montana.
- Kinsella, S.R. 2005. Weathering the Change – Helping Trout in the West Survive the Impacts of Global Warming. Available at: [www.montanatu.org/issuesandprojects/climatechange.pdf](http://www.montanatu.org/issuesandprojects/climatechange.pdf) (last accessed January 11, 2011).
- Leary, R.F., F.W. Allendorf, and S.H. Forbes. 1993. Conservation genetics of bull trout in the Columbia and Klamath River watersheds. *Conservation Biology* 7:856-865.
- Leary, R.F. and F.W. Allendorf. 1997. Genetic confirmation of sympatric bull trout and dolly varden in western Washington. *Transactions of the American Fisheries Society*. 126: 715-720.
- Leathe, S.A. and P.J. Graham. 1982. Flathead Lake fish habits study—Final Report. Montana Department of Fish, Wildlife and Parks, Kalispell, Montana. 137 p.
- Light, J.T., L.G. Herger, and M. Robinson. 1996. Upper Klamath Basin bull trout conservation strategy, a conceptual framework for recovery. Part One. The Klamath Basin Bull Trout Working Group. (As referenced in USDI 1998c).
- MBTSG. Montana Bull Trout Scientific Group. 1998. The relationship between land management activities and habitat requirements of bull trout prepared for The Montana Bull Trout Restoration Team, Montana Fish, Wildlife and Parks, Helena, Montana.
- McCubbins, J., S. Moran, N. Posselt, D. MacKay. 2012. Tributary Trapping and Downstream Juvenile Bull Trout Transport Program Progress report 2010 and 2011. Avist Corp. Natural Resources Field Office, Noxon, MT.
- Moran, N., P. Nosselt and D. MacKay. 2014. Tributary Trapping and Downstream Juvenile Bull Trout Transport Program Progress report 2012. Avist Corp. Natural Resources Field Office, Noxon, MT.
- Meefe, G.K. and C.R. Carroll. 1994. Principles of conservation biology. Sinauer Associates, Inc. Sunderland, Massachusetts.
- Mote, P.W., E.A. Parson, A.F. Hamlet, K.N. Ideker, W.S. Keeton, D.P. Lettenmaier, N.J. Mantua, E.L. Miles, D.W. Peterson, D.L. Peterson, R. Slaughter, and A.K. Snover. 2003. Preparing for climatic change: The water, salmon, and forests of the Pacific Northwest. *Climatic Change* 61:45-88.
- Muck, J. 2010. Biological effects of sediment on bull trout and their habitat—Guidance for evaluating effects. U.S. Fish and Wildlife Service, Washington Fish and Wildlife Office,



- Lacey, WA.
- Platts, W., M. Hill, W. Hillman, and Miller. 1993. Preliminary status report on bull trout in California, Idaho, Montana, Nevada, Oregon, and Washington.
- Poff, N. L., M. M. Brinson, and J. W. Day, Jr. 2002. Aquatic ecosystems & global climate change: Potential impacts on inland freshwater and coastal wetland ecosystems in the United States. Pew Center on Global Climate Change.
- Newton, J.A. and S. Pribyl. 1994. Bull trout population summary: Lower Deschutes River Subbasin. Oregon Department of Fish and Wildlife, The Dalles, Oregon.
- Pratt, K.L., and J.E. Huston. 1993. Status of bull trout (*Salvelinus confluentus*) in Lake Pend Oreille and the lower Clark Fork River: draft. The Washington Power Company, Spokane, Washington.
- Pratt, K.L. 1992. A review of bull trout life history. Pages 5-9 in P.J. Howell, and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis, Oregon.
- Quigley, T.M. and S.J. Arbelbide (technical editors). 1997. An assessment of ecosystem components in the interior Columbia basin and portions of the Klamath and Great Basins. Gen. Tech. Rep. PNW-GTR-405. U.S. Forest Service, Pacific Northwest Research Station, Portland, Oregon.
- Ratliff, D.E., and P.J. Howell. 1992. The status of bull trout populations in Oregon. Pages 10-17 in P.J. Howell and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis, Oregon.
- Rich, C.F. 1996. Influence of abiotic and biotic factors on occurrence of resident bull trout in fragmented habitats, western Montana. M.S. Thesis. Montana State University, Bozeman, Montana.
- Rieman, B.E., D.C. Lee, and R.F. Thurow. 1997. Distribution, status, and likely future trends of bull trout within the Columbia River and Klamath River basins. *North American Journal of Fisheries Management* 17:1111-1125.
- Rieman, B.E. and F.W. Allendorf. 2001. Effective population size and genetic conservation criteria for bull trout. *North American Journal of Fisheries Management* 21:756-764.
- Rieman, B.E., and J.D. McIntyre. 1993. Demographic and habitat requirements for conservation of bull trout. GTR-INT-302. USDA Forest Service, Boise, Idaho.
- Rieman, B.E., and J.D. McIntyre. 1995. Occurrence of bull trout in naturally fragmented habitat patches of varied size. *Transactions of the American Fisheries Society* 124:285-296.
- Rieman, B.E., and J.D. McIntyre. 1996. Spatial and temporal variability in bull trout red counts. *North American Journal of Fisheries Management* 16:132-141.
- Rieman, B.E., J.T. Peterson, and D.L. Myers. 2006. Have brook trout displaced bull trout along longitudinal gradients in central Idaho streams? *Canadian Journal of Fisheries and Aquatic Science*. Vol. 63. pp.63-78
- Rieman, B. E., Isaak, D., Adams, S., Horan, D., Nagel, D., Luce, C., & Myers, D. 2007.

- Anticipated Climate Warming Effects on Bull Trout Habitats and Populations Across the Interior Columbia River Basin. Transactions of the American Fisheries Society, 136(6), 1552-1565.
- Robins, C.R., R.M. Bailey, C.E. Bond, J.R. Brooker, E.H. Lachner, R.N. Lea and W.B. Scott. 1980. A list of common and scientific names of fishes from the United States and Canada. American Fisheries Society Special Publication 12, Bethesda, Maryland.
- Rode, M. 1990. Bull trout, *Salvelinus confluentus* Suckley, in the McCloud River: status and recovery recommendations. Administrative Report Number 90-15. California Department of Fish and Game, Sacramento, California.
- Ryan, R and R, Jakubowski. 2012. Idaho native salmonid research and monitoring report - 2011. Idaho tributary habitat acquisition and fishery enhancement program, Appendix A. Draft report to the Avista Corporation by the Idaho Department of Fish and Game, dated October 2012, Boise, Idaho.
- Saunders, D.A., R.J. Hobbs, and C.R. Margules. 1991. Biological consequences of ecosystem fragmentation: A review. Conservation Biology 5:18-32.
- Schiff, D., J. Peterson, E. Schriever. 2005. Regional Fisheries Management Investigations: Lochsa River Bull Trout Distribution, Abundance and Life History Characteristics of Bull and Brook Trout in The Lochsa River Basin. Annual Report 2003. Idaho Department of Fish and Game, PO Box 25, Boise, ID 83707. USDA Forest Service, ContractNumber 00-CS-11010500-015. IDFG 05-52. 30 Pp.
- Schiff, D., J. Peterson, E. Schriever. 2005. Regional Fisheries Management Investigations: Lochsa River Bull Trout Distribution, Abundance and Life History Characteristics of Bull and Brook Trout in The Lochsa River Basin. Annual Report 2004. Idaho Department of Fish and Game, PO Box 25, Boise, ID 83707. USDA Forest Service, ContractNumber 00-CS-11010500-015. IDFG 05-52. 28 Pp.
- Schill, D.J. 1992. River and stream investigations. Idaho Department of Fish and Game, Boise.
- Shoen, D., R.M. Jones, and P.K. Murphy. 1999. Section 7 Watershed Biological Assessment Lochsa River drainage Clearwater subbasin: determination of effects of ongoing activities based on the matrix of pathways and indicators of watershed condition for steelhead trout, fall chinook salmon and bull trout. USFS. U.S. Forest Service, Clearwater National Forest.
- Sedell, J.R., and F.H. Everest. 1991. Historic changes in pool habitat for Columbia River Basin salmon under study for TES listing. Draft USDA Report. Pacific Northwest Research Station. Corvallis, Oregon.
- Servizi, J.A. and D.W. Martens. 1992. Sublethal responses of coho salmon (*Oncorhynchus kisutch*) to suspended sediments. Canadian Journal of Fisheries and Aquatic Sciences 49: 1389-1395.
- Sexauer, H.M., and P.W. James. 1997. Microhabitat Use by Juvenile Trout in Four Streams Located in the Eastern Cascades, Washington. Pages 361-370 In W.C. Mackay, M.K. Brown and M. Monita (eds.). Friends of the Bull Trout Conference Proceedings. Bull Trout Task Force (Alberta), c/o Trout Unlimited. Calgary, Canada.
- Sigler, J. W., T. C. Bjornn, and F. H. Everest. 1984. Effects of chronic turbidity on density and

- growth of steelhead and coho salmon. Transactions of the American Fisheries Society 113:142-150.
- Thomas, G. 1992. Status report: Bull trout in Montana. Report prepared for Montana Fish, Wildlife, and Parks, Helena, Montana.
- USFWS. U.S. Fish and Wildlife Service. 2002a. Chapter 1, Introduction. 137pp. In: Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon.
- USFWS. U.S. Fish and Wildlife Service. 2002b. Chapter 2, Klamath River Recovery Unit, Oregon. 82pp. In: Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan. Fish and Wildlife Service, Portland, Oregon.
- USFWS. U.S. Fish and Wildlife Service. 2002c. Chapter 25, St. Mary-Belly River Recovery Unit, Montana. 134 pp. In: Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan. Fish and Wildlife Service, Portland, Oregon.
- USFWS. U.S. Fish and Wildlife Service. 2002d. Chapter 3, Clark Fork River Recovery Unit, Montana, Idaho, and Washington; Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan. 303 pp. In: Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan. Fish and Wildlife Service, Portland, Oregon.
- USFWS. U.S. Fish and Wildlife Service. 2002e. Chapter 16, Clearwater River Recovery Unit, Idaho. 196 pp. In: Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan. Fish and Wildlife Service, Portland, Oregon.
- USFWS. U.S. Fish and Wildlife Service. 2004a. Draft recovery plan for the Jarbidge River distinct population segment of bull trout (*Salvelinus Confluentus*). Federal Register Vol. 69(126) 39951-39952
- USFWS. U.S. Fish and Wildlife Service. 2004b. Draft recovery plan for the Coastal-Puget Sound distinct population segment of bull trout (*Salvelinus confluentus*). Volume I (of II): Puget Sound Management Unit. Portland, Oregon. 389 + xvii pp.
- USFWS. U.S. Fish and Wildlife Service. 2004c. Director's Memorandum on Application of the Destruction of Adverse Modification Standard under Section 7 (a)(2) of the Endangered Species Act. Memorandum to Regional Directors, Regions 1, 2, 3, 4, 5, 6, and 7 from U.S. Department of Interior, U.S. Fish and Wildlife Service, Director. December 9, 2004.
- USFWS. U.S. Fish and Wildlife Service. 2005. Bull trout core area conservation status assessment. W. Fredenberg, J. Chan, J. Young, and G. Mayfield, editors. U. S. Fish and Wildlife Service. Portland, Oregon. 95 pages plus attachments.
- USFWS. U.S. Fish and Wildlife Service. 2006. Jeopardy Determinations under Section 7 of the Endangered Species Act for the Bull Trout. Memorandum to Ecological Services Project Leaders - Idaho, Oregon, Washington from Region 1 Assistant Regional Director, U.S. Fish and Wildlife Service, Ecological Services. Portland, Oregon. April 20, 2006.
- USFWS. U.S. Fish and Wildlife Service. 2008a. Bull Trout (*Salvelinus confluentus*) 5-Year review: Summary and Evaluation. U.S. Fish and Wildlife Service, Portland, Oregon.

- USFWS. U.S. Fish and Wildlife Service. 2008b. Draft rotary screw trap protocol for estimating production of juvenile Chinook salmon. Document prepared by the U.S. Fish and Wildlife Service, Comprehensive Assessment and Monitoring Program. Sacramento, California. 44 pp.
- USFWS. U.S. Fish and Wildlife Service. 2010. Bull Trout Final Critical Habitat Justification Rationale for why Habitat is Essential, and Documentation of Occupancy. USFWS, Idaho Fish and Wildlife Office, Boise, Idaho. 979 pp. plus appendices.
- USFWS and NMFS. U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1998. Endangered Species Consultation Handbook (Final): Procedures for conducting consultation and conference activities under Section 7 of the Endangered Species Act. U.S. GPO:2004-690-278. March 1998.
- USFS. U.S. Forest Service. 1999. Roads analysis: informing decisions about managing the national forest transportation system. Miscellaneous Report FS-643. Washington, DC. 222p. [http://www.fs.fed.us/eng/road\\_mgt/DOCSroad-analysis.shtml](http://www.fs.fed.us/eng/road_mgt/DOCSroad-analysis.shtml) (Accessed November 2, 2007)
- USFS. U.S. Department of Agriculture, Forest Service. 2014. Biological Assessment and Evaluation for the Crooked River Rehabilitation Project. *Prepared by* Nez Perce Tribe, Department of Fisheries Resource Management Watershed Division, Sweetwater, Idaho and the Nez Perce-Clearwater National Forests, Grangeville, Idaho.
- Watson, G., and T.W. Hillman. 1997. Factors affecting the distribution and abundance of bull trout: an investigation at hierarchical scales. *North American Journal of Fisheries Management* 17:237-252.
- Whitesel, T.A. and 7 coauthors. 2004. Bull trout recovery planning: A review of the science associated with population structure and size. Science Team Report #2004-01, U.S. Fish and Wildlife Service, Region 1, Portland, Oregon.
- Ziller, J.S. 1992. Distribution and relative abundance of bull trout in the Sprague River Subbasin, Oregon. Pages 18-29 in Howell, P.J. and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain Bull Trout Workshop. Oregon Chapter of the American Fisheries Society, Corvallis, Oregon.

### **3.2 *In Litteris* References**

- NPT-DFRMWD. Nez Perce Tribe Department of Fisheries Resource Management Watershed Division. *In litt.* Adult and juvenile data from the Crooked River weir and screw trap gathered by Idaho Fish and Game from 2002-2004.

## NOAA- National Marine Fisheries Service - Concurrence Letter and Biological Opinion

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**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
NATIONAL MARINE FISHERIES SERVICE  
West Coast Region  
7600 Sand Point Way N.E., Bldg. 1  
Seattle, WA 98115

Refer to NMFS No: WCR-2014-1389

June 17, 2015

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Lt. Col. Timothy R. Vail  
U.S. Army Corps of Engineers  
Walla Walla District  
201 North Third Ave.  
Walla Walla, Washington 99362

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Crooked River Valley Rehabilitation Project, Crooked River, HUC 170603050302 (45.806786, -115.529237), Idaho County, Idaho, (One Project)

Dear Ms. Probert, Lt. Col. Vail, and Mr. Rose:

The enclosed document contains a biological opinion (Opinion) prepared by the National Marine Fisheries Service (NMFS) pursuant to section 7(a)(2) of the Endangered Species Act (ESA) on the effects of the Crooked River Valley Rehabilitation Project. This Opinion will also address the U.S. Army Corps of Engineers issuance of a permit under section 404 of the Clean Water Act (CWA) (33 U.S.C. 1251 et seq.) and the Bonneville Power Administration's funding of the project. In this Opinion, NMFS concludes that the action, as proposed, is not likely to jeopardize the continued existence of Snake River Basin (SRB) steelhead, or result in the destruction or adverse modification of designated critical habitat for SRB Basin steelhead.

As required by section 7 of the ESA, NMFS provides an incidental take statement (ITS) with the Opinion. The ITS describes reasonable and prudent measures (RPM) NMFS considers necessary or appropriate to minimize the impact of incidental take associated with this action. The take statement sets forth nondiscretionary terms and conditions, including reporting



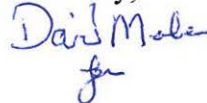
requirements, that the Federal agency and any person who performs the action must comply with to carry out the RPM. Incidental take from actions that meet these terms and conditions will be exempt from the ESA take prohibition.

This document also includes the results of our analysis of the action's likely effects on Essential Fish Habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and includes seven conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. These conservation recommendations are a subset the ESA terms and conditions. Section 305(b)(4)(B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations.

If the response is inconsistent with the EFH conservation recommendations, the Nez Perce Clearwater National Forest must explain why the recommendations will not be followed, including the justification for any disagreements over the effects of the action and the recommendations. In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, in your statutory reply to the EFH portion of this consultation, we ask that you clearly identify the number of conservation recommendations accepted.

If you have questions regarding this consultation, please contact Mr. Aurele LaMontagne, Biologist, (208) 378-5686 at the Northern Snake Basin Office in Boise or Ken Troyer, Branch Chief, in Boise at 208-378-5692.

Sincerely,



William W. Stelle, Jr.  
Regional Administrator

Enclosure

cc: S. Slate – COE  
A. Rogerson – NPT  
J. Harris - NPT  
K. Thompson – NPCNF  
B. Conard – USFWS  
R. Hennekey – IDFG



**Endangered Species Act Section 7(a)(2) Consultation Biological Opinion  
and  
Magnuson-Stevens Fishery Conservation and Management Act  
Essential Fish Habitat Consultation**

Crooked River Valley Rehabilitation Project, Crooked River  
HUC 170603050302  
Idaho County, Idaho, (One Project)

NMFS Consultation Number: WCR-2014-1389

Action Agencies: Nez Perce-Clearwater National Forests, U.S. Army Corps of Engineers

Designated Representative: Nez Perce-Clearwater National Forests

Affected Species and Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species or Critical Habitat?	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Snake River steelhead ( <i>Oncorhynchus mykiss</i> )	Threatened	Yes	No	No

Fishery Management Plan That Describes EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service, Northwest Region

*David Male*  
*Jr*

Issued By:

\_\_\_\_\_  
William W. Stelle, Jr.  
Regional Administrator

Date: June 17, 2015

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## ACRONYMS

A/P	Abundance/Productivity
BA	Biological Assessment
BMP	Best Management Practices
BPA	Bonneville Power Administration
bypass	Bypass Channel
cfs	cubic feet per second
COE	U.S. Army Corps of Engineers
CWA	Clean Water Act
dB	decibels
DPS	Distinct Populations Segment
DQA	Data Quality Act
DQA	Data Quality Act
EAP	Emergency Action Plan
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
ft/s	feet per second
ft <sup>2</sup>	square feet
FWS	U.S Fish and Wildlife Service
HIP III	Habitat Improvement Program
ICBTRT	Interior Columbia Basin Technical Recovery Team
IDEQ	Idaho Department of Environmental Quality
IDFQ	Idaho Department of Fish and Game
ISAB	Independent Scientific Advisory Board
ITS	Incidental Take Statement
LWD	Large Woody Debris
MDAT	Maximum Daily Average Temperature
MDMT	Maximum Daily Maximum Temperature
mg/L	milligrams per liter
mi <sup>2</sup>	square mile
MPG	Major population Group
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NMFS	National Marine Fisheries Service
NPCNF	Nez Perce-Clearwater National Forest
NPDES	National Pollutant Discharge Elimination System
NPT	Nez Perce Tribe
NTU	Nephelometric Turbidity Units
OHWM	Ordinary High Water Mark
Opinion	Biological Opinion

PCE	Primary Constituent Elements
RDG	River Design Group, Inc.
RPM	Reasonable and Prudent Measures
SEV	Severity of Effects
SRB	Snake River Basin
SWPPP	Storm Water Pollution Prevention Plan
TDML	Total Max Daily Load
TSS	Total Suspended Sediment
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VSP	Viable Salmonid Populations
yd <sup>3</sup>	cubic yard

## 1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3 below.

### 1.1 Background

The biological opinion (Opinion) was prepared by the National Marine Fisheries Service (NMFS) in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531, *et seq.*), and implementing regulations at 50 CFR 402.

NMFS also completed an Essential Fish Habitat (EFH) consultation. It was prepared in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801, *et seq.*) and implementing regulations at 50 CFR 600.

The Opinion and EFH conservation recommendations are both in compliance with section 515 of the Treasury and General Government Appropriations Act of 2001 (Public Law 106-5444) (“Data Quality Act”) and underwent pre-dissemination review.

### 1.2 Consultation History

The Crooked River Valley Rehabilitation project was introduced to the Level 1 team on February 4, 2012. A field tour was held at the project site with both the Level 1 and Level 2 teams on May 16, 2012 to discuss the project. That resulted in consensus among agencies to use a phased approach to the project and to use a bypass channel (bypass) to maintain fish passage for the multi-year duration of the project. Following the field trip, the River Design Group, Inc. (RDG) was contracted to design the project and provide a design package. A second field tour was held on June 19, 2013 with NMFS and other agencies in attendance to discuss the 95% drawings and project design criteria delivered by RDG; further agreement was reached on project sequence and timing of watering the bypass. The project was taken to the Level 1 team again November 19, 2013 where it was suggested that the project may qualify for consultation under the Habitat Improvement Program III (HIP III) Programmatic.

The Bonneville Power Administration (BPA) sent an email on January 9, 2014 notifying NMFS that the project may qualify for, and should be considered for consultation under, the HIP III Programmatic Biological Opinion for BPA funded restoration projects. On February 21, 2014, NMFS emailed BPA, Nez Perce Tribe (NPT), Nez Perce Clearwater National Forest (NPCNF), and the U.S. Fish and Wildlife Service (FWS) that NMFS would use formal consultation for the project because use of the HIP III was disqualified. The disqualification was based on NMFS’ estimate that take would occur through pathways, and at numbers, not analyzed in the HIP III Programmatic.

Following the Level 1 meeting on March 17, 2014 and continuing until April 23, 2014, several meetings, phone calls, and email exchanges were used to clarify project and consultation timing

and the procedures and start date (July 15) for dewatering both mainstem channel reaches. On February 13, March 21, and June 24, 2014 NMFS sent comments on iterative draft biological assessments (BAs). On August 5, 2014 NMFS received a letter requesting formal consultation and a final BA. On September 5, 2014 NMFS sent a consultation initiation letter which also confirmed the understanding that the consultation was not being handled under streamlining. On September 30, 2014, the NPT sent an email notice that the project would begin in 2015 with implementation of Option 2.

A complete record of this consultation is on file at Idaho State Habitat Office in Boise, Idaho.

Because this action has the potential to affect tribal trust resources, a copy of the draft proposed action and terms and conditions were sent to the NPT on June 3, 2015 with a request to return comments by June 24, 2015. The NPT responded on June 3, 2015 that they had no comments.

### 1.3 Proposed Action

“Action” means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. For purposes of this consultation, no interrelated or interdependent actions associated with this project were identified.

The action agencies for this consultation are the NPCNF, U.S. Army Corps of Engineers (COE), and BPA with the NPCNF as the lead action agency. The NPT is the project sponsor and administers the BPA funding for the project. The NPT and NPCNF are proposing the Crooked River Valley Rehabilitation Project. The project is funded by BPA, through 2018, to meet commitments contained in the 2010 Supplemental Federal Columbia River Power System Biological Opinion<sup>1</sup>. BPA has committed to funding the project through the 2014 to 2019 Geographic Review process. The proposed action would begin in 2015 and end in 2019.

The purpose of the proposed actions is to restore channel and floodplain functions, fish habitat complexity, and improve water quality for the purpose of increasing anadromous and resident fish densities in Crooked River. The habitat needs to be improved due to degradation from historic dredge mining activities. The goals of the project are to create natural stream sinuosity and morphology, channel structures for spawning and rearing, and restore floodplain and hydrologic process and riparian areas. The project is located on the lower Crooked River, tributary to the South Fork Clearwater River approximately 6.5 miles downstream of Elk City, Idaho. The project area includes the legacy dredge mine channel and floodplain which left man-made angular bends in the river that route the river back and forth across the width of the floodplain perpendicular to the stream gradient (Figure 1).

<sup>1</sup> [http://www.westcoast.fisheries.noaa.gov/fish\\_passage/fcrps\\_opinion/federal\\_columbia\\_river\\_power\\_system.html](http://www.westcoast.fisheries.noaa.gov/fish_passage/fcrps_opinion/federal_columbia_river_power_system.html)



**Figure 1. Aerial plan view of project construction extent (white outline). North is to the right.**

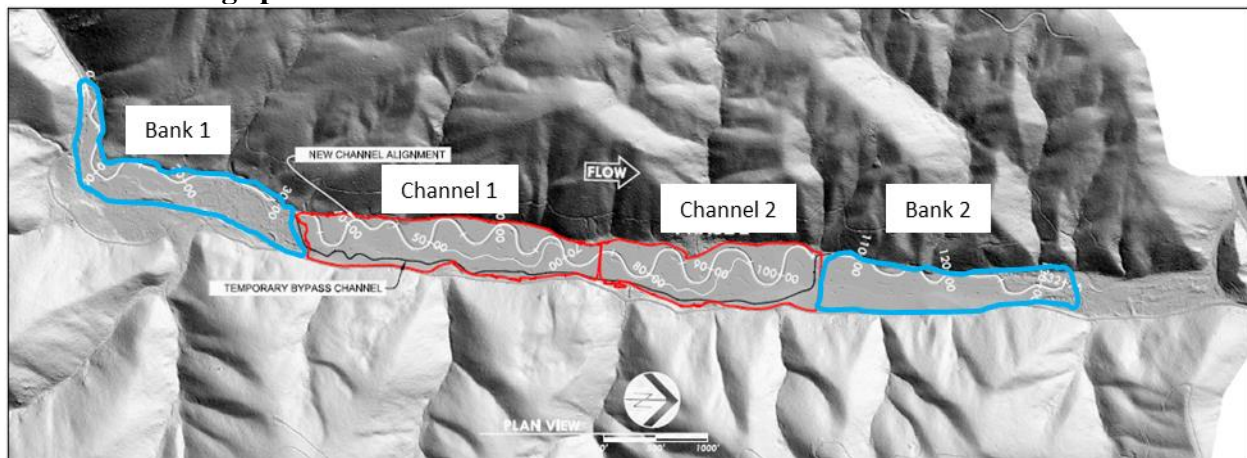


The proposed rehabilitation project consists of restoring and improving 2.0 miles (up to 115 acres) of valley bottom (Crooked River Meanders). The project boundary extends from 0.1 miles upstream from the mouth of Crooked River (at the Idaho Department of Fish and Game [IDFG] intake weir) to approximately 2.1 miles up-valley (approximately 6 river miles). The project would restore the Crooked River Meanders section and its floodplain that have been significantly degraded by past land management activities, most importantly dredge mining. These activities affected instream, riparian, floodplain, and hydrologic functions, and sediment regimes in the mainstem of Crooked River. Fire suppression, mining, road construction, and timber harvest have caused a shift in many of the natural hydrologic and geomorphic processes in the watershed. Over the long term, this shift has led to changes in streamflows and a reduction in the amount of large pieces of wood and rock in the stream. The area surrounding Crooked River was mined for mineral resources from the early 1900s through the 1950s. Mining waste (also referred to as mine tailings) is concentrated in the valley bottom, altering the physical condition of the stream system. The natural channel migration pattern of the stream is restricted, and the recolonization of riparian vegetation and function is impaired. These alterations have resulted in a significant reduction of productive aquatic habitat for listed Snake River Basin (SRB) steelhead in the lower Crooked River.

