Endangered Species Act - Section 7 Consultation

BIOLOGICAL OPINION
for
threatened and endangered species
USEPA Superfund Program Revised Proposed Clean-up Plan
for the Milltown Reservoir Sediments Operable Unit
of the Milltown Reservoir/Clark Fork River Superfund Site
2004

Agencies:	U.S. Environmental Protection Agency
Consultation Conducted by:	U.S. Fish and Wildlife Service Montana Ecological Services Field Office
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I. Introduction and consultation history

Introduction

This biological opinion describes potential effects to Federally-listed threatened and endangered species including the bald eagle (*Haliaeetus leucocephalus*) and bull trout (*Salvelinus confluentus*) that may occur as a result of implementation of the U.S. Environmental Protection Agency (USEPA) Superfund Program Revised Proposed Clean-up Plan for the Milltown Reservoir Sediments Operable Unit of the Milltown Reservoir/Clark Fork River Superfund Site (Revised Proposed Plan). The Revised Proposed Plan addresses removal of the historic Milltown Dam, removal of contaminated sediments in Sediment Accumulation Area 1 (SAA1) and numerous related activities. This biological opinion also addresses, in part, the interrelated action of restoration by the Natural Resource Trustees including the removal of the Stimson Lumber Mill Dam (Stimson Dam) and restoration of the principal channel and floodplain of the Clark Fork and Blackfoot river in the vicinity of Milltown Dam. In addition, this biological opinion addresses, in part, the interrelated action of ongoing operation of the Milltown Dam from the listing of bull trout under the Endangered Species Act (ESA) to the surrender of the licensee's Federal Energy Regulatory Commission (FERC) license (FERC License number 2543).

Bald eagles currently are found in the vicinity of Milltown Reservoir (the body of water impounded by Milltown Dam) and nest within the project area. Bull trout currently and historically occurred above and below the Milltown Project in the Clark Fork River below the dam and in the Blackfoot and Clark Fork rivers above the dam.

The Federal action agencies involved with the proposed action are the USEPA, the FERC and the U.S. Fish and Wildlife Service (Service). The USEPA holds responsibility for those actions that are required to remediate the superfund site. The FERC holds responsibility for those actions that occur during the continued operation of the Milltown Project and actions associated with the surrender of the Milltown Project license. The Service is acting as a Natural Resource Trustee for the restoration of the Clark Fork River within the project area with the State of Montana (State) and the Confederated Salish and Kootenai Tribes (Tribes). The Federal action agencies jointly prepared the *Biological Assessment of the Milltown Reservoir Sediments Operable Unit Revised Proposed Plan and of the Surrender Application for the Milltown Hydroelectric Project (FERC No. 2543)* (biological assessment)(USEPA and FERC 2004).

Consultation history

Informal consultation with the FERC for bull trout on the ongoing operation of the Milltown Project was initiated in 1999 with preliminary meetings between the Service, the FERC and Montana Power Company concerning the timing and scope of consultation and the potential for a non-Federal party to act on behalf of the FERC. Subsequent to these initial discussions, Montana Power Company was designated the FERC's non-Federal representative in August 2000, and began preparing the biological assessment for ongoing operation of the Milltown Project. Montana Power Company was acquired by NorthWestern Energy in February of 2002, and NorthWestern Energy became the FERC's designated non-Federal representative shortly thereafter. Informal consultation with the FERC on the ongoing operation of the Milltown Project was temporarily suspended following the 2003 proposal by the USEPA to pursue removal of Milltown Dam. Informal consultation with the FERC on the ongoing operation of the Milltown Project was resumed following issuance of the USEPA's Revised Proposed Plan, and is ongoing. Past and current owners of the Milltown Project did implement voluntary measures to partially mitigate the impacts of the structure on bull trout as a result of the ongoing consultation.

Informal consultation with the USEPA on the Milltown Reservoir Sediments Operable Unit began following the listing of bull trout in 1998 with discussions between the Service, the USEPA and the State concerning conditions at the Milltown Project. Earlier involvement by the Service at the Milltown Project focused on contaminants, wetlands and trust resources. The Service has provided technical assistance to the USEPA since 1998 assisting with the identification of opportunities to conserve native species.

Formal consultation with the USEPA on the Revised Proposed Plan for bull trout was initiated on August 18, 2004 with the Service's receipt of the aquatic biological assessment (USEPA and FERC 2004a). This biological assessment found the proposed remedial and restoration actions, including removal the Milltown Dam, removal of an estimated 2.6 million cubic yards (myc) of contaminated sediment from behind the dam, removal of the Stimson Dam and restoration of the channel and floodplain of the Clark Fork River were likely to adversely affect bull trout and proposed bull trout critical habitat, and was not likely to adversely modify proposed bull trout critical habitat. Proposed bull trout critical habitat was dropped from final designation within Montana on September 21, 2004.

The terrestrial biological assessment was received by the Service on October 25, 2004 (USEPA and FERC 2004b). This biological assessment determined that implementation of the Revised Proposed Plan, specifically the interrelated action of the Natural Resource Trustee's restoration of the Clark Fork River, was anticipated to adversely affect bald eagles within the action area.

This biological opinion describes the impacts the Revised Proposed Plan (which includes FERC and Service actions) are anticipated to have on Federally-listed species, but does not provide an incidental take statement to FERC, as they have not initiated formal consultation on the license surrender application, currently under development by the Milltown Project FERC license holder. This biological opinion will be amended, as appropriate, to include FERC and any terms and conditions that may be required to minimize the impact of incidental take.

This biological opinion also does not provide an incidental take statement to the Service itself for actions related to restoration of the Clark Fork or Blackfoot rivers within the action area, or for removal of the Stimson Dam. This biological opinion will be amended, as appropriate, to include the Service and any terms and conditions that may be required to minimize the impact of incidental take. It is anticipated that the Service will coordinate restoration efforts through an existing memorandum of agreement among it, the State and the Tribes dated November 1998 and titled "Regarding Restoration, Replacement or Acquisition of Natural Resources in the Clark Fork River Basin."

II. Description of proposed action

The *action area* is defined as 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 action area for this biological opinion is the portion of the Clark Fork River upstream from the confluence of the Clark Fork and Bitterroot rivers to Turah Bridge, a distance of approximately 19 miles, and the portion of the Blackfoot River from the confluence of the Blackfoot and Clark Fork rivers upstream to the upstream extent of the Stimson Lumber Mill facility, a distance of approximately 1.4 miles. This area includes portions of the upper Clark Fork, middle Clark Fork and Blackfoot River bull trout subpopulation areas (USDI 1998c). This action area is that portion of the total area where remedial actions and related activities would occur and there is the potential of activity related impacts to influence the movement, habitat use, and persistence of bull trout or other listed species.

The action area for this biological opinion also includes Opportunity Ponds, the repository for contaminated sediments and soil excavated at the Milltown Project, and the Montana Rail Link rail line from the Milltown Project to the Opportunity Ponds that will be used to transport contaminated sediments to Opportunity Ponds. Opportunity Ponds are an existing repository for mining and milling wastes generated in the Clark Fork River Basin. The environmental impacts of the existence and operation of this site, including potential impacts to threatened and endangered species, were addressed in the *Anaconda Regional Water, Waste and Soils Operable Unit, Anaconda National Priorities List Site Record of Decision*, dated September 1998. The Montana Rail Link rail line is an existing feature within the extensively-developed transportation corridor along the Clark Fork River, and additional use of the rail line substantially above existing levels is not anticipated. As such, deposition of excavated material at the existing repository at Opportunity Ponds and use of the existing Montana Rail Link rail line within the extensively-developed transportation corridor will not be further discussed in this biological opinion.

A. Background

Gold was discovered in Silver Bow Creek, a headwater tributary to the Clark Fork River, in the spring of 1864 (Glasscock 1935). By 1872, placer mining of gold deposits near the surface was replaced by mining shallow underground deposits for silver, and the first stamp mills for processing ore were constructed on the flats along Silver Bow Creek in 1875 and 1876 (Glasscock 1935; Brinig 1919). Over time, copper became the dominant metal extracted from ores mined in the area, though silver remained an important secondary metal into the 20th century. Open roasting, milling and smelting of ores produced a variety of byproducts and wastes, including mine waste rock, contaminated smelter tailings and mill process water, much of which was released directly into Silver Bow Creek as late as 1982 (USEPA 2004a). Tailings containing the metals copper, lead and zinc, the metalloid arsenic and the acid-producing mineral pyrite accumulated at processing sites, became mixed with soil and became dispersed through time. Shaft mining of deeper copper sulfide ores was well underway in Butte by the late 1880s and by 1890 there were a number of open roasting and smelting operations along Silver Bow Creek (Glasscock 1935). In Anaconda, construction of the first of a series of three smelters began in 1883 and by 1903 the gigantic Washoe Smelter was daily processing thousands of tons of ore from the Butte area, 26 miles away (MacMillan 2000). The mining and processing of ore in Butte and Anaconda produced the waste now found in the Clark Fork River.

In Butte, mining companies disposed of mining and milling wastes into Silver Bow Creek into the 20th century. Fluvial processes routed these wastes down Silver Bow Creek and into the upper Clark Fork River. Large quantities of wastes from the Anaconda Copper Company smelter in Anaconda also reached the Clark Fork River, routed down Warm Springs Creek and related tributaries. Discharge from underground mining, the pumping of Berkeley Pit, and aerial deposition from the Washoe Smelter operation also contributed waste and contaminants to the Clark Fork River and associated floodplain (USEPA 2004a; MacMillan 2000).

Between 1887 and 1908, six major flood events routed silt-sized tailings down Silver Bow and Warms Springs creeks to the upper Clark Fork River (USDI 1998d). In 1908, an estimated 370-year flood event- the largest on record for the Clark Fork River- occurred as a result of rain falling on snow and frozen ground (USDI 2002b). The 1908 flood lasted 10 days and transported mine waste in substantial quantities and with sufficient velocity to distribute wastes to and below Missoula Montana (USDI 1998d). During subsequent annual snowmelt runoff and major thunderstorms, more wastes were transported as a result of elevated stream flows. Mining wastes that originated in Butte and Anaconda and were deposited within the channel and on the 100-year floodplain of the Clark Fork River, and behind Milltown, Thompson Falls and Noxon Rapids dams.

The Milltown dam and power plant were constructed from 1905 and 1908 by Clark-Montana Realty, one of the many companies owned by Montana businessman William Andrews Clark. Following its completion, Milltown Dam provided electrical power for various Clark-owned businesses in Missoula, the towns of Bonner and Riverside, the Bonner Lumber Mill (now Stimson Lumber) and the surrounding rural area (Quivik 1984).

Milltown Dam was nearly destroyed a few months after completion by rising flood waters in the spring of 1908. As the powerhouse flooded and the flood waters flowed over the north abutment of the dam, workers at the site dynamited a large gap in the new dam near the south end of the spillway, reducing the impoundment capacity of the structure (Quivik 1984). None the less, contaminated waste accumulated behind the dam in sufficient quantity to substantially reduce the long term storage capacity of the reservoir (USDI 1998d).

There have been numerous modifications to the Milltown Dam over the course of the intervening 95 years. Milltown Dam is not, and has never been, equipped with a device or structure to facilitate fish passage over or through the 68-foot high structure. Milltown Dam has obstructed or severely restricted the upstream migration of fish since its completion in early 1908.

Milltown Dam was acquired by the Montana Power Company in 1929. Montana Power Company sold the facility to NorthWestern Energy in 2002, who subsequently reorganized the ownership of the Milltown Dam into the Clark Fork Blackfoot Limited Liability Corporation (CFBLLC).

The USEPA estimates that here are currently about 6.6 myc of contaminated sediment impounded by the Milltown Dam (USEPA and MDEQ 2004). Milltown Dam is a run of the river facility, in that river flow into the Milltown Reservoir is equivalent to river flow out of the reservoir. An estimated 125,000 cubic yards (cy) of sediment pass through Milltown Reservoir each year; approximately 55 percent (69,000 cy) originates in the upper Clark Fork River basin and has elevated levels of copper, arsenic and other mining-related contaminants (Envirocon 2004a; USEPA 2004a).

The Record of Decision (ROD) for the selected remedy for the clean up of the upper Clark Fork River Operable Unit of the Milltown Reservoir/Clark Fork River Superfund Site was completed in March 2004. Removal and in-situ treatment of the extensive deposits of tailings, mining and milling wastes and contaminated soils and sediment within the channel and along the floodplain of the upper Clark Fork River may begin during the implementation period of the Milltown Reservoir Sediments Revised Proposed Plan. Superfund cleanup of the upper Clark Fork River is expected to result in a substantial reduction in the volume of sediment, metals and arsenic being transported downstream, and will require 10 years or more to complete.

The description of the following proposed actions are derived from USEPA's Revised Proposed Plan (USEPA and MDEQ 2004), the biological assessments of this proposal (USEPA and FERC 2004a, b), the *Draft Statement of Work* for the project (Envirocon 2004b), the *Draft Application for Non-Capacity Amendment of Project License, Milltown Hydroelectric Project* (CFBLLC 2004b), the Draft ROD for the Revised Proposed Plan (USEPA 2004b) and numerous other documents.

B. USEPA remedial treatments

The USEPA, in consultation with the Montana Department of Environmental Quality (MDEQ), released the Revised Proposed Plan (USEPA and MDEQ 2004) in May of 2004 and anticipates completion of the ROD for the Milltown Reservoir project in the fall 2004. The Revised Proposed Plan describes key elements of the proposed action, including the connected activities of removal of the Stimson Dam and Natural Resource Trustee Restoration Plan, and was made available to the public for consideration, review and comment.

Designs for the actual deconstruction of Milltown Dam and removal of the SAA1 Sediments contained in Milltown Reservoir are being prepared by the contractor for the Atlantic Richfield Company (ARCO), Envirocon. Drafts plans, such as the Stage 1 *Remedial Design Work Plan* (Envirocon 2004c), were incorporated into this biological opinion (as appropriate) as they became available. The Service recognizes that changes to remedial treatments are likely to occur between the completion of the biological opinion and the finalization of the Remedial Design Work Plans. The final Remedial Design Work Plan for Stage 1 and the Remedial Design Work Plan(s) for Stages 2 and 3 will be reviewed and approved by the Service prior to the implementation of each phase. If significant modifications to the Revised Proposed Plan are proposed, the USEPA and FERC will prepare addendum(s) to the biological assessment for review and evaluation by the Service.

The USEPA estimates that implementation of the Revised Proposed Plan and Natural Resource

Trustee restoration of portions of the Clark Fork and Blackfoot rivers will require approximately 5 years to complete. As currently proposed, implementation of the Revised Proposed Plan should be completed in 2010.

The various elements of the Revised Proposed Plan are described in further detail below in the sequence in which they are likely to be implemented. As proposed, the Revised Proposed Plan would be implemented in three distinct time intervals based on the surface elevation of Milltown Reservoir. The intervals have been designated stages, identified below as Stages 1, 2 and 3. Although some actions may begin in one stage and continue into subsequent stages, elements of the Revised Proposed Plan will, for the most part, be implemented sequentially. Certain elements of the Revised Proposed Plan must be implemented at a specific river flow level to meet the USEPA's objectives for downstream sediment management. Note that, while described independently of the three stages, the removal of Stimson Dam and the Natural Resource Trustee restoration of the Clark Fork and Blackfoot rivers would occur concurrently with USEPA remedial actions.

Stage 1: Permanent drawdown, excavation of the bypass channel, construction of rail spur and armoring of the Blackfoot River

Stage 1 drawdown The Stage 1 drawdown would initiate the permanent drawdown of the Milltown Reservoir. The Stage 1 drawdown would be accomplished by gradually lowering the water level until the flow of the combined Clark Fork and Blackfoot rivers flows over the spillway and through the radial gate of Milltown Dam, effectively lowering the reservoir approximately 10.5 feet to a minimum pool elevation of 3,248.5 feet. The permanent drawdown is necessary to reduce the water content of the accumulated sediments in SAA1, facilitating the removal of the SAA1 sediments by conventional excavation techniques. As proposed, the permanent drawdown of the Milltown Reservoir would begin in December 2004. Stage 1 is expected to last approximately 10 months.

Excavation of the bypass channel As currently proposed, a bypass channel for the Clark Fork River would be excavated from the former location of the Chicago, Milwaukee St. Paul and Pacific railroad bridge to the Blackfoot River, a distance of approximately 3,850 feet. The bypass channel would be excavated to an elevation substantially below that of the river floodplain as it existed prior to construction of Milltown Dam and the subsequent accumulation of sediment (the 1907 floodplain). The sides of the bypass channel would be formed with structural backfill and protected by riprap, the bypass channel bottom would be armored with large rock. Material from the excavation would be piled onto SAA1 sediments to drain. A gradient control structure would be constructed at the upstream end of the bypass channel to minimize upstream scour.

Construction of rail spur and access roads During Stage 1, a rail spur would be reconstructed to access SAA1. The rail spur would originate at an existing siding east of Interstate Highway 90, cross Interstate Highway 90 at a preexisting underpass, cross the bypass channel on a single lane road and rail bridge constructed specifically for this project, and extend into SAA1. Access roads in SAA1 would also be constructed at this time. Construction of the rail spur and access roads will likely extend into Stage 2.

Armor Blackfoot River at SAA1 The southern bank of the Blackfoot River from the confluence of the newly-constructed bypass channel to immediately upstream of Milltown Dam (a distance of about 1,000 feet) would be armored with large rock and geotextile fabric to inhibit SAA1 sediments from moving into the Blackfoot River. The armor would extend onto the bank approximately 40 feet and would grade into a graveled roadway atop the northern perimeter of SAA1 sediments. A grade control structure would likely be installed in the Blackfoot River at the base of the Interstate Highway 90 bridge to reduce channel bed scour upstream from the structure. In addition, a grade control structure may be constructed at the downstream end of the bypass channel, the temporary confluence of the Clark Fork and Blackfoot rivers.

Based on ongoing discussions with the principal members of the Milltown Project technical team, the Service assumes that the proposed action includes construction of the bypass channel of the Clark Fork River through SAA1, including the grade control structures at the upstream, and if necessary, downstream ends, such that the upstream passage of adult bull trout at the appropriate river flows, as determined by the Service, is not obstructed.

Stage 2: Stage 2 drawdown, spillway removal, removal of SAA3 sediments

Stage 2 drawdown The Stage 2 drawdown would begin following the conversion of the Milltown Dam power generating penstocks into low level outlets for river flow. The combined flow of the Blackfoot and Clark Fork rivers would be routed through the low level outlets, lowering the reservoir elevation an additional 6 feet to a minimum pool elevation of 3,242.5 feet. As proposed, the Stage 2 drawdown would commence in the fall of 2005 and would last approximately 5 months.

Spillway removal During the Stage 2 drawdown, the Milltown Dam spillway, 220 feet long, would be removed using conventional demolition techniques. Removal of the Milltown Dam spillway would be accomplished by isolating the area of the spillway with the construction of a coffer dam. The coffer dam would force the combined flow of the Clark Fork and Blackfoot rivers through the powerhouse low level outlets and the radial gate if required. The spillway would be removed to an elevation of 3,226 feet. The radial gate, 52 feet wide, may also be removed at this time, or it may be left in place to function as an overflow should a high water event occur during the period in which only the low level outlets are passing river flow.

Removal of SAA3 sediments SAA3 sediments would be removed from immediately upstream of the Milltown Dam to the southern bank of the Clark Fork River, where they will eventually be used to cap debris from the demolished Milltown Dam. The primary river channel of the combined Blackfoot and Clark Fork rivers would be excavated through SAA3 sediments and would be routed through the former location of the spillway.

Stage 3: Stage 3 drawdown, excavation of SAA1 sediments, demolition of the remaining dam structure, backfill SAA1 area, grade floodplain and create river channel

Stage 3 drawdown The Stage 3 drawdown would be accomplished by routing the combined flow of the Clark Fork and Blackfoot rivers through the 220 foot gap in the Milltown Dam created by removal of the spillway. The Phase 3 drawdown would lower the water level to the point that Milltown Reservoir no longer impounded water and the base level of the Clark Fork River passing the dam site was an elevation of 3,238 feet.

Excavation of SAA1 sediments While excavation of the SAA1 sediments actually began with the excavation of the bypass channel, the removal of the SAA1 sediment and transport of the sediment to Opportunity Ponds would begin in earnest in Stage 3. Sediments would be excavated using conventional earth moving equipment such as excavators, front end loaders and similar equipment. The USEPA estimates that 60 gondola style rail cars will be loaded with SAA1 sediment and hauled to Opportunity Ponds each day, and that removal operations would occur 7 days each week. Stage 3 is estimated to require at approximately 33 months.

Demolition and removal of the remaining Milltown Dam Structures Following the routing of the combined flow of the Clark Fork and Blackfoot rivers through the river channel constructed through the removed Milltown Dam spillway, the remaining structural components of Milltown Dam would be demolished and removed from the site. It is likely that demolition would begin with divider block, progress to the powerhouse and then remove the north abutment. Regrading of the north bank of the river at the location of the powerhouse and right abutment would commence at this time.

For the purpose of the analysis of effects in section V, the Service assumes that the divider block, powerhouse and right abutment will be demolished and removed as described in the Revised Proposed Plan. The powerhouse and divider block extend into the 5-year flood plain of the Clark Fork River, and extensive river manipulation would be required to protect these structures elevated river flow. The Natural Resource Trustees will not implement restoration of the river or floodplain if these features are not removed.

Backfill excavated sediments SAA1 would be backfilled with non contaminated fill obtained from off-site sources, or with fill salvaged on site and determined to contain levels of arsenic and metals that do not pose a threat to human health or the environment. The volume of backfill would be substantially less than excavated; backfill would be used primarily to recreate the floodplain of the Clark Fork and Blackfoot rivers.

Floodplain grading and river channel construction Following the backfill of the area excavated for removal of the SAA1 sediments, the area would be graded to specifications to create floodplains, terraces, wetlands and other riverine features common to rivers of the size and gradient of the Clark Fork River. A river channel would be excavated into the graded area; the channel excavation would be to the specifications established by the Natural Resource Trustees.

C. Ongoing operation of the Milltown Project and surrender of FERC License No. 2543

As described in Section I, above, informal consultation with the FERC on the ongoing operation of the Milltown Project by Montana Power Company and now NorthWestern Energy was initiated in 1999 and was suspended in 2003 with the decision by the USEPA to pursue the removal of Milltown Dam to implement the superfund clean up of the Milltown Reservoir sediments. The ongoing operation of the Milltown Project resulted in full or partial impediment to upstream fish passage since completion of the dam in 1908. The experimental trapping of fish at the radial gate of the dam began in 1998, and all bull trout captured at the radial gate have been moved over the dam to upstream release sites. Conservation efforts in the Clark Fork River basin have been funded since 1994 with the development of the Milltown Fisheries Protection, Mitigation, and Enhancement Plan (MPC 1993), which is required under the FERC license for the Milltown Project. NorthWestern Energy initiated the Bull Trout Conservation Measures to fund the capture and transport of bull trout from the dam to upstream locations and to mitigate impacts to bull trout habitat within the Clark Fork River basin. Funding for the Bull Trout Conservation Measures was substantially increased 2004.

As proposed, the FERC license for the Milltown Project would be surrendered following the termination of power generating capacity at the dam and the removal of the Milltown Dam structure. Removal of the Milltown Dam would involve mechanical demolition of the dam structure and would restore fish passage to the Blackfoot and, eventually the upper Clark Fork rivers. Surrender of the license would also terminate the Fisheries Protection, Mitigation and Enhancement funding and the Bull Trout Conservation funding, which would substantially reduce aquatic conservation and restoration funding for the Clark Fork and Blackfoot rivers and associated tributaries.

The FERC will establish requirements for license surrender in a conditional surrender order to the owner and operator of the facility, NorthWestern Energy. The details of the conditional surrender order are not available as a surrender application has yet to be submitted to FERC. The Service assumes that regardless of who has responsibility or authority for a particular action, the action would be implemented following the sequence and procedures established in the Revised Proposed Plan and other documents that the Service has used in the preparation of this biological opinion. Please note that most of the actions required for dam removal are associated with the remedial actions outlined above. Regardless of who implements the specific actions, impacts to bald eagles and bull trout would be essentially the same.

D. Stimson Dam removal and Natural Resource Trustee restoration

The Stimson Dam removal will occur as a partnership between the Service, Stimson Lumber Company, NorthWestern Energy and other participants. The Natural Resource Trustee restoration will be conducted by the State of Montana with support from the Service and Tribes.

The Stimson Dam spans the Blackfoot River approximately 1.1 miles upstream from the confluence with the Clark Fork River. The Stimson Dam (also known as the Bonner Dam) was constructed prior to Milltown Dam and provided electrical power for the Bonner Lumber Mill and local users prior to its forced obsolescence by the Milltown Dam in 1907. The Stimson Dam is nearly inundated at the full pool of the Milltown Dam. With the permanent drawdown of the Milltown Reservoir, 8 to 12 feet of the downstream surface of the Stimson Dam would be exposed, creating a barrier to the upstream passage of fish. The Stimson Dam is a rock and crib structure, is of questionable stability and a potential hazard to downstream resources. The hazard of dam collapse increases with the lowering of water to the front of the dam.

Removal of the Stimson Dam would likely be accomplished by lifting sections of the dam infrastructure from the Blackfoot River with a crane. The crane would lift sections of the rock and crib structure from the river and deposit this debris on one or both banks of the Blackfoot River. The debris would be transported to an upland site for management. The removal of the Stimson Dam is expected to require approximately 6 weeks to complete, and may occur as early spring, 2005.

Restoration of the Clark Fork and Blackfoot rivers through the area of the Milltown Reservoir would occur to reestablish the natural form and function to the Clark Fork River and to reduce the rate of release of sediments from SAA4 and SAA5. The Natural Resource Trustees would implement the *Restoration Plan for the Clark Fork River and Blackfoot River near Milltown Dam* (Restoration Plan), currently in draft (NRT 2003). Restoration of the of the Clark Fork River channel would begin a substantial distance upstream from the Milltown Dam, possibly immediately downstream of the Turah Bridge, and would commence in 2006. As proposed, the final, single thread channel through the SAA1 area would be inundated during the winter of 2008 to 2009. Additional restoration of the floodplain, such as grading, revegetation and similar actions, will likely continue through 2009 and may extend into 2010.

IIIA. Status of the species/critical habitat-bald eagle

Species description The bald eagle became the national symbol of the United States in 1782 and is protected by Federal law. Mature adults are easily recognized by the white head and tail, yellow eyes, bill, and feet, and large size. The bald eagle is a member of the hawk family (Accipitridae), with a weight ranging from 6-1/2 to 14 pounds and a wing span of 6 to 7-1/2 feet. Mature bald eagles measure about 3 feet long from head to tail. Bald eagles have strong and sharp talons for seizing and carrying prey, a strong curved beak for ripping food, keen eyesight and excellent hearing (Buehler 2000). Immature bald eagles are difficult to identify because their plumage is more muted and tends to vary, and the characteristic white head and tail are not acquired until the bird is about 5 years old. For the most part, bald eagles prey on fish and waterfowl are typically more abundant along waterways and lakes. In some areas, carrion is also an important diet item. Montana has a relatively strong population of bald eagles. Some bald eagles migrate from Canada and Alaska to winter in Montana, while others pass through the area during their annual migration.

Listing history The southern subpopulation of the bald eagle, occurring in the southern portion of the United States, was originally listed as endangered in 1967 under the Endangered Species Preservation Act of 1966 (32 CFR 4001). In 1978, the bald eagle was listed as endangered under the Endangered Species Act of 1973 in 43 of the lower 48 states, including Montana, and threatened in 5 other states (USDI 1999a). In the 24 years since the bald eagle was listed throughout the lower 48 states, the population has substantially increased in number and expanded its range. The improvement is a result of banning DDT and other persistent organochlorides, habitat protection, a growing public awareness of the bald eagles' plight, and other measures (Ehrlich et al. 1988). Due to the overall population increase, the bald eagle was reclassified from endangered to threatened in all of the lower 48 states on July 12, 1995 (60 CFR 35999 36010; USDI 1995). The bald eagle is found in Missoula County, Montana, where they are considered both year-long residents and spring/fall migrants, with nesting near or along major waterways (USEPA and FERC 2004b).

Life history Historically, the bald eagle was found nesting throughout most of the continent. However, reproduction in North America declined dramatically between 1947 and 1970 largely due to intake of organochloride pesticides (USDI 1986; Buehler 2000). Habitat degradation, illegal harassment and disturbance, poisoning, and a reduced food base contributed to the decline.

The bald eagle, like most birds of prey, exhibits sexual dimorphism, females typically weighing more than males. Bald eagles require 4 to 5 years to reach sexual maturity and to attain full adult plumage. Breeding usually initially occurs at the age of 6 or 7 years (USDI 1994), and breeding pairs will stay together for as long as both are alive (Buehler 2000). Breeding pairs return to the same nesting territory year after year, and often use the same nest. The average life span of an adult bald eagle is about 30 to 50 years.

In Montana, nest building, courtship, and egg laying/incubation occur from February through the end of May. Clutch sizes range from one to three eggs, with an average of two (Ehrlich et al. 1988). The egg incubation period is usually around 34 to 36 days, and fledging generally occurs 70 to 98 days after hatching (Ehrlich et al. 1988). Hatching, rearing, and fledging generally take place from June through August (USDI 1994). Often the younger, weaker bird is killed by its sibling in the competition for food. After approximately 4 months of age, the eaglets are on their own. Immature birds are mainly brown and most do not acquire the characteristic white head and tail 5 or 6 years of age.

Habitat requirements In the Pacific Northwest, bald eagles typically nest in multi-layered coniferous stands with large, old growth trees. Nests are typically within 1 mile of large bodies of water, such as lakes, reservoirs, large rivers, and coastal estuaries. The availability of suitable trees for nesting and perching are important stand characteristics, the largest, tallest trees are typically chosen for nest locations (Buehler 2000). Nest trees in the Pacific Northwest are found primarily in ponderosa pine, mixed conifer, Douglas fir, and Sitka spruce/western hemlock forests (USDI 1986). The species of trees used for nesting, however, vary among areas. In Idaho, nests are typically found in large cottonwood, ponderosa pine, and Douglas fir (USDI 1986). In Wyoming, nests have been reported in a variety of forest types including old growth ponderosa pine and in narrow strips of forest vegetation surrounded by rangeland.

A large stick nest is built high in a tree or on an isolated cliff. Nests are generally not constructed in areas with nearby human activity. The nesting season for bald eagles in the Pacific Northwest generally extends from January 1 to mid-August (USDI 1994). Young are usually produced in March and fledged in July; however, they may stay near the nest for several weeks after fledging. Both parents incubate eggs and feed young (Buehler 2000).

Bald eagles feed primarily on fish and carrion and take advantage of whatever food source is most plentiful and easy to capture or scavenge (Buehler 2000). Most eagles consume a diet consisting primarily of fish, with lesser quantities of waterfowl, carrion, and small mammals, such as muskrats, squirrels, rabbits (Buehler 2000). The availability of unobstructed perches and open flight paths to feeding areas is important in habitat selection (Buehler 2000; USDI 1994). Perches are generally located at the edge of forest stands, near foraging areas, or near the nest tree and have panoramic views of surrounding areas. For perching, bald eagle generally use large trees-preferably snags- along rivers and with good visibility.

Nesting Bald eagles typically nest near open water in late-successional forest with many perches or nest sites, and low levels of human disturbance (Ehrlich et al. 1988; Buehler 2000; USEPA and FERC 2004). The nest site is usually within 0.25 to 1 mile of open water with less than 5 percent of the shoreline typically developed within 1 mile. Nests are usually built in large trees between 50 and 200 feet above ground (Polite and Pratt 2002). Where nest area disturbance is limited the same nest site may be used by a breeding pair for many years (Buehler 2000). Nests are often quite large, ranging from 12 feet in height (nest bottom to top) and 8 feet in diameter. Nests are constructed with sticks and lined with soft materials, including mosses, pine needles, grasses, and feathers (Sibley 2000; Ehrlich et al. 1988). Because of the size and weight of the nest, a large tree with sturdy branches and an open-branched structure is usually selected (Buehler 2000). The species of tree is not as important for nest site selection as height, size, and structure.

During the nesting season, eagles will roost in large trees in close proximity to the nest. Immature birds may congregate in large trees near water bodies with suitable food supplies. Protected deep ravines with large trees are often used as night roosts, especially during the winter when large numbers of birds may congregate. Human activity may be a major factor limiting bald eagle distribution on wintering areas (Steenhof 1978).

Winter habitat More than 25 percent of the wintering bald eagles in the lower 48 states occur in the Pacific Northwest (USDI 1986). Bald eagles winter in the Pacific Northwest from approximately November through March and are primarily associated with open water near concentrated food sources. An important habitat feature is perch trees that provide an unobstructed view of the surrounding area near foraging sites (USDI 1986). Ponderosa pine, cottonwood and other large-statured snags are preferred perches in some areas, probably due to their open structure and height.

Critical winter habitat is located near food sources, such as lower elevation lakes and rivers that do not freeze, and uplands with nearby big game winter range. During the winter, when surface waters are frozen over, eagles either move to lower elevations, migrate south, or forage for carrion in upland areas that support wintering big game animals (Buehler 2000). Wintering areas must also have adequate perch sites and sheltered roost sites. Foraging distances have been reported to range from 3 to 7 miles from nest and roost sites (Buehler 2000).

Bald eagles may also use communal night roost sites in winter for protection from inclement weather. Characteristics of communal winter roost sites differ considerably from those of diurnal perch sites (USDI 1986), although both are invariably located near concentrated food sources, such as migratory fish runs or high concentrations of waterfowl. Roost sites tend to provide more protection from weather than diurnal perch sites. Communal roosts in the Pacific Northwest tend to be located in uneven-aged forest stands with some degree of old-growth forest structure. Conifers might provide a more thermally favorable micro environment than dead or deciduous frees, which might explain their high use by wintering eagles. In eastern Washington, bald eagles have been observed roosting in mixed stands of Douglas fir and ponderosa pine and in stands of black locust and black cottonwood.

Foraging Habitat Bald eagles are opportunistic foragers throughout their range. In the Pacific Northwest, bald eagles consume a range of food items including a variety of game and nongame fish species, waterfowl, jackrabbits, and mammalian carrion (USDI 1986). However, fish tend to be the staple food of bald eagles throughout most of North America. Winter-killed mammals can be important on big game winter ranges, while waterfowl are important where concentrations are significant. Dead fish may also be consumed, especially spawned-out kokanee (USDI 1986). Bald eagles may forage for food great distances from theft nests.

Eagles generally follow the same foraging pattern, returning to their same location each year. In the 1970s through mid 1980s, the kokanee salmon run was substantial at McDonald Creek in Glacier National Park, and attracted numerous foraging bald eagles. The run has since declined.

Population dynamics *Home Range Size and Density* During the breeding period, the density of breeding pairs in the greater Yellowstone ecosystem (including areas of northwest Wyoming, southwest Montana, and northeast Idaho) has been observed to range from 0.04 to 0.067 pairs per mile of shoreline (Swenson et al. 1986), or about one nest per 15 to 25 miles of shoreline. The minimum distances reported between nests ranged from 0.6 mile in Alaska to 10 miles in Washington (Polite and Pratt 2002). During the breeding period, the home range of the bald eagle has been reported to be around 13.5 square miles, while it is somewhat smaller (about 7 square miles) in winter (USEPA and FERC 2004b).

Bald eagle nest locations in the upper Clark Fork River watershed and the surrounding area were identified based on a survey conducted by the Montana Natural Heritage Program in 1999. Twelve nests were reported in the watershed and surrounding area at that time. Based on a shoreline distance of 120 miles, this corresponds to an average nest density of about 0.067 nests per mile of shoreline, which is within the range of nest densities (0.04 to 0.067 nests per mile of shoreline) reported for bald eagles in this region of the country by Swenson et al. (1986).

Nest Success in the larger Clark Fork Assessment Area USEPA (2002a) summarized the status, brood size, and success of bald eagle nests in the assessment area for Zone 7 of the Bald Eagle Recovery Management Zone (including the Clark Fork River Basin) established by Service (1986) and throughout Montana during the period 1994 to 2001. USEPA (2002a) reported that the number of active nests tended to increase over time for both areas. The average brood size (1.9 young per active nest) and success of bald eagle nests (95 percent) in the upper Clark Fork River are above the averages observed for the state of Montana and within the Zone 7 Bald Eagle Recovery Management Zone (brood size of 1.5 young per active nest and 80 percent nest success). This indicates that the ability of bald eagles to successfully reproduce in the upper Clark Fork River basin is similar to what would be expected for bald eagles in the region or in the rest of Montana. In addition, the success rate and average brood size in the upper Clark Fork River exceed the values of 65 percent success rate and 1.0 young per nest identified by the Montana Bald Eagle Management Plan (USDI 1994) as one set of criteria for de-listing the bird from threatened status.

Status and distribution Bald eagle numbers, estimated at a quarter to a half million on the North American Continent before European arrival, declined steadily throughout the late 1800s and early l900s (USDI 1999a). In 1963, there were a total of 417 bald eagle pairs in the lower 48

United States. By 1982, the number of pairs had grown to 1,480. By 1998, the number of breeding pairs was 5,748 (USDI 1999a), and in 2000, there were 6,471 bald eagle pairs (USDI 2004b).