### 1.3.1 Project Timing and Sequence

The project actions can be grouped into two categories and organized by year of implementation. The bank work involves placement of large woody debris structures into stream banks and partial regrading of the floodplain. The channel sections will have their flow diverted into a bypass to facilitate extensive channel and floodplain reconstruction while isolated from live water (Figure 2). Figure 2 shows the position of the four primary bank and channel areas of construction in the lower Crooked River project construction extent (as depicted in Figure 1).

**Figure 2. Plan view of project. Bank areas of the project (blue) will receive bank stabilization treatments. Channel areas of the project (red) will receive channel reconstruction. The bypass channel is the black line in channel areas 1 and 2 and will provide fish passage while Channels 1 and 2 are isolated and dewatered. Fish will be salvaged from Channel 1 and Channel 2 and from all dredge ponds in all four bank and channel sections.**



The project begins with treatments in the Bank 2 area and fish salvage from isolated dredge ponds. This will occur in the fall (Table 1). In 2016, the bypass will be built and activated while Channel 1 is dewatered and isolated for channel and floodplain reconstruction. At this time, the bypass will provide fish passage around the Channel 1 area. In 2017, the lower section of the bypass will be completed and activated while Channel 2 is dewatered and isolated for channel and floodplain reconstruction. At this time, the bypass will provide fish passage around Channel 1 and Channel 2. Work on the primary floodplains and channels in the Channel 1 and Channel 2 areas will be completed in 2018, and the new channels will be rewatered. In 2019, after salvaging and dewatering, the bypass and haul road/berm will be reclaimed. Work will be completed on the Channel 1 and Channel 2 upland floodplains. Bank 1 activities can occur at any time between 2015 and 2019, and will receive the same large woody debris (LWD) and floodplain treatments as the Bank 2 area.

**Table 1. Project sequence and activities.**

Phase	Year	Scope
Bank 2	2015	LWD structures installed in the streambanks. Plant floodplain and revegetation maintenance.
Channel 1	2016	Bypass channel and temporary haul road/berm construction. Bypass activation and dewatering of Channel 1. New channel construction and grading of primary floodplain and grading of secondary floodplain features (swales, depressions, wetlands and side channels). Material stockpiling, including large woody debris, rock, woodchips and soil. Salvage wood and herbaceous plants and sod.
Channel 2	2017	Bypass channel and temporary haul road/berm construction. Bypass activation and dewatering of Channel 2. Treatments are the same as described for Channel 1.
Channel 1 and 2	2018	Bank treatments and floodplain roughness. Activation of Channel 1 and Channel 2. Revegetation of floodplain. Stockpile LWD material.
Channel 1 and 2	2019	Bypass channel and temporary haul road/berm reclamation. Add floodplain roughness and secondary floodplain features. Grade upland floodplain. Revegetation of floodplain.
Bank 1	Any year	This area will receive the same treatments as Bank 2 but may occur at any time from 2015-2019. Bank 1 will be completed if funds are available.

### 1.3.2 Pre-construction Activities

#### *1.3.2.1 Prepare staging and access areas*

Four staging areas have been identified in the project area: (1) Area A1 is in the designated camping area in the upper end of the project area near station 30+00; (2) A2 is in the middle of the project area at station 87+00; (3) A3 is in the lower end of the project area at station 113+00; and (4) A4 is in a campground on the east side of Crooked River Road. All of the staging areas have existing access roads and all are in designated or non-designated campsites that have existing disturbance. All of the staging areas are above the ordinary high water mark (OHWM). With the exception of A2, all of the staging areas would be greater than 150 feet from live water. Equipment storage and fueling would not occur at A2.

#### *1.3.2.2 Fish Salvage*

The project reach, all or in part, serves as migratory, spawning, and/or rearing habitat for steelhead. In addition to the mainstem Crooked River channel, the valley bottom through the project reach has many channels and ponds that may be connected, seasonally connected, or fully disconnected to the active stream channel. As a measure to reduce the project's impact on the stream ecosystem, fish will be salvaged from all channels and ponds that will receive construction treatments. Salvage will occur in a sequenced approach to avoid reintroducing fish (e.g., through high water event) to salvaged areas between the time of salvage and the time of construction. However, in the case of Channel 1 (2016 to 2018) and Channel 2 (2017 to 2018) the dewatered ponds or channels may be inundated with high water if winter or spring flood

events breach the bypass diversion allowing fish to enter the Channels. If breaching occurs, the inundated channel(s) will need to be salvaged again. Details of circumstances that may cause breaching are discussed below in section 1.3.2.2.4.

Table 2 lists the years and areas in which salvage will occur and incorporates the years for which there is the possibility of repeating salvage for Channels 1 and 2. Dredge ponds will be salvaged in 2015 in preparation for grading in 2016. Channels 1 and 2 will be salvaged prior to dewatering in 2016 and 2017 respectively. In 2018 the bypass will be salvaged before complete dewatering as flow is diverted to the new channel in channel areas 1 and 2.

**Table 2. Potential fish salvage area and work activity for each year. Salvage may need to be repeated if high water inundates a previously salvaged channel.**

Year/Phase	Location of Fish Salvage	Salvage Area (ft <sup>2</sup> )	Repeat Possibility
2015 Autumn	Dredge Ponds	203,147	2016
2016	Channel 1	261,143	2017, 2018
2017	Channel 2 Repeat Channel 1 Total	172,998 <u>261,143</u> 434,141	2018
2018	Bypass Channel Repeat Channels 1 and 2 Total	85,498 <u>434,141</u> 519,639	NA

#### 1.3.2.2.1 Dredge Pond Salvage

Dredge ponds in the flood plain areas will be salvaged in the fall of 2015, prior to the beginning of Phase 1. There are numerous off-channel and open water areas in the project area consisting of small and large ponds as well as a few interconnected channels. The majority of the ponds do not have a surface water connection to Crooked River. Other ponds have a connection during high spring flows and a few are connected perennially. Some of the ponds on the East side of the valley will be used for the bypass. The dredge ponds will be blocked and isolated, seined, and electrofished. Once the ponds are salvaged, fish passage to the ponds will be blocked using native materials to plug inlets and outlets of the ponds.

1.3.2.2.2 Channel Diversion and Dewatering. Channels 1 and 2 and the bypass will be slowly dewatered to approximately 20% of their flow before salvage occurs. Following salvage, the channels will be completely dewatered. The salvage supervisor will adjust the use, order, or duration of the following methods to best clear the areas of fish while minimizing fish handling:

Initial salvage during dewatering process:

- Block nets will be installed at the upstream end of the channel prior to dewatering to prevent adults from entering the salvage channels. (Initially, the downstream end of the

section being dewatered will be left open to allow fish to be herded downstream out of the section.)

- Sandbags will be placed one row at a time to slowly dewater the channel allowing fish to move out of the channel.
- Fish will be herded downstream and out of the channel using for instance (seine or block net) methods.
- The dewatered channel will be closed off.

Salvage remaining fish:

- Isolated deep pools will be pumped as needed to reduce depth. Pumping will follow NMFS pumping and screening criteria (NMFS 2011).
- Fish will be seined or dip-netted from channels and pools.
- Fish will then be dip-netted from shallow areas.
- All areas will be electrofished to remove all remaining fish according to NMFS electrofishing guidelines (NMFS 2000).

The bypass will be constructed in late June and July in 2016 for dewatering Channel 1, and in 2016 for dewatering Channel 2 in 2017. Fish salvage from the channels will begin after July 15 to ensure there are no juvenile steelhead still in redds in the Channel 1 and 2 sections. The bypass will divert water around Channels 1 and 2 in 2017 and 2018. Work area dewatering and fish salvage operations will be supervised by qualified personnel, from the U.S. Forest Service (USFS) and NPT, who are experienced with work area isolation and competent to ensure the safe handling of all fish.

1.3.2.2.3 Rewatering the Mainstem Channel. The rewatering of the mainstem channel and concurrent dewatering of the bypass will need special consideration to avoid fish being stranded in the partially watered or dewatered channels. Upon completion of construction in the dewatered sections of stream, and prior to removing the diversion structure, the construction site will be slowly re-watered to prevent loss of surface flow downstream and to prevent a sudden increase in stream turbidity. The cofferdams will be slowly opened on the mainstem at the upper end of the project area to begin the re-watering. Blocknets will be secured above the cofferdam to prevent fish from entering the new channel until it is fully rewatered. Slowly ramping up the flow over several days, will allow for sediment to settle in the channel, infiltrate into the cobbles, and begin to seal the channel. While ramping, crews will watch for areas where the flow may go subsurface or if downstream turbidity monitoring shows excessive turbidity (turbidity monitoring details are discussed later). If flow loss areas are found, flow would be reduced or turned off by closure of the diversion, and the substrate would be reworked with additional fine sediment to help seal the channel. Crews will watch for any signs of water loss over the several days before fully re-watering the channel. If turbidity monitoring during rewatering shows excessive turbidity, the flow would be ramped down until turbidity levels are reduced. During partial re-watering of the stream channel, the bypass will be monitored and flow adjusted to prevent stranding of fish in the bypass. Once the stream channel is ready to be fully rewatered, the

bypass will be prepared for full dewatering, and fish salvage steps in the bypass will be taken in the same manner described above. The bypass will then be filled and graded with rock and soil to match the newly created floodplain.

1.3.2.2.4 Repeat Salvage. As discussed above, there is a chance of repeat salvage for Channel 1 (2016 to 2018) and Channel 2 (2017 to 2018). Repeat salvage would need to occur if the Crooked River flows exceed the working capacity of the bypass. The bypass is designed to convey a 10-year flood event. The diversion controlling water entering the bypass will have a spillway which activates above the 10-year flow. The mainstem channel will contain the overflow up the equivalent of the 25-year flood flow before water leaves the channel and begins to inundate the floodplain. Breaching the bypass diversion will allow fish to enter the mainstem channel(s) and necessitate repeat salvage of the channel(s). Because the bypass and Channels 1 and 2 can convey the 25-year flood without water spilling onto the floodplain where the dredge ponds exist and the ponds will be closed off to the river channel, it is very unlikely that the dredge ponds will be inundated over the winter between 2015 and 2016. In addition, because the ponds will have been salvaged and connection to the river blocked, work on grading and eliminating the ponds may begin early in the spring before the peak of snowmelt or before a late spring rain-on-snow event.

### 1.3.3 Bank Stabilization Treatments

Streambank structures (sod mats, coir rolls, and fascines) and 60 LWD structures will be incorporated into the streambanks during construction. Both the bank structures and LWD are intended to stabilize the newly constructed streambanks until vegetation is established. The bank treatments were designed to be stable for several years, but allow the river to migrate over time once vegetation has become established. The 400 trees needed for bank treatments will come from onsite stockpiled material or imported from timber projects in the Crooked River watershed.

Ten LWD structures will be installed in the Bank 2 area during the 2015 work window. Nine LWD structures will be installed in the Bank 1 area at some point during the 2015 to 2019 work windows. The LWD structures will be installed by an excavator operating from the banks that will push logs into the bank; no trenches or work in live water will occur during these installations. However, some logs for each structure will extend into the river as their final placement. Turbidity will be monitored during the installation of structures in the Banks 1 and 2 areas to ensure turbidity levels do not exceed 50 nephelometric turbidity units (NTUs). The remainder of the 60 LWD structures will be installed in the isolated channels during 2016 to 2018.

The woody debris structures will be constructed with large enough trees so they will remain in place with higher flows while protruding into or spanning the channel (2 times channel width without rootwad or 1.5 times channel width with rootwad). Fish passage inspections will be conducted during summer low flow conditions. Special large wood structures will be installed in at the lower end of the project area to act as catchments to prevent LWD from interfering with

the IDFG fish weir intake structure. These structures will incorporate vertical log posts pushed into the floodplain, reinforced with boulders, and will be designed to withstand large flows (>Q50).

### 1.3.4 Bypass Channel and Haul Road Construction

#### *1.3.4.1 Construct a 5,700 foot temporary by-pass channel*

Construction of the floodplain and new river channel in 2016 to 2018 will require the Crooked River to be diverted around the construction area through a temporary 5,700-foot bypass. The bypass will be built in two sections over 2 years in preparation for the dewatering of the Channel 1 area in 2016 and the Channel 1 and 2 areas in 2017 and into 2018. The bypass will convey the Crooked River from 2016 to 2018 (3 years) and will be decommissioned and graded to match the surrounding floodplain in 2019. The bypass will be excavated into the east side of the project area and routed through existing floodplain ditches and ponds. The bypass banks will be constructed of on-site boulder and cobble materials (10,500 cubic yards [yd<sup>3</sup>]) capable of remaining stable during the design flows of the 10-year flood with a maximum capacity equivalent to the 25-year flood. The west berm of the channel will act as an access/haul road. Forest Road 233 is parallel and offset from the east bank of the bypass and is 10 to 15 feet above the floodplain and bypass. The procedure for construction of the two sections of the bypass is described below.

To divert water into the bypass from Channel 1 in 2016, a temporary diversion structure will be installed on the mainstem at the upstream end of the Channel 1 section. The structure will be a coffer dam constructed out of local material, substrate filled bags, or a combination of the two. The diversion structure will be designed with a hardened spillway (riprap-like material) that will pass flows into the bypass. The bypass and diversion are designed to convey the 10-year return interval flow (Q10; 1,061 cubic feet per second [cfs]). The bypass is designed to have one-foot of freeboard at Q10 and be able to contain up to a 25-year return interval flow (Q25; 1,316 cfs). However, the diversion is designed to allow flow in excess of the Q10 to spill over the diversion and into the isolated mainstem channel. When initially diverting water into the bypass, turbidity will be monitored. The bypass will be watered slowly, over several days, to reduce turbidity caused by mobilization of sediments disturbed during bypass construction. If turbidity approaches 50 NTUs over background turbidity, sandbags and/or substrate filled bags will be used to reduce flows until turbidity subsides. This incremental placing and removal of bags to increase flow will continue until the entire Crooked River flow is in the bypass. Once the flow is routed into the bypass, cobble material and riprap will be placed on the outside of the bags to protect them during high flows and to provide a hardened spillway.

To keep adult steelhead from entering the mainstem channel during the dewatering process, the lower end of the mainstem channel will be blocked using a type of weir structure, such as a PVC weir, picket weir, cofferdam or combination thereof. The structure will allow small fish to pass through, but adult steelhead will be blocked from going upstream. Crews will remove any debris on the weir daily as needed. The diversion structure and weirs will be evaluated by the contractor at the end of each construction season to ensure they are secure and in good condition

prior to winter. Repairs, if needed, will be completed. The structures will be evaluated again in the spring, prior to high flows, for erosion potential and for large woody debris caught in them. These measures are outlined in the Emergency Action Plan (EAP).

In 2017, the bypass will be extended to enable isolation of Channel 2 for channel and floodplain work. The extension will connect to the upper bypass and will route the flow to below dewatered Channels 1 and 2. Approximately 12,700 yd<sup>3</sup> of material will be excavated to create this lower section of bypass and berm/haul road. On or after July 15, an exclusion structure for adult fish will be installed on the mainstem channel near the downstream end of the bypass to preclude upstream fish passage into Channels 1 and 2 as described above. To begin connecting the two sections of the bypass, the bypass will be connected to the mainstem channel its downstream end. Second, a notch will be excavated in the existing (upper) bypass away from the mainstem to allow water into the new section of bypass until all of the flow is in the bypass. Sandbags will be used to increase or decrease flow into the new bypass section to control turbidity. The same turbidity monitoring protocols will be followed as outlined above. Once Channel 2 of the mainstem is dewatered, the berm will be constructed to separate the mainstem channel from the bypass and the sandbags will be removed.

#### *1.3.4.2 Haul Road Construction*

A haul road will be built on top of the bypass berm for project access and to reduce construction traffic on Road 233. When completed, the berm and haul road will be approximately 6,300 feet long and 16 feet wide. The haul road crosses the bypass in three locations, two on the upper section of the bypass and one on the lower section. The crossings will be installed prior to watering the bypass. The type of stream crossing structure used will be determined by the contractor. The crossings will be sized to pass the 25-year flow event and low flows, and pass fish throughout that range of flows.

#### 1.3.5 Tributary Inflow

There are three tributaries in the project area that will be hydrologically reconnected to the mainstem channel. The tributaries are small (approximately 1 cfs at baseflow), steep, not likely fish bearing, and may not have surface water connection due to the wetland conditions along the hillslopes. Two of the channels are on the east side of the valley and will be connected to the mainstem once the bypass is re-graded. One of the tributaries is on the west side of the valley and is currently routed through dredge ponds. The channel was surveyed in the summer of 2014 and will be surveyed again during fish salvage operations to determine if steelhead are using the stream. Any steelhead found will be documented and reported to NMFS in the annual report. If steelhead are found, the channel will be diverted downstream back to the mainstem channel to provide downstream fish passage. If steelhead are not found, the water from this tributary may need to be pumped from the project site or, if flows are too great to pump, routed around the project site. If pumping is required, water will be pumped into settling ponds.



### 1.3.6 Isolated Work

All of the floodplain reconstruction and channel reconstruction will occur while isolated from live water. While isolated, the river channel will be given a new planform, morphology, and bank structure, and the floodplain will be transformed over the valley width to restore hydrologic processes and riparian areas. Construction will require multiple excavators, loaders, haul trucks, and hand machinery over several years. Additional details of isolated construction activities can be found in the BA and are summarized in the list below:

- Remove and salvage 77 acres of existing shrub, tree, and sod materials and stockpile boulders, cobbles, gravels, sand, and soil to be used in the final project.
- Re-grade up to 115 acres of floodplain (190,000 yd<sup>3</sup>) to create a floodplain (300 feet wide) with a 1.1-year return interval (Q1.1) inundation flow, and the upland floodplain with a 25-year inundation flow.
- Construct secondary floodplain features, including swales, depressions, and wetlands to trap sediment and encourage natural recruitment of vegetation as these areas are depressions with better access to the water table. Acres of wetland will increase from 52 existing to 64 post-project.
- Roughen 49 acres of floodplain which includes adding LWD and creating ridges and furrows to help create stability in the floodplain, provide organic material in the floodplain, and increase water holding capacity.
- Re-plant the stream banks, depressions and swales, and uplands with native salvaged or plants grown in containers known as “container plants” (1- to 8- gallon; 20,000 plants) and treat noxious weeds following protocols in the Biological Opinion for Herbicide Treatment of Invasive and Noxious Weeds on the Nez Perce National Forest (NMFS 2009).
- Construct 7,400 feet of new river channel exhibiting instream habitat complexity. The new channel will exhibit a meandering planform, riffle-pool morphology, and a mobile gravel bed. The channel will be sized to convey the Q1.1 (300 cfs) within the banks before overflowing onto the floodplain.
- Install streambank structures including sod mats, coir rolls, fascines, and approximately 40 LWD structures to stabilize banks for several years until vegetation becomes established to provide bank stabilization.
- Construct 2,725 feet of side channels to provide velocity refuge during high flow events. As designed, fish access to these channels will not be available in summer (to avoid stranding) but in high flows above 50 cfs.

### 1.3.7 Best Management Practices (BMPs)

#### *Erosion and Sediment Control*

- Stormwater prevention techniques will be implemented according to the 404 permit, National Pollutant Discharge Elimination System (NPDES) permit, or Stormwater Pollution Prevention Plan (SWPPP) to minimize site preparation impacts and earth moving related erosion.
- Site clearing areas, staging areas, access routes, stockpile areas, and material handling areas will be identified and confined to the minimum area necessary to minimize ground and riparian vegetation disturbance, and preclude sediment delivery to stream channels.
- Silt fences, straw bales, straw wattles, or other sediment barriers will be placed prior to construction to reduce the potential for sediment to enter a stream directly or indirectly, including from roads and ditches.
- Erosion control materials (e.g., silt fence and wattles) will be kept on site to respond to sediment emergencies.
- Prevention measures will be used to control erosion and intercept and settle runoff of sediment-laden waters during dewatering, excavation, and stockpiling earth and rock materials.
- The construction site will be prepared with sediment control and minimization measures when the threat of storm activity is foreseen.
- Activities will cease when wet conditions exist and erosion may occur.
- Erosion controls will be monitored and inspected, and placed, repaired, or reinstalled as necessary to control erosion.
- Silt fences, wattles, and other erosion control devices will be installed along the slopes of the berm as needed to reduce erosion from the berm. Clays and silts from excavating the bypass will be stockpiled above the OHWM.
- NMFS water drafting guidelines (NMFS 2011) will be followed when drafting water for dust abatement
- Water seeping into the project area will be pumped to settling ponds in the construction area and allowed to percolate through soil or to filter through vegetation prior to reentering the stream channel.
- Settling ponds will be isolated from the bypass to reduce the potential for turbidity entering the bypass (Crooked River). If turbidity is seen in the bypass from seepage through the cobbles, pumping will stop, the pond will be relocated, and turbidity will be monitored to ensure levels do not exceed 50 NTUs instantaneously or 25 NTUs for 10 days. If levels exceed these limits, then settling basin will be moved or lined.

### *Fish Salvage*

- Dewatering will proceed over several days to allow species to naturally migrate out of the work area.
- Work area isolation, fish capture, and electrofishing will be performed during periods of the coolest air and water temperatures possible, normally early in the morning to reduce fish stress and mortality.
- Block nets will be installed at upstream and downstream locations and maintained in a secured position on the stream bottom and banks to exclude fish from entering the project area during isolation, dewatering, fish salvage, and transport.
- Nets will be monitored hourly anytime there is instream disturbance.
- Block nets will be monitored at least daily if nets remain in place more than 1 day to ensure they are secured to the banks, free of organic accumulation, and to minimize fish predation.
- Deep pools will be pumped, using NMFS' pumping and screening criteria (NMFS 2011), to reduce the water volume and increase catch rates before electroshocking.
- Fish will be herded downstream (i.e., using seines or blocknets) as the area is slowly dewatered to allow fish to move out of the project reach without being captured and handled or to be concentrated and seined from pools. Seines will have a mesh size to ensure capture of the ESA-listed fish. Remaining fish will be dip-netted from shallow areas to minimize the number of fish subjected to electroshocking.
- Bucket transport of fish will be done frequently enough from the salvage area to avoid crowding in the bucket, and minimize the time in the bucket.
- Fish will be released from buckets into areas of cold water and velocity refugia such as identified upwelling areas, tributary mouths, or below the project area if possible.
- Buckets will be held in shaded areas.
- Aerators and cold water changes will be used in buckets that must hold fish for greater than 15 minutes.
- Dead fish will not be stored in transport buckets, but will be left on the stream bank for counting and to avoid mortality counting errors.
- Electrofishing will be used only after other salvage methods have been employed.
- Electrofishing will proceed following NMFS' electrofishing guidelines (NMFS 2000).

### *Hazardous Material Control*

- The project will follow all provisions of the Clean Water Act (CWA), water quality standards as described the Idaho Department of Environmental Quality, permits (section 404 and NPDES), and SWPPP.
- Federal and Idaho state regulations regarding spills will be followed (see [http://www.deq.state.id.us/water/data\\_reports/storm\\_water/catalog/index.cfm](http://www.deq.state.id.us/water/data_reports/storm_water/catalog/index.cfm)). Any spills resulting in a detectable sheen on water shall be reported to the Environmental

Protection Agency (EPA) National Response Center (1-800-424-8802). Any spills over 25 gallons will be reported to the Idaho Department of Environmental Quality (IDEQ) (1-800-632-800), and clean-up will be initiated within 24 hours of the spill.

- A description of hazardous materials that will be used, including inventory, storage, and handling procedures will be available on-site. Written procedures for notifying environmental response agencies will be posted at the work site.
- Oil-absorbing floating booms and other equipment, such as absorbent pads appropriate for the stream size, will be available onsite during all construction phases. Booms will be placed in a location that facilitates an immediate response to potential petroleum leakage.
- Spill containment kits (including instructions for cleanup and disposal) adequate for the types and quantity of hazardous materials used at the site will be available at the work site. Workers will be trained in spill containment procedures and will be informed of the location of spill containment kits.
- Gas-powered equipment with tanks larger than 5 gallons will be refueled in a vehicle staging area placed 150-feet or more from a natural waterbody or wetland, or in an isolated hard reach, such as an established road. Equipment used for in-stream or riparian work will be fueled and serviced in an established staging area. When not in use, vehicles will be parked in the designated staging area.
- All equipment used for in-stream work will be cleaned of external oil, grease, dirt, and mud and leaks will be repaired prior to arriving at the project site. All equipment will be inspected before unloading at site. Any leaks or accumulations of grease will be corrected before entering streams or areas that drain directly to streams or wetlands. Equipment shall not have damaged hoses, fittings, lines, or tanks with the potential to release pollutants into any waterway.
- All vehicles and other mechanized equipment will be inspected daily for fluid leaks before leaving the vehicle staging and thoroughly cleaned before operation below ordinary high water, and as often as necessary during operation, to remain grease free.
- Any waste liquids generated at the staging areas will be temporarily stored under an impervious cover, such as a tarpaulin, greater than 150 feet from water until they can be properly transported to and disposed of at a facility that is approved for receipt of hazardous materials.
- Measures outlined in the EAP will be followed if mercury is found in the project area. Measures include containing, storing, and transporting mercury in a vaporproof, sturdy, unbreakable container by the Fish Biologist or qualified personnel to a safe disposal or recycle facility.
- Weed treatments in the project area will follow the Nez Perce National Forest Noxious Weed Opinions for Herbicide Treatment of Invasive and Noxious Weeds on the Nez Perce National Forest (NMFS 2009). The methods and effects of treatment are

incorporated by reference. If new BAs and Opinions are developed before the project is complete, weed treatment procedures will follow those specified in the most recent BAs/Opinions.

- The use of herbicides will be minimized by planting large trees and shrubs upon project completion.

### *Staging*

- Staging areas (used for construction equipment storage, vehicle storage, fueling, servicing, and hazardous material storage) will be 150 feet or more from any natural water body or wetland, or on an adjacent, established road area in a location and manner that will preclude erosion into or contamination of the stream or floodplain.
- Native materials to be used for aquatic restoration, such as large wood and channel substrate material, will be staged within the 100-year floodplain at a specifically identified and flagged area.
- Any material not used in restoration, and nonnative to the floodplain, will be removed to a location outside of the 100-year floodplain for disposal.

### *Invasive Species Control*

- Water will not be dumped from water tenders from one stream or lake into another stream or lake.
- Driving equipment through, or wading across, water bodies will be minimized whenever possible.
- Equipment will be disinfected prior to bringing equipment to the forest.
- Equipment and supplies will be kept as clean as possible to reduce the spread of undesirable aquatic organisms and thoroughly clean equipment if it is used in another area.
- All plant parts, soil, and other materials that may carry noxious weed seeds from all equipment and vehicles will be removed before entering the forest or moving from one forest to another.
- Cleaning and sanitation will be conducted in areas where there is no potential to deliver effluent to waterways.
- All erosion control materials will be certified weed free, including straw bales, wattles, straw, and seed mixes.

### *Herbicides*

- Weed treatments in the project area will follow the Opinion for Herbicide Treatment of Invasive and Noxious Weeds on the Nez Perce National Forest (Herbicide Opinion; NMFS 2009). The BMPs for treatment are incorporated by reference and include:
  - Herbicides will be applied using only a ground-based single nozzle device.
  - Only the minimum area necessary will be treated.

- Application will be limited to when conditions are, and when dry conditions are forecast.
- Herbicide use will be limited to the list of herbicides, and associated specified no-spray buffer distances from water, found in the Herbicide Opinion.
- Herbicide mixing will be at least 100 feet from water and in an area with no connection to water unless there is a special local condition (Note the previous BMP in the Crooked River action specifying fuel or chemical storage be a minimum of 150 feet from water or riparian areas).
- A spill cleanup kit will be available at the temporary storage sites and in all vehicles carrying herbicides. All handlers will be instructed on the mandatory spill contingency plan.
- Reporting requirements to NMFS on all applications of herbicide.

### 1.3.8 Monitoring and Reporting

- Turbidity monitoring will be used anytime a visible turbidity plume is observed or when channels are initially watered.
- Turbidity will be monitored according to the following methods:
  - Turbidity samples will be taken above the work site to determine the background level using a DH48 depth integrated sampler. The samples are taken across the width of the channel and samples will be analyzed using a field turbidimeter.
  - During watering of the bypass and rewatering of the isolated mainstem channel, if there is a visible turbidity plume, turbidity will be taken 300 feet below the point where the rewatered channel meets the existing channel. Turbidity readings will be checked every 30 minutes.
  - If turbidity levels approach 50 NTUs above background, water levels or activity will be reduced until turbidity levels return to background levels or 10 NTUs before activity is resumed. Turbidity will be monitored regularly every 15 minutes if there is a visible turbidity plume.
- An annual monitoring report that includes turbidity results, fish salvage, vegetation data, and BMP effectiveness will be provided to the Services in January each year.

### 1.3.9 Interrelated and Interdependent Activities

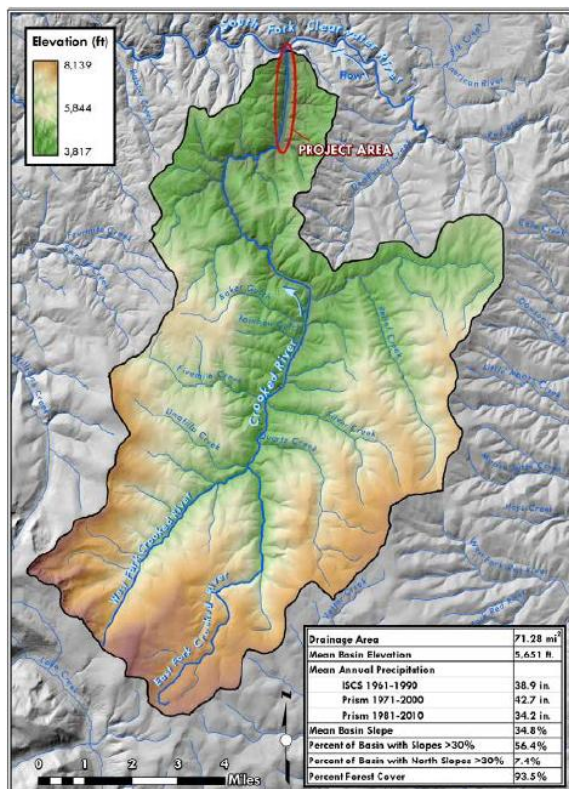
Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR 402.02). There are no interrelated or interdependent actions associated with this project.

### 1.4 Action Area

“Action area” means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

The project area is the lower 2 miles of the Crooked River before the confluence with the South Fork Clearwater River. The upstream extent of work is above Campground 4 (Figure 1) but background turbidity levels will be taken 100 feet above the upper extent of work near the lower end of the Narrows section of the Crooked River (Figure 1). In addition, the downstream extent of Bank 2 work (potential turbidity causing activities) is approximately one-half mile upstream of the confluence with the South Fork Clearwater (Figure 1) and may cause visible turbidity to the confluence. Therefore, the action area is the Crooked River valley (including lateral riparian areas and extending to Forest Road 233), river, and floodplain from the downstream extent of the Narrows to the confluence with the South Fork Clearwater River (Figures 1 and 4).

**Figure 4. Project location on lower Crooked River near the confluence with the South Fork Clearwater River.**



## 2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, Federal agencies must ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provides an opinion stating how the agency's actions will affect listed species and their critical habitat. If incidental take is expected, section 7(b)(4) requires NMFS to provide an incidental take statement (ITS) that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures (RPM) and terms and conditions to minimize such impacts.

### 2.1 Analytical Approach

This Opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of a listed species," which is "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

The adverse modification analysis considers the impacts of the Federal action on the conservation value of designated critical habitat. This Opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.<sup>2</sup>

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Identify the rangewide status of the species and critical habitat likely to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.

<sup>2</sup> Memorandum from William T. Hogarth to Regional Administrators, Office of Protected Resources, NMFS (Application of the "Destruction or Adverse Modification" Standard Under Section 7(a)(2) of the Endangered Species Act) (November 7, 2005).



- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat.
- Reach jeopardy and adverse modification conclusions.
- If necessary, define a reasonable and prudent alternative to the proposed action.

## 2.2 Rangewide Status of the Species and Critical Habitat

This Opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The Opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential physical and biological features that help to form that conservation value.

Snake River fall-run Chinook salmon have spawned in the lower South Fork Clearwater River since 1996, with their upstream extent 6 to 10 miles downstream of the mouth of the Crooked River (B. Arnsburg, Nez Perce Tribe, letter to NMFS, April, 2015). Because fall-run Chinook salmon are well downstream of the project, NPCNF determined that the action would not affect Snake River fall-run Chinook salmon; therefore, that species is not considered further in this analysis. Although the action area contains Snake River spring/summer Chinook salmon and coho salmon, they are not listed under the ESA in the Clearwater River basin. Chinook salmon and coho salmon, however, are addressed below in Section 3 (MSA EFH Consultation).

### 2.2.1 Status of the species

NMFS reviews the condition of the listed species affected by the proposed action using criteria that describe a viable salmonid population (VSP) (McElhany *et al.* 2000). Attributes associated with a VSP include abundance, productivity, spatial structure, and genetic diversity that allow the population to adapt to various environmental conditions and allow it to sustain itself in the natural environment. These attributes are influenced by survival, behavior, and experiences throughout the entire life cycle, characteristics that are influenced, in turn, by habitat and other environmental conditions.

The Snake River steelhead was listed as a threatened evolutionary significant unit (ESU) on August 18, 1997 (62 FR 43937), with a revised listing as a distinct population segment (DPS) on

January 5, 2006 (71 FR 834). This DPS occupies the SRB, which drains portions of southeastern Washington, northeastern Oregon, and north/central Idaho. Reasons for the decline of this species include substantial modification of the seaward migration corridor by hydroelectric power development on the Snake and mainstem Columbia Rivers, and widespread habitat degradation and reduced streamflows throughout the SRB (Good *et al.* 2005). Another major concern for the species is the threat to genetic integrity from past and present hatchery practices, and the high proportion of hatchery fish in aggregate run of SRB steelhead over Lower Granite Dam (Good *et al.* 2005, Ford *et al.* 2011). On August 15, 2011, in the agency's most recent five-year review for the Snake River ESU, NMFS concluded that the species should remain listed as threatened (76 FR 50448).

Adult SRB steelhead enter the Columbia River from late June to October to begin their migration inland. After holding over the winter in larger rivers in the SRB, steelhead disperse into smaller tributaries to spawn from March through May. Earlier dispersal occurs at lower elevations and later dispersal occurs at higher elevations. Juveniles emerge from the gravels in 4 to 8 weeks, and move into shallow, low-velocity areas in side channels and along channel margins to escape high velocities and predators (Everest and Chapman 1972). Juvenile steelhead then progressively move toward deeper water as they grow in size (Bjornn and Rieser 1991). Juveniles typically reside in fresh water for 1 to 3 years, although this species displays a wide diversity of life histories. Smolts migrate downstream during spring runoff, which occurs from March to mid-June depending on elevation, and typically spend 1 to 2 years in the ocean.

### *Spatial Structure and Diversity*

This species includes all naturally-spawning steelhead populations below natural and manmade impassable barriers in streams in the SRB of southeast Washington, northeast Oregon, and Idaho, as well as the progeny of six artificial propagation programs (71FR834). The hatchery programs include Dworshak National Fish Hatchery, Lolo Creek, North Fork Clearwater River, East Fork Salmon River, Tucannon River, and the Little Sheep Creek/Imnaha River steelhead hatchery programs. The SRB steelhead listing does not include resident forms of *O. mykiss* (rainbow trout) co-occurring with steelhead.

The Interior Columbia Basin Technical Recovery Team (ICBTRT) identified 24 extant populations within this DPS, organized into five major population groups (MPGs) (ICBTRT 2003). The ICBTRT also identified a number of potential historical populations associated with watersheds above the Hells Canyon Dam complex on the mainstem Snake River, a barrier to anadromous migration. Two of the five MPGs with extant populations are in Idaho: the Clearwater River MPG (five extant populations, one extirpated); and the Salmon River MPG (12 populations). In the Clearwater River, the historic North Fork population was blocked from accessing spawning and rearing habitat by Dworshak Dam. Current steelhead distribution extends throughout the DPS, such that spatial structure risk is generally low. For each population in the DPS, Table 3 shows the current risk ratings that the ICBTRT assigned to the four parameters of a viable salmonid population (spatial structure, diversity, abundance, and productivity).

**Table 3. Summary of viable salmonid population (VSP) parameter risks and overall current status for each population in the Snake River Basin steelhead DPS (Ford *et al.* 2011, ICBTRT 2010).**

MPG	Population	VSP Parameter Risk		Overall Viability Rating
		Abundance/Productivity	Spatial Structure/Diversity	
Lower Snake River	Tucannon River	High	Moderate	High Risk?
	Asotin Creek	Moderate	Moderate	High/Moderate Risk?
Grande Ronde River	Lower Grande Ronde		Moderate	Moderate Risk?
	Joseph Creek	Very Low	Low	Highly Viable
	Wallowa River	High	Low	High Risk?
	Upper Grande Ronde	Moderate	Moderate	Moderate Risk
Imnaha River	Imnaha River	Moderate	Moderate	Moderate Risk
Clearwater River (Idaho)	Lower Mainstem Clearwater River	Moderate	Low	Moderate Risk?
	South Fork Clearwater River	High	Moderate	High Risk?
	Lolo Creek	High	Moderate	High Risk?
	Selway River	High	Low	High Risk?
	Lochsa River	High	Low	High Risk?
	North Fork Clearwater River			Extirpated
Salmon River (Idaho)	Little Salmon River	Moderate	Moderate	Moderate Risk?
	South Fork Salmon River	High	Low	High Risk?
	Secesh River	High	Low	High Risk?
	Chamberlain Creek	Moderate	Low	Moderate Risk?
	Lower Middle Fork Salmon River	High	Low	High Risk?
	Upper Middle Fork Salmon River	High	Low	High Risk?
	Panther Creek	Moderate	High	Moderate Risk?
	North Fork Salmon River	Moderate	Moderate	Moderate Risk?
	Lemhi River	Moderate	Moderate	Moderate Risk?
	Pahsimeroi River	Moderate	Moderate	Moderate Risk?
	East Fork Salmon River	Moderate	Moderate	Moderate Risk?
Upper Mainstem Salmon River	Moderate	Moderate	Moderate Risk?	
Hells Canyon	Hells Canyon Tributaries			Extirpated

The SRB steelhead DPS exhibit a diversity of life-history strategies, including variations in fresh-water and ocean residence times. Traditionally, fisheries managers have classified SRB steelhead into two groups, A-run and B-run, based on ocean age at return, adult size at return, and migration timing. A-run steelhead predominately spend one year at sea and are assumed to be associated with low to mid-elevation streams in the SRB. B-run steelhead are larger with most individuals returning after 2 years in the ocean. The ICBTRT has identified each population in the DPS as either A-run or B-run. Recent research, however, suggests that some populations may support multiple life history strategies. Within one population in the Clearwater

River, IDFG reports at least nine different phenotypes, with steelhead spending 1, 2, or 3 years in the ocean (Bowersox 2011). Maintaining life history diversity is important for the recovery of the species.

Diversity risk for the DPS is low to moderate, and drives the moderate combined spatial structure/diversity risks shown in Table 3 for some populations. Moderate diversity risks for some populations are caused by the high proportion of hatchery fish on natural spawning grounds. The current moderate diversity risks for populations in Idaho do not preclude most populations from achieving viability goals under the draft recovery plan for Idaho's steelhead (2011b).

### *Abundance and Productivity*

Historical estimates of steelhead production for the entire SRB are not available, but the basin is believed to have supported more than half the total steelhead production from the Columbia River basin (Mallet 1974, as cited in Good *et al.* 2005). Historical estimates do exist for portions of the basin. Estimates of steelhead passing Lewiston Dam (removed in 1973) on the lower Clearwater River are 40,000 to 60,000 adults (Ecovista *et al.* 2003). Based on relative drainage areas, the Salmon River basin likely supported substantial production as well (Good *et al.* 2005). In contrast, at the time of listing the 5-year (1991 to 1996) mean abundance for natural-origin steelhead passing Lower Granite Dam was 11,462 adults (Ford *et al.* 2011). Steelhead passing Lower Granite Dam include those returning to the Grande Ronde and Imnaha Rivers in Oregon and Asotin Creek in Washington as well as the Clearwater and Salmon Rivers in Idaho. The most recent 5-year (2003 to 2008) mean abundance passing Lower Granite Dam was 18,847 natural-origin fish (Ford *et al.* 2011), showing an increase since the time of listing. These natural-origin fish represent just 10% of the total steelhead run over Lower Granite Dam of 162,323 adults for the same time period. However, a large proportion of the hatchery fish return to hatchery racks or are removed by hatchery selective harvest and therefore do not contribute to natural production in most Snake River tributaries (Ford *et al.* 2011).

Despite recent increases in steelhead abundance, population-level natural origin abundance and productivity (A/P) inferred from aggregate data indicate that many populations in the DPS are likely below the viability targets necessary for species recovery (ICBTRT 2010). Population-specific abundance estimates are not available for most Snake River steelhead populations, including all populations in Idaho. Instead, the ICBTRT estimated average population A/P using annual counts of wild steelhead passing Lower Granite Dam, generating separate estimates for a surrogate A-run and B-run population. Most population A/P risks shown in Table 3 are based on a comparison of the surrogate population current A/P estimates to a population viability threshold of 1,000 natural-origin spawners and a productivity of 1.14 recruits per spawner. The surrogate A-run population has a mean abundance of 556 spawners and productivity of 1.86, indicating a moderate A/P risk. The surrogate B-run population has a mean abundance of 345 spawners and productivity of 1.09, indicating a high A/P risk (NMFS 2011a). Based on these tentative risk ratings, all populations in Idaho are currently at either high

or moderate risk of extinction over the next 100 years. Joseph Creek in Oregon, for which population-specific abundance information is available, is the only population in the DPS currently rated as viable (Ford *et al.* 2011).

### *Limiting Factors for DPS*

Limiting factors and threats to the SRB steelhead DPS include the following (NOAA Fisheries 2011, NMFS 2011c):

- Mainstem Columbia River and Snake River hydropower impacts
- Degraded freshwater habitat: Floodplain connectivity and function, channel structure and complexity, riparian areas and large wood supply, stream substrate, elevated water temperature, stream flow, and water quality have been degraded as a result of cumulative impacts of agriculture, mining, forestry, road-building, and development
- Impaired tributary fish passage
- Harvest impacts, particularly for B-run steelhead
- Predation by pinnipeds, birds, and piscivorous fish in the mainstem river and estuary migration corridor
- Genetic diversity effects from out-of-population hatchery releases

The South Fork Clearwater steelhead population is one of five extant, and one extirpated, populations in the Clearwater River MPG. The ICBTRT example recovery scenario for this MPG includes achieving viable status in the Lower Clearwater River (large size) and two out of the following three populations: Lochsa, Selway, and South Fork Clearwater rivers; achieving at least maintained/moderate risk status in the populations that do not achieve viable status. The South Fork Clearwater population is one of three intermediate-sized populations, two of which must achieve viable status. The South Fork Clearwater population's habitat has been more impacted by land uses than the other intermediate populations and a state highway runs along much of the mainstem river. The South Fork Clearwater also has a higher degree of hatchery fish influence than the other intermediate-sized populations. In the draft Snake River Recovery Plan (NMFS 2011a), the initial objective status for the South Fork Clearwater population is Maintained, with only a moderate risk of extinction over a 100-year period.

### *Abundance and Productivity*

The ICBTRT classified the South Fork Clearwater population as intermediate in size and complexity based on historical habitat potential (ICBTRT 2007). A steelhead population classified as intermediate must have a mean minimum abundance threshold of 1,000 natural-origin spawners to achieve five percent or less risk of extinction over a 100-year timeframe to be

considered “viable”. The Idaho populations of Snake River steelhead do not have direct estimates of annual spawning escapements. The surrogate population for B-run steelhead above Lower Granite Dam has an estimated recent abundance of 345 and productivity of 1.09. Currently, the South Fork Clearwater population is at high risk due to a great uncertainty in A/P due to insufficient data (Ford *et al.* 2011).

### *Spatial Structure*

The South Fork Clearwater population has four major spawning areas and three minor spawning areas, and this extensive spawning structure provides inherent protection against extinction. Current spawning is widely distributed throughout the population and has been documented in all of the larger tributaries to the South Fork Clearwater River, including all major spawning areas, one of which includes the Crooked River. The population’s spatial structure score is therefore low risk. A low spatial structure risk is adequate for the population to have the potential to attain its overall desired status.

### *Diversity*

For the South Fork Clearwater, diversity risk is primarily driven by the long history of outplanting hatchery steelhead into this population. Steelhead fry, fingerlings, smolts and adults have been released into the population since at least 1969. In recent years, unclipped hatchery steelhead smolts were released for supplementation purposes, and these releases are expected to continue into the near-term. The contribution of supplementation releases and unharvested marked hatchery fish to natural production is unknown, but the duration of supplementation releases and the potential for the naturally spawning population to consist of a high proportion of hatchery-origin fish creates diversity risk, leading to a cumulative diversity risk of Moderate. Although the South Fork Clearwater population is currently at high risk due to other VSP parameter risk ratings, the population can reach its desired status with a diversity risk of moderate.

The South Fork Clearwater steelhead population is currently at high risk overall due to a tentative high risk rating for A/P, based on the ICBTRT’s average surrogate B-run population passing Lower Granite Dam. In the absence of population-specific data, we assume that improvements in A/P will need to occur for this population to reach its minimum necessary status of maintained, with moderate risk of extinction. Of particular concern is an overall high risk rating for the remaining Clearwater River MPG populations, none of which are currently viable.

Limiting factors for the South Fork Clearwater population are habitat related and are described below in section 2.2.2, Status of Critical Habitat.

### 2.2.2 Status of Critical Habitat

NMFS reviews the status of designated critical habitat affected by the proposed action by examining the condition and trends of essential physical and biological features throughout the designated area. These features are essential to the conservation of the listed species because they support one or more life stages of the species. NMFS refers to these features as the primary constituent elements (PCEs) of critical habitat. The PCEs are also similar (Table 4). In general, these PCEs include sites essential to support one or more life stages of the ESA-listed species (e.g., spawning, rearing, or migration), and contain physical or biological features essential to the conservation of the listed species (e.g., spawning gravels, water quality and quantity, side channels, or food).

**Table 4. Types of freshwater sites and essential physical and biological features designated as PCEs, and the species life stage each PCE supports (70 FR 52630).**

Site Type	Essential Physical and Biological Features	Species Life Stage
<b>Snake River Steelhead</b>		
Freshwater spawning	Water quality, water quantity, and substrate	Adult spawning, embryo incubation, and larval development
Freshwater rearing	Floodplain connectivity, forage <sup>a</sup> , natural cover <sup>b</sup> , water quality, and water quantity	Fry emergence from gravel, juvenile growth and development
Freshwater migration	Free of artificial obstructions, water quality and quantity, and natural cover <sup>b</sup>	Juvenile migration, adult migration and holding

<sup>a</sup> Forage includes aquatic invertebrate and fish species that support growth and maturation.;

<sup>b</sup> Natural cover includes shade, large wood, log jams, beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

Critical habitats were designated for SRB steelhead on September 2, 2005 (70 FR 52630). Critical habitat includes the stream channel and water column with the lateral extent defined by the ordinary high-water line, or the bankfull elevation where the ordinary high-water line is not defined. The riparian zone is critical because it provides shade, streambank stability, organic matter input, and sediment/nutrient/chemical regulation. Designated critical habitat for listed SRB steelhead includes most accessible streams in the mainstem Lower Snake River, and the Salmon, Clearwater, Imnaha, Tucannon, and Grande Ronde River basins. The proposed action discussed in this Opinion will be constructed within designated critical habitat for SRB steelhead.

Roughly one-third of the designated critical habitat for SRB steelhead is in undeveloped roadless or designated wilderness areas. Outside the roadless and wilderness areas, land management and development activities have: (1) Reduced connectivity (i.e., the flow of energy, organisms, and materials) between streams, riparian areas, floodplains, and uplands; (2) elevated fine sediment yields, degrading spawning and rearing habitat; (3) reduced large woody material that traps sediment, stabilizes streambanks, and helps form pools; (4) reduced vegetative canopy that minimizes solar heating of streams; (5) caused streams to become straighter, wider, and shallower, thereby reducing rearing habitat and increasing water temperature fluctuations;

(6) altered peak flow volume and timing, leading to channel changes and potentially altering fish migration behavior; and (7) altered floodplain function, water tables and base flows (Henjum *et al.* 1994; McIntosh *et al.* 1994; Rhodes *et al.* 1994; Wissmar *et al.* 1994; NRC 1996; Spence *et al.* 1996; Lee *et al.* 1997; Ecovista *et al.* 2003). These alterations to critical habitat impair PCEs related to spawning, rearing and migration to various degrees, but with the exception of several streams that are sometimes dewatered by water withdrawals or where passage is blocked by an artificial structure, there are few circumstances where PCEs are degraded to the point where one or more of these functions have been lost completely. Since steelhead have been listed, efforts have been made to identify and fix the majority of situations where PCEs have been lost to impassable culverts or other artificial structures that block fish passage. Most fixable barriers that remain are located in smaller streams near the top of the watersheds.

Land use in the South Fork Clearwater has included mining, logging, livestock grazing, recreation, development, and road construction. Mining was historically a major land use, and the South Fork has the most extensive history of placer mining of any area in the Clearwater River basin. Major tributary systems were dredged, and hydraulic mining was common throughout the South Fork Clearwater. Increased sedimentation, stream channelization, and riparian degradation have occurred in areas where mining, logging, and road building has occurred.

To determine the habitat limiting factors for the South Fork Clearwater River steelhead population, NMFS reviewed multiple data sources and reports on stream conditions when formulating the SRB steelhead Recovery Plan (NMFS 2014). Based on reports and discussions with local fisheries experts and watershed groups, it was concluded that the habitat limiting factors for the South Fork Clearwater steelhead population are riparian conditions, elevated stream temperatures, migration barriers, sediment, and habitat complexity. Table 5 summarizes the mechanisms by which each limiting factor affects steelhead, and management objectives for addressing each limiting factor.

**Table 5. Primary limiting factors identified for the South Fork Clearwater River steelhead population, mechanisms by which each limiting factor affects salmonids, and management objectives for addressing each limiting factor.**

Limiting Factors	Effects on Salmonids	Management Objectives to Address Limiting Factors
Riparian and Floodplain Conditions	Poor riparian conditions reduce habitat quality, streambank stability (sediment and channel condition), shade (stream temperature), and large woody debris recruitment (habitat complexity and pool formation). Disconnection of main channels from the floodplain and side channel leads to less available habitat.	Revegetation of riparian areas. Reconnection of floodplains and side channels.
Temperature	High stream temperatures affect salmonid growth and development, alter life history patterns, induce disease, or exacerbate competitive predator-prey interactions. High stream temperature can also be lethal to both adult and juvenile salmon.	Riparian restoration actions to improve shade and stream cover to reduce stream temperature. Restoration of hyporheic flow.



<b>Limiting Factors</b>	<b>Effects on Salmonids</b>	<b>Management Objectives to Address Limiting Factors</b>
Migration Barriers	Migration barriers such as dams, culverts, and dewatered stream sections can create fish passage barriers. These barriers reduce or eliminate movement of adult and juvenile salmon within a watershed ultimately reducing potential spawning and rearing habitat.	Correction or removal of fish passage barriers
Sediment	Excess sediments can reduce juvenile habitat (rearing), aquatic insect availability (food), and spawning and incubation success (reproduction).	Riparian restoration actions to stabilize streambanks and reduce sedimentation to the stream. Reduction of sediment delivery to streams from roads.
Habitat Complexity	Reduced habitat quality as measured by pools frequency, pool quality, and sufficient LWD reduces juvenile rearing and adult holding and spawning.	Restoration of riparian vegetation to increase LWD recruitment to streams over time. Reconnection of floodplains.

The Crooked River through the action area is steelhead critical habitat. Dredge mining has reduced the conservation value of critical habitat PCEs through the action area. The channel is incised and disconnected from its floodplain. Surface flow is reduced as a portion of surface flow moves down-valley as subsurface flow through the coarse valley substrate. Stream banks are armored reducing undercut banks and cover. The artificially lengthened channel has slow moving pools and floodplain has many shallow pools, both of which contribute to elevated water temperatures and capture spawning gravels. These reductions in the utility of critical habitat through the action area have resulted in reduced steelhead spawning area, low quality juvenile rearing habitat, and a thermal barrier for out-migrating juvenile steelhead.

### 2.2.3 Climate Change

Climate change is likely to have negative implications for the conservation value of designated critical habitats in the Pacific Northwest (Climate Impacts Group 2004; Scheuerell and Williams 2005; Zabel *et al.* 2006; ISAB 2007). Average annual Northwest air temperatures have increased by approximately 1°C (33.8°F) since 1900, or about 50% more than the global average warming over the same period (ISAB 2007). The latest climate models project a warming of 0.1°C (32.18°F) to 0.6°C (33.8°F) per decade over the next century. According to the Independent Scientific Advisory Board (ISAB), these effects may have the following physical impacts within the next 40 or so years:

- Warmer air temperatures will result in a shift to more winter/spring rain and runoff, rather than snow that is stored until the spring/summer melt season.
- With a shift to more rain and less snow, the snowpacks will diminish in those areas that typically accumulate and store water until the spring freshet.

- With a smaller snowpack, these watersheds will see their runoff diminished and exhausted earlier in the season, resulting in lower streamflows in the June through September period.
- River flows in general and peak river flows are likely to increase during the winter due to more precipitation falling as rain rather than snow.
- Water temperatures will continue to rise, especially during the summer months when lower streamflow and warmer air temperatures will contribute to the warming of regional waters.

These changes will not be spatially homogenous. Areas with elevations high enough to maintain temperatures well below freezing for most of the winter and early spring would be less affected. Low-lying areas that historically have received scant precipitation contribute little to total streamflow and are likely to be more affected. These long-term effects may include, but are not limited to, depletion of cold water habitat, variation in quality and quantity of tributary rearing habitat, alterations to migration patterns, accelerated embryo development, premature emergence of fry, and increased competition among species.

## **2.3 Environmental Baseline**

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).