In 1990, bald eagles nested in all but 5 of the 50 states. However, most bald eagle nesting is limited to the Pacific Northwest, Alaska, Canada, the Great Lake states, Chesapeake Bay, Arizona, and Florida. Oregon and Washington have been strongholds for bald eagles with more than two-thirds of the nesting population and one-half of the wintering population of the Pacific recovery area occurring in these two states (USDI 1994). Occupied breeding territories surveyed in Oregon and the Washington portion of the Columbia River Recovery Zone have increased from less than 100 in 1979 to 393 in 2001 (Isaacs and Anthony 2001).

During the period of precipitous decline, raptors were regarded as vermin and shot indiscriminately. The Bald Eagle Protection Act of 1940 increased public awareness and made indiscriminate shooting, poisoning, collecting, and trading of bald eagles illegal. This temporarily halted the decline. Pesticides such as DDT used during and after the second world war soon adversely impacted eagle reproductive success and caused numbers to plummet. Some of the factors that contributed to the decline of bald eagles included habitat destruction, hunting, and increasing concentrations of pesticides in the food web (Buehler 2000). Bald eagles still suffer from habitat loss from increasing human population and urbanization or residential development, from logging, loss of wetland and riparian habitat, water pollution, nesting failure caused by human disturbance at active nest sites, lead poisoning, the use of certain insect and predator poisons and electrocution from power lines.

Reservoir drawdowns, low winter flows, or high ramping rates that reduce fish populations may impact bald eagle food supplies. Low winter flows that result in increased ice cover can affect the availability of fish and may be a factor in heavily used areas. Reservoir areas may not be available to bald eagles during the late winter due to ice conditions.

Contamination of waterways from point and non-point sources of pollution is also a potential problem. Contaminants may impact the reproductive success, health, and survival of bald eagles. After years of research, scientists determined that DDE, a breakdown product of DDT, accumulated in the fatty tissues of female eagles and impaired the calcium release necessary for eggshell formation. This resulted in thin shells and reproductive failure due to broken shells during incubation. These findings eventually led to the banning of DDT and related compounds in the United States in 1972.

The abundance and quality of prey maybe seriously impacted by environmental contamination. Although many compounds implicated in reduced reproductive rates and direct mortality are no longer used, contaminants continue to be a major problem in some areas. Pesticide use in recent times is not known to have impacted the bald eagle on a population level. However, individual poisonings still occur.

In Montana, the bald eagle population has grown substantially since listing under the ESA. Since breeding surveys began in 1978, the bald eagle population in Montana has grown consistently, both in total number of pairs and number of young fledged. Between 1978 and

1995, the number of known breeding pairs increased from 12 to 166, well above the delisting goal of 99 breeding pairs cited in the 1986 Bald Eagle Recovery Plan (USDI 1986).

Recovery In establishing a recovery program for the bald eagle in the mid-1970s, the Service divided the lower 48 states into five recovery regions. A recovery plan with goals and identified tasks to achieve those goals was prepared for each region by separate recovery teams composed of species experts in each geographic area. The Pacific recovery region includes the states of Idaho, Oregon, Washington, Montana, Wyoming, California, and Nevada. The bald eagle recovery plan for the Pacific Region was approved in 1986.

Delisting requirements for the Pacific Region include: a) a minimum of 800 nesting pairs; b) an average reproductive rate of 1.0 fledged young per pair with an average success rate per occupied site of not less than 65 percent; c) breeding population goals met in at least 80 percent of the management zones; and d) stable or increasing wintering populations.

Between 1984 and 1994, the number of known breeding pairs in the Pacific States Bald Eagle Recovery Region (Washington, Oregon, California, Nevada, Idaho, Wyoming, and Montana) increased from 479 pairs to 1,192 pairs. In 1998, a total of 1,480 occupied territories were estimated (USDI 1999a). The number of occupied territories has consistently increased since 1986 and exceeded 800 for 5 years since 1990 (USDI 1999a). Productivity has averaged about 1.0 young per occupied territory since 1990. In 1998, 28 of the 37 specified management zones had met or exceeded their recovery goals for breeding, and 5 zones (in addition to the original 37 zones and are not part of the recovery goals for this region) also had nesting eagles (USDI 1999a). Delisting goals have been met in all categories except distribution in zones with nesting targets. Twenty-five percent of the bald eagles in the lower 48 states occur in this region.

Montana has an active bald eagle working group comprised of representatives from Federal and State agencies, tribes, universities, conservation groups, and private industry. The Montana Bald Eagle Working Group, formed in 1982, provides leadership at the state level and advice in the recovery, research, management, inventory, and monitoring of the bald eagle and its habitat in Montana (USDI 1994). In 1994 the group developed a *Montana Bald Eagle Management Plan* to provide information and guide landowners and resource managers in conserving eagle habitat (USDI 1994).

Analysis of the species/critical habitat likely to be affected

The proposed activities would occur in the Clark Fork River basin at the confluence of the Clark Fork and Blackfoot rivers. This area is know to be used as foraging and nesting habitat for bald eagles. Bald eagles are listed as threatened under the ESA. Critical habitat for bald eagles has not been designated, therefore, none will be affected.

The terrestrial biological assessment prepared for the proposed remedial action (USEPA and FERC 2004b) stated that implementation of the Revised Proposed Plan would have no effect on the grizzly bear (*Ursus arctos horibilus*), Canada lynx (*Lynx canadensis*), gray wolf (*Canus lupis*) or water howellia (*Howellia aquatilis*). The Service notes the no effect determination for the grizzly bear, Canada lynx, gray wolf and water howellia.

IIIB. Status of the species/critical habitat-bull trout

Species description Prior to 1980, bull trout and Dolly Varden (*S. malma* Girard) were combined under one name, the Dolly Varden (*S. malma* Walbaum). In 1980, with the support of the American Fisheries Society, these fish were recognized as two distinct species. Two of the most useful characteristics in separating the two species are the shape and size of the head (Cavender 1978), though correct identification may be difficult. Bull trout have an elongated body, somewhat rounded and slightly compressed laterally, and covered with cycloid scales numbering 190 to 240 along the lateral line. The mouth is large with the maxilla extending beyond the eye and with well-developed teeth on both jaws and head of the vomer (none on the shaft). Bull trout have 11 dorsal fin rays, 9 anal fin rays, and the caudal fin is slightly forked. Although they are often olive green to brown with paler sides, color is variable with locality and habitat. Their spotting pattern is easily recognizable, showing pale yellow spots on the back, and pale yellow and orange or red spots on the sides with no halos. Bull trout fins are often tinged with yellow or orange, while the pelvic, pectoral, and anal fins have white margins. Bull trout have no black or dark markings on the dorsal fin.

Listing history In September 1985, bull trout in the coterminous United States were designated as a category 2 candidate for listing, in the Animal Notice of Review (USDI 1997). Category 2 candidates show some evidence of vulnerability but not enough information is available to support a listing of the species (USDI 1997). Their status changed in May 1993 when the Service placed bull trout in category 1 of the candidate species list (USDI 1997). The listing of category 1 species was justified, but precluded due to other higher priority listing actions (USDI 1997).

In June 1998, the Service published the final rule listing the Klamath River and Columbia River distinct population segments (DPS) as threatened (USDI 1998a), with an effective date of July 10, 1998. In November 1999 the Service published a rule listing all populations of bull trout as threatened throughout its entire range in the coterminous United States (USDI 1999b), with an effective date of December 1, 1999.

Current known range Bull trout are found throughout the northwestern United States and western Canada (Rieman and McIntyre 1993). In the Klamath River basin, only isolated, resident bull trout are found in higher elevation headwater streams of the Upper Klamath Lake, Sprague River, and Sycan River watersheds (Goetz 1989; Light et al. 1996). The Columbia River basin is composed of 141 bull trout subpopulations residing in parts of Oregon, Washington, Idaho, and Montana (USDI 1998b). Within Montana, bull trout exist in the headwaters of the Saskatchewan River, and the Clark Fork and Kootenai subbasins (USDI 1998b).

Life history

Life history forms Two distinct life-history forms, migratory and resident, occur throughout the range of bull trout (Pratt 1992; Rieman and McIntyre 1993). Migratory bull trout rear in natal tributaries for several years before moving to larger rivers (fluvial form), lakes (adfluvial form), or the ocean (anadromous) to mature. Migratory forms return to natal tributaries to spawn (MBTSG 1998). Migratory bull trout may use a wide range of habitats ranging from first to sixth order streams and varying by season and life stage. Resident populations often live in small headwater streams where they spend their entire lives (Thurow 1987; Goetz 1989).

Most bull trout spawning occurs between late August and early November (Pratt 1992; MBTSG 1998). They may spawn each year or in alternate years (Fraley and Shepard 1989). Hatching occurs in winter or early spring, and alevins may stay in the gravel for extended periods, typically emerging from the gravel in April. Growth is variable with different environments, but first spawning is usually noted after age 4, and the fish may live 10 or more years (Pratt 1992; Rieman and McIntyre 1993). Although spawning typically occurs in second to fifth order streams, juveniles may move upstream or downstream of reaches used by adults for spawning, presumably to forage in other accessible waters (Fraley and Shepard 1989; Ratliff 1992). Seasonal movements by adult bull trout may range up to 180 miles as migratory fish move from spawning and rearing areas into over-winter habitat in large lakes or rivers in the downstream reaches of large basins (Bjornn and Mallet 1964; Fraley and Shepard 1989).

Habitat requirements Common predators of juvenile bull trout are larger bull trout and non-native fish, such as lake trout, brown trout and brook trout (Pratt and Huston 1993; Rieman and McIntyre 1993). Disease is not believed to be a critical factor in the long-term health and survival of bull trout populations (USDI 1999). Hybridization with brook trout poses a threat to the persistence of isolated or remnant populations. These hybrids are likely to be sterile, experience developmental problems and could eliminate a bull trout population (Leary et al. 1993; Rieman and McIntyre 1993).

The degree of hybridization, other interactions, and distribution of the two species is likely influenced by habitat condition (Rieman and McIntyre 1993). Bull trout are rare, if present at all, in many streams supporting large numbers of brook trout (Buckman et al. 1992; Ziller 1992; Rich 1996). Rich (1996) found brook trout occupied more degraded stream reaches than bull trout. Leary et al. (1993) documented a shift in community dominance from bull trout to brook trout in Lolo Creek, Montana and expect the trend to continue until bull trout are displaced from the stream. Habitat degradation appears to give brook trout a competitive advantage over bull trout.

Bull trout are sensitive to environmental disturbance at all life stages, and have very specific habitat requirements. Bull trout growth, survival, and long-term population persistence appear to be dependent upon five habitat characteristics: temperature, substrate composition, migratory corridors, channel stability and cover (Rieman and McIntyre 1993). Cover includes undercut banks, large woody debris, boulders, and pools that are used as rearing, foraging and resting habitat, and protection from predators (Fraley and Shepard 1989; Watson and Hillman 1997). Deep pools also help moderate stream temperatures, offering refuge from warmer water temperatures during summer low-flow conditions. Stream temperatures and substrate types are especially important to bull trout.

Temperature Like other char species, bull trout are particularly intolerant of warm water and are typically associated with the coldest stream reaches within basins they inhabit (Craig 2001; Selong et al. 2001). The most heavily populated reaches in several Oregon streams seldom exceeds 15 degrees C (Buckman et al. 1992; Ratliff 1992; Ziller 1992). Cold water temperatures are required for successful bull trout spawning. Many studies report water temperatures near 9 or 10 degrees C during the onset of spawning (Riehle et al.1997; Chandler et al. 2001). Bull trout spawning typically occurs in areas influenced by groundwater (Allan 1980; Shepard et al. 1982; Fraley and Shepard 1989; Ratliff 1992). In Montana's Swan River drainage, bull trout spawning site selection occurred primarily in stream reaches directly influenced by groundwater upwelling or directly downstream from upwelling reaches (Baxter et al. 1999; Baxter and Hauer 2000). Cold-water upwellings may moderate warmer summer stream temperatures (Bonneau and Scarnecchia 1996; Adams and Bjornn 1997) and extreme winter cold temperatures, which can result in anchor ice.

Cold water temperature also influences the development of embryos and the distribution of juveniles (Fraley and Shepard 1989; Saffel and Scarnecchia 1995; Dunham and Chandler 2001). Selong et al. (2001) report the predicted ultimate upper incipient lethal temperature for age-0 bull trout during 60 day lab trials to be 20.9 degrees C and peak growth to occur at 13.2 degrees C. Goetz (1994) reports juvenile bull trout in the Cascade Mountains were not found in water temperatures above 12 degrees C.

Substrate composition Bull trout are more strongly tied to the stream bottom and substrate than other salmonids (Pratt 1992). Substrate composition has been repeatedly correlated with bull trout occurrence and abundance (Rieman and McIntyre 1993; Watson and Hillman 1997; Earle and McKenzie 2001) as well as selection of spawning sites (Graham et al. 1981; Boag and Hvenegaard 1997). Bull trout are more often found in areas with boulder and cobble substrate rather than areas of finer bed material (Watson and Hillman 1997).

Preferred spawning habitat includes low gradient reaches of mountain valley streams with loose, clean gravel and cobble substrate (Fraley and Shepard 1989; Reiser et al. 1997; MBTSG 1998). Fine sediments fill spaces between the gravel needed by incubating eggs and fry, lowering incubation survival and emergence success (Everest et al. 1987). If fine sediment is deposited into interstitial spaces during incubation, it can impede the movement of water through the gravel, lowering the levels of dissolved oxygen as well as inhibiting the removal of metabolic waste (MBTSG 1998). Because bull trout eggs incubate about 7 months (typically mid-September to mid-April) in the gravel, they are especially vulnerable to fine sediment accumulation and water quality degradation (Fraley and Shepard 1989). Some embryos can incubate and develop successfully but emerging fry can be trapped by fine sediment and entombed (MBTSG 1998).

Juveniles are similarly affected, as they also live on or within the streambed cobble (Pratt 1984). The accumulation of sediment leads to a reduction in pool depth and interstitial spaces, as well as causing channel braiding or dewatering (Shepard et al. 1984; Everest et al. 1987). Substrate interstices also provide important over-wintering cover (Goetz 1994; Jakober 1995). Sub adults and adults tend to occupy deep pools with boulder-rubble substrate and abundant cover (MBTSG 1998).

Migratory corridors Migratory bull trout ensure interchange of genetic material between populations, thereby promoting genetic variability. Unfortunately, many populations of migratory bull trout have been restricted or eliminated due to stream habitat alterations, including seasonal or permanent obstructions, detrimental changes in water quality, increased temperatures, and the alteration of natural stream flow patterns. Migratory corridors tie seasonal habitat together for anadromous, adfluvial, and fluvial forms, and allow for dispersal of resident forms for recolonization of recovering habitats (Rieman and McIntyre 1993). Dam and reservoir construction and operation have altered major portions of bull trout habitat throughout the Columbia River Basin. Dams without fish passage create barriers to fluvial and adfluvial bull trout which isolates populations, and dams and reservoirs alter the natural hydrograph, thereby affecting forage, water temperature, and water quality (USDI 1999).

Channel stability and stream flow Bull trout are exceptionally sensitive to activities that directly or indirectly affect stream channel integrity. Juvenile and adult bull trout frequently inhabit areas of reduced water velocity, such as side channels, stream margins, and pools. These areas can be eliminated or degraded by management activities (Rieman and McIntyre 1993). Bull trout are also sensitive to activities that alter stream flow. Incubation to emergence may take up to 200 days during winter and early spring. The fall spawning period and strong association of juvenile fish with stream channel substrates make bull trout vulnerable to flow pattern changes and associated channel instability (Fraley and Shepard 1989; Pratt 1992; Pratt and Huston 1993; Rieman and McIntyre 1993).

Patterns of stream flow and the frequency of extreme flow events that influence substrate are important factors in population dynamics (Rieman and McIntyre 1993). Embryo and juvenile bull trout, closely associated with the substrate, may be particularly vulnerable to flooding and channel scour associated with rain-on-snow events common in some parts of the range (Rieman and McIntyre 1993). Channel dewatering and bed aggradation can also block access for spawning fish.

Cover All life history stages of bull trout are associated with complex forms of cover, including large woody debris, undercut banks, boulders and pools (Fraley and Shepard 1989; Goetz 1989). Young-of-the-year bull trout tend to use areas of low velocity such as side channels, staying close to substrate and submerged debris (Rieman and McIntyre 1993). Juveniles live close to undercut banks, coarse rock substrate and woody debris in the channel (Pratt 1984; Goetz 1991; Pratt 1992). Adult fish use deep pools with boulder-rubble substrate, undercut banks and areas with large woody debris (Pratt 1984, 1985; MBTSG 1998). Cover also plays an important role to spawning bull trout by protecting the adults from disturbance or predation as well as providing security (MBTSG 1998). Jakober (1998) observed bull trout over wintering in deep beaver ponds and pools containing large woody debris in the Bitterroot River drainage, and suggested that suitable winter habitat may be more restrictive than summer habitat.

Population dynamics

Population size The Columbia River DPS of bull trout has declined in overall range and numbers of fish. Though still widespread, there have been numerous local extirpations reported throughout the Columbia River basin (Thomas 1992; Goetz 1994). The Service recognizes 141 subpopulations within the Columbia River DPS, indicating habitat fragmentation, isolation, and barriers limiting bull trout distribution and migration currently exist within the basin. The Service defined subpopulation as a reproductively isolated group of bull trout that spawns within a particular area of a river system (USDI 1998b). If two groups of bull trout are separated by a barrier (e.g. an impassable dam or waterfall, or reaches of unsuitable habitat) only allowing individuals in the upper portion of the watershed access to downstream portions (i.e. one-way passage), both groups were considered subpopulations. The ensuing baseline and effects analysis uses the subpopulation as the unit of biological organization to demonstrate the influences of land management activities on population persistence at several scales.

To evaluate the current bull trout distribution and abundance, the Service analyzed data on bull trout relative to subpopulations because fragmentation and barriers have isolated bull trout throughout their current range. In addition, subpopulations were considered at risk of extirpation from naturally occurring events if they were:

, Unlikely to be reestablished by individuals from another subpopulation (i.e. functionally or geographically isolated from other subpopulations);

, Limited to a single spawning area (i.e. spatially restricted); and either

, Characterized by low individual or spawning numbers; or

, Primarily of a single life-history form.

For example, a subpopulation of resident fish isolated upstream of an impassable waterfall would be considered at risk of extirpation from naturally occurring events especially if the subpopulation had low numbers of fish that spawn in a restricted area. In such cases, a natural event such as a fire or flood affecting the spawning area could eliminate the subpopulation, and the impassable waterfall would prevent reestablishment from fish downstream. However, a subpopulation residing downstream of the waterfall might not be considered at the same level of risk of extirpation from naturally occurring events because there would be immigration potential by fish from the subpopulation upstream. Because resident bull trout may exhibit limited downstream movement, the Service's determination of subpopulations at risk of extirpation from naturally occurring events may overestimate the number of subpopulations likely to be reestablished (USDI 1998b).