NMFS describes the environmental baseline in terms of the biological requirements for habitat features and processes necessary to support all life stages of each listed species within the action area. The SRB steelhead considered in this Opinion reside in or migrate through the action area. Thus, for this action area, the biological requirements for SRB steelhead are the habitat characteristics that support successful completion of spawning, rearing, and freshwater migration.

### **2.3.1 Steelhead Presence**

Steelhead runs were eliminated in the South Fork Clearwater River in 1927 by the construction of the Harpster Dam. The dam was removed in 1962 and B-run steelhead were reestablished in the watershed. Steelhead populations were studied in Crooked River by the IDFG beginning in the early 1980s and continuing into the 1990s (Kiefer and Lockhart 1992). Salmonid populations in the lower Crooked River were much lower than what is typical for Idaho streams. In the mid-1980s stream restoration work, including installation of log and rock structures, streambank stabilization, and side channel and pond reconnection, occurred to improve habitat

for salmonids. The purpose of connecting the ponds and side channels in the project area was to provide continuous water supply during low flows.

During these periods, the IDFG stocked steelhead juveniles and adults in Crooked River with up to 200,000 smolts each year between 1986 and 1989 (Keifer and Lockhart 1992). In 1991, 776 adults of which 516 were female, were stocked in Relief Creek and the mainstem Crooked River and there were 49 (22 female) naturally returning steelhead. These stockings and returns had a very high prespawning mortality. A total of 50 redds were counted in May of 1991 from the mouth of Crooked River to the Orogrande Town site (12 miles). The study did note that most of the outplanted steelhead that did not spawn were planted in the lower Crooked River.

In 1992, 23 female steelhead returned to Crooked River during the end of March through the first of May (Kiefer and Lockhart 1994). Of these, six were left in the mainstem of Crooked River above the weir, while the remaining 17 were transported to West Fork Crooked River and Relief Creek with an additional 10 steelhead pair released in Fivemile Creek. Almost all of the fish transported to the West Fork Crooked River and Fivemile Creek returned to the mainstem Crooked River to spawn as identified by the number of redds in Crooked River.

Adult female naturally spawning steelhead returns to Crooked River from 1992 to 1995 and 2009 to 2013 ranged from zero to 7 with numbers declining each year from 2010 to 2013. Based on screw trap data, estimated emigration rates of steelhead parr from 2007 to 2012 ranged from 145 (2009) to 1450 with numbers increasing every year from 2009 to 2012. As the adult and parr numbers show, steelhead spawning is currently limited in Crooked River. However, steelhead use Crooked River for both spawning and rearing purposes and maintain a naturally reproducing population, which has been supplemented with hatchery fish. Snorkeling surveys conducted in the proposed project area in September, 2013, observed no steelhead. In August, 2014, the NPCNF performed snorkel surveys in the upper Crooked River, including riffle, run, backwater, and pool habitats, and found the average juvenile steelhead density to be 0.001 steelhead per square foot (ft<sup>2</sup>) of water surface area.

In summary, current Crooked River steelhead are primarily descended from hatchery stock and female adult returns are very low ranging from zero to seven for the years 1992 to 1995 and 2009 to 2013. Based on past stocking efforts and surveys, steelhead prefer to spawn in the mainstem Crooked River upstream of the project area and there is little presence of juvenile steelhead in the project area during summer.

### 2.3.2 Hydrology

Watershed-scale disturbances resulting from mining impacts are influencing Crooked River hydrology and geomorphic processes in the project area. Crooked River is a 71 square mile (mi<sup>2</sup>), snow-dominated watershed with a mean annual precipitation range of 34 to 43 inches. Crooked River does not have long-term flow data, therefore, RDG used representative stream gauges in the Upper South Fork Clearwater River to estimate hydrologic statistics. Storage of water and sediment in subsurface coarse materials and dredge ponds throughout the watershed may be responsible for reduced peak flows and extended duration runoff in the project area.

The RDG estimated bankfull discharge in the project area using field data (bankfull indicators, channel cross section geometry, water surface slope and roughness derived from bed substrate) resulting in values that were one quarter to one-half of bankfull discharge derived from regional regression equations and U.S. Geological Survey (USGS) gage data from nearby drainages. One possible reason for the disparity is flow attenuation caused by water storage in dredge ponds in the project area as well as the upper watershed near the town of Orogrande. Another possible reason for the disparity is high rates of subsurface flow through disturbed coarse deposits.

During spring runoff, lateral flow and sediment inputs from side drainages are being stored and routed through dredge ponds resulting in a slower release of water and sediment into the mainstem Crooked River. Similarly, coarse subsurface material may be routing flow underground. The effects of those streambed and floodplain features on the Lower Crooked River hydrograph are to dampen the mean annual peak flow and extend flow duration during runoff. These effects are causing the Lower Crooked River to behave similarly to a spring creek with more stable flows, whereby the channel forming discharge (bankfull flow) is correlated with a lower recurrence interval (Q1.1 or less) versus a recurrence interval typically associated with bankfull discharge (~Q1.5). Encroachment of stable vegetation communities along the channel margins supports the premise that peak flows are dampened and channel capacity is responding to flow attenuation. In summary, coarse substrate may be routing flow and storing water subsurface so peak and channel forming bankfull flows are reduced in magnitude and are extended in the annual water cycle.

Floodplain inundation is also compromised due to channel incision and non-uniform floodplain elevation. Floodplains are generally inundated at flows above bankfull. The BA estimates that 50% of the project valley floodplain is greater than 1.5 feet above the bankfull indicators, suggesting little floodplain connection with Crooked River. Additionally, 20% of the valley bottom was greater than 2 feet below bankfull indicators, flooded nearly year-round (shallow ponds), and not suitable for preferred riparian vegetation.

### 2.3.3 Sediment and Substrate

Natural processes influencing sediment supply in the Crooked River watershed include geology, soils, hillslope mass wasting, forest fires and lateral migration/bank erosion. Relatively stable hillslopes, infrequent fires, and low bank erosion rates appear to be factors contributing to a low sediment supply. In the Crooked River watershed, past land use included 1,400 acres of grazing and 36,500 acres of timber management; nearly half the watershed has had some timber harvest. Grazing and timber harvest, with associated access roads, contribute fine sediment to the watershed. In the action area, river bed and bank substrate characteristics are mainly dictated by past dredge mining and channel restoration activities.

Sediment transport in the Crooked River is affected by valley gradient, stream type and supply. An evaluation of valley gradients and stream types indicates that sediment transport capacity begins to decrease in the upstream end of Channel 1 where the stream gradient eases and pools capture the incoming gravel. Past rehabilitation efforts to increase channel sinuosity by routing the river through large dredge ponds have reduced channel gradient and increased the potential

for sediment deposition and storage, thus making the dredge ponds function as large sediment traps capable of depleting downstream reaches of sediment supply. The change in gradient in Channel 1 is affecting substrate size and trapping the gravel supply from upstream. Deprived of bedload supply, Channels 1 and 2 and Bank 2 have scoured down to the largest substrate size classes thus causing the bed to become armored with large cobble substrate that is not suitable for steelhead spawning. The low incoming sediment supply, combined with the coarse channel margins and channel incision, also prohibits lateral migration which could replenish the sediment supply in the lower project reaches.

The Channel 1 (beyond sediment trapping pools at upper end), Channel 2 and Bank 2 reaches have few potential spawning gravels due to the altered stream dynamics in the action area. In the action area, the existing amount and distribution of steelhead spawning habitat, as modeled by using substrate size class 50 to 75 millimeters, is less than 2 acres and is mainly in Bank 1 and the upper most portion of Channel 1 sections of stream. This is less than the potential for the area because of the altered gradient, flow velocities, and concentration of gravel in a relatively small area. Channel 1 supports the highest area for steelhead spawning based on substrate size.

Total suspended sediment (TSS) is used to assess the amount of excess sediment production in a watershed relative to natural conditions. In modeling efforts by the IDEQ as part of a total maximum daily load (TMDL) assessment in 1989 and 2001 the Crooked River was found to have smaller TSS levels than upstream watersheds including the upper South Fork Clearwater, Red, and American Rivers.

In summary, the majority of the project area reaches do not receive an adequate sediment supply due to a change in stream gradient in the Channel 1 reach which effectively traps sediment. Although there may be some potential spawning in Channel 1, suitable spawning substrate settles out in Channel 1, never reaching or replenishing gravel from this point downstream through the remainder of the project area (Channels 1 and 2, and Bank 2). Flow is generally reduced through the action area due to surface flow being routed through coarse substrates remaining from dredge mining. These coarse substrates have created armored stream banks that do not erode and, in conjunction with reduced surface flows and channel incision, prevent lateral migration of the river channel.

#### 2.3.4 Water Temperature

The IDEQ developed a list of impaired waters across the state of Idaho to comply with section 303(d) of the CWA. IDEQ's 2009 Integrated 303(d)/305(b) Report lists the South Fork Clearwater and all tributaries stream segments under section 4a (EPA approved TMDLs) for temperature (IDEQ 2003). Reduction in streamside shading is discussed in the report as a cause for increases in water temperature. Disturbed riparian conditions alongside Crooked River have resulted in altered plant communities and reduced canopy cover. Reduced canopy cover decreases effective shade, resulting in increased solar heating of the river. Lack of floodplain connectivity limits the interaction between Crooked River and its floodplain, which inhibits the process of sediment deposition along the river margins and within the floodplain that initiates

woody plant community succession. The coarse, well-drained tailings piles lack sufficient fine-grained rooting material to support a healthy, diverse plant community, and significantly limit the area available for woody plant communities to establish.

Currently, effective shade is only about 30% and on average, about 70% of solar radiation reaches the stream. This indicates surface water temperatures are elevated due to high solar radiation and low percent effective shade. Almost 30% of the project area consists of conifer community types with less than three percent occurring along streambanks (greenline transects). Greenline transects (RDG 2012) show the dominant community types recorded on greenline transects include reed canarygrass (40%), water sedge (19%), alder (12%), dredge conifer (eight percent), and conifer (three percent). Although the dredge-conifer community type occurs immediately along the channel in many locations within the project area, the steep slopes of the dredge piles typically do not support conifers and therefore these trees are typically located a number of feet from the edge of the channel providing little shade to the channel. General limiting factors for vegetative growth include a lack of floodplain connectivity that limits woody plant succession, coarse substrates do not contain fine rooting material, reed canary grass has displaced native vegetation, and recreational use causes direct damage to vegetation and inputs and spreads invasive species.

Late-summer maximum daily maximum temperatures (MDMT) and maximum weekly maximum temperatures (MWMT) in lower Crooked River exceeded 20°C (68°F) for numerous days when monitored in 2005, 2012, and 2013. NMFS and U.S. Fish and Wildlife Service (USFWS) developed a matrix of pathways and indicators of watershed condition for Chinook, steelhead, and bull trout (NMFS and USFWS 1998). The document describes appropriate temperature conditions for ESA-listed steelhead with 14°C (57.2°F) as optimal for spawning and rearing, and greater than 16.5°C (61.7°F) and 17.8°C (64.04°F) receiving a low rating for spawning and rearing. Summer temperatures in the Crooked River Meanders (action area) are well above temperature ranges considered optimal for steelhead rearing and migration. In preparation for this action and BA, RDG monitored temperature from August 1 to November 10, 2012, and again from June 6 to October 13, 2013, in the upper, mid, and lower areas of the action area, and points upstream of the action area. The results can be summarized as follows:

(1) daily average and maximum water temperatures are higher throughout the project reach than the Crooked River and tributaries upstream; (2) there is a general cooling through the project reach of 1°C likely due to groundwater input; (3) MDMT and MWMT temperatures can exceed 20°C (68°F) in the action area, are variable, but generally unsuitable for steelhead rearing from late June through late August; (4) high late summer water temperatures coupled with low water velocities and poor habitat complexity may create an emigration barrier to steelhead smolts; and (5) water temperatures will cool to suitable steelhead rearing temperatures following rain events at any time during the summer. In summary, summer water temperatures are too high for suitable rearing habitat and may act as a temperature barrier to smolt emigration.

### 2.3.5 Heavy Metal Toxicity

There are no CWA 303d designated reaches for chemical contaminants in the Crooked River drainage. Mine tailings have potential issues with soil and water contamination from heavy metals, and mercury is typically the heavy metal of concern. Mercury was not used in dredge mining in the upper South Fork Clearwater. Idaho Champion Group Lode and Pacific Group Load Claims: Preliminary Assessment and Site Inspection Report (IDEQ 2011a) showed that concentrations of heavy metals in both soil and water are generally equivalent to background levels or below detection limits. Recent heavy metals monitoring data collected within the project area in 2013 by the NPT did not exceed cold water biota water quality standards.

### 2.3.6 Other Habitat Elements

Other habitat elements in the project area are large woody debris, pool frequency and quality, off channel habitat, width to depth ratio, and streambank stability. The past dredge mining activities removed all of the woody debris and vegetation throughout the valley bottom. The highly disturbed valley and dredge tailing piles have limited natural re-growth of lodgepole pine which provide little shade or large wood recruitment. The quantity of river channel pools in the 3.1 mile project area is fairly high. Many pools are the result of past rehabilitation efforts of connecting dredge ponds or are legacy from the dredging activity. These pool types can be deep, but due to the lack of functioning hydraulics, most act as sediment traps for fine sediments. Additionally, the pools lack pool-forming and maintenance processes, and cover or complexity preferred by focal fish species. The existing channel width-to-depth ratios for the four river reaches of Crooked River within the project area range from 17 to 31 which are moderate to high, indicating a wide, shallow channel shape. The steep dredge tailings consisting of large gravel and cobble are a poor medium for riparian vegetation. With the poor conditions and growth on the streamside greenline, over 50% of the streambanks in the project area have low stability based on vegetation.

### 2.3.7 Baseline Summary

Steelhead were eliminated from the South Fork Clearwater subbasin in 1927 due to construction of the Harpster Dam. This persisted until the dam was removed in 1962 and B-run steelhead were reestablished. Due to low returns, hatchery supplementation of steelhead has occurred in the South Fork Clearwater subbasin from 1986 until present. The Crooked River watershed has significant disturbance from legacy mining resulting in numerous ponds and overly coarse substrates that reduce and delay the flow of water and sediment through the watershed, and attenuate and extend peak flows during spring runoff.

In the project area, legacy dredge mining has severely altered the valley bottom and river channel. Due to altered topography, 70% of the valley floodplain is rarely inundated due to channel incision or submerged nearly year-round as shallow ponds unsuitable for desired riparian vegetation. Channel alterations in the valley have greatly lengthened the channel which has reduced steam gradient and water velocities, and created a dominance of seasonally disconnected

ponds. These ponds capture and expose groundwater to solar heating before reentering the channel through seepage. Low velocity pools are heated and capture sediment, which contribute to high water temperatures and a lack of spawning gravels. The river bed, banks, and floodplain are dominated by large cobble substrate which is unsuitable for salmonid spawning, retards riparian vegetation growth causing a lack of shade, and prevents channel migration and gravel recruitment from streambanks. The coarse porous substrate accommodates a relatively high subsurface flow which reduces surface channel forming flows and has essentially eliminated natural fluvial geomorphic processes through the valley. The habitat alterations have created a river environment unsuitable or suboptimal for steelhead spawning and rearing, and at times may cause an emigration barrier to steelhead smolts. Currently, only the upper most portion of the project area has gravel suitable for spawning; however, the small amount of steelhead spawning in the watershed generally takes place in the mainstem Crooked River upstream of the project area.

## **2.4 Effects of the Action on the Species and its Designated Critical Habitat**

Under the ESA, “effects of the action” means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

The proposed action has the potential to affect ESA-listed SRB steelhead and their critical habitat. The project includes moving a 2-mile reach of the Crooked River to a bypass for 3 years potentially affecting all steelhead freshwater life stages including adult and juvenile migration, spawning and incubation, and juvenile rearing. In addition, because the temporary bypass is located near the mouth of the Crooked River, it has the potential to adversely affect all ESA-listed, and other fish, migrating into and out of the Crooked River watershed. Effects of the project can be generalized into two categories of effects: (1) potential short-term adverse effects to the species and critical habitat during project implementation; and (2) long-term effects of the rehabilitation project on critical habitat which are almost entirely beneficial. For this consultation, short-term includes immediate impacts such as turbidity plumes and fish salvage, the life of the bypass which will be in place for up to 3 years (2016 to 2018), and the establishment of planted and natural revegetation of the river banks.

### 2.4.1 Effects on ESA-listed Species

Effects to steelhead from the proposed actions may occur at any time during the 4- to 6-year life of the project but are most likely to occur while initially diverting water between channels and during fish salvage. Potential effects to steelhead include: (1) Temporary increases in suspended sediment; (2) temporary reductions substrate quality due to deposited sediment; (3) change in water quality (i.e., water temperature, petroleum based contaminants, metal toxicity, and herbicides); (4) habitat access and fish passage while displaced from the existing stream



channel; (5) project scale loss of channel habitat from a reduced channel length; (6) displacement from noise disturbance; and (7) fish exclusion and salvage.

#### 2.4.1.1 Suspended Sediment

The project has several activities that may elevate suspended sediment (turbidity) in live waters of the Crooked River:

- Placement and removal of temporary cofferdam diversions
- Initial watering of the two bypass sections and rewatering of the reconstructed stream channel and floodplain
- Subsurface seepage from pumping into settling ponds
- Incidental sediment sloughing or dropping while installing wood structures, or from placement of logs in the bank and on the streambed during Banks 1 and 2 actions
- Erosion and runoff from staging, work, and travel areas

Concentration of suspended sediment is often measured as turbidity (i.e., scattering of light due to suspended sediment in the water column) in nephelometric turbidity units. Turbidity monitoring (300 feet downstream of anticipated or visual turbidity sources) will be used in this project because readings can be taken instantaneously on-site, and project actions can be altered if readings approach thresholds (50 NTUs) where steelhead may be harmed.

Suspended sediment can affect fish through a variety of direct pathways: abrasion (Servizi and Martens 1992), gill trauma (Bash *et al.* 2001), behavioral effects such as gill flaring, coughing, and avoidance (Berg and Northcote 1985; Bisson and Bilby 1982; Servizi and Martens 1992; Sigler *et al.* 1984), interference with olfaction and chemosensory ability (Wenger and McCormick 2013); and changes in plasma glucose levels (Servizi and Martens 1987). These effects of suspended sediment on salmonids generally decrease with particle size and increase with particle concentration and duration of exposure (Bilby and Bisson 1982; Gregory and Northcote 1993; Servizi and Martens 1987, Newcombe and Jensen 1996). The severity of sediment effects is also affected by physical factors such as particle hardness and shape, water velocity, and effects on visibility (Bash *et al.* 2001). Although increased amounts of suspended sediment cause numerous adverse effects on fish and their environment, salmonids are relatively tolerant of low to moderate levels of suspended sediment. Gregory and Northcote (1993) have shown that moderate levels of turbidity (35 to 150 NTUs) can accelerate foraging rates among juvenile Chinook salmon, likely because of reduced vulnerability to predators (camouflaging effect). When testing steelhead response to turbidity exposures from 38 to 265 NTUs for 14 to 21 days, Sigler *et al.* (1984) observed that steelhead remained at or below carrying capacity in water with turbidities up to 80 NTUs, but newly-emerged steelhead had reduced growth rates when exposed to constant turbidity as low as 48 NTUs for 14 days (i.e., minimum days tested).

Salmon and steelhead typically avoid suspended sediment where possible. Avoidance behavior can mitigate adverse effects when fish are capable of moving to an area with lower concentrations of suspended sediment. To avoid turbid areas, salmonids may move laterally (Servizi and Martens 1992) or downstream (McLeay *et al.* 1987). Avoidance of turbid water may begin as turbidities approach 30 NTUs (Sigler *et al.* 1984; Lloyd 1987). Servizi and Martens (1992) noted a threshold for the onset of avoidance at 37 NTUs (300 milligrams per liter (mg/L) TSS. However, Berg and Northcote (1985) provide evidence that juvenile coho salmon did not avoid moderate turbidity increases when background levels were low, but exhibited significant avoidance when turbidity exceeded a threshold that was relatively high (>70 NTUs). Under the proposed action, fish should be capable of avoiding turbidity from placement of materials in the river or seepage from settling ponds but may be unable to avoid turbidity during initial watering of new channels when turbidity may extend the full width of the channel. In the case of watering channels, steelhead may be exposed to turbidity but effects will be limited by actions to keep turbidity concentrations below 50 NTUs.

Newcombe and Jensen (1996) developed an index that is used in this Opinion to predict the severity of ill effects experienced by fish when exposed to suspended sediment (Box 1). The “severity of ill effects score” (SEV) is based on the concept of a dose-response relationship, where the severity of effect increases in relation to the dosage. Under Newcombe and Jensen’s (1996) model, the “dosage” is dependent on the sediment concentration and the duration of exposure, and the SEV score represents the fish’s response. The FWS (Muck 2010) developed guidance for using the SEV score to represent thresholds for incidental take, such as “harm,” or “harass.” The precise thresholds for take vary with different species, lifestages, and the physical characteristics of the sediment particles (such as hardness, size and angularity). Using a similar method as Muck (2010), NMFS created a similar guide using local coincident suspended sediment and turbidity data from 14 culvert, diversion, or road removal or replacement projects on the NPCNF (A. Connor, NPCNF hydrologist, unpublished data 2014).

Newcombe and Jensen (1996) based their SEV scores on suspended sediment concentrations expressed as the unit weight of sediment per unit volume of water (mg/L), while in the proposed action, water quality criteria for suspended sediment are expressed as turbidity measured in NTUs. Turbidity is a measure of how much a beam of light is scattered by particles suspended in water, and for any given particle type, there is a relationship between particle concentration and the amount of light scattering; therefore turbidity measurements can be used to estimate suspended sediment concentrations or vice versa. For Clearwater River tributary sediments, NMFS used the NPCNF data to develop a conversion from suspended sediment concentration (mg/L) to NTUs. The conversions were based on the absolute value of NTUs, not NTUs over background; back ground NTUs for these projects ranged from 1 to 3 NTUs for clear water baseflow conditions. To develop SEV scores based on turbidity (NTUs),

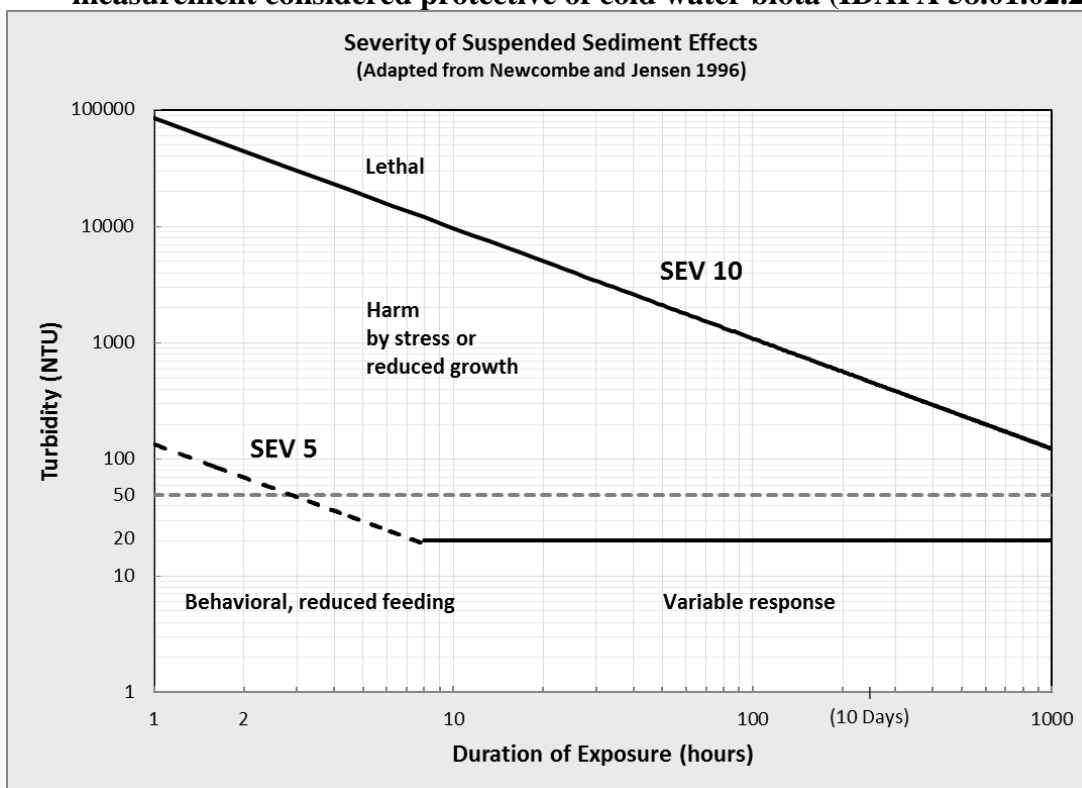
**Box 1. Severity of ill effects scores.**

<b>SEV</b>	<b>Description of Effect</b>
	<b>Null Effect</b>
0	No behavioral effects
	<b>Behavioral effects</b>
1	Alarm reaction
2	Abandonment of cover
3	Avoidance response
	<b>Sublethal effects</b>
4	Short-term reduction in feeding rates and feeding success;
5	Minor physiological stress: Increased rate of coughing; increased respiration rate
6	Moderate physiological stress
7	Moderate habitat degradation; impaired homing
8	Indications of major physiological stress: long-term reduction in feeding rate; long-term reduction in feeding success; poor condition
	<b>Lethal and Para-lethal Effects</b>
9	Reduced growth rate; delayed hatching; reduced fish density
≥10	Increasing rates of mortality

numbers from Newcombe and Jensen (1996) are converted to turbidity units so the units of measure in this analysis are consistent with the units the NPCNF uses for monitoring suspended sediment.

In this Opinion, SEV 5 is used to represent an approximate threshold where suspended sediment may begin to harm juvenile or adult salmon and steelhead by causing minor physiological stress, and SEV 10 represents an approximate threshold where fish might be killed (Box 1). An SEV of 4 to 5 represents a threshold when fish may experience a short reduction in feeding rates. In Figure 5, the severity scores of SEV 5 (dashed line) and SEV 10 (solid line) are plotted to characterize the effects of suspended sediment on salmon and steelhead over a wide range of turbidity levels and exposure durations. The approximate area below the 20 NTUs line but above the dashed (SEV 5) line represent exposures of 8 or more hours at NTU of 20 or less over background, a range of exposures where salmonid responses vary.

**Figure 5. Relationship of turbidity, duration of exposure, and severity of effects (SEV) adapted from Newcombe and Jensen (1996; Model 3 for juvenile salmonids). The lines represent Newcombe and Jensen’s severity of effects scores including SEV= 5 (dashed line) and SEV=10 (solid line). See above text for explanation. The 50 NTU line (horizontal dashes) is the State of Idaho instantaneous turbidity measurement considered protective of cold water biota (IDAPA 58.01.02.200.08).**



The proposed action calls for turbidity monitoring to be in place anytime turbidity is expected (watering or rewatering of channels) or if unexpected turbidity is seen. Proposed monitoring

specifies readings to be taken 300 feet below the point where a newly watered channel meets the Crooked River (i.e., 2016 and 2017 – below the bypass mouth, 2018 – below the confluence of Channel 2 and the bypass) or 100 feet below the point source of turbidity (e.g., below cofferdams or pumping return flow). If turbidity approaches 50 NTUs over background, flow introduction or turbidity causing activities will be halted and procedures changed until NTUs reduce to about 10 NTUs, at which time activities can resume. Dewatering will take place on or after July 15 of any given year, and rewatering or other work that may cause turbidity will take place after this date.

Based on gage data from the South Fork Clearwater at the mouth of Crooked River, flows are expected to be less than 10% of bankfull flow by July 15<sup>th</sup> and be reduced to baseflow by early August. Sediment transport is maximized at bankfull flows and higher. At the expected lower flows, the river has a greatly reduced capacity to suspend sediment in the water column and generally will carry only fine sand sediments or smaller; a sediment size which is less harmful to fish than larger particle sizes (Newcombe and Jensen 1996). Larger particles such as coarse sand are expected to settle out of the water quickly during inwater work. Monitoring reports from other projects using similar BMPs to control turbidity (e.g., halting and modifying procedures if turbidity approaches 50 NTUs), in a similar range of flows, report favorable control of turbidity (CH2MHill 2012).

Past monitoring of smaller scale projects with similar rewatering scenarios, with and without a 50 NTUs threshold for halting project activity, helps characterize the anticipated turbidity plumes. The NPCNF monitored but did not use the 50 NTUs absolute (i.e., not 50 NTUs over background) threshold for 20 recent culvert replacements (A. Connor, NPCNF hydrologist, unpublished data 2014). A summary analysis from the 20 culvert, diversion, and road replacement or removal projects from the NPCNF (flow range 1 to 50 cfs, back ground turbidity ranged from 1 to 3 NTUs, and includes the 14 projects used to develop Figure 5) show there were spikes in turbidity at the onset of dewatering and rewatering at monitoring sites (two spikes per project) between 100 and 600 feet downstream. Of these projects 50% of the projects exceeded 50 NTUs at some time, and for 80% of these (i.e., work related), the exceedance lasted less than 2 hours; the other 20% were attributable to isolated events such as rainstorms. Examining all monitoring data points, the majority remained below 250 NTUs anytime 50 NTUs was exceeded. The BA states that during similar construction activities in the Upper Crooked River, the NPCNF observed NTU levels of 233 which lasted less than 15 minutes. Jakober (2013) monitoring data from a Bitterroot National Forest culvert replacement show that at a 100-foot downstream monitoring distance, there was an initial spike of 241 NTUs with NTUs decreasing to 40 in 1 hour, 20 NTUs in 4 hours and returning to background in 8 hours. Turbidity at 600 feet downstream for the same project did not exceed 6 NTUs over background. Using Figure 5, these projects created spikes in turbidity resulting in SEV scores slightly greater than 5 which may have caused harm to steelhead in the form of increased stress. It is unlikely that the short duration (hours) of these spikes caused significant reductions in growth.

Turbidity monitoring, in conjunction with altering rates of flow reintroduction or altering project activities can be used successfully to keep turbidity below 50 NTUs absolute turbidity (not 50 NTUs over background). In a project very similar to the proposed action, with stepped rewatering of a large side-channel over 4 days and additional in-water work, a post-project report

for the Yankee Fork Pond Series 3 Side Channel Restoration (CH2MHill 2012) reported no peaks greater than 30 NTUs with spikes subsiding to less than 10 NTUs within 2 hours. With this effort, turbidity remained below an SEV of 5 (Figure 5) likely without causing adverse effects on fish.

When rewatering isolated work areas, as discussed in the monitoring projects cited above, turbidity is characterized by short initial spikes with turbidity rapidly attenuating with time and downstream distance. Foltz (2008, 2013) found turbidity can remain above background for half a mile following culvert removal and stream rewatering. In addition, during a culvert-to-bridge project, Foltz (2013) found that the two main causes of turbidity, machinery working in live water and placing objects in live water, did not cause turbidity to exceed 10 NTUs or to persist longer than 10 minutes. This level of turbidity would likely cause fish to respond with minor volitional movements to other areas of the stream.

During implementation of the project, increases in turbidity are expected, but unpredictable in time, from a variety of point sources. Because sediment control devices in staging areas are designed to prevent or minimize sediment from entering the river in fair or stormy conditions, excess sediment originating from these areas is not expected to generate turbidity significantly above background levels. Settling ponds will be in the floodplain away from live water channels so turbid seepage from these ponds is unlikely and, if detected, pumping from work area(s) to the pond will cease and the settling pond relocated. The interim seepage is likely to be of low volume and cause very light turbidity with no adverse effects at the mixing zone at the edge of the channel. As discussed above, placement of wood structures in the streambanks with portions of some logs being placed in the live-water channel is likely to cause very low intensity turbidity plumes lasting only a few minutes. While the bypass is watered (2016 to 2018), there may be a need for bank repair which will need to be isolated. NMFS has estimated that two areas per year or six over the 3-year period may have to be isolated for repairs. Although turbidity will be generated while rewatering these isolated areas, these areas are anticipated to be small and monitoring and watering/ rewatering adjustments will be used to keep turbidity spikes below 50 NTUs. Turbidity pulses that may occur from any of the above activities are expected to be of low intensity, short in duration (minutes), and limited to one side of the river. These short pulses are expected to cause only minor avoidance responses where fish volitionally move to other areas of the river; a response not considered harmful to fish (SEV 1 to 3; Box 1).

Increased turbidity is expected while watering the bypass or the newly constructed Channels 1 and 2. Because the channels to be watered are new or reconstructed, they are void of fish and the monitoring is designed to protect fish below the channel. For watering of the bypass sections (2016 and 2017) and watering the reconstructed mainstem channel (Channels 1 and 2 in 2018), BMP's such as stepped watering and monitoring turbidity at 300 feet downstream to keep turbidity below 50 NTUs, will be implemented to avoid/reduce adverse effects on steelhead. Because watering of channels will occur after July 15<sup>th</sup> during clear water baseflow conditions, the difference between absolute 50 NTUs and 50 NTUs over background should make little to no difference in the calculated SEV score and effects to steelhead. Based on past monitoring as described above, and with implementation of the BMPs and monitoring, turbidity spikes are expected to be up to 50 NTUs for 1 to 2 hours (less than SEV 5) and subside to levels below 20 NTUs within 4 hours (less than SEV 5) and remaining below 20 NTUs between steps

(variable responses below an SEV of 5 or below those harmful to steelhead). With stepped watering, this cycle is anticipated to last for several days for each of the three rewatering events and effects to fish are would remain below those harmful to fish (SEV 1 to 5; Figure 5). However, because the introduction of flow or stepped flow increase can be nearly instantaneous, and reaction to turbidity spikes may be delayed due to the length of the watered channel, NMFS must consider a worst case scenario equivalent to having no monitoring threshold in place. In a scenario without a threshold but retaining turbidity reducing BMPs, as described in monitoring reports above, turbidity spikes would be expected to reach between 200 and 300 NTUs for up to 2 hours. Attenuation time frames and responses would be expected to be similar to the threshold scenarios and extend up to one-half mile downstream of the monitoring point before returning to background levels. With delayed responses to watering adjustments and turbidity peaking beyond 50 NTUs (200 to 300 NTUs), the resulting SEV scores may be slightly greater than 5 (Figure 5) which may cause harm or take to steelhead in the form of increased coughing, respiration, and stress.

The number of juvenile fish likely to be exposed to harmful turbidity (take) from the proposed action can be estimated from fish densities and the size of the area where suspended sediment may become harmful. Densities of 0.001 steelhead per ft<sup>2</sup> were found in 2014 fish surveys in the project area. Hall-Griswold (1995) developed a smolt density modeled from fish density data from the Crooked and Upper Salmon Rivers. In this model, the Crooked River, through the project reach, is rated as “poor” steelhead habitat with a designated density of 0.001 steelhead per ft<sup>2</sup>. This is consistent with the 2014 surveys. For calculations in this analysis, NMFS will use a juvenile steelhead density of 0.001 steelhead per ft<sup>2</sup>.

As discussed above, steelhead may experience adverse effects for up to one-half mile downstream for up to 2 hours. There will likely be varying minor effects (not adverse effects) between turbidity peaks for several days. Under the worst-case circumstances, turbidity exposure may occur up to half a mile (2640 feet) downstream from the confluence of the newly rewatered channel and the Crooked River. Given a 35-foot average width of the Crooked River, the area below each confluence where turbidity may extend is 91,000 ft<sup>2</sup> (2640 feet long x 35 feet wide). Applying the juvenile steelhead density of 0.001 per ft<sup>2</sup> to the 91,000 ft<sup>2</sup> area, (0.001 x 91,000), 91 juvenile steelhead per year (2016 to 2018) may be exposed to harmful levels of turbidity and respond with minor alterations in behavior and feeding rates, and moderate physiological responses (harm or take) including increased coughing, respiration, and stress.

In summary, the project is expected to generate turbidity from sources that are likely to occur but unpredictable in time and others sources that are predictable and will be controlled. Turbidity that is unpredictable in time may be produced from project sources such as seep from substrates as a result of pumping turbid water from isolated areas, or from bank sloughing or placement of logs while installing log structures above the OHWM during Banks 1 and 2. Turbidity pulses from these sources are expected to be of low intensity, short in duration (minutes), and limited to one side of the river. These short pulses are expected to cause only minor avoidance responses where fish volitionally move to other areas of the river; a response not considered harmful to fish. For watering and rewatering of channels (2016 to 2018), predictable turbidity pulses are expected to peak at up to 300 NTUs, be elevated above background for as long as several days,

and extend for up to one-half mile downstream. Juvenile steelhead responses to these turbidity plume exposures are expected to have minor to moderate behavioral, feeding, and physiological responses.

#### 2.4.1.2 Deposited Sediment

When suspended sediment settles out of suspension, it can cause detrimental effects on spawning and rearing habitats by filling interstitial spaces between gravel particles (Anderson *et al.* 1996; Suttle *et al.* 2004). Sedimentation can: (1) Bury salmonid eggs or smother embryos; (2) destroy, alter or displace prey habitat; and (3) destroy, alter or displace spawning and rearing habitat. Excessive sedimentation can reduce the flow of water and supply of oxygen to eggs and alevins in redds which can decrease egg survival, decrease fry emergence rates (Bash *et al.* 2001; Cederholm and Reid 1987; Chapman 1988), delay development of alevins (Everest *et al.* 1987), reduce growth and cause premature hatching and emergence (Birtwell 1999), loss of spawning habitat (Spence *et al.* 1996) and loss of summer and winter rearing habitat (Bjornn *et al.* 1977).

The project reach has very little suitable spawning habitat and steelhead will likely move above the action area into the upper watershed to spawn. Records from the Crooked River fish weir from 1992 to 2014 show steelhead enter the Crooked River between March and late-May. Steelhead emergence for the Crooked River was estimated in the BA using 1200 degree-days for steelhead fry emergence, and temperature data from the South Fork Clearwater at the Crooked River confluence (i.e., comparable temperature to Crooked River; USGS gauge No. 13337500). Degree-day analysis provides evidence that fry from late-May steelhead spawners would emerge from redds prior to start of the July 15 work window and activities generating suspended and deposited fine sediments.

Suspended sediment will deposit onto streambed substrate following watering, rewatering, and other minor project-related events. Flow data from Crooked River show streamflow increases in response to precipitation events which occur more frequently in autumn. Daily flow statistics from the South Fork Clearwater gage (USGS gauge No. 13337500) indicate that late-February through mid-April flows in this area steadily increase from 2 to 10 times greater than baseflow. With the increase in flow, greater water depths and velocity will increase fine sediment mobilization from river substrates (Leopold *et al.* 1964). This mobilization of deposited fine sediment will likely occur before steelhead spawning in the following spring. It is also unlikely that redds will occur in the action area, and thus redds would not likely be exposed to run-off associated re-suspension/deposition of project-related sediments. In addition, mobilization of fine sediments will occur before fry emergence and before mid-summer when juveniles presence is unlikely due to high water temperatures.

In summary, it is expected that some fine sediment will be deposited on substrates during the work window. Due to a lack of spawning substrate in the project reach, it is unlikely that redds will be present. In the event that redds are present, fry will have emerged from the redds before the start of the instream work window. In addition, due to the timing and location of spawning, and timing of fine sediment flushing flows, it is unlikely that project-related deposited sediments would affect steelhead spawning, fry emergence, or rearing.

### 2.4.1.3 Water Quality

#### Water Temperature

Project actions may cause water temperature changes which have a direct effect on ESA-listed species. The project actions include a complete re-grading of the floodplain and a new channel planform which will essentially remove all existing vegetation and shade from the streambanks and floodplain along current Channels 1 and 2. To expedite riparian vegetation and stream shade recovery, stream banks will be planted with container plants. In addition, it is anticipated that morphological changes in the project reach and floodplain will reduce solar heat loading and improve floodplain and groundwater functions which will result in cooler summer water temperatures.

The EPA's published temperature criteria (7-day average daily maximum) for salmon/trout "core" rearing (60.8°F) (16°C), non-core rearing (64.4°F) (18°C), and migration (68°F) (20°C) (IDEQ 2003). The Idaho water quality temperature criteria for cold water biota is 71.6°F (22°C) MDMT, and 66.2°F (19°C) MDAT (IDEQ 2011a, available at: <http://www.deq.idaho.gov/water-quality/surface-water/temperature.aspx>). Water temperature fluctuations and their relationship to dissolved oxygen can affect all aspects of salmon and steelhead life histories in freshwater including: incubation and egg survival in stream gravel; emergence, feeding, and growth of fry and juvenile fish; outmigration of juvenile fish; adult migration, holding, resting, prespawning and spawning activities (Spence *et al.* 1996). In addition, dissolved oxygen decreases as water temperature increases, potentially adding stress to fish. Long-term sublethal temperature effects, as well as short-term acute effects of warm water temperatures, can be detrimental to the overall health of salmonids (Bjornn and Reiser 1991). Heat stress increases the susceptibility of juvenile fish to disease (ODEQ 1995). Sustained water temperatures of 70°F (21.1°C) or greater can cause death of cold-water species such as salmon and steelhead within hours or days (ODEQ 1995). Density of rearing steelhead is strongly negatively related to water temperature at temperatures greater than 68°F (20°C) (Ebersole *et al.* 2001) with avoidance occurring at 72°F (22.2°C) or above (Nielson *et al.* 1994). Migrating adult steelhead are impaired by water temperatures greater than 66.2°F (19°C) (Keefer *et al.* 2009).

Temperatures in the Crooked River Meanders (project area) are well above temperature ranges considered optimal for steelhead spawning, rearing, and migration. In preparation for this action and BA, temperature data were collected from August 1 to November 10, 2012, and again from June 6 to October 13, 2013, in the upper, mid, and lower project reaches and points upstream of the project area. The results can be summarized as follows: (1) daily average and maximum water temperatures are higher throughout the project reach than the Crooked River and tributaries upstream; (2) there is a general cooling through the project reach of 1°C (33.8°F) (likely in response to groundwater inputs); (3) summer Crooked River water temperatures cool to suitable rearing temperatures in response to precipitation events; (4) daily and weekly maximum temperatures can exceed 68°F (20°C) in the project reach, are variable, but are generally unsuitable for steelhead rearing, from late June through late August; and (5) high late summer water temperatures coupled with low water velocities and poor habitat complexity may create a



emigration barrier to steelhead smolts. This makes water temperatures, suitability of the project area as rearing habitat, and the project reach as a temperature barrier to smolt emigration, more vulnerable to present and future climate change due to predicted drier summers (Luce 2009).

As discussed in the baseline section, daily maximum summer water temperatures in the project reach can exceed 68°F (20°C), potentially causing a range of responses from juvenile steelhead including avoidance (including delayed emigration), reduced growth, or death. The cause of these high water temperatures can, in part, be attributed to dredge mining changes to valley floodplain and channel features. Evidence that legacy mining is causing increased water temperatures includes: (1) There are over 20 acres of ponds which capture and expose groundwater to incoming solar radiation; (2) water in the river channel, when compared to more natural reaches, has a greatly increased residence time and exposure to solar heating due to increased channel length and width with a low gradient that reduces stream velocity; and (3) a lack of shade plants (30% effective shade; three percent along greenline) due to poor growing conditions along streambanks (large substrate and steep slopes). Project actions will address these legacy conditions.

Some of the proposed actions will help to lower water temperatures. Floodplain grading will eliminate 20 acres of ponds and the associated surface exposure to solar heat loading, allowing cool groundwater or hyporheic flow to remain subsurface, insulated from solar heating, until it intersects with warmer surface flow. Without the ponds, groundwater or tributary flow inflow can drive river temperatures down and hyporheic exchange will act as a more effective buffer against high surface water temperatures (Poole and Berman 2001). River channel grading will narrow the channel, shorten the channel length, increase the channel gradient, increase water velocity, and reduce the residence time and exposure to heat loading of surface water through the project reach. Planting of large container shrubs and trees, and natural streambank vegetation recruitment (i.e., because of improved sediment deposition and soil retention patterns), should help provide some immediate shading with shade increasing in the short to long terms to a final effective shade goal of 83% after trees are established. Because water temperature is proportional to heat load (heat energy) divided by the discharge (volume) of water (Poole and Berman 2001), the reduced surface area and residence time of water in the project reach is expected to reduce solar heating of the river resulting in a decrease in water temperatures through the project reach. A decrease in water temperature could increase, over baseline conditions, the area or length of season of suitable rearing habitat in the project reach. Although it is unknown whether these anticipated decreases in water temperature will be measurable, three 3-year cycles of post-project monitoring (Columbia River Habitat Monitoring Program [CHaMP]; NOAA and BPA, <https://www.champmonitoring.org/>) of water temperatures may reveal if there is change. Any project-related decrease in water temperature will improve habitat conditions for steelhead and help to buffer habitat from climate change.

### Petroleum Based Contaminants

ESA-listed fish have the potential to be affected by chemical contamination should it occur as a result of the action. The project will require the use of multiple pieces of heavy machinery which will pose a risk of chemical fluid contamination to water and riparian areas. The proposed

action includes machinery working in live water when placing some sections of the diversion dams. There are three onsite staging areas for refueling and machinery and fuels storage.

Petroleum-based contaminants such as fuel, oil, and some hydraulic fluids, contain poly-cyclic aromatic hydrocarbons, which can cause chronic sublethal effects to aquatic organisms (Neff 1985). Ethylene glycol (the primary ingredient in antifreeze) has been shown to result in sublethal effects to rainbow trout at concentrations of 20,400 mg/L (Beak Consultants Ltd., 1995 as cited in Staples 2001). Brake fluid is also a mixture of glycols and glycol ethers, and has about the same toxicity as antifreeze.

The proposed action and BMPs include many pollution control measures. Project actions will follow all provisions and standards of the IDEQ, the CWA (permits for section 404 and NPDES), and project SWPPP. There are numerous BMPs to prevent contamination of project areas waters and wetlands and to enable a quick response in the event of a spill. Fueling, staging, and storage areas will be at least 150 feet from natural waterbody or wetland or they will be on a hardened surface such as a road. Spill prevention and containment equipment (booms and oil-absorbing pads) will be available on site for immediate response. Workers will be trained in spill containment procedures. Because all work will be in areas draining to streams or riparian areas, all equipment will be washed free of mud, petroleum products, and plant and seed material. Leaks and damaged fittings will be repaired prior to arriving on site. Because fuel storage and refueling will occur away from water and riparian areas, spill containment materials will be available on site, and equipment will be free of leaks, contamination of waters is unlikely.

### Sediment Toxicity

Heavy metal toxins may be unearthed when disturbing soils and substrate during floodplain reconstruction. Mercury is the toxin of greatest concern because it can be toxic to fish and other aquatic life in low concentrations and because it bioaccumulates. There is little potential for mercury to enter waters of the Crooked River in concentrations toxic to fish.

Mercury in water can accumulate in fish tissue and become toxic to fish. Mercury's primary path as a toxin to fish is in the form of methylmercury. Methylmercury is formed with organic matter in oxygen poor conditions such as deep fine sediments in ponds (Rhea 2008). The effects to fish from mercury or methylmercury are permanent damage to the olfactory, visual, and nervous systems; and adverse effects to growth and development, reproduction, and osmoregulation (Baatrup 1991; Rhea 2008).

As discussed in the baseline section, mercury was not used in dredge mining the upper South Fork Clearwater watershed and several studies have found mercury in soils or water in the action area to be equivalent to background levels or below detection limits. In the event that mercury is uncovered during project activities, specific BMPs are called for in handling and disposing of mercury. These procedures are detailed in Appendix C in the BA and summarized here: work will cease in the area and mercury will be transferred to a vapor-proof, unbreakable, and labeled container for storage and transport to a proper disposal site. Nitrile gloves will be kept onsite. Similar containment and disposal for contaminated clothing and shoes will be used. Because

mercury was not used in past dredge mining, current studies do not indicate excess mercury or other toxins in the action area, and project actions include specific BMPs for containment and disposal of mercury if encountered, it is very unlikely that toxic metals will be released by project actions, or be released in concentrations harmful to fish.

## Herbicides

Weed treatments may be necessary to control noxious weeds which may compromise establishment of desirable planted or natural vegetation. Weed treatments in the project area would follow the Biological Opinion for Herbicide Treatment of Invasive and Noxious Weeds on the Nez Perce National Forest (Herbicide Opinion; NMFS 2009). The BMPs and effects of treatment are incorporated by reference.

Following all BMPs in the Herbicide Opinion should ensure that any effects to fish should be non-lethal. Some of the anticipated effects found in the Herbicide Opinion which are likely to be similar to effects resulting from this action include:

- The amount of herbicides applied to any given area is too low to cause appreciable concentrations of herbicide contamination beyond relatively short stream segments adjacent to areas where herbicides are applied to riparian areas or roadside drainage ditches that drain into stream channels.
- Peak water concentrations of herbicides likely to occur under the proposed action are far less than the lowest concentrations where sub-lethal effects have been reported, and the duration of exposure under the proposed action is likely too short to cause significant effects.
- The proposed action would cause minor changes in riparian vegetation through the intentional eradication of weeds and incidental mortality of non-target riparian plants. Weed control would help restore ecological functions of riparian communities where those functions have been impaired by invasion of exotic plants.
- Herbicide contamination is unlikely to reach concentrations that are high enough or of sufficient duration to interfere with the PCEs of critical habit affecting spawning, rearing, or migration.

If new BAs and Opinions are developed before the project is complete, weed treatment procedures will follow those specified in the most recent BA/Opinion.

### 2.4.1.4 Habitat Access

From 2016 until 2018, the Crooked River will be in the bypass which has the potential to impair upstream passage to areas above the project reach and prevent access to previously accessible habitats in the project reach including the floodplain and tributaries. Loss of habitat can

adversely affect population productivity. The project is, however, designed to maintain fish passage and has contingencies to ensure fish passage is restored should it not function as designed.

The project has several aspects which could block fish passage: (1) velocities in the bypass could be too high for juvenile or adult passage; (2) the bypass berm or diversion could fail due to high water; (3) surface water could go subsurface during low flow periods or initial watering of the newly constructed bypass or mainstem channels; and (4) tributary streams could be blocked by mainstem channel isolation. Conservation measures will be in place to reduce impacts during construction; however, contingencies, as outlined in the EAP are needed to change how the project is implemented if problems arise. The COE, BPA, and USFS are responsible for following the EAP and NMFS will be notified within 48 hours by email documenting the procedures followed during any emergency.

The bypass will be in use year-round from when it is watered in 2016 until it is dewatered and obliterated in 2018 and must provide passage for adult and juvenile steelhead migration. The foremost concern for passage in this project is that the bypass not hinder the April through May adult steelhead migration to known spawning areas upstream. To address the passage issue, the bypass has been designed to accommodate upstream and downstream juvenile and adult passage year-round.

Upstream passage is dependent on water velocity (generally increasing with flow) and the size of the fish. The velocities at which juvenile and adult steelhead can migrate are dependent on distance and fish size. Using a short burst speed, fish 45 to 65 mm can pass velocities of 1.5 to 2.5 feet per second (ft/s) for about 1-foot in distance, while fish 80 to 100 mm can pass velocities of 3 to 4.5 ft/s for about 1-foot (NMFS 2011). Adult steelhead can sustain swimming speeds up to 4 ft/s for hours, and 4 to 14 ft/s for minutes (Bell 1991).

NOAA specifies that upstream passage design should be based on flows typical of periods when juveniles migrate. In an average year, bankfull flow is the highest water of the year, with the highest water velocities, and normally occurs during the peak snow runoff period in May and June. Because juveniles may migrate year-round, analysis of bypass velocities provided in the BA were performed using annual bankfull flow (493 cfs).

Modeled velocities for three longitudinal transects ranged from 1 to 7.5 ft/s in the middle of the channel and a maximum of 2.5 ft/s for the left and right margins (Figure 6). These results, when compared to the swimming velocities of steelhead, indicate that adult and juvenile steelhead will have year-round upstream and downstream passage under annual bankfull flow conditions.

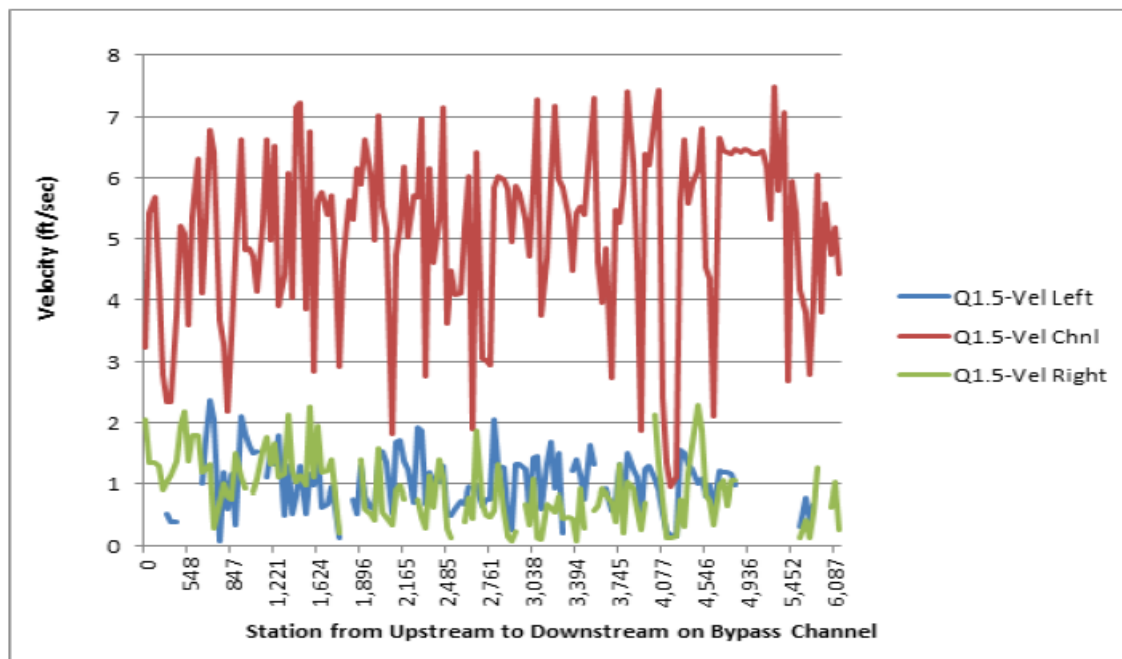
Adult upstream migration through the bypass is critical for adult steelhead when accessing upstream spawning areas. Data from the Crooked River weir indicate that adult steelhead migrate up the Crooked River in April through May. The 10-year peak flow for this time period is the same as the annual bankfull flow of 493 cfs. Modeling of the annual bankfull flow (Figure 6) indicates a velocity range of 1 to 7.5 ft/s, well within the swimming velocity of adult steelhead as discussed above. Additional modeling was performed for when the bypass is at capacity

(10-year peak annual flow); modeling results show adult steelhead can pass upstream through the bypass when the bypass is at capacity. In summary, adult steelhead will be able to pass upstream through the bypass under any flow condition likely to occur while the bypass is in operation.