In the process of reviewing information relative to the bull trout listing process, the status of subpopulations was based on modified criteria of Rieman et al. (1997), including the abundance, trends in abundance, and the presence of life-history forms of bull trout. The Service considered a subpopulation "strong" if 5,000 individuals or 500 spawners likely occur in the subpopulation, abundance appears stable or increasing, and life-history forms were likely to persist. The Service considers a subpopulation "depressed" if less than 5,000 individuals or 500 spawners likely occur in the subpopulation, abundance appears to be declining, or a life-history form historically present has been lost. If there was insufficient abundance, trend, and life-history information to classify the status of a subpopulation as either "strong" or "depressed", the status was considered "unknown." With exceptions in some areas, bull trout generally occur throughout the Columbia River DPS as isolated subpopulations in headwater lakes or tributaries where migration is now restricted (USDI 1999). The complete review of this evaluation is found in a status summary compiled by the Service (USDI 1998c).

Based on abundance, trends in abundance, and the presence of life-history forms, bull trout were considered strong in 13 percent of the occupied range in the interior Columbia River basin (Quigley and Arbelbide 1997). Using various estimates of bull trout range, Rieman et al. (1997) estimated that bull trout populations were strong in 6 percent of the subwatersheds in the Columbia River basin. Bull trout declines have been attributed to the effects of land and water management activities, including forest management and road building, mining, agricultural practices, livestock grazing (Meehan 1991; Frissell 1993), isolation and habitat fragmentation from dams and agricultural diversions (Rode 1990; Jakober 1995), fisheries management practices, poaching and the introduction of non-native species (Rode 1990; Bond 1992; Donald and Alger 1993; Leary et al. 1993; Pratt and Huston 1993; Rieman and McIntyre 1993; MBTSG 1998).

Population variability Distribution of existing bull trout populations is often patchy even where numbers are still strong and habitat is in good condition (Rieman and McIntyre 1993,1995). It is unlikely bull trout occupied all of the accessible streams within the range at any one time. The number of bull trout within a population can vary dramatically both spatially and temporally. Redd counts are commonly used to assess population trends. Existing long-term redd count data indicate a high degree of variability within and between populations (Rieman and McIntyre 1996). Habitat preferences or selection is likely important (Rieman and McIntyre 1995; Dambacher and Jones 1997), but more stochastic extirpation and colonization processes may influence distribution even within suitable habitats (Rieman and McIntyre 1995).

Population stability The best available information indicates that bull trout are in widespread decline across their historic range and are restricted to numerous reproductively isolated subpopulations in the Columbia River basin with many recent local extirpations (Rieman et al. 1997; USDI 1998b). The largest contiguous areas supporting bull trout are central Idaho and western Montana. Many bull trout subpopulations in the Columbia River DPS are characterized by declining trends.

Status and distribution

Historic and current distribution The historic range of bull trout was restricted to North America (Cavender 1978; Haas and McPhail 1991). Bull trout have been recorded from the McCloud River in northern California, the Klamath River basin in Oregon and throughout much of interior Oregon, Washington, Idaho, western Montana, and British Columbia, and extending into Hudson Bay and the St. Mary's River in Saskatchewan (Rieman et al. 1997).

Bull trout may be a glacial relict and their broad distribution has probably contracted and expanded periodically with natural climate change (Williams et al. 1997). Genetic variation suggests an extended and evolutionarily important isolation between populations in the Klamath and Malheur basins and those in the Columbia River basin (Leary et al.1993). Populations within the Columbia River basin are more closely allied and are thought to have expanded from common glacial refugia or to have maintained higher levels of gene flow among populations in recent geologic time (Williams et al. 1997).

Despite occurring widely across a major portion of the historic potential range, many areas support only remnant populations of bull trout. Bull trout were reported present in 36 percent and unknown or unclassified in 28 percent of the subwatersheds within the potential historic range. Strong populations were estimated to occur in only 6 percent of the potential historic range (Rieman et al. 1997). Bull trout are now extirpated in California and only remnant populations are found in much of Oregon (Ratliff and Howell 1992). A small population still exists in the headwaters of the Jarbidge River, Nevada, which represents the present southern limit of the species' range.

Though bull trout may move throughout entire river basins seasonally, spawning and juvenile rearing appear to be restricted to the coldest streams or stream reaches. The downstream limits of habitat used by bull trout are strongly associated with gradients in elevation, longitude, and latitude, which likely approximate a gradient in climate across the basin (Goetz 1994). The patterns indicate that spatial and temporal variation in climate may strongly influence habitat available to bull trout. While temperatures are probably suitable throughout much of the northern portion of the range, predicted spawning and rearing habitat are restricted to increasingly isolated high elevation or headwater "islands" toward the south (Goetz 1994; Rieman and McIntyre 1995).

Status of Columbia River distinct population segment Range wide, populations are generally isolated and remnant. Migratory life histories have been lost or limited throughout the range (Ratliff and Howell 1992; Pratt and Huston 1993; Rieman and McIntyre 1993, 1995; Goetz 1994; Jakober 1995; MBTSG 1998) and fluvial bull trout populations in the upper Columbia River portion of the DPS appear to be nearly extirpated. Resident populations existing in headwater tributary reaches are isolated and generally low in abundance (Thomas 1992).

The Service recognizes 141 subpopulations in the Columbia River DPS within Idaho, Montana, Oregon, and Washington and additional subpopulations in British Columbia. Bull trout in this DPS are threatened by habitat loss and degradation, passage restrictions at dams, and competition from non-native brook trout (*S. fontinalis*) and lake trout (*S. namaycush*). The American Fisheries Society listed bull trout as a species of concern in all of its range (California, Idaho, Montana, Nevada, Oregon, Washington, Alberta and British Columbia) except Alaska, because of present or threatened destruction, modification, or curtailment of its habitat or range and introduction of exotic species (Williams et al. 1989). Bull trout have been categorized as an indicator species of forest and ecosystem health as they are particularly sensitive to environmental change (Rieman and McIntyre 1993).

Generally, where status is known and population data exist, bull trout populations throughout the Columbia River DPS are at best stable and more often declining (Thomas 1992; Schill 1992; Pratt and Huston 1993). Presently, bull trout in the Columbia basin occupy about 45 percent of their estimated historic range (Quigley and Arbelbide 1997). Of the 141 subpopulations, 75 are at risk of natural extirpation through physical isolation. Many of the remaining bull trout occur as isolated subpopulations in headwater tributaries, or in tributaries where the migratory corridors have been lost or restricted. Few bull trout subpopulations are considered strong in terms of relative abundance and subpopulation stability (USDI 1998c). Those few remaining strong subpopulations are generally associated with large areas of contiguous habitats such as portions of the Snake River basin in central Idaho, the South Fork Flathead River in Montana, and the Blue Mountains in Washington and Oregon.

The upper Columbia River geographic area includes the mainstem Columbia River and all tributaries upstream of Chief Joseph Dam in Washington, Idaho, and Montana. Within this area, bull trout are found in two large basins, the Kootenai River and Pend Oreille River, which includes the Clark Fork River. Historically, bull trout were found in larger portions of the area. Numerous dams and degraded habitat have fragmented bull trout habitat and isolated fish into 71 subpopulations in 9 major river systems, as follows (with the number of subpopulations within each system): Spokane River (1), Pend Oreille River (3), Kootenai River (5), Flathead River (24), South Fork Flathead River (3), Swan River (3), Clark Fork River (4), Bitterroot River (27), and Blackfoot River (1). The high number of subpopulations (27) in the Bitterroot River system, Montana, indicates a high degree of habitat fragmentation where numerous groups of resident bull trout are restricted primarily to headwaters. Bull trout are thought to be extirpated in 64 streams and lakes of various sizes, including: Nespelam, Sanpoil, and Kettle Rivers; Barnaby, Hall, Stranger, and Wilmont Creeks; 8 tributaries to Lake Pend Oreille; 5 tributaries to Pend Oreille River below Albeni Falls Dam; Lower Stillwater Lake; 12 streams in the Coeur d'Alene River basin; and approximately 25 streams in the St. Joe River basin.

The upper Columbia River area contains several strong subpopulations of bull trout (USDI 1998b). Bull trout subpopulations are considered strong in South Fork Flathead River and Swan River. Trends in abundance are stable in South Fork Flathead River, and increasing in Swan River (Rieman and Myers 1997). Although high numbers of bull trout are found in Lake Pend Oreille and the upper Kootenai River, trends in abundance are either negative or unknown. The Service considers 50 of the 71 subpopulations in the upper Columbia River drainage at risk of extirpation because of naturally occurring events due to isolation, single life-history form, and low abundance.

In summary, the Columbia River DPS has declined in overall range and numbers of fish. Though still widespread, there have been numerous local extirpations reported throughout the Columbia River basin. The population segment is composed of 141 subpopulations indicating habitat fragmentation, isolation, and barriers limit bull trout distribution and migration within the basin. Although some strong subpopulations still exist, bull trout generally occur as isolated subpopulations in headwater lakes or tributaries where migratory fish have been lost.

Status of the Upper, Middle Clark Fork River and Blackfoot River Section 7 Watersheds
Section 7 watersheds were adopted by the Western Montana Bull Trout Level 1 Consultation team to facilitate streamlined consultation and watershed analysis. Section 7 watersheds correspond to bull trout Restoration/Conservation Areas identified by the Montana Bull Trout Scientific Group in 1996, prior to the listing of bull trout under the ESA. The upper Clark Fork, middle Clark Fork and Blackfoot section 7 watersheds also correspond to *core areas* as described in the draft bull trout recovery plan (USDI 2002d). These spatial units form the basis for baseline condition analysis at the watershed scale.

The predominant life history form of bull trout in the middle Clark Fork River is currently the fluvial migratory form. Bull trout in the upper Clark Fork River are thought to be adults, subadults and juveniles the originate from upstream populations from the upper Clark Fork River basin (USDA 2000d). The Blackfoot River supports bull trout with fluvial and resident life history strategies.

Middle Clark Fork River The middle Clark Fork River Section 7 Watershed consists primarily of private residential, private timber, and agricultural lands in the valley bottom, and Federally managed public lands in the more mountainous areas. The upstream extent of the middle Clark Fork River Section 7 Watershed is Milltown Dam, 6 miles upstream (east) from Missoula. The Clark Fork River flows northwest approximately 90 miles to the confluence of the Clark Fork with the Flathead River, approximately 8 miles southeast of Plains. The confluence of the Clark Fork and Flathead rivers forms the downstream extent of the middle Clark Fork River Section 7 Watershed. There are nine major tributaries to the middle Clark Fork River (MBTSG 1996), including the Bitterroot River. The approximate mean annual flow of the middle Clark Fork River is 7,145 cfs upstream from its confluence with the Flathead River (USGS 1999).

Fisheries biologists and hydrologists from the Lolo National Forest prepared the *Middle Clark Fork River Section 7 Consultation Watershed* analysis (USDA 2000b) to establish a baseline condition for bull trout in this portion of the Clark Fork River. This baseline analysis, periodic updates and relevant past and ongoing research are summarized here. In addition, some actions that influence the number of bull trout in the middle Clark Fork River but occur downstream from the confluence of the Flathead and Clark Fork rivers are also discussed here.

Prior to 1890, bull trout from Lake Pend Oreille in northeastern Idaho moved throughout the Clark Fork River system (MBTSG 1996; USDI 2002d). Construction of the Missoula Light and Water Company (now Stimson Lumber (1887)), Milltown (1908), Thompson Falls (1916), Cabinet Gorge (1952) and Noxon Rapids (1958) dams essentially eliminated the natural upstream migration of adfluvial bull trout from Lake Pend Oreille, and greatly reduced the number of bull trout in the Clark Fork River basin upstream from the dams (USDI 2002d). As a result, bull trout currently found in the principal channel of the Clark Fork River downstream from Milltown Dam and upstream from Thompson Falls Dam are predominately fish that spawn in direct tributaries to this section of the river. Spawning migratory bull trout or redds have been observed in the St. Regis River and Fish, West Fork Fish, North Fork Fish, Trout, Cedar, Petty, Rattlesnake, Cache, and Montana Creeks (MBTSG 1996).

Several of the tributaries to the middle Clark Fork River such as Rattlesnake, Crow, Mission, Post, and Dry Creeks were also dammed in the last century. With the exception of Crow Creek, these are historic bull trout spawning and rearing streams. Some of these dams block migratory fish from spawning habitat and have isolated bull trout upstream from the dams (MBTSG 1996). The Montana Bull Trout Scientific Group recognized the existence of dams as one of the primary causes of bull trout declines in this section of the Clark Fork River system (MBTSG 1996).

The St. Regis River and Fish, Trout, Cedar, Petty, Ninemile, Tamarack, Grant, Dry (near Superior), and Rattlesnake Creek drainages also support resident bull trout populations. Bull trout densities in these populations range from rare to moderate. Westslope cutthroat trout and mountain whitefish (*Prosopium williamsoni*) are the only other salmonid species native to the middle Clark Fork River (MBTSG 1996).

The Montana Bull Trout Scientific Group (MBTSG) report (1996) identified bull trout core areas in the middle Clark Fork River. Core areas as defined by MBTSG are drainages containing the strongest remaining populations of bull trout within each restoration/conservation area and warranting the most stringent levels of protection. Core areas in the middle Clark Fork River are the St. Regis River and Fish, Trout, Cedar, Petty, and Rattlesnake Creeks (MBTSG 1996). Please note that core areas as defined by the MBTSG differ from those identified in the draft bull trout recovery plan (USDI 2002d) in area and intent.

Bull trout abundance may vary widely from one core area to the next as core areas were identified relative to a particular restoration/conservation area. To protect all existing bull trout populations and thus conserve genetic diversity, MBTSG designated core areas are the focus of restoration in the Montana Bull Trout Restoration Plan (MBTRT 2000). Core habitat designations were developed prior to ESA recovery criteria (currently in draft), but follow a consistent population-based approach.

Salmonid habitat within this drainage of 1,986 square miles has been degraded to varying degrees by past and continuing land uses. Sources of impairment are primarily mainstem river dams, mining, and silviculture. Illegal fish introductions, fish management, agriculture practices, dam operations, transportation systems, and illegal harvest also contribute to impairment (MBTSG 1996). Bull trout in the middle Clark Fork River are at a higher risk of extirpation now than in the historic past. Mainstem dams and habitat alterations in tributaries to the middle Clark Fork River have resulted in habitat fragmentation and the isolation of groups of fish.

Of the introduced species, brook trout likely present the greatest threat to bull trout in the middle Clark Fork River. Bull trout hybridize with brook trout and the resulting offspring exhibit greatly reduced reproductive fitness (Kanda et al. 2002). Brook trout are present in the majority of bull trout streams in the drainage, except possibly the headwaters of Fish, Trout, Cedar, Rattlesnake, and Post Creeks (MBTSG 1996). Brook trout exhibit uneven distribution on the Lolo National Forest as 63 percent of developed and 13 percent of undeveloped watersheds were occupied (USDA 1998). In Milltown Reservoir, northern pike (*Esox lucius*) prey on juvenile bull trout out migrating from the Blackfoot River and possibly the upper Clark Fork River (Schmetterling 2001).

Recovery efforts for bull trout on the Clark Fork River are occurring in a number of areas. The FERC issued a license to the Avista Corporation allowing hydroelectric production at the Cabinet Gorge and Noxon Rapids dams in 1999. Pursuant to this license, the Avista Corporation funds activities intended to offset the adverse environmental impacts of their dams, reservoirs and power production. Activities designed to offset impacts to bull trout are identified in the Fish Passage/Native Salmonid Restoration Plan of the Clark Fork Settlement Agreement.

The Native Salmonid Restoration Plan calls for moving adult adfluvial bull trout that migrate upstream from Lake Pend Oreille over the Cabinet Gorge and Noxon Rapids dams. This experimental program moved 35 bull trout, captured in the Clark Fork River near the Cabinet Gorge Fish Hatchery, over the Cabinet Gorge Dam in 2001 and again in 2002. Two adult bull trout were subsequently moved over the Noxon Rapids Dam into Noxon Reservoir in both years (Lockard et al. 2002a; Lockard 2002). The objective of this program is to increase the number of bull trout spawning above the dams. Lockard et al. (2002a) estimated that the female adfluvial bull trout transported from Idaho in 2001 potentially accounted for 60 percent of the eggs deposited by spawning bull trout in the East Fork of the Bull River, a major spawning tributary to the lower Clark Fork River.

The Downstream Juvenile Bull Trout Transport Program was designed to enhance the survival of out migrating juvenile bull trout by transporting captured fish from natal or rearing tributaries to release locations below Cabinet Gorge Dam. In 2001, 49 juvenile out migrating bull trout, captured in the Bull River and Rock Creek, were released into the Clark Fork River near the Cabinet Gorge Fish Hatchery (Lockard et al. 2002b).

In a separate but parallel effort, adult bull trout are also being moved over the Thompson Falls Dam, approximately 50 miles upstream from the Idaho/Montana state line. Three adult fluvial bull trout were captured at the base of the Thompson Falls dam, and two were moved over the dam in 2001 (Mabbott et al. *in litt*.). A single bull trout was moved over the dam in 2002 (Katzman 2002). Eventual improvements in capture efficiency will likely result in higher numbers of bull trout moved over the dam in future years.

Recent investigations have demonstrated that recruitment of bull trout to the middle Clark Fork River occurring from upstream from Milltown Dam, at least to a limited extent. Swanberg (1997a) captured and transported two adult bull trout to above Milltown Dam. These fish moved to what were likely their natal stream, where one apparently spawned (Swanberg 1997a). In 2000, Schmetterling and Liermann (2000) monitored the movement of seven bull trout trapped and transported over the dam. At least four of these large (mean length 663 mm) bull trout entered spawning tributaries, where it is assumed spawning occurred. Bull trout have been captured and moved over the Milltown Dam since 1998. In general, bull trout in the middle Clark Fork River are considered rare.

The Service anticipates that the transport of adult adfluvial fish over the Cabinet Gorge, Noxon Rapids and Thompson Falls dams, coupled with enhanced survival of out migrating juvenile bull trout from the downstream transport program and other bull trout recovery actions, will eventually result in an increase in the number of bull trout ascending the Clark Fork River (Lockard et al. 2002b; Lockard 2002). The removal of Milltown and Stimson dams will connect disjunct groups of bull trout and allow for the migration of fish from the middle Clark Fork to upper spawning reaches. These programs will lead to an increase in the number of adult and juvenile bull trout in Clark Fork River, Blackfoot River and tributaries.