During the critical upstream migration period for spawning adults, April through May, adults will have upstream passage for up to the 10-year peak monthly flow.

The bypass would be constructed by connecting the existing ponds and ditches resulting in pools that provide areas of lower velocities. For all flows, some of the channel margins will exhibit lower velocities and the modeling does not account for larger boulders and LWD in the bypass which will also offer areas of reduced velocity.

**Figure 6. HEC-RAS modeling of the bankfull flow (Q1.5; 300 cfs) through the bypass channel.**



The possibility of a bypass failure, including the berm or toe of the Crooked River Road, and consequent passage barrier was considered when designing the bypass and diversion cofferdam. The bypass was designed to contain the Crooked River 10-year peak annual flow (Q10; 1,061 cfs) with enough freeboard to contain the 25-year peak annual flow (Q25; 1,316 cfs). Modeling of bypass water velocities and substrate mobility for the 10-year flow shows that existing 6- to 12-inch substrates (the material used to build the channel berms/access road) will remain stable while the channel retains the capacity to mobilize and pass smaller substrates. This indicates that the channel will not erode during 10-year or lesser flows or fill with sediment, which would reduce its capacity to pass the 10-year flow. The contractor, NPT (Project Manager), and USFS (Fish Biologist or Hydrologist) staff would evaluate the bypass after watering the channel and after any high flow event for damage to the toe of the road or the berm.

Areas that appear to be damaged or that could become damaged would be riprapped. The riprap would be installed so that it does not impede fish passage. During regrading of the bypass, the rocks would be buried in the upland floodplain (above OHWM) or removed when the bypass is filled in.

The diversion (i.e., that diverts the Crooked River from the mainstem channel to the bypass) could fail during the project period due to high water. As stated in the EAP, the diversion structure would be evaluated by the contractor at the end of each construction season to ensure it is secure and in good condition prior to winter. Repairs, if needed, would be completed. The structures would be evaluated again in the following spring, prior to high flows, for erosion potential. They would be cleaned of any large woody debris. The diversion would be developed with a spillway that is activated above the Q10. As an example, if a rain-on-snow or spring peak high water equivalent of the Q25 (1,316 cfs), the bypass would contain 1,061 cfs (Q10) while the additional 300 cfs would spill over the diversion spillway into the newly constructed mainstem channel.

The newly constructed channel is designed to contain 300 cfs (bankfull flow) before flowing over the banks onto the floodplain. Because the bypass and mainstem channels can contain the Q25 peak flow without inundation of the floodplain, the risk of steelhead being stranded on the unfinished floodplain is low. Fish would have to be re-salvaged from the newly constructed mainstem channel prior to work continuation if high water were to flow over the diversion spillway. Details of effects to steelhead salvage are discussed in detail below in section 2.4.1.7 of this Opinion.

During initial rewatering of the bypass and newly constructed river channels or during baseflow periods, water could go subsurface in the freshly worked channel substrate potentially causing a fish passage barrier or fish stranding. This possibility is addressed using project channel design, project BMPs, and procedures outlined in the EAP. The two sections of the bypass will be watered in consecutive years. The first half of the bypass will receive water to facilitate dewatering of the Channel 1 reach, and in the following year, the second half of the bypass will be connected to the upper section to facilitate the dewatering of the Channel 2 reach. Blocknets will be installed above the diversion prior to and during watering of the bypass to keep fish from moving into the bypass until continuous flow and passage is established. An adult exclusion structure will be installed on the mainstem above the downstream end of the bypass confluence to preclude upstream fish passage into the mainstem during watering of the bypass (dewatering of mainstem). To ensure the bypass does not run dry during baseflow periods, the bypass has been designed to have its thalweg (deepest part of the channel) below the June through September water table elevation, capturing groundwater from the floodplain and the east hillslopes. As outlined in the EAP, if water depths in the bypass are too low for adult passage, as determined by year-round inspections, those areas would be excavated to provide adequate depth. For rewatering of the Channels 1 and 2, initial flows of lower than baseflow will be introduced, if flow goes subsurface, the channel will be allowed to adjust or flow will be cutoff and the channel would be remixed with additional fine substrate and flow restored. This procedure will continue until the channel stabilizes with surface flow. Turbidity monitoring will be necessary for each of these excavated areas. Effects to steelhead from turbidity are discussed in detail in the sub-section 2.4.1.4 Suspended Sediment of this Opinion.

Blocknets above the diversion will prevent steelhead passage for several days during late summer or early fall. At this time, spawning adults are not expected to be migrating in the Crooked River. The majority of smolts will have exited Crooked River during the spring high water and those that remain will experience a delay in migration through potentially suboptimal water temperatures. During rewatering of the mainstem and dewatering of the bypass, juvenile steelhead will not be able to move above the diversion and are expected to move out of the bypass; those that remain in the bypass will be isolated and salvaged (see sub-section 4.2.1.7 Salvage below).

There are three tributaries in the project area that will be hydrologically reconnected to the mainstem channel. The tributaries are steep, small (~ 1 cfs at baseflow), not likely fish bearing streams, and on the east side may not have surface water connections (i.e., flow subsurface to the Crooked River) due to the wetland conditions along the hillslopes.

As noted above, there is the potential for tributary streams to the project reach to become blocked to steelhead passage. The two on the east side currently do not have a surface connection but will have a surface connection established after the bypass has been obliterated. The west-side tributary will ensure steelhead passage through the following project actions: (1) The west-side tributary will be surveyed in the summer of 2014 and again during fish salvage operations to determine if steelhead are using the stream; (2) if steelhead are found, the channel will be diverted downstream back to the mainstem channel to provide downstream fish passage; if steelhead are not found, the water from this tributary may need to be diverted or pumped during construction of the floodplain or routed around the project site if flows are too great to pump; and (3) if steelhead are detected in the west side tributary, the stream will be routed around the work area to provide passage until the tributary is reconnected to the fully rewatered mainstem.

#### *2.4.1.5 Loss of habitat*

There will be an overall loss of stream area during and after project implementation. Isolation and construction will occur in Channels 1 and 2 of the mainstem. The Crooked River will be in the bypass around Channel 1 from 2016 to 2018 and Channel 2 from 2017 to 2018. The mainstem through these sections is about 10,560 feet long and the bypass will be approximately 6000 feet long, creating a loss of up to 4,560 feet of channel habitat from 2016 through the working season of 2018. Because Channels 1 and 2 combined are approximately the same length as the bypass, when Channels 1 and 2 are rewatered, the loss 4,560 feet of channel habitat will continue after 2018.

As stated in the Baseline Conditions section, the existing habitat in Channels 1 and 2 has a low gradient, poor substrate, warm water temperatures, and limited overhead cover. Steelhead could use the mainstem channel for rearing, and spawning could occur in the limited steeper gradient sections with suitable substrate; however, rearing conditions are relatively poor and fish surveys of the project area show very low density of juvenile steelhead. The bypass would provide a migratory corridor and some complexity including pools, riffles, and some large woody debris for overhead cover. The gradient of the bypass will be steeper and capable of transporting

spawning sized gravel which could potentially provide spawning areas. In addition, when compared to the mainstem channel, the bypass will have reduced relative pool area, increased channel gradient, and similar shade (i.e., little shade currently on mainstem) which may result in cooler water temperatures. However, the bypass was designed to provide passage, and is not designed, or expected to be used, as spawning and rearing habitat. While in the bypass, the Crooked River will not have access to the floodplain. Access to the floodplain is already limited under the baseline, because much of the river channel through Channels 1 and 2 is incised. What access to the floodplain there is consists of many pools which will become isolated as flows recede, possibly stranding juvenile steelhead in these pools that will have suboptimal to lethal conditions later in summer.

Although there is a reduction in linear feet of stream for approximately 3 years, the bypass will provide 6,000 feet of mixed habitat. It should be noted that upon project completion, the mainstem through Channel 1 and 2 will have a finished total length of 5,700 feet; similar to the 6,000 foot length of the bypass. The bypass will provide passage and the possibility of improved habitat conditions including a greater variety of substrate and decreased water temperatures. Post-project, reconstructed Channels 1 and 2 and the associated floodplains will have improved groundwater conditions, gradient and morphology, sediment transport capacity, and access to the floodplain.

#### 2.4.1.6 Noise

There will be considerable noise generated from heavy equipment operation and truck traffic in the project area for the 4-year life of the project. The majority of the work will be in isolated areas of the river and floodplain away from the bypass. However, the bypass berm will act as the main access route to the project and machinery will operate in or adjacent to live water while constructing or removing diversions, during floodplain grading in Reaches 1 and 4, and while placing large wood structures during options 1 and 2.

When operating in or near live water, heavy equipment (e.g., excavators, dump trucks) will create visual, noise, vibration, and water surface disturbances. Popper *et al.* (2003) and Wysocki *et al.* (2007) discussed potential impacts to fish from long-term exposure to anthropogenic sounds, predominantly air blasts and aquaculture equipment, respectively. Popper *et al.* (2003), using caged fish unable to move away from noise, identified possible effects to fish including temporary, and potentially permanent hearing loss (via sensory hair cell damage), reduced ability to communicate with conspecifics due to hearing loss, and masking of potentially biologically important sounds. Wysocki *et al.* (2007) did not identify any adverse impacts to rainbow trout from prolonged exposure to three sound treatments common in aquaculture environments (115, 130, and 150 decibels [dB]). The Federal Highway Administration (2009) indicates backhoe and truck noise production ranges between 80 and 84 dB. Because the dB scale is logarithmic, noise levels expected from machinery are expected to be 100 times less than and noise levels known to have generated adverse effects to surrogate species, as discussed above. Therefore, noise-related disturbances from machinery are unlikely to result in injury, other adverse physiological or behavioral effects, or death. It is unknown if the expected dB levels will cause fish to temporarily move away from the disturbance or if fish will remain present.



For this project, the majority of machinery use and truck traffic will be separated from live water by distances of 8 to 400 feet from live water. In-water work will be limited to placing or removing materials for diversion structures including a few individual trips into live water lasting several minutes over the course of 1 to several days while new channels are initially watered; during these times, blocknets will exclude fish from the immediate area and, as confirmed by recent fish surveys, few steelhead are expected to be present in the area during these times of channel transition. Work adjacent to live water may occur during some floodplain grading or during large woody debris placement in Options 1 and 2. In all cases, as discussed above, it is unknown if the fish will temporarily move away from the noise but NMFS does not expect any steelhead to be adversely affected by construction noise.

#### 2.4.1.7 Salvage

Project actions will require dewatering of stream reaches or areas to facilitate restructuring or maintenance of channels. Before these areas are fully dewatered and channel reconstruction work begins, fish must be salvaged (captured and transported) to flowing areas of the river. Fish salvage will occur any time a stream area is dewatered including:

- when dewatering Channels 1 and 2, and the bypass;
- Channels 1 and 2 if high water causes the Crooked River to breach the bypass diversion and flow into the isolated reaches; and
- anytime a repair in the bypass necessitates isolation of a repair area; NMFS assumes two per calendar year or six over the life of the bypass

Fish salvage will be supervised by Tribal and IDFG biologists who will ensure the best methods are employed to minimize contact and injury to steelhead. The general procedure for salvaging fish is as follows:

- Place block nets above (prior to dewatering) and below (after fish swim out) the area to be dewatered.
- Slowly dewater the area leaving enough depth for fish to swim out.
- Use seine nets to herd fish out of the area.
- Block all flow into the salvage area.
- Dip net or seine fish stranded in shallow areas.
- Pump water from deeper pools following NMFS pumping guidelines (NMFS 2011) then dip-net fish from the pools.

- Use a three pass electroshocking technique following NMFS electroshocking guidelines (NMFS 2000).
- All fish will be returned to the closest free flowing areas of the bypass or mainstem channels where the fish can move throughout the channel to find suitable habitats.
- The number of fish handled, injured, and killed will be recorded and reported in the annual monitoring report.

Capturing fish by any means subjects the fish to physiological stress and possible injuries. Therefore, slow dewatering to allow fish to move out of the area unharmed then seining and dip netting will be used since they have a lower injury rate than electrofishing. IDFG suggests that reducing flow to 20% of the original flow in a salvage area results in 50% to 75% of fish moving out of the area (Tom Curret, Fisheries Biologist, IDFG, 2005). Because deep pools are available for cover in the declining flows, NMFS assumes that only 50% of juvenile steelhead will leave the isolated area without exposure to capture/handling. Netting of both shallow areas and stepped dewatering and seining of pools is expected to remove 60% to 70% of the fish present (Tom Curret, Fisheries Biologist, IDFG, 2012). Because the project area and pools have coarse substrate where juvenile fish can shelter, NMFS assumes the lower figure of 60% will be captured by net.

Block nets will be used upstream and downstream of the construction area to prevent fish migration into the work site from upstream or downstream habitats. The FWS (2002) conducted a study on sampling efficiency with the use of block nets, and observed five juvenile mortalities as a result of block net impingement out of 704 bull trout handled. Although not all fish are thought to have encountered the block nets, this mortality figure represents approximately a 0.7% block net mortality rate for fish handled in the study. For this analysis, NMFS assumes a 0.7% block net related mortality rate for the juvenile steelhead handled despite that the impinged fish are excluded upstream or downstream from the isolated area.

For electrofishing, Peterson *et al.* (2004) reviewed literature citing a range of capture efficiencies for salmonids of 20% to 100% based on different methods used to calculate capture efficiencies and further notes that capture efficiency is also inversely related to habitat complexity. Because the area to be electrofished lacks complexity but has large substrate cover, NMFS conducted this Opinion's analysis with a mid-range electrofishing capture efficiency of 75%. This capture efficiency rate also indicates that 25% of fish subjected to electrofishing will not be captured (seek refuge in the substrate) and will die in the dewatered work area.

The effects of electrofishing on juvenile salmonids will be limited to the direct and indirect effects of exposure to an electric field, capture by netting, and the effects of handling associated with transferring the fish back to the river. Smaller fish intercept a smaller head-to-tail potential than larger fish (Sharber and Carothers 1988) and may therefore be subject to lower injury rates (Dalbey *et al.* 1996; Thompson *et al.* 1997). Only a few recent studies have examined the long-term effects of electrofishing on salmonid survival and growth (Ainslie *et al.* 1998; Dalbey *et al.*

1996). These studies note that although some of the fish suffer spinal injury, few die as a result. However, injured fish grow at slower rates and sometimes show no growth at all (Dalbey *et al.* 1996).

NMFS electroshocking guidelines (NMFS 2000) will be followed for this action. The guidelines recommend, in ascending order of catch efficiency and adverse effects to fish, using 100 volt continuous direct current (DC) followed by pulsed direct current (PDC) up to 70 hertz. Injury rates range from 12% to 15% minimum for DC (Ainslie *et al.* 1998; Dalbey *et al.* 1996) to maximums of 39% to 54% using PDC (Ainslie *et al.* 1998; Dalbey *et al.* 1996; Sharber *et al.* 1994). Mortality rates during the cited injury studies were one percent or less. Other studies found that electrofishing with techniques similar to NMFS guidelines is expected to cause five percent mortality from vertebral injuries (McMicheal *et al.* 1998; Hudy 1985). To be conservative, NMFS will use the higher mortality rate of five percent for all fish exposed to electrofishing. All fish captured by electrofishing are likely to experience at least temporary or permanent injury or death.

While placing and removing diversion structures, machinery may need to drive in live water which may crush juvenile fish. Driving in live water may be necessary while constructing diversions for the bypass in Channels 1 and 2, and when removing the top diversion in 2018. To calculate this mortality, NMFS assumes a worst case scenario for this work. This scenario is that a tracked excavator (2-foot wide tracks) will make three trips per hour (25-foot stream width), for 10 hours, each of the 3 days of diversion work. NMFS estimates the number of juvenile crushed by the machinery per day of work: (1) Three trips per hour for 10 hours is 30 trips per day (area affected per trip is 2 feet x 25 feet x 2 [out and back] for a total of 100 ft<sup>2</sup> per trip); (2) and (3) 30 trips x 100 ft<sup>2</sup> per trip x 0.001 steelhead per ft<sup>2</sup> equals three fish killed from crushing per day. For the total of three days of diversion work (Channel 1 dewatering, Channel 2 dewatering, bypass dewatering; each of which is a single-day activity and each occurs in a separate year), NMFS expects nine juvenile steelhead to be crushed and killed (Table 6).

When estimating the number of fish that could be harmed or killed during fish salvage operations, NMFS applied the following assumptions: (1) Approximately 50% of the fish will voluntarily move out of the area during slow dewatering; (2) 60% of the fish present after voluntary movement will be captured by netting (dip netting and or seining); (3) 75% of the fish present after voluntary movement and netting will be captured by electrofishing; of these five percent will die and the remainder will experience temporary or permanent injury; (4) 25% of the fish present during electrofishing will not be captured and will die from stranding in the dewatered area; (5) the juvenile steelhead density used in calculation is 0.001 fish per ft<sup>2</sup>; and (6) all partial fish calculations will be rounded to the nearest whole number or whole fish. The results of the salvage effects and all other mortality pathways are presented in Table 6.

**Table 6. Fish salvage injury and mortality calculations for juvenile steelhead. Estimates include fish experiencing mortality or non-lethal adverse effects. Total Mortality includes electrofishing, stranding, crushing, and impingement on blocknets.**

Fish Salvage	Juvenile Steelhead					Totals
	2015	2016	2017	2018	Excavation of Bypass	
	Dredge Ponds	Channel 1	Channel 2 and Channel 1 repeat	Bypass and Channel 1 and 2 repeat	6 Occurances at 1,250 Ft <sup>2</sup> per	
Fish Density (Juveniles/ft <sup>2</sup> )	0.001	0.001	0.001	0.001	0.001	
Salvage Area (ft <sup>2</sup> )	203,147	261,143	434,141	519,639	7,500	
<b>Fish Present</b>	<b>189</b>	<b>243</b>	<b>403</b>	<b>483</b>	<b>8</b>	<b>1,325</b>
Volitional Movement from Salvage Zone after Slow Dewatering (50%)	0	-121	-202	-241	-4	-568
<b>Fish Remaining to be Salvaged</b>	<b>189</b>	<b>122</b>	<b>201</b>	<b>242</b>	<b>4</b>	<b>757</b>
Fish removed by Dip Seining (60%)	-113	-73	-121	-145	-2	-454
<b>Fish remaining to be Electrofished</b>	<b>76</b>	<b>49</b>	<b>80</b>	<b>97</b>	<b>2</b>	<b>303</b>
Electrofishing Capture (75%)	57	36	60	73	1	227
Electrofishing Injury (95% of 75%)	54	34	57	69	1	215
Electrofishing Mortality (5% of 75%)	3	2	3	4	0	12
Stranding Mortality (25%)	19	13	20	24	1	76
<b>Outside of Salvage Area</b>						
Crushing Mortality		3	3	3		9
Blocknet Mortality (0.7% of Capture)	1	1	1	2	0	5
<b>Total Non-lethal Adverse Effect</b>	<b>170</b>	<b>109</b>	<b>181</b>	<b>218</b>	<b>18</b>	<b>696</b>
<b>Total Mortality</b>	<b>23</b>	<b>19</b>	<b>27</b>	<b>33</b>	<b>6</b>	<b>108</b>

1. Numbers in calculations are rounded to the nearest whole number.
2. Capture for bypass repairs was increased to 1 per occurrence.
3. Crushing mortality occurs outside of the isolated salvage area.
4. Blocknet mortality occurs outside of the isolated salvage area but is based on a relationship to the number of fish captured in the isolated salvage area.

Any capture of juvenile steelhead will result in stress, injury, or mortality to juvenile steelhead. In Table 6, Total non-lethal adverse effects include any fish captured and released alive; total mortality fish captured dead or die in captivity. For the 4 years of salvage, including the dredge ponds, Channels 1 and 2, and the bypass, non-lethal adverse effects are expected for 170, 109, 181, and 218 juvenile steelhead with an additional 18 (i.e., three per occurrence) for bypass repairs. Total juvenile steelhead mortalities (electrofishing only) are three, two, three, and four. The total mortality estimated for crushing is nine, and blocknetting is five. Mortality for the 4 years of salvage and bypass repairs is 23, 19, 27, and 33 with an additional six mortalities (one per occurrence) for bypass repairs for a project total of 108. For all dewatering of channels, dewatering areas of the bypass for repairs, stranding, crushing, and blocknet impingement, the project is expected to have non-lethal adverse effects to 696 juvenile steelhead and kill 108 juvenile steelhead.

#### *2.4.1.8 Species Effects Summary*

Effects to species will generally occur during discrete events over a short-term period of 4 years during project implementation. Because of the scale of the project, a substantial length of channel will be isolated for reconstruction. The primary potential effects to species from project actions include turbidity exposure associated with watering new channels, fish salvage from dewatered channels, and fish passage through a bypass for 3 years. Lesser potential effects include possible changes in substrate conditions from temporary fine sediment deposition, potential favorable or unfavorable (until vegetation is established) water temperature changes, habitat loss from a reduction in river length, machinery noise from floodplain work, and a low risk of chemical contamination from fuel spills and limited herbicide use.

When introducing water to the bypass or Channels 1 and 2, substantial areas of disturbed channel bed will contribute to turbidity plumes. Flow introductions will occur over several days using a stepped approach and turbidity monitoring to keep peak turbidity spikes to short durations and limited intensity with low levels of turbidity persisting for several days. In addition, other actions such as installing bank structures or seepage from settling ponds may cause incidental turbidity; these events are expected to last only a few minutes to hours and be of low intensity. For all anticipated and incidental turbidity events, it is unlikely that steelhead adults will be present. NMFS expects 91 juvenile steelhead per year, for 3 years (273 total), to respond to turbidity exposure with minor behavior, feeding, and physiological changes. Suspended sediment will deposit in downstream substrates in the lower reach of the Crooked River; however, sediments will likely be mobilized and transported in rising flows prior to the following April/May steelhead spawning period.

Fish salvage will occur in floodplain ponds and during three dewatering events in separate years 2016 to 2018 if necessary to facilitate bypass repairs or to repeat salvage in mainstem isolated work areas if they are inundated due to a high water event. Salvage will employ methods to minimize handling of juvenile steelhead including slow dewatering, block-netting, seining and dip-netting, and electroshocking. For all dewatering of channels, dewatering areas of the bypass for repairs, stranding, crushing, and blocknet impingement, the project is expected to have non-lethal adverse effects to 696 juvenile steelhead and kill 108 juvenile steelhead.

Habitat alterations during project implementation include routing the Crooked River through a bypass which will affect passage and habitat access, substrate, and water temperature, and will increase noise and the risk of chemical contamination. The bypass is designed to allow adult and juvenile upstream and downstream passage throughout the year under average conditions. Additional design features will allow adult passage up to the 25-year peak flow. In addition, in the unlikely event of a 25-year flow, flood design features would guard against bypass berm failure and the diversion would not remain intact enough to become a passage barrier. As noted above, in the event the diversion dam is overtopped (i.e., greater than the 10-year peak), there are provisions to re-salvage the isolated channels.

Although the bypass was only designed to provide fish passage, it is shorter than the existing mainstem channel through the project reach (but equal in length to the new channel) and will be capable of transporting sediment and capturing groundwater. Habitat in the bypass is likely to be equivalent or slightly improved compared to the existing reach and provide at least the equivalent in utility for steelhead. In the long-term, habitat conditions are expected to be greatly improved throughout the action area.

#### 2.4.2 Effects on Critical Habitat

The project will have substantial long-term beneficial effects and short-term adverse effects on critical habitat. During project implementation, there will be limited periods of work in live water and extensive work in isolation or above the OHWM adjacent to live water. Project work will have the following potential short-term adverse effects on critical habitat PCEs: (1) Water quality (suspended sediment, temperature, chemical); (2) substrate (deposited sediment) and forage; and (3) obstruction, natural cover, and floodplain connectivity.

##### *2.4.2.1 Long-term Beneficial Effects*

Project actions provide improvements in stream function that address all of the primary limiting factors for the South Fork Clearwater River described in Table 5 including: (1) riparian and floodplain conditions; (2) water temperature; (3) migration barriers; (4) sediment; and (5) habitat complexity.

Currently, the Crooked River floodplain has reduced function due to intensive legacy dredge mining of the valley floor. The dominance of large armoring substrates has nearly eliminated natural geomorphic processes, altered surface and subsurface flow pathways, and reduced riparian vegetation. The proposed actions that address legacy mining include:

- General improvement to habitat complexity over the existing simplified habitat.
- Grading the valley primary and upland floodplains for full inundation at appropriate peak flow intervals and restoring more natural flow paths and water storage.
- Construction of secondary floodplain features such as swales, depression, and wetlands to promote natural recruitment of vegetation.

- Roughening the floodplain surface and adding LWD to stabilize the surface, provide organic material, and increase water holding capacity.
- Installing streambank structures including sod mats, coir logs, fascines, and LWD structures that will stabilize streambanks for several years until vegetation becomes established.
- Replanting streambanks, floodplain, and upland areas will stabilize these areas and increase shade which, in the long term, should decrease stream temperatures.
- Install 60 LWD structures in the project reach for the short and long terms for pool formation, water retention, instream cover, channel migration, bank erosion, and recruitment of LWD.

Project actions will restore complex habitat to the lower Crooked River by transforming the planform to a meandering riffle-pool morphology with accessible and complex floodplains. The length of the project reach will be shortened resulting in increased stream gradients designed to transport gravel substrate into and through the project reach. Although excess sediment is a common limiting factor throughout the South Fork Clearwater, in the Crooked River project reach a lack of spawning gravel limits steelhead spawning. With the new planform, spawning gravel recruitment and increased hyporheic exchange in these gravels are expected to create additional spawning areas. In addition to the new planform, side channel habitat will be added to provide velocity refuge during higher flows. However, side channels are designed to not be inundated during summer to avoid solar warming of excess shallow channels. In summary, the actions are designed to restore the channel and floodplain to more natural functions, and this will improve stream and PCE conditions in several ways and address primary habitat limiting factors for the South Fork Clearwater River steelhead population.

#### 2.4.2.2 Water Quality

##### Suspended Sediment

Suspended sediment is expected during planned watering of the bypass and reconstructed mainstem channels and at other less predictable times such as incidental seeps from substrate or sloughing of streambanks during placement of large wood structures. The duration and intensity of turbidity pulses will be greatly reduced by isolating channel construction, and employment of BMPs (e.g., minimizing disturbance areas, erosion control materials, controlled rewatering of the side channel, and turbidity monitoring). As discussed in 2.4.1.1 Suspended Sediment, peak turbidity is expected to last for up to 2 hours and low level turbidity may last for a few days during channel dewatering. All project-related turbidity, episodes are expected to be temporary (hours to days) with no long-term loss of conservation value to steelhead critical habitat.

## Water Temperature

The project location is at the base of the Crooked River watershed and there is evidence that juvenile rearing habitat is temperature limited and emigration from the Crooked River may be interrupted due to high water temperatures in late-summer and early-fall. So, reductions in stream temperature in the project area may have an important effect on juvenile passage and rearing in the project area.

There is a potential for interim adverse effects to water temperature from removing vegetation during the regrading of the valley floodplain and before vegetation is re-established. Most of the floodplain and all of the streambank vegetation will be removed in Channels 1 and 2 and, where possible, retained in Banks 1 and 2. Most of the vegetation will be salvaged and replanted (with exceptions for unusable plants or noxious weed species). Currently, coniferous trees account for 30% effective shade in the entire project area and only three percent of vegetation along the greenline of the river. Other grasses and shrubs provide limited shade near the river banks. Steep streambanks armored with large rocks have kept conifers high on the bank and far enough from the river so they are ineffective as shade. Cleared and reconstructed sections of the floodplain and streambanks will be replanted before and after rewatering the new channels. Streambanks will be planted first with 8-gallon container plants 5 to 6 feet tall. These plantings are expected to establish quickly in 1 to 2 years on the river banks and floodplain as a result of elevated water tables and soil additions. Floodplain depressions and channel features (swales, depressions, wetlands, and side channels) are designed to have frequent flood inundation and favorable substrate and moisture conditions for natural recruitment of riparian vegetation. In the short term, favorable streambank and flood plain conditions, with plantings and natural vegetation recruitment, should provide more shading over current conditions within 2 years. In the interim period, as all vegetation establishes and riparian and upland trees grow, effective shade for the entire project area is expected to increase from the current 30% to a long-term goal of 83%.

Project actions are anticipated to restore more natural surface and subsurface flow paths which are anticipated to help mitigate high water temperatures in the project reach. In addition, tributaries in the project area will be reconnected in surface channels which will improve habitat connectivity and likely offer thermal refugia. As discussed in the Species Effects Section, the reconstructed surface channel will be shorter in overall length with an increased gradient, will have reduced width-to-depth ratios (narrower and deeper channels), and will not have the extensive ponds and low velocity pools that it currently has. As a result of the channel reconstruction, water surface area and water travel time will be greatly reduced with a consequent insulating effect through reduced exposure to solar heating. Because water temperature is proportional to the heat load divided by the volume of water (Poole and Berman 2001), decreases in heat loading should reduce water temperatures.

Floodplain reconstruction will eliminate ponds that currently capture and expose groundwater to solar heat loading before it returns to the Crooked River. There is currently a 1°C (33.8°F) cooling of surface water through the project reach, which emphasizes the role of groundwater as an influence on stream temperature in streams at or near their headwaters (Caissie 2006; Poole and Berman 2001). The project proposes to eliminate these ponds which will help insulate



groundwater from additional solar heat, before entering the river. The project will enhance groundwater retention in the floodplain and riparian areas which should offer an enhanced cool groundwater input later into the summer. In addition, the riffle-pool morphology will encourage greater hyporheic exchange (two-way interaction between stream and subsurface flow), one of the most important factors in buffering (i.e., exchanging, not adding or subtracting heat) stream temperatures (Poole and Berman 2001).

The project is timely and well placed in relation to climate change. As discussed above, for a given heat load, less water will result in a higher water temperature. Mote (2003) has shown a downward trend in snow packs for Idaho and Luce (2009) reveals that, in Idaho, the most significant drying trends are for the driest 25% of years. Clark (2010), using data from 1967 to 2007, has shown a declining trend in annual mean and annual daily minimum flow for the South Fork Clearwater River. Less snowpack in any year means less water in summer and higher water temperatures with greater consequences in the driest summers. These trends and reduced summer flows are predicted to continue in the future and likely to result in higher stream temperatures. In light of climate change and these drying trends, the lower elevation base of Crooked River may be a critical gateway for ESA-listed fish accessing and exiting the natal habitats above the project area. Restoration of floodplain function and riparian vegetation will help insulate and buffer against water temperature increases caused by climate change (Beechie *et al.* 2012).

In summary, current shading is 30% for the project area and three percent along the streambanks. Vegetation will be cleared from Channels 1 and 2 while most will be retained in Banks 1 and 2. Replanting should restore current stream bank shading within 2 years, and project area shading is expected to increase to 83% over the long term as riparian and upland trees grow. Reconstruction of the floodplain will eliminate ponds that capture and expose groundwater to solar heat loading, and reconnect tributaries, improving habitat connectivity and likely offering additional thermal refugia. The Crooked River channel will be shortened, steepened, and narrowed reducing surface area and residence time which will reduce solar heat loading and warming of river water. In addition, the planned riffle-pool morphology will improve surface/ground water interaction likely resulting in cooler surface water temperatures. The combination of floodplain and channel reconstruction with extensive replanting of the reconstructed area will result in insulated and buffered, and possibly lowered, stream temperatures. This will improve the conservation value of critical habitat in the both the short and long terms.

### Chemical Contamination

As discussed in sub-section 2.4.1.5 Loss of Habitat, storage areas are at least 150 feet away from live water and wetland areas. Numerous BMP's are proposed (SWPPP, spill prevention and cleanup equipment, equipment washing, and work area isolation) that will minimize the risk of petroleum based chemical contaminants reaching the river or riparian areas. Surveys revealed that mercury levels in sediments and water are equal to background, so uncovering additional toxic metals is very unlikely. The use of herbicides will follow protocols and BMPs found in the Opinions for Herbicide Treatment of Invasive and Noxious Weeds on the Nez Perce National

Forest (NMFS and USFWS 2009) which will minimize the risk of toxic concentrations of the herbicides reaching the river. With implementation of all project BMP's, there is low risk of adverse effects on the water quality PCE from chemical contamination.

#### 2.4.2.3 Substrate and Forage

Project actions have the potential to mobilize and deposit fine sediment into substrates which has the potential to reduce available spawning substrate and invertebrate forage. As discussed in the Species Effects Section, deposited fine sediment is expected to remobilize during higher flows in the months prior to spring spawning. Invertebrate communities can change in response to changes in substrate condition; however, added fines are only expected for a few months in each year of the project and invertebrates will continue to drift through affected areas (Bjornn *et al.* 1977) and quickly recolonize (Bêche *et al.* 2005; Kreutzweiser *et al.* 2005). In addition, increases in bank and floodplain vegetation should add leaf litter to the nutrient cycle in the project area which would add forage for macroinvertebrates. Because effects to substrate are temporary, any reduction of invertebrates is likely to be short term and minor. Long-term improvements in vegetation and floodplain access will increase nutrient inputs and increase the forage area resulting in an increase in the conservation value of critical habitat in the project area.

#### 2.4.2.4 Obstruction of Fish Passage

As discussed in sub-section 2.4.2.2 Water Quality, from 2016 to 2018 the bypass is designed to allow adult and juvenile upstream and downstream passage throughout the year under average annual conditions. Additional design features will allow adult passage and flood control (i.e., guard against bypass berm failure) up to the 25-year peak flow. Any peak flow greater than the 25-year peak is unlikely to occur during the three years the bypass is in place. If a flow of this magnitude were to occur, it is unlikely that the diversion would become a passage barrier. The design of the new mainstem channels is for low gradient spawning and rearing and will be passable by adult and juvenile steelhead.

During flow introductions, BMPs call for channel monitoring to see if water initially goes subsurface in the newly reconstructed streambed. If this occurs, the streambed substrates will be remixed in an iterative process until the channel can hold the full flow of the Crooked River.

It is unlikely that there will be short-term interruptions to passage, and it is likely that long-term passage will be maintained because of the following: (1) The bypass will provide adult and juvenile steelhead passage year-round; (2) BMPs will ensure surface flow is stable when the flow is introduced to channels; and (3) the new channel design allows adult and juvenile passage.

#### 2.4.2.5 Natural Cover

Baseline conditions currently reducing natural cover include a lack of pool quality, LWD, side channels, connection to the floodplain and tributaries, shade, and habitat complexity. The project will add considerable habitat complexity to the channel. A new planform geometry will reestablish side channels and natural geomorphic processes resulting in floodplain access, undercut banks, and LWD recruitment with an additional 60 LWD structures placed in the channel and banks as part of the action. Planting and natural recruitment of riparian vegetation will result in overhanging vegetation and shade along low velocity channel margins. The new planform will have a riffle-pool morphology with an accessible floodplain which will increase quality pool habitat, substrate variety, and general habitat complexity. Because the bypass will utilize current channels and ponds in its construction, natural cover is expected to be similar to current conditions during project implementation. In summary, project actions will greatly increase habitat complexity, access to the floodplain, and natural cover, increasing the long-term conservation value of habitat in the action area.

#### 2.4.2.6 Summary of Effects on Critical Habitat

The project will have short- and long-term beneficial effects to critical habitat. Changes in the physical characteristics of the river such as channel morphology enhancing gravel and floodplain access will be immediate upon rewatering of newly constructed channels. Long-term benefits will progress over time as vegetation becomes established to provide more shade, cover, and nutrients to the project reach.

Water quality will be affected by project actions. Watering of reconstructed channels is anticipated to produce peaks in turbidity lasting for to 2 hours with low levels of turbidity lasting for several days. For all project-related turbidity, episodes are expected to be temporary (hours to days) with no long-term loss of conservation value to steelhead critical habitat. Current high water temperatures are caused by excessive solar heating due to a lack of vegetative shade and channel and floodplain characteristics that allow for excessive solar heating. Riparian plantings, and physical changes to the channel and floodplain that will encourage soil retention and natural vegetation recruitment, will improve shading in the interim period before riparian trees establish to provide long-term shading to the project reach. Physical changes to the channel and floodplain will reduce the surface area, residence time, and consequent solar heating of water flowing through the project reach. The physical changes to the channel and floodplain have the potential to cause short-term, interim, and long-term reductions in water temperatures. Full implementation of project BMPs will minimize the risk of chemical contamination from fuel storage and transfer, and the application of herbicides for weed control.

Deposited sediments from watering of newly constructed channels will likely be re-suspended and transported prior to steelhead spawning. In addition, invertebrates in depositional areas may be affected but invertebrate drift into the project area will provide forage. Long-term improvements in vegetation and floodplain access will increase nutrient inputs and increase the forage area resulting in an increase in the conservation value of critical habitat in the project area.

Fish passage will be afforded by a bypass during project implementation for flows up to the 25-year peak flood flow, an unlikely flow magnitude for the project time frame. During flow introductions, BMPs and the Emergency Action Plan call for channel monitoring to see if water initially goes subsurface in the newly reconstructed streambed. If this occurs, the streambed substrates will be remixed in an iterative process until the channel can hold the full flow of the Crooked River.

There is a lack of cover in the project reach is due to channel simplification from legacy dredge mining. The project will add many aspects of habitat complexity such as more frequent floodplain access, a more natural riffle pool morphology, 60 LWD structures, and increased riparian and streambank vegetation. In summary, project actions will greatly increase habitat complexity and restore more natural geomorphic processes increasing the long-term conservation value of habitat in the action area.

## **2.5 Cumulative Effects**

“Cumulative effects” are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). 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.

State and private timber harvest and cattle grazing are likely to continue at current levels in the action area. There are two larger parcels of private land that were historically or are currently mined. The Champion Mine is about 6 miles upstream from the mouth of Crooked River and has not been developed, and no known mining or development is proposed. Premium Exploration owns about 1 mi<sup>2</sup> near the town of Orogrande. The mining company has been conducting exploration activities on this land for the past few years including building roads and drilling test pits. Full scale mining operations have been proposed on these lands. These activities have the potential to increase sediment delivery into Crooked River.

## **2.6 Integration and Synthesis**

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action to the environmental baseline and the cumulative effects, taking into account the status of the species and critical habitat, to formulate the agency’s biological opinion as to whether the proposed action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated or proposed critical habitat for the conservation of the species.

Project actions are designed to correct baseline habitat limiting factors in the action area caused by past dredge mining and, with improved sediment transport, will have the potential to maintain

habitat. It is also likely that habitat will recover more quickly, should future mining add fine sediment to the system. Habitat damage and channel and floodplain reconstruction in the action area are extensive enough so that over 10,000 feet of the Crooked River channel and adjacent Crooked River floodplain will need to be isolated for 2.5 years. To isolate the mainstem channel, the Crooked River will be diverted to a bypass then returned to the reconstructed mainstem channel after two and half years. When diverting water from the mainstem to the bypass (Channels 1 and 2) and when returning water from the bypass to the reconstructed mainstem, water will enter newly disturbed channel beds which will mobilize sediments and cause turbidity downstream. Fish will need to be salvaged and passage may be temporarily interrupted. In addition, floodplain access will be temporarily unavailable in the project reach but post-project the floodplain will be inundated more frequently than under current baseline conditions. Other non-adverse effects will occur such as a loss of river length (from low quality baseline habitat to high quality reconstructed habitat) and noise disturbance (behavioral response) when machines are operating adjacent to live water.

There are many BMPs which will minimize but not eliminate fish exposure to turbidity plumes. Water will be transitioned between channels in each of three work seasons after July 15. At this time, juvenile steelhead are the only life stage expected to be present, and surveys show very low to no steelhead presence in and below the project reach. Turbidity plumes are expected to have peaks lasting for hours and low level turbidity lasting for up to several days. From 2016 to 2018, 91 juvenile steelhead per year (273 total) are expected to have temporary minor behavioral, feeding, and physiological responses to turbidity. For each year of these turbidity plumes, the suspended sediment from these plumes is expected to settle on substrates within the project reach but is likely to be mobilized during increasing flows in the fall and early winter before the next steelhead spawning period and fry emergence.

Fish salvage will use slow dewatering, and various net techniques to reduce the number of fish that will need to be salvaged using electroshocking. Salvage will be used for floodplain ponds in 2015, when isolating the mainstem channels and dewatering the bypass (2016 to 2018), and for isolating areas of the bypass if repairs are needed during bypass use (2016 to 2018). It is expected that capture and handling by any means will cause stress, injury or death to juvenile steelhead. There is also the potential of additional mortality resulting from crushing during diversion work. NMFS estimates the number of juvenile steelhead that will experience non-lethal adverse effects from 4 years of salvage and all bypass repairs to be 107, 109, 181, 218, and 18 for a project total of 696. The total mortality estimated for juvenile steelhead from salvage, crushing by instream machinery, and blocknetting over the years 2015 to 2018 will be 108. The number of sub-lethally affected or killed juvenile steelhead is not large enough to have significant effects on the abundance, productivity, spatial structure, or diversity of the South Fork Clearwater River steelhead population.

Maintaining adult and juvenile passage through the project area year-round during the project life is very important because the project is located at the base of the Crooked River watershed and affects all upstream and downstream migration into and out of the watershed. From 2016 to 2018, fish passage will be maintained through a bypass which has been designed to allow adult and juvenile passage during bankfull flows; a flow slightly greater than the average annual peak flow. Passage will be temporarily blocked by nets when placing diversion structures for a few

hours each of the 3 years. A high capacity design for the bypass, numerous BMPs, and an EAP are included in the action to maintain passage in the event of a high flow event exceeding the 10-year peak (capacity of the bypass) or flow going subsurface during initial watering or rewatering of channels. With these measures, it is unlikely that passage will be compromised for significant periods of time for the life of the project.

The South Fork Clearwater River steelhead population has three major spawning areas, and four minor spawning areas. Rearing also occurs in those areas and in the stream reaches between those areas. The Crooked River is included in one of the Major Spawning Areas. For this action, estimated annual mortality of juvenile steelhead is low, and other adverse effects to steelhead are temporary and/or not substantial enough to affect VSP criteria at the population scale. Because adverse effects are not great enough to affect the viability of the South Fork Clearwater River steelhead at the population scale, steelhead viability will not be affected at the MPG or DPS scales.

Critical habitat is not at risk during this project. Baseline data show water temperatures are in the suboptimal range for juvenile steelhead rearing in the project reach in summer. The project will restore floodplain function and subsurface flow paths which may result in lower water temperatures and increase the area or length of season of suitable rearing habitat in the project reach. Baseline data show little effective shade in the project reach. For the project channel and floodplain, replanted and anticipated increased natural vegetation of banks and flood plain will provide interim and long-term shade and cover while short-term losses of bank vegetation re-establish.

Although some spawning may occur in the project reach, almost all suitable spawning habitat exists above the project reach. The new channel is designed to transport and recruit spawning gravel to increase spawning area in the project reach. The bypass will provide adequate passage throughout the year and is not designed to improve or worsen spawning or rearing conditions in the project reach.

Short-term water quality will be affected by turbidity and will be at risk from chemical contamination. While watering newly constructed channels turbidity plumes are expected to be of sufficient intensity and duration to cause temporary adverse effects to steelhead. The risk of chemical contamination from fuel transfer and storage, and herbicide use will be short-term and minimized through BMPs. These include staging fuel activities at least 150 feet from live water and riparian areas, and limiting the areal extent and proximity to live water when applying herbicides. This spill risk will not add to the risk of potential future contamination (cumulative effects) from mining.

Substrate and forage will potentially be affected in the short-term when suspended sediment settles on substrates and potentially affects invertebrate prey. However, invertebrates will continue to drift into the project reach during project implementation and invertebrates will quickly re-establish in substrates in the bypass and reconstructed channels.

Because the project reach is primarily suited to and used for passage, and passage will be maintained, there will be very small short-term effect or increased risk of effects to the baseline

conservation value of critical habitat in the project reach. Because there is little risk at the project scale there is little risk to the conservation value of Snake Basin steelhead critical habitat at the designation scale. Other effects to critical habitat will be minimal and of short duration. All restorative project actions are designed to restore functionality to the project area and add substantial long-term conservation value to steelhead critical habitat in the project reach.

## 2.7 Conclusion

After reviewing the status of the affected ESA-listed species and their designated critical habitats, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of SRB steelhead and is not likely to destroy or adversely modify SRB steelhead designated critical habitat.

## 2.8 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a 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 regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

### 2.8.1 Amount or Extent of Take

The proposed action is reasonably certain to result in incidental take of the ESA-listed species. NMFS is reasonably certain the incidental take described here will occur, because SRB steelhead are expected to occur in action area, and the proposed action may cause harm through effects of suspended sediment (turbidity) and efforts to exclude or capture and relocate fish (dewatering and salvage). All take will be limited to 4 consecutive years of project operation. Only juvenile steelhead are expected to be present during fish salvage or times when project actions may cause suspended levels to rise significantly above background levels.

For each watering event (i.e., watering a new or dewatered channel or partial channel area), turbidity plumes are expected to last from hours (e.g., bypass repair) to several days (e.g., watering channels). Each event (plume) is expected to be characterized by a spike of varying intensities then quickly tapering to low intensity. Channel watering events, where flow is

increased in steps, are larger in scale and are expected to have higher intensity peaks for each step. These may last up to 2 hours each over the multi-day stepped flow increases. These sediment plumes will likely cause minor behavioral, feeding or physiological responses with no mortality.

Monitoring or measuring the number of steelhead actually affected by turbidity during project activities is not possible for a number of reasons; therefore, the number of fish affected via this pathway cannot be quantified. However, turbidity that causes this form of take is readily measurable and it is directly related to the amount of take. Therefore, the extent and duration of downstream turbidity is a suitable surrogate measure of incidental take caused by turbidity. For take exceedence thresholds, monitoring and downstream extent distances are measured from either the source point of turbidity or, for channel waterings, from the downstream junction of the bypass and mainstem channels.

Operations of channel dewatering (i.e., fish exclusion, water diversion, dewatering, and fish capture) may result in injury or death of juvenile steelhead from crushing, netting, and electroshocking. Incidental take caused by fish salvage includes both sub-lethal and lethal take. Lethal take can be counted directly (108 dead over the life of the project; Table 7); however, all sublethal take from fish salvage is not observable through captured fish, however, the number of fish captured can be counted (minus the number of dead fish) and used as a surrogate measure of sublethal take from fish salvage (696 with non-lethal effects over the life of the project; Table 7).

**Table 7. Total non-lethal take and lethal take for all years of the project.**

Fish Salvage	Juvenile Steelhead					Totals
	2015	2016	2017	2018	Excavation of Bypass	
	Dredge Ponds	Channel 1	Channel 2 and Channel 1 repeat	Bypass and Channel 1 and 2 repeat	6 Occurances at 1,250 Ft <sup>2</sup> per	
<b>Total Non-lethal Adverse Effect</b>	<b>170</b>	<b>109</b>	<b>181</b>	<b>218</b>	<b>18</b>	<b>696</b>
<b>Total Mortality</b>	<b>23</b>	<b>19</b>	<b>27</b>	<b>33</b>	<b>6</b>	<b>108</b>

The amount or extent of take allowed in the Opinion is exceeded if:

1. Turbidity is observed beyond 0.5 miles downstream of the downstream extent of the sediment source.
2. Turbidity is greater than or equal to 50 NTUs for greater than 2 hours, or equal to or greater than 25 NTUs for 10 days, at a monitoring distance of no more than 300 feet downstream of the downstream extent of the turbidity source.
3. During work in the wet (large wood installation) in Banks 1 or 2, turbidity exceeds 50 NTUs at a monitoring distance of no more than 300 feet downstream of the turbidity source.



4. Capture or mortality of juvenile steelhead exceeds the annual or project Total Capture or Total Mortality as described in Table 7. Total Capture and Total Mortality associated with bypass repairs will be counted towards the annual Total Captured and Total Mortality in the year the repair occurs.

The authorized take includes only take caused by the proposed actions within the action area as defined in this Opinion. Should any of the above limits be exceeded, the NPCNF, BPA or COE shall immediately contact NMFS to reinitiate consultation.

### 2.8.2 Effect of Take

After reviewing the status of SRB steelhead, their designated critical habitat, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, NMFS concludes that this level of anticipated take is not likely to result in jeopardy to this species.

### 2.8.3 Reasonable and Prudent Measures and Terms and Conditions

“Reasonable and prudent measures” are nondiscretionary measures to minimize the amount or extent of incidental take (50 CFR 402.02).

The NPCNF, BPA, and COE (for those measures relevant to the CWA section 404 permit) shall comply with the following RPMs:

1. Minimize the potential for incidental take resulting from implementation of the proposed action.
2. Ensure completion of a monitoring and reporting program to confirm that the terms and conditions in this ITS were effective in avoiding and minimizing incidental take from permitted activities and ensure incidental take is not exceeded.

The terms and conditions described below are non-discretionary, and the NPCNF, BPA, and COE or any applicant must comply with them in order to implement the RPM (50 CFR 402.14). The NPCNF, BPA, and COE or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. To implement RPM 1, the NPCNF, BPA, and COE (for those measures relevant to the CWA section 404 permit) shall ensure that:
  - a. The proposed action, including all described conservation measures, BMPs and EAP, will be implemented as described in the BA, proposed action section, and Appendix A of this Opinion.

- b. All refueling and fuel storage over 5 gallons will be at least 150 feet from riparian areas.
  - c. Motorized vehicles and machinery, used in or near the stream or riparian areas, are cleaned of external oil, grease, dirt and mud; and repair leaks prior to arriving at the project site, and daily after arriving onsite.
  - d. Spill clean-up kits are available on site and accessible to all vehicles entering the project area on either side of, or driving on, the bypass berm, and at equipment maintenance sites, and refueling locations.
  - e. All vehicle operators (including truck operators) are educated on proper deployment of spill kits.
  - f. NMFS is contacted within 48 hours of any Project motorized vehicle or machinery that is leaking fuels or other toxic chemicals within 50 feet of moving water, project floodplain, or riparian area.
  - g. All potential sources of sediment delivery to streams from the bypass berm are eliminated or minimized prior to and throughout the duration of use.
2. To implement RPM 2 (monitoring and reporting), the NPCNF, BPA, and COE (as relevant to the CWA section 404 permit) shall ensure that:
- a. Turbidity monitoring will be in-place prior to watering the mainstem and bypass.
  - b. Turbidity monitoring is required during rewatering of any isolated areas of the bypass (including repairs).
  - c. Turbidity monitoring will be used whenever there is visible turbidity from a point source. Monitoring will follow the same protocol as turbidity monitoring described in the action with monitoring will be stationed 100 feet downstream from the point source.
  - d. For channel waterings, monitoring will be stationed 300 feet downstream from the downstream junction of the bypass and mainstem channels.
  - e. Background turbidity monitoring will be taken at least 100 feet upstream of the project reach.
  - f. Weirs for blocking passage into dewatered channels will be checked and cleaned of debris daily.
  - g. NMFS will be notified if any environmental effects occur from implementation of the action that were not considered in the BA or this Opinion.
  - h. If the amount or extent of take as described above (both from dewatering/salvage and turbidity) is exceeded, the NPCNF shall cease take-causing activities and contact NMFS as soon as possible.
  - i. Take and attainment of project objectives are monitored and reported; reports shall also indicate any adaptive management activities planned or taken as a result of completed monitoring observations.

- j. A project report summarizing the results of the monitoring above shall be submitted to NMFS by December 31 of the year in which activities were implemented. The post-project report shall also include a statement on whether all the terms and conditions of this Opinion were successfully implemented.
- k. Submit post-project reports to:

Snake Basin Area Office Director  
National Marine Fisheries Service  
Attn: David Mabe  
Plaza IV, Suite 220  
800 East Park Boulevard  
Boise, Idaho 83712-7743

NOTICE: If a steelhead or salmon becomes sick, injured, or killed as a result of project-related activities, and if the fish would not benefit from rescue, the finder should leave the fish alone, make note of any circumstances likely causing the death or injury, location and number of fish involved, and take photographs, if possible. If the fish in question appears capable of recovering if rescued, photograph the fish (if possible), transport the fish to a suitable location, and record the information described above. Adult fish should generally not be disturbed unless circumstances arise where an adult fish is obviously injured or killed by proposed activities, or some unnatural cause. The finder must contact NMFS Law Enforcement at (206) 526-6133 as soon as possible. The finder may be asked to carry out instructions provided by Law Enforcement to collect specimens or take other measures to ensure that evidence intrinsic to the specimen is preserved.

## 2.9 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

1. To mitigate the effects of climate change on ESA-listed salmonids, follow recommendations by the ISAB (2007) to plan now for future climate conditions by implementing protective tributary and mainstem habitat measures; as well as protective hydropower mitigation measures. In particular, implement measures to protect or restore riparian buffers, wetlands, and floodplains; remove stream barriers; and to ensure late summer and fall tributary streamflows.
2. The COE should continue to work with local planning and zoning bodies to protect sensitive streamside areas from future development and subsequent need for streambank protection measures.

Please notify NMFS if the action agencies or designated Federal representative carries out any of these recommendations so that we will be kept informed of actions that minimize or avoid adverse effects and those that benefit listed species or their designated critical habitats.

## **2.10 Reinitiation of Consultation**

This concludes formal consultation for the Crooked River Valley Rehabilitation Project.

As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) the amount or extent of incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

## **3. MAGNUSON-STEVENSON FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT CONSULTATION**

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the NPCNF and descriptions of EFH for Pacific coast salmon (PFMC 1999) contained in the fishery management plans developed by the Pacific Fishery Management Council (PFMC), including Amendment 18 (79 FR 75449) and approved by the Secretary of Commerce.