Upper Clark Fork River Prior to the introduction of contaminated mining waste from Butte and Anaconda and the completion of Milltown Dam, bull trout were likely distributed throughout the upper Clark Fork River. There are no natural barriers that would have excluded bull trout from major portions of the river system. A century of mining and smelting polluted streams in the upper Clark Fork River system with toxic metals, metalloids and other chemicals

(MBTSG 1995). Degradation, resulting primarily from historic mining and associated water pollution, effectively extirpated migratory bull trout from much of the historic range in the upper Clark Fork River prior to the turn of the 20th century (MBTSG 1995), a condition that lasted into the 1950s (USEPA 2004a). Milltown Dam has effectively blocked the passage of bull trout and other aquatic species from the middle Clark Fork River upstream to the upper Clark Fork River since its completion in 1907.

Bull trout are considered rare in the principal channel of the upper Clark Fork River. Twelve bull trout were sampled in the upper Clark Fork River between 1989 and 1994; eight of these fish were found in vicinity of Warm Springs Creek and Racetrack Creek (PTS 2002), and are likely to be outmigrants from these or other bull trout-bearing streams in the upper Clark Fork River watershed. A small number of migratory bull trout are captured at the base of Milltown Dam and transported over the dam to release points on the upper Clark Fork River upstream from the dam (USEPA and MDEQ 2003). These fish have been observed in the Clark Fork River between Milltown Dam and Rock Creek, in Rock Creek, and in the Blackfoot River (Swanberg 1997b; Schmetterling 2003). Efforts to pass bull trout over Milltown Dam have occurred since 1997 (Swanberg 1997; Schmetterling 2003) and will continue until such time as the actual removal of the Milltown Dam begins, currently proposed for 2006 (USEPA and MDEQ 2003). Some bull trout likely outmigrate from tributary streams into the principal channel of the upper Clark Fork River. The degree to which this occurs or is influenced by the level of metals and arsenic in the principal channel of the Clark Fork River is speculative.

Bull trout in the upper Clark Fork River tributaries consist mainly of small-sized, resident fish (MBTSG 1995). Upper Clark Fork River tributaries from Drummond upstream typically drain timbered, mountainous topography to the broad Clark Fork River valley. Principal tributaries in this upper reach include Warm Springs, Lost, Racetrack, Schwartz, Rock, Harvey, and Flint creeks, and the Little Blackfoot River. Harvey Creek contains resident bull trout, but a fish passage barrier prevents fish from the Clark Fork River from using this stream for spawning. Warm Springs Creek and its tributaries contain bull trout in the upper portion of this watershed. Lost, Racetrack, and Schwartz Creeks also contain bull trout. The Flint Creek drainage has been considerably impacted from human activity and currently, bull trout densities are considered very low. Populations are generally depressed and isolated from one another by human-created barriers to fish migration, with the exception of Rock Creek (MBTSG 1995).

Rock Creek contains fluvial bull trout inhabiting the mainstem and migrating to spawn in tributaries. Rock Creek, one of Montana's bull trout strongholds has a relatively high number of bull trout of multiple life history forms and offers high quality habitat for bull trout and other salmonids.

Blackfoot River The Blackfoot River has recently been characterized as supporting "one of the better fluvial populations of bull trout" within the range of the species (Pierce et al. 2001). Recent investigations indicate that migratory bull trout inhabit approximately 100 miles of the mainstem of the Blackfoot River. Roughly 340 miles of tributary streams are occupied by bull trout during some portion of their life history (Pierce et al. 2001).

The Blackfoot River and tributaries support fluvial and resident bull trout. Of 52 streams within the Blackfoot River Section 7 Watershed sampled by the State from 1989 to 1996, 12 (including one tributary to the Clearwater River) had bull trout. Excluding the Clearwater River drainage, fluvial bull trout currently occur in 10 subwatersheds in the Blackfoot River drainage, and, based on historical records, are extirpated from 11 drainages or approximately 120 miles of stream. Fluvial bull trout currently use approximately 420 river miles in the drainage, including 120 miles of mainstem river and 300 miles of tributaries. Spawning occurs in approximately 24 of these 300 stream miles (8 percent). Long term monitoring of fish populations in the Blackfoot River indicate stable to increasing densities of bull trout in the middle reaches of the Blackfoot River and the lower North Fork of the Blackfoot River, but a recent decline in the lower Blackfoot River.

The abundance of bull trout varies by river section. The Montana Bull Trout Scientific Group (MBTSG)(1995a) considered bull trout in the lower and middle sections of the Blackfoot River (mouth of the Blackfoot River to the North Fork of the Blackfoot River) to be uncommon. Pierce et al. (2001) have identified an upward trend for bull trout populations in these sections, estimating densities of bull trout from 4.3 to 7.7 fish per 1000 feet of river for fish in excess of 6 inches in length. In 1994, in the lower Blackfoot River (the confluence of the Clark Fork and the Blackfoot River upstream to Whitaker Bridge) bull trout comprised about 1 to 2 percent of the catch or about 206 fish caught and released by anglers (D.J. Peters *in* MBTSG 1995a).

Pierce et al. (2001) determined that bull trout densities above Nevada Creek are currently too low to estimate. Catch statistics from the 1999 season suggested that bull trout in excess of 6 inches in length ranged form one to two fish per 1,000 feet of river. Creel census data collected in 1994 indicate that bull trout comprised 9 percent of the catch in the Blackfoot River from Nevada Creek upstream to Lincoln, representing about 86 fish caught and released by anglers (D.J. Peters *in* MBTSG 1995a).

Bull trout have not been documented to currently occur downstream from Nevada Creek to the confluence of the North Fork of the Blackfoot River, a distance of approximately 15 river miles. Nevada Creek contributes a substantial portion of the stream flow of the Blackfoot River. Poor quality water from Nevada Creek likely contributes to the apparent absence of bull trout in this 15-mile section (USDA 2000; Pierce et al. 2001).

Spawning areas within the tributary streams are apparently very localized, relatively small and seem to have strong groundwater influence. Bull trout have been observed using the same small spawning areas in consecutive years (D.J. Peters, *in* MBTSG 1995a; R. Pierce, *in* MBTSG 1995a). Recent investigations indicate that the majority of bull trout production in the Blackfoot River watershed occurs in a small percentage of tributaries. Eighty percent of the 198 redds identified in the Blackfoot River system in 1996 occurred in 3 south flowing tributary streams: Monture Creek, Copper Creek and the North Fork of the Blackfoot River (USDA 2000).

With the exception of Copper Creek and Belmont Creek (and possibly a few others) most tributaries to the Blackfoot River contain brook trout. To date, little work has been done to document the extent of hybridization between brook trout and bull trout in the Blackfoot River basin. Bull trout/brook trout hybrids have been documented in Poorman Creek, but analysis of a sample of 15 fish from Belmont Creek showed there was no hybridization within those sampled fish (Leary 1993).

Bull trout use of the lower Blackfoot River is strongly influenced by water temperature. Spawning adult fish typically use the lower Blackfoot River during the winter months, moving upstream after peak flows in the spring (Swanberg 1997). Many non-spawning, but presumably adult fish follow a similar pattern, though upstream movement does not reach the extent as it does in spawning fish. Swanberg (1997) found that some bull trout in the lower Blackfoot River did not make substantial up-stream movements, and surmised that non-migratory bull trout were immature fish. Immature bull trout in the lower Blackfoot River seek cooler water temperatures at he confluences of tributaries to the Blackfoot River. Habitat in the lower Blackfoot River consists of lateral scour and plunge pools that typically incorporate large boulders. Pool features are separated by low gradient riffles and glides. Key winter habitat features for bull trout in the lower Blackfoot River are large, low water pools (Swanberg 1997).

While data indicates bull trout are increasing in Monture Creek and the North Fork of the Blackfoot River, populations of bull trout are very small in other tributaries. Several tributaries may have lost populations in recent years (Pierce et. al 1997). Copper Creek, near the headwaters of the Blackfoot River, receives the third greatest amount of bull trout spawning use based on redd counts conducted by the Helena National Forest. A recent telemetry study completed in the headwaters of the Blackfoot River indicate the headwater population of bull trout is isolated during the fall and winter by intermittent reaches in the principal channel of the Blackfoot River just upstream from the town of Lincoln. The five fluvial bull trout implanted with transmitters for the study used only 4 miles of the principal channel of the Blackfoot River and lower Lander's Fork to Copper Creek. Unfortunately, an substantial portion of the Copper Creek watershed burned during the 2003 Snow Talon Fire. This fire resulted in the loss of an undetermined number of bull trout from high fire severity in the near-stream area and from fire suppression activities.

In general, the status of bull trout in the Blackfoot River watershed appears to remain precarious. While the available data indicates that bull trout may be increasing in some portions of the Blackfoot River watershed, it appears that bull trout have been completely lost from other areas of the drainage in recent years. Though there has been a dramatic (albeit localized) increase in the number of redds since the early 1990’s, biologists have been unable to document a corresponding long term increase in the number of adult bull trout in the mainstem of the Blackfoot River (USDA 2000).

Analysis of the species/critical habitat likely to be affected

The proposed activities would occur in the Clark Fork River and the lower 1.4 miles of the Blackfoot River, both of which are currently occupied by bull trout (USDA 2000). Bull trout are listed as threatened under the ESA.

IVA. Environmental baseline for bald eagles

Regulations implementing the ESA (50 CFR §402.02) define the environmental baseline as the past and present impacts of all Federal, state, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed federal projects in the action area which have already undergone section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation in progress.

a. Status of the species in the action area

Bald eagles in the action area The action area for this biological opinion is the Clark Fork River upstream from the confluence of the Bitterroot River and the Clark Fork River to Turah Bridge, an distance of approximately 19 miles, and the Blackfoot River from the confluence of the Blackfoot and Clark Fork Rivers to the upper extent of the Stimson Lumber Mill yard, a distance of approximately 1.4 miles. See Section II, *Description of the proposed action.* The following discussion, however, includes data and information concerning bald eagles from along the upper Clark Fork River, as this area forms the transportation corridor from Milltown Reservoir to Opportunity Ponds, the repository for soils and waste from Milltown Reservoir. No bald eagle nests are known to occur within 10 miles of Opportunity Ponds (MNHP database). As such, no bald eagles would be expected to use this area during the breeding season.

Clark Fork River and Milltown Reservoir An active bald eagle nest is located about 0.75 miles upstream (southeast) of Duck Bridge and the upstream extent of SAA1 in Township 13 North, Range 18 West, Section 28. This active nest has been occupied since at least 1992, and was documented to have produced two chicks as of April 24, 2003 (USDI *in litt.* 2004; USEPA and FERC 2004b). This nest territory is numbered as 007-078, and has consistently fledged two to three young over the 9-year period of 1992 to 2000. No in-depth studies of this specific nesting pair have been conducted to date. Winter activity in the actions area occurs primarily in open parts of the river, as the Milltown Reservoir freezes for a month or more during most winters (Milodragovich *in* USEPA and FERC 2004b). Wintering bald eagles apparently forage in different parts of the river in response to ice formation (Milodragovich *in* USEPA and FERC 2004b).

The Allen Creek bald eagle territory (territory 007-109) is approximately 7 miles upstream from Milltown Dam and approximately 3 miles upstream from the upstream extent of the proposed Natural Resource Trustee restoration of the Clark Fork River. It is likely that adult bald eagles occupying nest territory 007-109 forage within the action area.

The MNHP database identified 10 bald eagle nest territories along the Clark Fork River adjacent to the transportation corridor from Milltown Reservoir to Opportunity Ponds, along which excavated metals-laden sediment will be transported. These nest territories are in addition to the two nests within and at the upper end of the restoration area, nest territories 007-078 and 007-109. The transportation corridor adjacent to these nests is a major east-west route that is heavily traveled by several thousand cars and trucks and 16 trains daily. As described earlier, the bald eagle nest density along the Clark Fork River and transportation corridor in similar to that else where in Montana and within Bald Eagle Recovery Zone 7, suggesting there is limited impact, if any from the transportation corridor on nesting bald eagles.

Fisheries resources (bald eagle prey) in the action area were described by several early investigators (Evermann 1892, Gilbert and Evermann 1895). Several species of fish that are suitable as prey for bald eagles are present in Milltown Reservoir or in the Clark Fork and Blackfoot rivers. Native fish among these include bull trout, westslope cutthroat trout *(Oncorhynchus clarki lewisi),* mountain whitefish *(Prosopium williamsoni),* northern pikeminnow (*Ptychocheilus oregonensis*), longnose sucker (*Catostomus catostomus*), and largescale sucker *(Catostomus macrocheilus*) (McPhail and Lindsay 1970).

Species of native and introduced salmonids co-exist over most of the assessment area, particularly in the larger river systems. The introduced salmonids frequently are the most abundant species among trout populations. Introduced trout species in the assessment area include rainbow/redband trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), and brook trout. In addition, naturally reproducing populations of northern pike, a non-native species illegally introduced into Milltown Reservoir, occur in the action area.

Blackfoot River The MNHP database indicates that three bald eagle nests exist on the Blackfoot River about 7.5, 8.5, and 10 miles upstream from Milltown. It is possible that eagles from some or all of these three nest territories forage within the action area to a limited extent. None of the remediation or restoration activities will occur within 5 miles of any of these nests. The Service does not anticipate adverse impacts to bald eagles at nesting locations along the Blackfoot River, and these nest territories are not considered further in this biological opinion.

b. Factors affecting the species habitat within the action area

The USEPA (2002a) compared the breeding density and nesting success of bald eagle use along the Clark Fork River with other bald eagle populations in nearby areas to assess whether ongoing river contamination or other factors were adversely affecting bald eagles. The following discussion is from USEPA and FERC (2004b) and is presented here to provide an overview of the status of bald eagles along the Clark Fork River including areas within and outside the action area. Information from the upper Clark Fork River is pertinent to assessing current conditions and potential impacts of the Milltown project on bald eagles.

Human activity and disturbances influence the local distribution of bald eagles. Bald eagles are almost never found in areas of heavy human use, and will reach maximum densities in areas with minimal human activity (USDI 1994). Eagle responses to human activities range from spatial or temporal avoidance of the disturbing activity to total reproductive failure and abandonment of breeding areas (USDI 1994). Bald eagles are the most sensitive to human activity early in the nesting cycle. In Montana, nesting activity generally occurs during the period of February 1 through May 15 (USDI 1994).

In general, human activity along the upper Clark Fork River is moderate, consisting mainly of ranching and recreational use. These human activities may tend to limit the occurrence of bald eagles along the Clark Fork River, although this does not currently appear to be a major factor. The immediate area around bald eagle nest 007-078 is subject to similar uses. The area in the immediate vicinity of the nest is grazed by livestock or managed for hay production, and a local road is located approximately 750 feet south of the nest site. The nearest developed home site is approximately 1,200 feet north-northwest of the nest. Additional houses and Interstate Highway 90 are located across the Clark Fork River approximately 3,000 feet east of the nest.

Food availability has been reported as an important factor for nest site selection and presence of bald eagles (USDI 1994). As discussed in USEPA (2001b), a variety of aquatic and terrestrial wildlife occur along the Clark Fork River, including fish, birds, and small and large mammals, of which all are potential food source for bald eagles. With regard to fish (the main food item), the density of trout in the upper Clark Fork River is lower than expected for other similar streams (USEPA 2001b), but the total density of fish, including whitefish, is likely more than sufficient to support bald eagle feeding requirements (USEPA 2002a). This is supported by the finding that current nest densities along the upper Clark Fork River are within a range expected for this region of the country. This suggests that the availability of food is not currently a factor limiting bald eagle populations in the Clark Fork River basin. Bald eagles have nested at nest territory 007-078 since at least 1992 and have consistently produced two to three offspring; it is likely that food availability is not a limiting factor for this pair of eagles.

Bald eagles may potentially be exposed to chemical contamination by several pathways, the most important of which is likely ingestion of prey that has accumulated chemical contaminants in their tissues. While elevated levels of some inorganic chemicals can be detected in the tissues of fish in the upper Clark Fork River, especially in the upper reaches, predicted Hazard Quotient values for the bald eagle are below a level of concern for all inorganic chemicals considered at all reaches of the upper Clark Fork River (USEPA 2001b). These findings suggest that hazards to the eagle from oral exposure to mining-related contaminants are likely to be minimal. Based on this, mining-related chemical contamination is not likely to substantially limit bald eagles in the upper Clark Fork River. The Service assumes that this conclusion is valid for nest territories 007-078 and 007-109.

IVB. Environmental baseline for bull trout

a. Status of the species within the action area

Bull trout in the action area The action area for this biological opinion is the Clark Fork River upstream from the confluence of the Bitterroot River and the Clark Fork River to Turah Bridge, an distance of approximately 19 miles, and the Blackfoot River from the confluence of the Blackfoot and Clark Fork Rivers to the upper extent of the Stimson Lumber Mill yard, a distance of approximately 1.4 miles. See Section II, *Description of the proposed action,* for a further discussion of the action area .

The Service (USDI 1998b) recognized one bull trout subpopulation in the middle Clark Fork River. The middle Clark Fork River section 7 consultation watershed analysis (USDA 2000b) identified 10 sixth-code hydrologic units (HUC6) that occur within the action area of this biological opinion. Analysis of these HUC6s using the analysis matrix developed by the Service (USDI 1998d) determined that all 10 HUC6s were functioning at unacceptable risk for the majority of population and habitat categories. All 10 HUC6s received an integrated species and habitat determination of functioning at unacceptable risk. This determination was largely driven by the lack of upstream and downstream connectivity as a result of the large dams that obstruct migratory movement in the river and habitat degradation.

Adult bull trout are currently considered rare in the middle Clark Fork River (USDA 2000b). Recent survey and analysis work indicates that adult fluvial bull trout occur in the Clark Fork River within the action area at about one to three adult fish per mile (USDI 2002a). Surveys in this portion of the Clark Fork River typically occur in June and/or October (Knotek 2002b).

Juvenile bull trout are likely moving into the action area as river flow increases in the spring of the year. As a secondary observation to a larger investigation, Schmetterling (2001) identified a narrow time period when juvenile bull trout were outmigrating from the Blackfoot River and possibly the Clark Fork River. Juvenile bull trout entered Milltown Reservoir from upstream rearing areas in early to mid May 2000, which corresponds to the ascending limb of the annual peak in the Clark Fork River hydrograph.

Adult fluvial bull trout in the action area begin migration to spawning tributaries as early as April, and upstream movements to the base of Milltown Dam have been documented though the month of May (Swanberg 1997a). Schmetterling and Liermann (2000) identified a peak period of adult fluvial bull trout capture at Milltown Dam from June 28 to July 4 in 2000. Katzman (2002) reports capturing adult bull trout at the base of the Thompson Falls Dam in late July 2001 and 2002, apparently in up stream migration. Using radiotelemetry, Swanberg (1997a) monitored an adult fluvial bull trout holding near the confluence of Rattlesnake Creek and the Clark Fork River through July and into August, later moving freely in Clark Fork River channel flow through October.