### **3.1 Essential Fish Habitat Affected by the Project**

The PFMC designated EFH in the South Fork Clearwater River sub-basin, including the Crooked River watershed for Chinook and coho salmon (PFMC 1999). The action and action area for this consultation are described in the Introduction to this document. The action area includes areas designated as EFH for various life-history stages of Chinook and coho salmon.

### **3.2 Adverse Effects on Essential Fish Habitat**

Based on the information provided in the BA and the analysis of effects presented in the ESA portion of this document, NMFS concludes that the proposed action will have the following adverse effects on designated Chinook and coho salmon EFH: (1) There will be short-term increased sediment affecting water quality and substrate; (2) there is a risk of chemical contamination of water quality; and (3) temporary disruption of juvenile migration.

### **3.3 Essential Fish Habitat Conservation Recommendations**

To address the three potential adverse effects to EFH, the NPCNF and COE should ensure that:

1. The proposed action, including all described conservation measures, BMPs and EAP, will be implemented as described in the BA, and proposed action section and Appendix A of this Opinion. (Addresses adverse effects 1, 2, and 3)
2. All refueling and fuel storage over 5 gallons will be at least 150 feet from riparian areas.
3. Motorized vehicles and machinery, used in or near the stream or riparian areas, are cleaned of external oil, grease, dirt and mud; and repair leaks prior to arriving at the project site, and daily after arriving onsite.
4. Spill clean-up kits are on all vehicles entering the project area or driving on the bypass berm, equipment maintenance sites, and refueling locations.
5. All vehicle operators (including truck operators) are educated on proper deployment of spill kits.
6. NMFS is contacted within 48 hours of any Project motorized vehicle or machinery that is leaking fuels or other toxic chemicals within 50 feet of moving water, project floodplain, or riparian area.
7. All potential sources of sediment delivery to streams from the bypass berm are eliminated or minimized prior to, and throughout the duration of, use.

Fully implementing these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in section 3.2, above, approximately 115 acres of designated EFH for Pacific coast salmon.

### **3.4 Statutory Response Requirement**

As required by section 305(b)(4)(B) of the MSA, the Federal agency must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation from NMFS. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations, unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NMFS Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects [50 CFR 600.920(k)(1)].

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

### **3.5 Supplemental Consultation**

The NPCNF, BPA, and COE must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations [50 CFR 600.920(l)].

## **4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW**

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

### **4.1 Utility**

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this document are the NPCNF, its representatives, its contractors, and the COE. Other interested users include the NPT and BPA. Individual copies of this document were provided to the entities listed in the

transmittal letter. This consultation will be posted on NMFS West Coast Region website (<http://www.westcoast.fisheries.noaa.gov>). The format and naming adheres to conventional standards for style.

## 4.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, ‘Security of Automated Information Resources, Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

## 4.3 Objectivity

**Information Product Category:** Natural Resource Plan.

**Standards:** This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including NMFS ESA Consultation Handbook, ESA Regulations, 50 CFR 402.01, *et seq.*, and the MSA implementing regulations regarding EFH, 50 CFR 600.920(j).

**Best Available Information:** This consultation and supporting documents use the best available information, as referenced in the Literature Cited section. The analyses in this Opinion/EFH consultation contain more background on information sources and quality.

**Referencing:** All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

**Review Process:** This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with Northwest Region ESA quality control and assurance processes.

## 5. REFERENCES

- Ainslie, B.J., *et al.* 1998. Effects of Pulsed and Continuous DC Electrofishing on Juvenile Rainbow Trout. *North American Journal of Fisheries Management*. v.18(4). 905-918pp.
- Anderson, P., B. Taylor, and G. Balch. 1996. Quantifying the effects of sediment release on fish and their habitats. Eastern B.C. and Alberta Area Habitat Units, Canadian Department of Fisheries and Oceans.
- Bash, J., C. Berman, and S. Bolton. 2001. Effects of turbidity and suspended solids on salmonids. University of Washington.
- Baatrup, E. 1991. Structural and functional effects of heavy metals on the nervous system, including sense organs, of fish. *Comp. Biochem. Physiol. C* 100, 253-257.
- Berg, L. and T.G. Northcote. 1985. Changes in territorial, gill-flaring, and feeding behavior in juvenile coho salmon (*Oncorhynchus kisutch*) following short-term pulses of suspended sediment. *Canadian Journal of Fisheries and Aquatic Sciences* 42:1410-1417.
- Bêche, L.A., S.L. Stephens, and V.H. Resh. 2005. Effects of prescribed fire on a Sierra Nevada (California, USA) stream and its riparian zone. *Forest Ecology and Management*. 218(1-3):37-59.
- Beechie *et al.* 2012. Restoring salmon habitat for a changing climate. *River Research Applications*. Volume 29, Issue 8, pages 939 to 960.
- Bell, M. 1991. Fisheries handbook of engineering requirements and biological criteria. U.S. Army Corps of Engineers, North Pacific Division, Portland, Oregon.
- Birtwell, I.K. 1999. The effects of sediment on fish and their habitat. Canadian Stock Assessment Secretariat Research Document 99/139, West Vancouver, British Columbia.
- Bisson, P.A. and R.E. Bilby. 1982. Avoidance of suspended sediment of juvenile coho salmon. *North American Journal of Fisheries Management* 4:371-374.
- Bjornn, T.C., M.A. Brusven, M.P. Molnau, J.H. Milligan, R.A. Klamt, E. Chacho, and C. Schaye. 1977. Transport of granitic sediment in streams and its effects on insects and fish. University of Idaho, Forest, Wildlife and Range Experiment Station. Moscow, Idaho. 46 pages.
- Bjornn, T.C. and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. Pages 83–138 in W.R. Meehan, editor. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society, Special Publication 19. Bethesda, Maryland.



- Bowersox, B.J., R. Banks, and E. Crawford. 2011. Potlatch River steelhead monitoring and evaluation, 2009 annual report. Pacific Coast Salmon Recovery Funds Contract # 05 052 08 CW M5, NOAA Intensively Monitored Watershed Fund Contract #10-37, Idaho Department of Fish and Game Report # 11-103, February 2011. Idaho Department of Fish and Game: Boise, Idaho. 42 p.
- Caissie, D. (2006). "The thermal regime of rivers: a review." *Freshwater Biology* 51(8): 1389-1406.
- Cederholm, C.J. and L.M. Reid. 1987. Impact of forest management on coho salmon (*Oncorhynchus kisutch*) populations of the Clearwater River, Washington: A project summary. E. Salo, and T. W. Cundy, editors. *Streamside management: Forestry and fishery interactions* -University of Washington Institute of Forest Resource Contribution 57.
- Chapman, D.W. 1988. Critical Review of Variables Used to Define Effects of Fines in Redds of Large Salmonids. *Transactions of the American Fisheries Society* 117(1):1-21.
- CH2MHill. 2012. Yankee Fork Habitat Improvement Project Pond Series 3 Side Channel Creation. Post-Project Monitoring Report. CH2MHill. Boise ID.
- Clark, G.M., 2010. Changes in patterns of streamflow from unregulated watersheds in Idaho, western Wyoming, and northern Nevada. *Journal of the American Water Resources Association*, Volume 46, Issue 3, pages 486 to 497.
- Climate Impacts Group. 2004. Overview of climate change impacts in the U.S. Pacific Northwest. Seattle, WA. University of Washington: 13.
- Connor, A. 2014. *Unpublished raw turbidity data*. e-mail dtd 2015 April 4.
- Currett, T. 2005. *Personal communication*. Idaho Department of Fish and Game.
- Currett, T. 2012. *Personal communication*. Idaho Department of Fish and Game.
- Dalbey, S.R., *et al.* 1996. Effect of electrofishing pulse shape and electrofishing-induced spinal injury on long-term growth and survival of wild rainbow trout. *North American Journal of Fisheries Management*. v.16(3). 560-569pp.
- Ebersole JL, Liss WJ, Frissell CA. Relationship between stream temperature, thermal refugia and rainbow trout *Oncorhynchus mykiss* abundance in arid-land streams in the northwestern United States. *Ecology of Freshwater Fish* 2001. 10: 1–10.
- Ecovista, *et al.* 2003. Draft Clearwater subbasin assessment: 125.

- Everest, F.H. and D.W. Chapman. 1972. Habitat selection and spatial interaction by juvenile Chinook salmon and steelhead trout in two Idaho streams. *Journal of the Fisheries Research Board of Canada* 29(1):91-100.
- Everest, F.H., and coauthors. 1987. Fine sediment and salmonid production: A paradox. Pages 98-142 in E. Salo, and T. W. Cundy, editors. *Streamside management: Forestry and fishery interactions*. University of Washington Institute of Forest Resources Contribution 57.
- FHWA (Federal Highway Administration). 2009. *Construction Noise Handbook*. Available on line: [http://www.fhwa.dot.gov/environment/noise/construction\\_noise/handbook/handbook09.cfm](http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm)
- Foltz, R.B., B. Westfall, and B. Kopyscianski. 2013. Turbidity changes during culvert to bridge upgrades at Carmen Creek, Idaho. Res. Note RMRS-RN-54. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 12 p.
- Foltz, R.B., K.A. Yanosek, and T.M. Brown. 2008. Sediment concentration and turbidity changes during culvert removals. *Journal of Environmental Management*. 87(3): 329-340.
- Ford, M.J., *et al.*, Ed. 2011. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Pacific Northwest. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-113.
- FWS (U.S. Fish and Wildlife Service). 2002. Report on activities conducted during calendar year 2001 under bull trout recovery sub permit FWSWWO-6, issued pursuant to Regional Blanket Permit TE-702631. Lacey, WA. January 31, 2002.
- Good, T.P., *et al.* 2005. Updated status of Federally listed ESUs of West Coast salmon and steelhead. U. S. Department of Commerce. NMFS-NWFSC-66
- Gregory, R.S. and T.G. Northcote. 1993. Surface, planktonic, and benthic foraging by juvenile Chinook salmon (*Oncorhynchus tshawytscha*) in turbid laboratory conditions. *Canadian Journal of Fisheries and Aquatic Sciences* 50:233-240.
- Hall-Griswold, J., *et al.* 1995. Idaho habitat/natural production monitoring part I. Annual Report 1994. IDFG 96-2, Project Number 91-73, Contract Number DE-BI79-91BP21182, November 1995, 62 pp.
- Henjum, M.G., *et al.* 1994. Interim protection for late-successional forests, fisheries, and watersheds: National forests east of the Cascade crest, Oregon and Washington. Bethesda, MD. The Wildlife Society: 261.
- Hudy, M. 1985. Rainbow trout and brook trout mortality from high-voltage AC electrofishing in a controlled environment. *North American Journal of Fisheries Management* 5:475-479.

- IDEQ (Idaho Department of Environmental Quality). 2003. South Fork Clearwater River Subbasin Assessment and TMDL. Boise, ID.
- IDEQ. 2011. Idaho Champion Group Lode and Pacific Group Lode Claims; Preliminary Assessment and Site Inspection Report. Grangeville, ID.
- ICBTRT (Interior Columbia Basin Technical Recovery Team). 2003. Independent Populations of Chinook, Steelhead, and Sockeye for Listed Evolutionarily Significant Units Within the Interior Columbia River Domain, Interior Columbia Technical Recovery Team, Working Draft, July 2003. [http://www.nwfsc.noaa.gov/trt/col/trt\\_pop\\_id.cfm](http://www.nwfsc.noaa.gov/trt/col/trt_pop_id.cfm).
- ICBTRT. 2007. ICBTRT viability memo, Scenarios for MPG and ESU viability consistent with TRT viability criteria, Interior Columbia Technical Recovery Team, January 8, 2007. [http://www.nwfsc.noaa.gov/trt/col/trt\\_viability.cfm](http://www.nwfsc.noaa.gov/trt/col/trt_viability.cfm).
- ICBTRT. 2010. Status Summary – Snake River Steelhead DPS. Interior Columbia Technical Recovery Team: Portland, Oregon
- ISAB (Independent Scientific Advisory Board). 2007. Climate Change Impacts on Columbia River Basin Fish and Wildlife. Independent Scientific Advisory Board for the Northwest Power and Conservation Council, Columbia River Basin Indian Tribes, and National Marine Fisheries Service. ISAB 2007-2 <http://www.nwcouncil.org/library/isab/isab2007-2.htm>.
- Jakober, M. 2013. POST-Project Checklist for Actions Implemented Under the FS & BLM Programmatic Stream Crossing and Replacement Biological Assessment (June 2012). Bitterroot National Forest, Hamilton, MT.
- Keefer, K., A. Peery, and B. High. 2009. Behavioral thermoregulation and associated mortality trade-offs in migrating adult steelhead (*Oncorhynchus mykiss*): variability among sympatric populations. *Can. J. Fish. Aquat. Sci.* V. 66. Pp 1734–1747.
- Kiefer, R.B. and J.N. Lockhart. 1992. Idaho Habitat and Natural Production Monitoring: Part II. Fisheries Research Station, Idaho Department of Fish and Game. Project Number 91-73, contract Number DE-BI79-91-BP21182.
- Kiefer, R.B. and J.N. Lockhart. 1994. Intensive Evaluation and Monitoring Of Chinook Salmon And Steelhead Trout Production, Crooked River And Upper Salmon River Sites. Annual Progress Report. Idaho Department of Fish and Game. Project Number 9 1-73, Contract Number DEBI79- 9-BP21182.
- Kreutzweiser, D., *et al.* (2005). "Effects of fine sediment inputs from a logging road on stream insect communities: a large-scale experimental approach in a Canadian headwater stream." *Aquatic Ecology* 39(1): 55-66.

- Lee, D.C., *et al.* 1997. Broadscale assessment of aquatic species and habitats. Pages 1057-1713 in T.M. Quigley and S.J. Arbelbide. An assessment of ecosystem components in the Interior Columbia basin and portions of the Klamath and Great Basins. U.S. Forest Service, Pacific Northwest Research Station, Portland, OR.
- Leopold, L.B., M.G. Wolman, and J.P. Miller. 1964. Fluvial Processes in Geomorphology. Dover Publications, Inc. New York.
- Lloyd D. 1987. Turbidity as a Water Quality Standard for Salmonid Habitats in Alaska. North American Journal of Fisheries management 7:34-45.
- Luce, C.H. and Z.A. Holden. 2009. Declining annual streamflow distributions in the Yacific Northwest United States, 1948-2006. Geophysical Research Letters, Volume 36, Issue 16.
- McElhany, P., *et al.* 2000. Viable salmonid populations and the recovery of evolutionarily significant units. U.S. Dept. Commerce, NOAA Tech Memo NMFS-NWFSC-42.
- McIntosh, B.A., *et al.* 1994. Management history of eastside ecosystems: Changes in fish habitat over 50 years, 1935 to 1992. Gen. Tech. Rep. PNW-GTR-321
- McLeay, D.J., I.K. Birtwell, C.F. Hartman, and G.L. Ennis. 1987. Responses of arctic grayling (*Thymallus arcticus*) to acute and prolonged exposure to Youkon River placer mining sediment. Canadian Journal of Fisheries and Aquatic Sciences, 44:658-673.
- McMichael, G.A., *et al.* 1998. Electrofishing Injury to Stream Salmonids; Injury Assessment at the Sample, Reach, and Stream Scales. North American Journal of Fisheries Management. v.18(4). 894-904pp.
- Mote, P.W., 2003, Trends in snow water equivalent in the Pacific Northwest and their climatic causes, Geophys. Res. Lett., v. 30 ((12)), pp. 1601, doi:doi:10.1029/2003GL017258.
- Muck, J., 2010. Biological effects of sediment on bull trout and their habitat. July 13, 2010. U.S. Fish and Wildlife Service, Lacey, WA.
- Neff, J.M. 1985. Polycyclic aromatic hydrocarbons. 416-454p. In: G.M. Rand and S.R. Petrocelli (Editors), Fundamentals of aquatic toxicology. Hemisphere Publishing.
- Newcombe, C.P. and J.O.T. Jensen. 1996. Channel suspended sediment and fisheries: a synthesis for quantitative assessment of risk and impact. North American Journal of Fisheries Management 16:693-727.
- Nielsen, J.L., T.E. Lisle, and V. Ozaki. 1994. Thermally stratified pools and their use by steelhead in Northern California streams. Transactions of the American Fisheries Society, 123:613-626.

- NMFS (National Marine Fisheries Service). 2000. Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act. URL: <http://www.westcoast.fisheries.noaa.gov/>
- NMFS. 2009. Nez Perce National Forest Noxious Weeds Programmatic. NMFS No. 2008/03330. Grangeville, Id.
- NMFS 2011. Anadromous Salmonid Passage Facility Design <http://www.westcoast.fisheries.noaa.gov/>.
- NMFS. 2011a. Draft Recovery Plan, Chapter 5, Section 5.3, Status and Recovery, Salmon River MPG, in the Snake River Steelhead DPS. NMFS: Boise, Idaho. <http://www.idahosalmonrecovery.net/recoverplans/srsteelhead.html>
- NMFS. 2011b. Draft Recovery Plan, Chapter 5, Section 5.2, Status and Recovery, Clearwater River MPG, in the Snake River Steelhead DPS. NMFS: Boise, Idaho. <http://www.idahosalmonrecovery.net/recoverplans/srsteelhead.html>
- NMFS. 2011c. Draft Recovery Plan, Chapter 5, Section 5.1, Idaho Snake River Steelhead Status and Recovery. NMFS: Boise, Idaho. <http://www.idahosalmonrecovery.net/recoverplans/srsteelhead.html>
- NMFS. 2014. Draft Idaho Management Unit Plan for spring/summer Chinook & steelhead. NOAA Fisheries West Coast Region website. URL: [http://www.westcoast.fisheries.noaa.gov/protected\\_species/salmon\\_steelhead/recovery\\_planning\\_and\\_implementation/snake\\_river/current\\_snake\\_river\\_recovery\\_plan\\_documents.html](http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/snake_river/current_snake_river_recovery_plan_documents.html)
- NMFS and USFWS (United States Fish and Wildlife Service). 1998. Matrix of Pathways and Indicators of Watershed Condition for Chinook, Steelhead, and Bull Trout. Local adaptation for the Clearwater Basin and Lower Salmon. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Environmental and Technical Services Division, Habitat Conservation Branch.
- NRC 1996. (National Research Council). 1996. Upstream Salmon and Society in the Pacific Northwest. National Academy Press, Washington, D.C.
- Peterson, J.T., *et al.* 2004. An Evaluation of Multipass Electrofishing for Estimating the Abundance of Stream-Dwelling Salmonids. Transactions of the American Fisheries Society. v.133(2). 462-475pp.
- PFMC (Pacific Fishery Management Council). 1999. Amendment 14 to the Pacific Coast Salmon Plan. Appendix A: Description and Identification of Essential Fish Habitat, Adverse Impacts and Recommended Conservation Measures for Salmon. Pacific Fishery Management Council, Portland, Oregon (March 1999). <http://www.pcouncil.org/salmon/salfmp/a14.html>

- Poole, G.C. and C.H. Berman (2001). "An Ecological Perspective on In-Stream Temperature: Natural Heat Dynamics and Mechanisms of Human-Caused Thermal Degradation." *Environmental Management* 27(6): 787-802.
- Popper, A.N., J. Fewtrell, M.E. Smith, and R.D. McCauley. 2003. Anthropogenic Sound: Effects on the Behavior and Physiology of Fishes. *Marine Technology Society Journal* Vol. 37, no. 4, pp. 35-40. 2003-2004.
- Rhea, Darren T., A.M. Farag, E. McConnell, and W.G. Brumbaugh. 2008. "Mercury and selenium concentrations in biofilm, macroinvertebrates, and fish collected in the Yankee Fork of the Salmon River, Idaho." U.S. Geological Survey Final Report Agreement No. 01-IA-11041303-090.
- RDG (River Design Group, Inc.). 2012. River Design Group, Inc., Geum Environmental Consulting, Inc., and TerraGraphics Environmental Engineering, Inc. 2012. Design Criteria Report: Crooked River Valley Rehabilitation Design. September. 73 pp. + appendices.
- Rhodes, J.J., *et al.* 1994. A coarse screening process for evaluation of the effects of land management activities on salmon spawning and rearing habitat in ESA consultations. Technical Report 94-4
- Scheuerell, M.D. and J.G. Williams. 2005. Forecasting climate-induced changes in the survival of Snake River spring/summer Chinook salmon (*Oncorhynchus tshawytscha*). *Fisheries Oceanography*. v.14(6). 448-457pp. <http://dx.doi.org/10.1111/j.1365-2419.2005.00346.x>.
- Servizi, J.A. and D.W. Martens. 1987. Some effects of suspended Fraser River sediments on sockeye salmon (*Oncorhynchus nerka*) Pages 254-264 in H. D. Smith, L. Margolis, and C. C. Wood, editors. Canadian Special Publication of Fisheries and Aquatic Sciences.
- Servizi, J.A. and D.W. Martens. 1992. Sublethal responses of coho salmon (*Oncorhynchus kisutch*) to suspended sediment. *Canadian Journal of Fisheries and Aquatic Sciences* 49:1389-1395.
- Sharber, N.G., *et al.* 1994. Reducing Electrofishing-Induced Injury of Rainbow Trout. *North American Journal of Fisheries Management*. v.14 340-346pp.
- Sharber, N.G. and S.W. Carothers 1998. Influence of Electrofishing Pulse Shape on Spinal Injuries in Adult Rainbow Trout. *North American Journal of Fisheries Management*. v.8 117-122pp.
- Sigler, J.W., T.C. Bjornn, and F.H. Everest. 1984. Effects of chronic turbidity on density and growth of steelheads and coho salmon. *Transactions of the American Fisheries Society* 113:142-150.

- Spence, B.C., G.A. Lomnický, R.M. Hughes, and R. P. Novitzki. 1996. An ecosystem approach to salmonid conservation. ManTech Environmental Research Services Corporation, Corvallis, Oregon.
- Staples, C.A, J.B. Williams, G.R. Craig, and K.M. Roberts. 2001. Fate, effects and potential environmental risks of ethylene glycol: a review. *Chemosphere*. 43(3): 377-383.
- Suttle, K.B., M.E. Power, J.M. Levine, and C. McNeely. 2004. How fine sediment in riverbeds impairs growth and survival of juvenile salmonids. *Ecological Applications* 14(4):969-974.
- Thompson, K.G., *et al.* 1997. Long-term effects of electrofishing on growth and body condition of brown trout and rainbow trout. *North American Journal of Fisheries Management*. v.17(1). 154-159pp.
- Wenger, A.S. and M.I. McCormick. 2013. Determining trigger values of suspended sediment for behavioral changes in a coral reef fish. *Marine Pollution Bulletin*. 70(1-2):73-80.
- Wissmar, R.C., *et al.* 1994. Ecological Health of River Basins in Forested Regions of Eastern Washington and Oregon. Gen. Tech. Rep. PNW-GTR-326. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Portland, OR.
- Wysocki, L.E., J.W. Davidson III, M.E. Smith, S.S. Frankel, W.T. Ellison, P. M. Mazik, A.N. Popper, and J. Bebak. 2007. Effects of aquaculture production noise on hearing, growth, and disease resistance of rainbow trout *Oncorhynchus mykiss*. *Aquaculture* 272: 687-697.
- Zabel, R.W., *et al.* 2006. The interplay between climate variability and density dependence in the population viability of Chinook salmon. *Conservation Biology*. v.20(1). 190-200pp. <http://dx.doi.org/10.1111/j.1523-1739.2005.00300.x>.

## APPENDIX A

### EMERGENCY ACTION PLAN

As with any large restoration project, the potential for problems to arise during construction exists. For the Crooked River project there is a potential, though low, to see flows greater than the Q25 while the bypass is in operation; spring flows or high snow pack could preclude constructing the bypass in early spring; the berm through the project area could fail at high flows, the diversion structure could fail during high flows; and surface flow in the newly constructed bypass could go subsurface when the new channel is rewatered. Conservation measures are in place to reduce impacts during construction; however, contingencies are needed to change how the project is implemented if problems arise. The NPT, USFS, and COE are responsible for following the Emergency Action Plan. NMFS and USFWS would be notified if any of the following emergencies occur, or if other unforeseen emergencies occur within 48 hours. The procedures followed to address any emergency would be documented and send to NMFS and USFWS via email.

#### **Bypass Channel Failure**

- To reduce the potential for bypass failure, a hardened spillway will be constructed on the coffer dam that will allow flows greater than the Q10 to spill into the newly constructed channel.
  - Splitting the flows between the bypass and the new channel would reduce the velocities in the bypass and prevent water from overtopping the berm in an undesirable area.
  - Since the new channel would be constructed to hold up to 300 cfs, potential impacts of water flowing over a raw floodplain would also be reduced.
- When the bypass is watered, crews will evaluate the bypass for signs of water going subsurface. The bypass would be evaluated at low flow to ensure that there is enough water for adult fish to migrate upstream. If flow in the bypass were to become low enough to preclude adult fish passage, those sections that are too high would be excavated. Fish salvage operations would have to occur in the adjacent areas prior to excavation. Fish salvage operation outlined above would be followed. The bypass would be evaluated throughout the year, and each year it is in operation to ensure adequate fish passage.



## Loss of Water in Mainstem Channel

There is a potential for the loss of water in the mainstem channel when it is rewatered due to the porosity of the valley substrate.

- During construction of the mainstem channel, crews will evaluate the flows in the channel since it is likely to capture groundwater. Because the floodplain elevations will be raised and the slope of the channel would be increased, it is expected that the groundwater will be intercepted and will flow in the new channel (i.e., While Crooked River is in the bypass). Crews will be able to observe how the new channel will function, prior to rewatering the new channel.
  - Groundwater elevations in the project area are currently exhibited at or near surface water elevations. Since the floodplain elevations would be raised relative to the current floodplain elevation, it is uncertain as to where groundwater would be intercepted.
- If water loss is observed in the channel, then more fines would be mixed into the substrate, depending on the severity of the loss.
  - For example, if only a couple of inches of the top of a riffle are dry, and water is flowing out of the other side, then more fines would probably not be added since the flows observed would be less than baseflow. But if the depth of water loss is more than a foot, then more fines would be added. These precautions need to be considered to keep from cementing in the channel by adding too many fines and reducing the potential for hyporheic exchange.

Another precaution would be to observe the new channel for loss of water while rewatering the channel.

- The diversion structure at the top of the new channel will slowly be removed. Once 6 to 10 cfs (baseflow) are flowing through the new channel for at least 48 hours, the project manager and fish biologist/hydrologist would survey the new channel to determine if there is water loss. If water is lost, then flows would be turned off using substrate filled bags and fines would be remixed into the channel with an excavator. This is repeated until the channel maintains the 6 to 10 cfs for its entire length for 48 hours before the remainder of the Crooked River is released into the new channel.
- During at least the first year of construction, the USFS and NPT would contract a stream restoration specialist to oversee the construction. The stream restoration specialist would have an experienced hydrologist on site to direct construction crews in the event that water in the channel is lost.

## **Diversion Structure Failure**

There is the potential for the diversion structure to fail during the project period due to a high water event.

- The diversion structure will be evaluated by the contractor at the end of each construction season to ensure it is secure and in good condition prior to going into winter. Repairs, if needed, will be completed. The structures will be evaluated again in the spring, prior to high flows, for erosion potential and for removal of any large woody debris caught in the diversion.