Knotek (2002a) found adult fluvial bull trout migrating up Rattlesnake Creek from the Clark Fork River late in June through early August, with the peak of upstream migration in July. Using radiotelemetry, Knotek (2002b) documented bull trout that spawn in Rattlesnake Creek using that portion of the middle Clark Fork River from Missoula downstream to Frenchtown during the non-spawning period of the year. In addition, Knotek (2002a) suggested that bull trout migration into Rattlesnake Creek was influenced by elevated water temperatures in the Clark Fork River, indicating that the timing of upstream migration may fluctuate annually with changes in river volume and temperature. Rattlesnake Creek is approximately 6.5 miles downstream from Milltown Dam.

Water Temperature In the Clark Fork River, the temperature of main-channel water can vary greatly during periods of the year when bull trout are moving to or toward spawning habitat. Bull trout are known to enter the Clark Fork River from Lake Pend Oreille in January, April, August and September (Normandeau 2001 *in* Gillin 2002). None have entered the fish ladder/artificial spawning channel at the Cabinet Gorge Fish Hatchery, below Cabinet Gorge Dam, until August 6, however, and the majority of bull trout that ascend the ladder do so in September (Gillin 2002). During August and September, water in the river can range from 16 to 19 degrees C, leading Gillin (2002) to suggest that while bull trout are holding in the main channel of the Clark Fork River, they are finding cold water microhabitats associated with tributaries or upwelling in the main channel.

At Thompson Falls Dam, adult fluvial bull trout have been captured while attempting to move upstream of the dam from mid April through late July. Bull trout have been captured at the base of the dam in water that is 18 degrees C (2001) and 20 degrees C (2002) (Katzman 2002). Schmetterling and Liermann (2000) documented water temperature at the base of Milltown Dam in excess of 16 degrees C in late June and early July, the peak period of bull trout capture at the base of the dam.

Swanberg (1997b) found fluvial bull trout in the Blackfoot River directly upstream of the action area began upstream movement on the descending limb of the hydrograph in early June (1994) to early July (1995). The initiation of upstream movement was correlated with increases water temperature. Though the river temperature varied greatly (range 12 to 20 degrees C), the mean temperature at which fish began upstream migrations was 17.7 degrees C in 1995.

The Blackfoot River within the action area is inundated by the full pool of the Milltown Reservoir, and during drawdowns of the Milltown Reservoir, the Blackfoot River immediately upstream from the Stimson Dam is inundated by the pool formed by this structure. Habitat use by bull trout in the lower 1.5 miles of the Blackfoot River is likely limited to the downstream movement of adults and juveniles. It is likely that predatory northern pike influence bull trout use of the lower 1.5 miles of the Blackfoot River (Schmetterling 2004). Adult and /or juvenile bull trout are reasonably certain to occur in the Clark Fork River in the action area throughout the year.

b. Factors affecting species environment within the action area

There are many factors affecting bull trout and bull trout habitat in the action area (see, for example, Reiser et. al 2000). The over-riding factors affecting bull trout and bull trout habitat in the action area are, however, the impediment to upstream fish passage imposed by Milltown Dam and the reservoir behind the dam. (USEPA and FERC 2004). Secondary considerations include the contaminated sediments in SAA1 that were mobilized during the 1996 ice scour event and the Stimson Dam.

Clark Fork River Milltown Dam has effectively fragmented the Clark Fork River and isolated the upper Clark Fork River, the Blackfoot River and associated tributaries from lower reaches since 1907. The elimination of the migratory corridor has perpetuated the depletion of bull trout and other migratory fish throughout the Clark Fork River basin. The isolated nature of these groups of bull trout increase the risk of local extirpation from environmental stochasticity, and Milltown Dam limits the potential of fish recolonizing such areas.

As a result of the 1990 FERC license extension for the Milltown Project, Montana Power Company convened the Milltown Fisheries Technical Advisory Committee (MTAC) and produced the *Milltown Fisheries Protection, Mitigation and Enhancement Plan* (PM&E Plan) (MPC 1993). The PM&E plan was intended to evaluate and implement measures to mitigate impacts to fisheries resources, and includes one operational change and several non-operational activities. The operational change limits necessary reservoir draw down to two feet or less per day and using generation flow instead of spill to lower the reservoir to minimize sediment entrainment. Non-operational components of the PM&E Plan provide funding for resource projects developed for the protection, mitigation and enhancement of the fishery resources of the

Milltown Project Area (MPC 1993). The goal of the PM&E Plan is to increase trout populations in the Blackfoot and Clark Fork rivers and associated tributaries.

The non-operational components of the PM&E Plan include funding for: a) projects involving species of special concern, such as bull and westslope cutthroat trout; b) tributary and mainstem PM&E activities; c) long-term monitoring of fisheries and PM&E activities; d) providing field and administrative assistance to implement PM&E activities; e) modifying the spillway of Milltown Dam to prevent fish stranding during periods of variable inflows; and f) construction of an experimental fish capture facility at the dam and assessing its effectiveness. Funding for the PM&E Plan was $91,608 in 2004 including the annual inflation adjustment of 3 percent.

Restoration and rehabilitation projects completed in the Blackfoot and Clark Fork rivers with the assistance of PM&E funding have significantly improved the available spawning and rearing habitats for all fish species in these systems with special emphasis on bull trout and westslope cutthroat trout. Bull trout and westslope cutthroat populations have significantly increased in the Blackfoot River and Rock Creek over the last decade, but still remain in relatively low densities (USEPA and FERC 2004).

Fishery conservation efforts were expanded in 2003 with the commitment by NorthWestern Energy to provide substantial funding for bull trout conservation, developed in consultation with the Service. Bull Trout Conservation funding increased by NorthWestern Energy to $250,000 in 2004. The Bull Trout Conservation funding is directed by a subcommittee of the MTAC, the Bull Trout Technical Committee. The Bull Trout Technical Committee reviews project proposals with final approval/denial/modifications provided by the Service. Funding is allocated as shown in Table 1, below.

Table 1. Summary of Bull Trout Conservation Measures and funding level addressing on-going operations of the Milltown Dam Project for the period 2003 until FERC license surrender.

Item	***Description***	***Cost***
Bull Trout Conservation Measures - Habitat	Bull trout off-site mitigation projects in the Blackfoot, Middle or Upper Clark Fork River drainages	$50,000 annually 2003 until FERC license surrender
Bull Trout Conservation Measures	Upstream passage, downstream passage, radial gate trap/haul migrating fish, northern pike control and assessments, public outreach, education and other assessments related to project impacts	$200,000 annually 2004 until FERC license surrender

Limited upstream fish passage at Milltown Dam has occurred using the radial gate raceway as a fish trapping facility. In 1998, Montana Power Company, in cooperation with MFWP initiated intermittent operation of a trap and haul operation using the radial gate raceway to collect upstream migrating fish. This system is operated annually between March and early November, with trapping subject to river flow conditions. Two bull trout were captured at the radial gate and transported to upstream release locations in 1999. In 2000 and 2001, a total of 18 (9 in 2000 and 9 in 2001) bull trout were captured at the radial gate and transported upstream. During optimal flow conditions, the current trap's effectiveness for fish capture is low (USEPA and FERC 2004).

Upstream fish passage evaluations at the Milltown Dam have determined that fish captured in the radial gate fish trap are highly sensitive to the source of water flowing through the radial gate at the time of capture. As a result of the position of the positioning of the radial gate and powerhouse inlets, water flowing through the radial gate at base flow levels typically originates from the Clark Fork River. As river stage increases in the spring, the percentage of the flow through the radial gate originating from the Blackfoot River increases. As river stage returns to base flow in the summer the percentage of flow through the radial gate originating from the Blackfoot River again decreases (USEPA and FERC 2004).

Milltown Reservoir provides excellent spawning and rearing habitat for the recently and illegally introduced northern pike, which now dominate the reservoir (Schmetterling 2004). The northern pike population in the reservoir has increased to high abundance levels and predation on other fish species has greatly impacted the fish species composition and abundance in the reservoir (USEPA and FERC 2004). In addition, other fish species migrating through the reservoir appear to provide a significant proportion of the food for the northern pike. Bull, westslope cutthroat, rainbow, and brown trout and mountain whitefish have been observed in pike stomachs from Milltown Reservoir.

Northern pike control and evaluation monitoring started in 1999 in the reservoir and downstream of the dam (Schmetterling 2003b). Two primary methods of population control have been applied in Milltown Reservoir since 1999. These are reservoir draw down of approximately 6 feet in late summer for control of young-of-the-year and trap netting of adult northern pike during spawning migrations. In 2002, the use of hoop trap nets proved an effective method for removing adult and sub-adult northern pike. Experimental gill nets are also used in the reservoir fishery investigations for fish population and food habitats monitoring. Northern pike control actions have reduced older aged northern pike abundance 73 percent from 2002 to 2003 (Schmetterling 2003b). Gill net reservoir fish surveys have also revealed improvements in fish species diversity in the reservoir along with the reduced northern pike population.

Introduced species such as brook trout, brown trout, rainbow trout and northern pike have been identified as a high risk to bull trout through hybridization (brook trout), predation (brown trout, northern pike) and possible competition (brook, brown and rainbow trout). Since habitat availability and quality has been reduced through several factors (highway and railroad construction, mining, forestry, agriculture and other activities), and since brook trout and brown trout habitat preferences overlap with bull trout, these interactions may reduce habitat carrying capacity for bull trout. Well established brown trout populations are stable or increasing as indicated by spawning surveys in the upper Clark Fork and several of its tributaries (R2 Resource Consultants 1999, 2002).

Conditions upstream in the upper Clark Fork River also influence bull trout and bull trout habitat in the action area, and have contributed to degraded habitat conditions in the action area. Water pollution essentially eliminated migratory bull trout from the upper Clark Fork River by 1892 (MBTSG 1995). Contaminated mine tailings and sediments have been deposited extensively throughout the Clark Fork River streambed, banks, and 100-year floodplain.

The deposition of tailings and contaminated sediments in the upper Clark Fork River valley resulted in a substantial portion of the floodplain and streambanks exhibiting varying degrees of phytotoxicity. The level of phytotoxicity of floodplain and streambank soils strongly influences the composition and density of riparian vegetation. Riparian vegetation, where it does exist under conditions of phytotoxicity, is likely not representative of the pre-contaminant composition and density, and is not optimum for stable streambanks under varying flow conditions.

Phytotoxic streambanks in the Clark Fork River valley and resulting impacts to the composition and density of riparian vegetation have caused excessive bank erosion, high suspended sediment concentrations, and high contaminant transport/redistribution rates (USDI 1998d). Not only has this led to degraded aquatic habitat conditions, but also has reduced the resistence of the Clark Fork River to catastrophic geomorphic change during large flood events (USDI 2002b) and chronic effects of land use practices. Phytotoxic conditions are most prominent in Reach A of the upper Clark Fork River, from Warm Springs Creek downstream to Garrison. Phytotoxic streambanks are not currently known to be impacting riparian vegetation within the action area of the Revised Proposed Plan.

Continual erosion of phytotoxic streambanks exposes buried floodplain tailings deposits and forms a continuous, recycling source of contamination to the Clark Fork River to and past Milltown Reservoir. Contamination occurs through leaching of soluble substances into groundwater and through stream channel dynamics, promoting mobilization and subsequent redeposition of streambank and bed materials with elevated levels of arsenic and metals. Mobilized streambank and bed material with elevated levels of arsenic and metals continually migrates downstream, though migration is periodically interrupted by retention on floodplains or behind one of the four Clark Fork River dams.

During extended dry periods, highly soluble copper and zinc salts form on tailings deposits as soil moisture evaporates. Rapid solubilization of copper salts during high-intensity precipitation events can more than double background total recoverable copper and increase dissolved copper concentrations by an order of magnitude in a matter of hours within the upper Clark Fork River (USEPA 2004a).

Concentrations of metals of concern are higher in surface water, sediment and benthic organisms from the upper Clark Fork River than from reference streams (Rock Creek, Gold Creek, Little Blackfoot River, Blackfoot River) for all metals except cadmium (ISSI Consulting 1999). Fish in the upper Clark Fork River are subject to higher background exposure to metals of concern than fish in reference streams (ISSI Consulting 1999). Although less certain, bull trout are likely at risk of chronic stress from long-term average exposure to metals in water and/or the diet (Stratus 2002). Risk is likely greater upstream from Gold Creek than downstream (SRC 2001), though the risk to chronic stress may be lower immediately downstream from the Warm Springs

Ponds.

Also of concern is bull trout avoidance of water containing levels of metals similar to those found in the Clark Fork River. This avoidance response could interfere with normal migratory behavior and may be a factor influencing the recolonization of the upper Clark Fork River by bull trout following extirpation of fish from the river at the height of mining in the upper watershed. For further discussion of the potential impacts to bull trout and bull trout habitat in the Clark Fork River upstream from the action area, see the April, 2004 *Biological and Conference Opinions for bull trout and proposed bull trout critical habitat for the USEPA Selected Remedy for the Clark Fork Operable Unit* (USDI 2004c).

Blackfoot River Mining and introduced species are rated as the two predominant risks to bull trout restoration in the Blackfoot River (MBTSG 1995a). Mining impacts include the direct loss and deleterious alteration of habitat, particularly in the upper and southern portions of the watershed as well as water quality impacts (lowered pH - sulfates) that pervade the system. These impacts persist and new mines may be developed in the future, potentially leading to further losses of habitat and more water quality degradation.

The Milltown Dam and irrigation diversions in the basin are considered risks to bull trout as they directly remove fish from the population. Swanberg (1997) found that 8 percent (n=37) of the bull trout marked in the lower Blackfoot River were lost to the population by downstream migration over Milltown Dam.

Introduced species such as brook trout, brown trout, rainbow trout and northern pike have been identified as a high risk to bull trout through hybridization (brook trout), predation (brown trout, northern pike) and possible competition (brook, brown and rainbow trout). Since habitat availability and quality has been reduced through several factors (mining, forestry, agriculture), ands brook trout and brown trout habitat preferences overlap with bull trout, these processes/interactions may synergistically act to reduce the carrying capacity for bull trout. In addition, whirling disease has been identified in the lower Blackfoot River.

Other risk factors identified in the Blackfoot River watershed include habitat impacts from forest practices, such as sedimentation from roads and the loss of woody debris. Impaired water quality resulting from silvicultural practices has been noted in 10 tributaries to the Blackfoot River (MT DHES *in* MBTSG 1995a). Livestock grazing and rural residential development also produce and deliver sediment to the Blackfoot River.

V. Effects of the action

"Effects of the action" refers to 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. Direct effects are considered immediate effects of the project on the species or its habitat. Indirect effects are those caused by the proposed action and are later in time, but are still reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consultation.

Once remedial actions begin, it is likely that there will be nearly continuous activity until the Revised Proposed Plan is fully implemented, a period estimated to require approximately 5 years. There will be numerous actions during the implementation of the Revised Proposed Plan that, in and of themselves, could result in impacts to bald eagles or their habitat, and to bull trout or bull trout habitat. The individual actions, as described in Remedial Action Work Plans for stages 1, 2 and 3 are grouped in to broader categories in the implementation stages in which they are expected to occur. Part A of the effects analysis describes temporal, physical and mechanical effects to bald eagles, bull trout and bull trout habitat associated with each stage. Part B of the analysis describes effects to bull trout that are anticipated to occur as a result of site disturbance and the resulting impacts from suspended solids and elevated metals and arsenic in the water column. Part C of the analysis describes the anticipated long-term effects to bald eagles and bull trout associated with the fully implemented Revised Proposed Plan.

Part A. Temporal and physical effects on bald eagles and bull trout

1. USEPA Remedial treatments

Stage 1: Initiation of the permanent drawdown, excavation of the bypass channel, construction of rail spur and armoring of the Blackfoot River

Stage 1 drawdown The Stage 1 drawdown initiates the permanent, final drawdown of the Milltown Reservoir. The permanent drawdown is an action necessary to reduce the water content of the accumulated sediments within the reservoir area, facilitating access to SAA1 for the construction of operational infrastructure and ultimately conventional excavation of the bypass channel and SAA1 sediments. As currently proposed, the permanent drawdown of the Milltown Reservoir would begin between December 2004 late March 2005. Stage 1 of the permanent drawdown is expected to extend through December 2005 (Envirocon 2004b).

The Stage 1 drawdown of the Milltown Reservoir would be accomplished by gradually lowering the water level until the flow of the combined Clark Fork and Blackfoot rivers flows over the spillway and through the radial gate of Milltown Dam. Stage 1 of the permanent drawdown would effectively lower the Milltown Reservoir approximately 10.5 feet to a minimum pool elevation of 3248.5 feet.

The Stage 1 drawdown would occur gradually, with the elevation of the pool of Milltown Reservoir falling no more than 2 feet per day. The drawdown of 10.5 feet would require five to six days. Drawing the reservoir down gradually is intended to reduce the scour and transport of Total suspended solids (TSS) and metals to minimize impacts to downstream aquatic resources than would occur at a more rapid drawdown rate (see EMC2 2002). However, the initial phase of the Stage 1 drawdown will result in a substantial volume of sediment leaving the reservoir and elevated TSS for several days. The Stage 1 drawdown would result in adverse impacts to bull trout from degraded water quality as described in Part B, below.

Potential effects to bald eagles The Stage 1 drawdown would result in a reduced pool area for the Milltown Reservoir. The reduced pool area would be primarily in that portion of the Clark Fork River currently inundated by the reservoir; the upstream extent of ponded water would retreat downstream to approximately Duck Bridge, and the lateral extent of the reservoir would retreat to the existing channel of the Clark Fork River though the former reservoir pool. The retreating reservoir would result in concentrating fish within the reservoir into a smaller, shallower pool area. Concentrating the reservoir fish in a smaller, shallower area could increase the foraging efficiency of bald eagles. Drawdown of the reservoir could also result in stranding fish in isolated pools on the bed of the former reservoir, resulting in a temporary, short-term increase in prey availability.

Increased foraging efficiency and prey ability would likely be greatest immediately following the Stage 1 drawdown of the reservoir to its lowest pool depth, an action that is likely to occur in late fall or during the winter. As such, increased foraging efficiency and prey ability would benefit bald eagles wintering along the Clark Fork River and Blackfoot River corridor. Increased foraging efficiency as a result of reduced pool area could extend into the breeding season, though, as described below, upstream migration into the reservoir would remain obstructed by Milltown Dam, and prey recruitment to the reservoir would be form downstream movement of fish and recruitment from fish production within the river channels. Recruitment from northern pike would be essentially eliminated by the draining of shallow breeding habitat along the edges of the former reservoir.

Immediately following the initiation of the Stage 1 and subsequent drawdowns, concentrations of TSS will increase dramatically in the Clark Fork River below Milltown Dam. Elevated concentrations of TSS would adversely influence sight recognition of aquatic prey by bald eagles from Milltown Dam downstream to the Bitterroot River. This would likely reduce the opportunity for bald eagles to capture fish from the river. Elevated concentrations of TSS are anticipated to gradually diminish over a period of 1 to 2 months from the initial peak. As currently proposed, the Stage 1 and Stage 2 drawdowns are likely to occur outside of the nesting period.

Potential effects to bull trout The Service anticipates that potential adverse impacts to bull trout resulting from the Stage 1 drawdown would include the inability to operate the radial gate fish trap and transfer program as a result of elevated flows through the radial gate. The radial gate fish trap cannot be operated at flows in excess of approximately 7000 cfs as the tail water elevation floods the radial gate pool area, preventing safe and productive operation of the radial gate trap. Limited trapping and upstream transport of migratory bull trout has occurred since 1998. Schmetterling (2003) however, estimates that only 12 percent of the trout that congregate at the base of the dam are captured by the radial gate fish trap.

Fewer than 10 bull trout per year have been captured at the radial gate fish trap during the 7 years this trap has been used (USEPA and FERC 2004; Schmetterling 2003). Information is inconclusive as to the sex of the adult bull trout captured at the radial gate fish trap in any given year (Schmetterling 2004), and the Service has no information to suggest that the sex ratio of the bull trout captured at the radial gate is in any way representative of that of the spawning cohort that congregates at the base of Milltown Dam. Assuming that capture efficiency at the radial gate in the year of the Stage 1 drawdown is equal to that from 1998 to 2004, from zero to nine spawning females would have been released above Milltown Dam during the Stage 1 drawdown period. The Service estimates that implementation of the Stage 1 drawdown would result in the loss of the recruitment of the progeny of from one to nine spawning adult female bull trout during the 1 year the Stage 1 drawdown is in affect.

There is the potential that the rate of excavation for and construction of the bypass channel for the Clark Fork River is substantially less than anticipated in the Statement Of Work (Envirocon 2004b). If the rate of excavation or construction is substantially less than that anticipated, the capture of migratory bull trout at the radial gate would not occur for a second year. The progeny of those bull trout in the spawning cohort congregating at the base of Milltown Dam successfully captured and moved over the dam would not be recruited into upstream populations for a second year.

Currently, bull trout moving downstream from spawning locations in upstream tributaries in the fall of the year are essentially unable to return to foraging, migratory and overwintering habitat below Milltown Reservoir until the following spring. Unable to pass downstream from the Milltown Dam, these adult bull trout remain in Milltown Reservoir or reascend the Blackfoot or Clark Fork rivers (Schmetterling 2004), until elevated flows in March and April allow downstream passage over Milltown Dam. Juvenile bull trout outmigrating from upstream rearing areas in early fall are also impeded by the restricted fish passage over Milltown Dam. Outmigrating juvenile bull trout appear to remain in the Milltown Reservoir for days or weeks until they pass through the turbines or are lost to predation (Schmetterling 2004).

The Stage 1 drawdown will enhance the downstream passage of fish with the removal of spillway panels and opening of the radial gate. With limited exceptions, downstream passage of fish has been restricted to passage through the powerhouse turbines, or to periods when river flow exceeds the generating capacity of the powerhouse turbines, approximately 1,600 cfs. This typically is the period of March through July. Enhanced downstream passage will extend from the initial drawdown sequence until the flooding of the penstocks at the beginning of Stage 2. See table 2.

Table 2. Mean of monthly streamflow of the Clark Fork and Bitterroot rivers*

Clark Fork River at Turah Bridge (site 12340500)				Clark Fork River above Missoula (site 12340500)				Bitterroot River (site 12352500)			
Jan.	724	*July*	1225	*Jan.*	1,327	*July*	3,159	*Jan.*	909	*July*	3,276
Feb.	846	*Aug.*	639	*Feb.*	1,474	*Aug.*	1,487	*Feb.*	1,000	*Aug.*	1,050
Mar.	1032	*Sept.*	706	*Mar.*	1,865	*Sept.*	1,399	*Mar.*	1,283	*Sept.*	892

Table 2. Mean of monthly streamflow of the Clark Fork and Bitterroot rivers*											
Clark Fork River at Turah Bridge (site 12340500)				Clark Fork River above Missoula (site 12340500)				Bitterroot River (site 12352500)			
Apr.	1492	*Oct.*	871	*Apr.*	3,723	*Oct.*	1,559	*Apr.*	2,753	*Oct.*	1,033
May	2480	*Nov.*	857	*May*	7,887	*Nov.*	1,555	*May*	6,765	*Nov.*	1,094
June	2772	*Dec.*	739	*June*	8,266	*Dec.*	1,414	*June*	8,456	*Dec.*	1,021
*From USGS website											

Excavation of the bypass channel A bypass channel for the Clark Fork River would be excavated from the former location of the Chicago, Milwaukee, St. Paul and Pacific railroad bridge (locally known as 'Duck Bridge') downstream to the Blackfoot River, a distance of approximately 3,850 feet. As currently proposed, the bypass channel would be excavated parallel to Interstate Highway 90, through the northeastern edge of the entire extent of SAA1. Material from the excavation would be piled onto SAA1 sediments to drain and to "preload" sediments to be excavated, increasing the rate of dewatering the lower sediments. Eventually the SAA1 sediments excavated for the bypass channel would be loaded onto railroad cars and transported to Opportunity Ponds.

The bypass channel is a key component of the of the Revised Proposed Plan. The purpose of the bypass channel is to isolate the flow of the Clark Fork River from contaminated sediments in SAA1 and SAA3, thus minimizing (reducing, eliminating) the entrainment and downstream deposition of the most highly contaminated sediment in the Milltown Reservoir Sediments Operable Unit. The bypass channel would be in place and functioning as the primary path of the Clark Fork River for 33 months and possibly longer. Stability of the bypass channel through a variety of flow conditions is thus a principal concern. As such, "hard" engineering techniques, such as riprap and in-stream deflectors will be incorporated into the design. The bypass channel would be designed to contain a 100-year flow event without exposing SAA1 sediments to out-of-bank river flow (Forba *in litt*. 2004a).

Potential effects to bald eagles Excavation of the bypass channel will initiate the 33 month period in which intensified, year-round activities are occurring in SAA1, immediately adjacent to Milltown Reservoir. The excavation of the bypass channel and subsequent excavation of SAA1 sediments (see below) will create a substantial volume of heavy equipment use and associated traffic adjacent to a bald eagle foraging area. Disturbance of this nature is expected to occur daily and to continue for 33 months. Disturbance of this nature could influence the foraging use of the Milltown Reservoir area by bald eagles. SAA1 falls within Zone 3 of bald eagle nesting territory 007-078.

The Service notes that bald eagle territory 007-078 currently has major disturbance elements in close proximity to the nest site. These disturbance elements include Interstate Highway 90, the Montana Rail Link rail line and the frontage road, suggesting that the nesting pair occupying nest territory 007-078 are accustomed to relatively high levels of disturbance.

Potential effects to bull trout The flow of the Clark Fork River would remain in the current channel until the bypass channel is completed, such that the bypass channel and associated features- railway/road bridge, fish-passable grade control structures and others- will be constructed without operations in the flooded channel. The Service does not anticipate adverse impacts to bull trout to occur from the actual construction of the bypass channel.

The bypass channel would be excavated to an elevation substantially below the lower extent of contaminated sediments or the existing level of the floodplain prior to 1908. Excavation of the bypass channel to a depth below the 1907 floodplain would ensure that contaminated sediments were removed from the channel prior to innundation river flow from the upper Clark Fork River. Excavation to a lower depth would also allow for the construction of the bypass channel bed with a larger substrate size than will likely be encountered at the level of the 1907 floodplain, which, following channel innundation, would reduce the potential for channel incision during elevated flows and would mimic channel armoring as observed in natural river channels with gravel and cobble bottoms. Channel incision in the bypass channel could render the fish passable grade control structure constructed at the upstream end of the bypass channel impassible to migratory bull trout and other species of fish at flow regimes appropriate for fish migration.

Excavation of the channel to a depth below the 1907 floodplain would increase the hydraulic gradient between SAA1 sediments and the bypass channel, facilitating the dewatering of adjacent SAA1 sediments into the bypass channel. Ground or pore water entering the bypass channel from dewatering the SAA1 sediments will likely contain elevated levels of metals and arsenic (Envirocon 2004c). Ground water accumulating in the bypass channel would be pumped into the Clark Fork River, where river flow will dilute concentrations dissolved arsenic and copper. Pore water with elevated levels of arsenic and copper entering the Clark Fork River are discussed further in Part B.

A grade control structure would be constructed at the upstream end of the bypass channel to accommodate for the anticipated difference in depth between the excavated channel bottom and the existing elevation of the thalwag of the Clark Fork River at Duck Bridge. The current, theoretical design of the grade control would lower the existing Clark Fork River thalwag 5 feet over a distance of 50 feet, resulting in a 10 percent stream gradient over a relatively short portion of the bypass channel. The base elevation of the grade control structure would be equivalent to the base of the railroad overpass, and a hardened structural apron will likely extend from the foot of the grade control structure downstream to and slightly beyond the overpass. The grade control structure would minimize upstream channel incision; upstream channel incision could undermine the railway overpass.

The bypass channel will be the route migrating fish use to access and return from the upper Clark Fork River during the anticipated 33 months the bypass channel is in place. The Service recognizes potential impediments to the upstream migration of bull trout may occur during the period of operation due the design and operation of the channel. As currently drawn, the sides of the bypass channel would be formed with structural backfill obtained from borrow sources outside the immediate project area. The structural backfill would be protected by riprap, and the bypass channel bottom would be armored with large rock to a depth of 2.5 to 3 feet (Envirocon

2004b). The final design of the fish-passable grade control structure and the fish-passable bypass channel have not been competed at the time of the preparation of this biological opinion. However, the final design of the bypass channel will occur with the involvement of fisheries biologists and the Service (USEPA and FERC 2004). The Service assumes that the final design and the constructed bypass channel will accommodate the upstream migration of adult bull trout at bankfull river flows. The bypass channel will also allow downstream movement of adult and juvenile bull trout during the appropriate seasons.

Concurrent with the construction of the bypass channel, the southern bank of the Blackfoot River from the confluence of the newly-constructed bypass channel to immediately upstream of Milltown Dam (a distance of about 1,000 feet) would be armored with large rock overlying geotextile fabric. The armor would extend onto the bank approximately 40 feet and would be grade into a graveled roadway atop the northern perimeter of SAA1 sediments. This armoring would tie into the armored side wall of the bypass channel, and would eventually tie into the coffer dam constructed to isolate the spillway and radial gate from the river flow during Stage 2 and following.

Construction of the armored embankment along the Blackfoot River and the coffer dam will require heavy equipment working adjacent to and within the active channel of the Blackfoot River. Instream operations pose a potential for mechanical impacts to bull trout, such as direct contact between machinery and bull trout, stranding bull trout in de-watered sections of the river channel and similar actions. Instream operations are expected to occur from the beginning of Stage 1 through Stage 2. The bypass channel, the armoring along the Blackfoot River and the coffer dam are all intended to reduce SAA1 sediments from moving into the Blackfoot and Clark Fork rivers during and following sediment and dam removal.

In addition, a grade control structure may be installed in the Blackfoot River at the base of the Interstate Highway 90 bridge to minimize upstream scour and protect the Interstate Highway 90 bridge. The grade control will be installed in sections; the area of installation will likely be isolated from river flow by sheet pile retaining walls such that most actions associated with the installation will be conducted in the dry. This action will also require instream work with heavy equipment, which may also result in mechanical impacts to bull trout.

Construction of rail spur and access roads During Stage 1, a rail spur would be reconstructed to access SAA1. The rail spur would originate from an existing siding on the Burlington Northern-Montana Rail Link line immediately east of Interstate Highway 90 and approximately 1 mile southeast of SAA1. The reconstructed rail spur would cross Interstate Highway 90 at the preexisting, historic Milwaukee Road underpass, and new construction would begin as the rail spur approached the bypass channel described above.

Potential effects to bald eagles Construction of the rail spur and access roads will contribute to the high level of human activity associated with implementation of the Revised Proposed Plan, and would contribute to the disturbance of foraging eagles on Milltown Reservoir.

Potential effects to bull trout To access SAA1, a single lane rail and road bridge would be constructed across the bypass channel. The timing of construction would be such that the bridge, including any in-stream support, would be completed prior to the bypass channel being flooded. As such, it is unlikely that adverse impacts to bull trout would result from construction of the rail and road bridge. Constructed specifically for SAA1 sediment removal, the rail bridge would be demolished following the innundation of the restored river channel through the site where SAA1 sediments were excavated.

Access roads in SAA1 would also be constructed at this (and later) time. Construction of the rail spur and access roads may extend into Stage 2.

Stage 2: Stage 2 drawdown, spillway removal, removal of SAA3 sediments

Stage 2 drawdown Stage 2 of the permanent drawdown would begin following the removal of the turbines and exciters from the powerhouse penstocks, converting these features to low level outlets. The combined flow of the Blackfoot and Clark Fork rivers would be routed through the low level outlets, lowering the Reservoir elevation an additional 6 feet to a minimum pool elevation of 3,242.5 feet. Base river flow above Milltown Dam would remain 14 to 17 feet above base flow in the Clark Fork River below the dam. Downstream fish passage would be entirely through the penstocks unless river flow exceeded 7,800 cfs, in which case flow would be routed through the radial gate, should that structure remain in place. Velocity through the penstocks following the removal of the turbines and exciters is expected to be similar to that now occurring through the turbines; the Service has no information to address the potential impacts to fish from routing through the penstocks. As proposed, the Stage 2 drawdown would commence in the fall of 2005 and would last until Stage 3 is initiated, an estimated 5 months later.

Potential effects to bald eagles As described under the Stage 1 drawdown analysis, reservoir drawdown will likely concentrate fish and waterfowl in the remaining reservoir area. This will likely result in a rapid, short term increase in prey availability for bald eagles. However, as the Stage 2 drawdown is expected to be initiated in November 2005, only those bald eagles that use this portion of the Clark Fork River as winter foraging habitat would benefit from increased availability.

As described above, the Clark Fork River would experience a rapid increase in turbidity following the initiation of the Stage 2 drawdown. Foraging opportunities for bald eagles in the Clark Fork River downstream from Milltown Dam would likely be adversely impacted from this turbidity.

Potential effects to bull trout The Stage 2 drawdown would result in a substantial volume of sediment being generated and transported downstream of the Milltown Dam. The effects of the degradation of water quality on bull trout within and downstream of the project area are discussed in Part B, below.

Spillway removal During the Stage 2 drawdown, the 220 feet long Milltown Dam spillway would be removed using conventional demolition techniques. Removal of the Milltown Dam spillway would be accomplished by isolating the area of the spillway with a coffer dam from the southwest side of the divider block or radial gate to the armored embankment of the Blackfoot River. The coffer dam would force the combined flow of the Clark Fork and Blackfoot rivers through powerhouse low level outlets and potentially the radial gate, should this structure be left in place. The spillway a would be removed to an elevation of 3,226 feet. The 52 foot radial gate may also be removed at this time, or it may be left in place to function as an overflow should a high water event occur during the period in which only the low level outlets are passing river flow.

Potential effects to bald eagles As this activity is limited in scope, area and duration, the Service does not anticipated adverse effects to bald eagles from removal of the Milltown Dam spillway, other than those associated with potential disturbance of foraging eagles from elevated human activity in the area.

Potential effects to bull trout The spillway removal, and a period of elevated sediments following the release of the combined flow of the Clark Fork and Blackfoot rivers through the area of the former spillway, is anticipated to result in the most substantial volume of sediment in the form of TSS and bedload to enter the river downstream from Milltown Dam generated by implementation of the Revised Proposed Plan. Impacts of this sediment pulse are discussed further in Part B.

Removal of SAA3 sediments Some SAA3 sediments would be removed from immediately upstream of the Milltown Dam to the southern bank of the Clark Fork River. These sediments will be isolated from river flow by the earth-reinforced coffer dam (described above) and the large rock armoring on the southern bank of the Blackfoot River placed during Stage 1 of the permanent drawdown. SAA3 sediments excavated at this time will eventually be used to cap debris from the demolished Milltown Dam, deposited in a depression immediately south of the railway tunnel on the southwestern shore of the reservoir. The primary river channel of the combined Blackfoot and Clark Fork rivers would be excavated through former location of the spillway.

Potential effects to bald eagles As this activity is limited in scope, area and duration, the Service does not anticipated adverse effects to bald eagles from removal of SAA3 sediments, other than those associated with potential disturbance of foraging eagles from elevated human activity in the area.

Potential effects to bull trout Ground water will enter the area from which SAA3 sediments and the spillway are being removed, and this water will likely flow into the Clark Fork River below the dam. It is likely that additional turbidity caused by this seepage will be a minor contribution to the total TSS concentration generated by implementation of the Stage 2 drawdown.

Removal of the SAA3 sediments would result in a substantial improvement to bull trout habitat in that removal would result in a general improvement in water quality at and upstream from the confluence of the Clark Fork and Blackfoot rivers.

Stage 3: Stage 3 drawdown, excavation of SAA1 sediments, demolition of the remaining dam structure, backfill SAA1 area, grade floodplain and create river channel

Stage 3 drawdown The Stage 3 of the permanent drawdown would be accomplished by routing the combined flow of the Clark Fork and Blackfoot rivers through the 220 foot gap in the Milltown Dam created by removal of the spillway. The Phase 3 drawdown would lower the water level to the point that impounded water no longer existed in Milltown Reservoir to an elevation of 3,238 feet. Stage 3 of the permanent drawdown is scheduled to occur in March 2006.

Potential effects to bald eagles As described under the Stage 1 drawdown analysis, reservoir drawdown will likely concentrate fish and waterfowl in ponded water isolated from the river channels in the remaining reservoir area. This will likely result in a rapid, but extremely limited increase in prey availability for bald eagles in the short term, as most of the inundated area where off-channel ponding could occur would have been isolated during Stage 2 of the permanent drawdown. The Stage 3 drawdown would return the lower Blackfoot and Clark Fork Rivers to riverine conditions, completely eliminating the reservoirs created by the Milltown and Stimson Dams. The Stage 3 drawdown would likely reduce bald eagle prey availability and reduce foraging efficiency at the confluence of the Blackfoot and Clark Fork rivers until such time as fish biomass recovers to near pre mining and dam construction levels. There would also be a substantial increase in turbidity downstream from Milltown Dam immediately following initiation of the Stage 3 drawdown as described above.

Potential effects to bull trout Initiation of the Stage 3 drawdown will restore the passage of all migratory fish, including bull trout to the Blackfoot and upper Clark Fork rivers after nearly 100 years of obstructed passage. Removal of the spillway and the subsequent restoration of uninhibited fish passage past the Milltown Dam site is undoubtedly a key element of the restoration of bull trout habitat in the upper Clark Fork River system.

The Stage 3 drawdown would result in a substantial release of reservoir sediments into the Clark Fork River below Milltown Dam. The impacts to bull trout associated with this are discussed in Part B, below.

Excavation of SAA1 sediments While excavation of the SAA1 sediments actually began with the excavation of the bypass channel, the removal of the 2.6 mcy of SAA1 sediment and transport of this sediment to Opportunity Ponds would begin in earnest in Stage 3. The USEPA estimates that 60 gondola style rail cars will be loaded with SAA1 sediment and hauled to Opportunity Ponds each day, and that removal operations would occur 7 days per week. Stage 3 is estimated to require at approximately 33 months.

Potential effects to bald eagles The excavation of the SAA1 sediments will require the extensive use of heavy equipment for excavation and loading of sediment on to rail cars for transport to Opportunity Ponds. Excavation of SAA1 sediments is expected to be a continuous source of noise and activity at the confluence of the Blackfoot and Clark Fork rivers, an area currently used by foraging bald eagles, specifically the bald eagles of nest territory 007-078. The Service anticipates that this continuous activity could result in reduced foraging opportunity for bald eagles during the implementation period of the Revised Proposed Plan, as bald eagles may be disturbed from feeding sites during operating hours.

Potential effects to bull trout The construction and use of the full bypass channel of the Clark

Fork River and the armoring of the Blackfoot River isolate SAA1 sediments from river flow. It is unlikely that large volumes of sediment will enter flowing water as a result of excavations of SAA1 sediments, and excavation of these sediments will occur away from river flow. The Service does not anticipate adverse impacts to bull trout from removal of SAA1 sediments. The Service does anticipate an overall improvement to bull trout habitat from removal of this source of contamination to the Clark Fork River.

Demolition and removal of the remaining Milltown Dam Structures Following the demolition and removal of the spillway and possibly the radial gate, the remaining components of the Milltown Dam would be demolished and removed from the site. It is likely that demolition would begin with divider block, progress to the powerhouse and then remove the north abutment. During deconstruction, the divider block, powerhouse and other in-stream features would be isolated from river flow by coffer dam(s), such that the majority of the removal would be done 'in the dry'. The lowest portion of the foundations of these structures would be left in place to function as grade control for the reconstructed/restored channels upstream.

As proposed, much of the debris from demolition would be removed to a location immediately north of the historic housing complex at the Milltown Dam site. Some, however, may be salvaged for construction of an interpretive center at or near the site.

The Milltown Dam site has been identified as eligible for nomination as a national historic site. Local interests have expressed interest in retaining the powerhouse at its current location, and maintaining the powerhouse as a monument to man's control of nature. By the nature of its intended function, the powerhouse will be immediately adjacent to the active channel of the Clark Fork River below the confluence with the Blackfoot River. Analysis conducted for the Natural Resource Trustee Restoration Plan demonstrates that a substantial portion of the powerhouse is in the 5-year floodplain of the river. As such, to maintain this structure, extensive protection from elevated river flows would be required. This protection would likely be in the form of extensive large rock placed upstream, downstream and on the immediate channel side of the powerhouse, essentially creating a hardened rock protrusion into the 5-year channel, and eliminating river access to the floodplain on the northern bank. The principal reason the Milltown Dam was constructed at this location is that a prominent rock bluff dominates that southern bank. Retaining the powerhouse at this location, and hence eliminating the narrow floodplain on the north side of the river, forms an artificial constriction in the valley bottom area available to the river of approximately 300 feet.

During elevated river flow, the constriction in the Clark Fork River would force a ponding of water upstream of the powerhouse, which would result in the deposition of sediment over the long term. The Natural Resource Trustees contend that continued deposition upstream from the powerhouse and hardening a permanent feature in that substantially constricts the flow of the river is incompatible with the concept of natural river design. As such, the Natural Resource Trustees will not implement the Restoration Plan in the Clark Fork and Blackfoot Rivers should the Milltown Dam powerhouse be retained in its current location.

Potential effects to bald eagles Adverse impacts to bald eagles specifically from removal of the remaining structures of the Milltown Dam are unlikely. However, the removal activity is an additional disturbance source at the confluence of the Blackfoot and Clark Fork rivers and within Zone 3 of nest territory 007-078. Removal of the remaining Milltown Dam structures would occur simultaneously with the excavation of the SAA1 sediments and other elements of the project, as described above. Continuous disturbance created by extensive, continuous noise and human activity could reduce bald eagle foraging opportunities in the action area.

Potential effects to bull trout Demolition of the divider block, powerhouse and remaining components of Milltown Dam, if conducted while the flow of the Clark Fork River is isolated from the deconstruction site, is unlikely to result in adverse impacts to bull trout or bull trout habitat. It is unclear if the Clark Fork River channel created with the removal of the spillway and radial gate would extend into the 26 foot space created by removal of the divider block, or into the 126 foot space created by the removal of the powerhouse. If so, innundation of these areas by river flow would result in the downstream delivery of sediment.

During the period of deconstruction of the divider block, powerhouse and right abutment, the initial phases of the Stage 3 drawdown would be generating a substantial of scoured sediment and this sediment would be routed downstream. The initial deconstruction of these structures is likely to immediately follow the innundation of the newly constructed Clark Fork River channel through the location of the spillway and radial gate, the event that is expected to trigger the largest pulse of total suspended solids during the implementation of the revised proposed plan. This is discussed in greater detail in Part B.

Backfill excavated sediments SAA1 would be backfilled with non-contaminated fill obtained from off-site sources. The volume of backfill would be substantially less than excavated; backfill would be used primarily to recreate the floodplain of the Clark Fork and Blackfoot rivers.

During the backfill process, the interface between the excavated SAA1 sediments and SAA3 sediment will be armored with large rock (riprap). This action will construct an armored terrace that will define the southwestern extent of the 100 year floodplain from Duck Bridge downstream to the former site of the Milltown Dam. The armored terrace will protect SAA3 and SAA2 sediments from out-of-bank flows less than the 100-year event, and minimize erosion of sediments with elevated concentrations of metals and arsenic to the Clark Fork River. This action will be conducted entirely ‘in the dry.’

Potential effects to bald eagles The backfill of excavated sediment in SAA1 would contribute to the elevated level of human disturbance in Zone 3 of bald eagle nesting territory 007-078, and may influence foraging in the Clark Fork and Blackfoot rivers.

Potential effects to bull trout No adverse impacts to bull trout or bull trout habitat are anticipated as a result of backfilling the SAA1 area.

Floodplain grading and river channel construction Following the removal of the Milltown Dam and SAA1 sediments, the site would be graded to form the floodplain of the river, to include floodplain features as described in the Stage 2 and 3 Remedial Design Work Plan. The area excavated for removal of the SAA1 sediments would be graded to specifications to create floodplains, terraces, wetlands and other riverine features common to rivers of the size and gradient of the Clark Fork River. A river channel would be excavated into the graded area; the channel excavation would be to the specifications established by the Natural Resource Trustees.

Potential effects to bald eagles Floodplain grading and river channel construction in the former location of SAA1 sediment would contribute to the elevated level of human activity in Zone 3 of bald eagle nest territory 007-078.

Potential effects to bull trout No adverse impacts to bull trout or bull trout habitat are anticipated as a result of grading the floodplain in the remedial area or creation of the river channel through the former location of the SAA1 sediments, as the flow of the Clark Fork River will be through the full bypass channel. As these elements of the revised proposed plan would be done 'in the dry' the delivery of sediment to occupied bull trout habitat will be minimized in the short term.

2. Ongoing operation of the Milltown Project and surrender of the FERC license

Ongoing operation Operation of the Milltown Project by NorthWestern Energy is conducted under FERC license number 2543. Operations from the completion of construction of Milltown Dam in 1907 until the present resulted in full or partial impediment to upstream fish passage. As described in section IVB.b, *Factors affecting the species environment in the action area,* this has led to a general decline in fish abundance as a result of impeding the migratory behavior of fish in the Clark Fork and Blackfoot rivers. Since the listing of bull trout under the ESA in 1998, efforts have been made to move bull trout over Milltown Dam. There have been a number of reservoir drawdowns, the most recent of which occurred in July and August 2004, some of which have resulted in a substantial volume of sediment being mobilized within the reservoir and routed downstream.

Operation of the Milltown Project since 1998 has continued to impede upstream movement of bull trout and other native fish species. Not only has this impacted migration and reproductive fitness for bull trout, but also has continued to impede the upstream migration of largescale sucker and other native fish, and consequently a substantial volume of biomass to upstream areas. The experimental trapping of fish at the radial gate of the dam began in 1998, and while all bull trout captured have been moved over the dam to upstream release sites, trap efficiency is noted to be low. For further information on the number of bull trout captured and moved, see section IVB.b *Factors affecting the species environment in the action area*, above.

Conservation efforts in the Clark Fork River basin have been funded since 1994 following the development of the Milltown Fisheries PM&E Plan (MPC 1993). In 2003, NorthWestern Energy, the current owner of the Milltown Project, initiated the Bull Trout Conservation funding to fund the capture and transport of bull trout from the dam to upstream locations and to mitigate impacts to bull trout habitat within the Clark Fork River basin.

License surrender As proposed, the FERC license for the Milltown Project would be surrendered following the termination of power generating capacity at the dam and the removal of the Milltown Dam structure. At the time of the preparation of this biological opinion, the

Service has not reviewed the draft Surrender Application for the Milltown Project. As such, some details of the surrender criteria, such as timing of the demolition of Milltown Project features on the east bank of the Clark Fork River, the disposition of power conveyance lines associated with the Milltown Project and similar activities are somewhat speculative. However, the Service anticipates substantial overlap in the requirements put forth in the FERC conditional surrender order and those actions required by USEPA as proposed in the Revised Proposed Plan. As the draft and subsequent final Surrender Applications become available, the Service will review these documents, and if necessary, require additional environmental analysis of potential effects to threatened and endangered species, as necessary.

The Service anticipates that the FERC conditional surrender order for the Milltown Project would require removal of all or a portion of the Milltown Dam. Removal of the Milltown Dam would involve mechanical demolition of the dam structure and would restore fish passage to the Blackfoot and, eventually the upper Clark Fork rivers. Surrender of the license would also terminate the PM&E funding and the Bull Trout Conservation funding, which would substantially reduce aquatic conservation and restoration funding for the Clark Fork and Blackfoot rivers and associated tributaries.

Potential effects to bald eagles Potential effects to bald eagles from surrender of the FERC License No. 2543 are virtually identical to those associated with implementation of the Revised Proposed Plan. These potential impacts were discussed at length under section 1, *USEPA Remedial treatments*, above.

Potential effects to bull trout The Milltown PM&E Plan and Bull Trout Conservation funding, developed in concert with the Service, FERC, NorthWestern Energy, MFWP and other conservation organizations to mitigate the impacts of Milltown Dam, have been very successful programs. The PM&E funding and Bull Trout Conservation funding leverage funds to conduct riparian and aquatic conservation work, and provide an estimated 25 percent of the funds required to complete all the projects undertaken with the two programs. Adaptive management of the PM&E and Bull Trout Conservation funding have provided the means to develop critical fisheries information on the impacts of Milltown Dam, broadly expanded overall understanding of native and non-native fish species local life history and behavior, as well as the restoration and protection of Clark Fork and Blackfoot rivers and tributaries in the vicinity of Milltown Dam. PM&E and Bull Trout Conservation funding, used to as match funds from other private, state, and Federal funding sources have significantly benefitted fishery investigations and restoration work in the Clark Fork and Blackfoot rivers and tributaries. The loss of the PM&E and Bull Trout Conservation funding with surrender of the FERC License No. 2543 would significantly reduce the opportunity to obtain matching funds for riparian and aquatic conservation in the Clark Fork River basin.

In 2003 and 2004, 61 and 42 percent (respectively) of PM&E Plan and Bull Trout Conservation funding supported projects to restore bull trout habitat (CFBLLC 2003b and CFBLLC 2004). The significant funding of habitat restoration is consistent through the 10 years of PM& E funding and 2 years of Bull Trout Conservation funding. Projects completed using this funding will continue to provide long-term off-site benefits to bull trout and bull trout habitat.

PM&E and Bull Trout Conservation evaluations identified five long-term effects to bull trout and bull trout habitat resulting from the presence and operation of Milltown Dam and reservoir. These long term effects are:

1. Limiting access to upstream spawning habitat
2. Limiting the connectivity between groups of bull trout
3. Potentially reducing genetic variability from the loss of small populations
4. Limiting access of BT to upstream thermal refuge
5. Limiting access of BT to upstream foraging areas

The FERC dam removal action would provide long-term benefits by eliminating the five factors responsible for the adverse effects to bull trout. Removing Milltown Dam would also end the necessity for the mitigation programs related to the five factors.

3. Stimson Dam Removal and Natural Resource Trustee Restoration

Stimson Dam removal The Stimson Dam spans the Blackfoot River approximately 1 mile above Milltown Dam, and is nearly inundated at the full pool of the Milltown Dam. With the permanent drawdown of the Milltown Reservoir, 8 to 12 feet of the downstream surface of the Stimson Dam would be exposed, resulting in barrier to the upstream passage of fish. The Stimson Dam was constructed of stacked wooden cribbing, the cribbing filled with rock. While detailed diagrams of the Stimson Dam from prior to or during the construction of this dam are not known to exist, it is likely that the Stimson Dam is held in place by gravity acting on the mass of the cribbing and rock. The Stimson Dam is of questionable stability and a potential hazard to downstream resources. The small volume of sediment accumulated behind the Stimson Dam is not known to be contaminated.

As proposed, the removal of the Stimson Dam would likely occur between November 2004 and March 2005, or the fall of 2005, based on the availability of funding, and would require approximately 6 weeks to complete. The removal of the cribbing infrastructure would likely be accomplished by lifting portions of the infrastructure from the river with a crane, operating either from a river barge, from the north and south banks of the Blackfoot River, or both. Debris from the dam would be lifted to the banks of the Blackfoot River, where it would be transported via existing roads to the Stimson Lumber Mill yards on nearby terraces above the river.

To support the ends of the Stimson Dam, a earthen platform, reinforced by interlocking timber cribbing, was constructed on the north river bank. The timber cribbing on the north side of the river will be removed, and the bank recontoured to the pre-dam bank angle and configuration on completion of the dam removal. The interlocking timber cribbing on the north bank is approximately 40 feet long and protrudes into the Blackfoot River approximately 8 feet. The cribbing on the south bank will likely be left in place to reinforce the river bank, as the Stimson Lumber Mill yard is immediately adjacent to the river at this point. Debris generated from the removal of the timber cribbing at the north end of the Stimson Dam would be removed to nearby Stimson Mill yards. No excavation of the river channel or of the river floodplain is anticipated. Likewise, no fill within the 100-year floodplain is anticipated.

Analysis conducted in 2004 indicates that the Stimson Dam impounds very little fine sediment, likely a result of early manipulation of the river channel to facilitate dam operation/power generation and management of sawlogs that were transported to the lumber mill by flow in the Blackfoot River. Over the course of over 100 years of operation of the lumber mill, the channel of the Blackfoot River was narrowed an estimated 40 percent for approximately 700 feet upstream from the dam. As a result, the velocity of the river during high flow conditions is substantially increased, producing an elevated sediment transport capacity immediately upstream from the dam.

Using bathymetry and side scan sonar, the *Stimson Dam-Draft Estimate of Sediment Deposition* (CH2MHILL 2004a) estimated that there are 14,000 cy of coarse sediments (gravels to large cobbles) deposited upstream from the Stimson Dam. The area of deposition extends from the base of the dam upstream approximately 1,600 feet. Fine(er) sediment undoubtedly fills the interstitial space between gravels and cobbles. Assuming that all of the interstitial space is filled, and that the porosity of gravel and large cobbles accumulated behind the dam is 20 percent, the fraction of fine sand and smaller sediment behind Stimson Dam would be approximately 2,800 cubic yards.

Recent analysis indicates the volume of coarse sediment available for scour and transport in the Stimson Reservoir area could be substantially greater than predicted by CH2MHILL (2004a), however. Envirocon (2004f) identified a potential for 44,700 cy of coarse material to be scoured from upstream from the Stimson Dam, but suggested that the additional 29,000 cy exemplifies the conservative nature of the Envirocon modeling process.

With the removal of Stimson Dam, the gravel to large cobble deposits-bedload- would begin to redistribute through and below the site of the Stimson Dam. The movement of the bedload would release finer sediment contained in the interstitial spaces at various flows. It is likely that in the initial high flow period following removal of the Stimson Dam, much of the estimated 2800 cy on finer sediment would be come suspended or otherwise entrained. Much of the finer suspended sediment may be transported in the water column to and over Milltown Dam. Larger particles, entrained in the water column, would likely be deposited in the Milltown Reservoir immediately downstream.

In addition to the 14,000 cf of coarse sediments, and estimated 1,100 cy of sands and silts have been deposited immediately upstream from the south end of the Stimson Dam. It is likely that this 1,100 cy would initially be mobilized soon after the Stimson Dam is removed, as the eddy that deposited this material would likely be eliminated with the removal of the dam.

The hazard of dam collapse increases with the lowering of water to the front of the dam. Stimson Dam removal may also occur in Stage 2, and would likely occur prior to removal of the spillway.

Potential effects to bald eagles No impacts to bald eagles are anticipated as a result of the removal of Stimson Dam.

Potential effects to bull trout Removal of the Stimson Dam is proposed for spring, 2005, but may occur in late fall 2005. If removal of Stimson Dam occurs in January, February or March of 2005, it is unlikely that bull trout will be in the vicinity of the demolition. However, if removal of the Stimson Dam occurs in late fall 2005, there is the potential that adult and juvenile bull trout descending the Blackfoot River and impeded from further downstream movement by the Milltown Dam may be in the lower reach of the Blackfoot River, and thus in the vicinity of Stimson Dam. Bull trout in the vicinity of Stimson Dam during removal in 2005 may be subject to mechanical impact from machinery, demolition falling debris or other means.

In the late fall of 2005, Milltown Reservoir Sediments project will be in Stage 2 drawdown, and the entire flow of the Blackfoot and Clark Fork rivers will be routed through the converted penstocks of the powerhouse. It is unknown to what extent adult and juvenile bull trout will migrate downstream through the converted penstocks, if in fact they do. If so, it is unlikely that they will be in the vicinity of Stimson Dam during the late fall removal. If not, some may have moved back up the Blackfoot River as described by Schmetterling (2004). In either removal scenario, adult bull trout may be moving downstream through the project area during the removal of Stimson Dam, and would also be susceptible to mechanical impacts associated with demolition of the structure, which is anticipated to require approximately 6 weeks.

Natural Resource Trustee Restoration The Natural Resource Trustees (the Service, State and Tribes) propose to restore a substantial portion of the of the Clark Fork and Blackfoot rivers during and immediately following the implementation of the remedial action. The restoration will be closely coordinated with the remedial action, and actions conducted during the remedial action will develop graded elevational surfaces from which a portion of the restored river channels, floodplains and wetlands will be developed.

The Natural Resource Trustee restoration will follow the principals and methodology of natural river channel design. Natural river channel design incorporates native material such as large logs, rootwads, rock and stabilizing riparian vegetation into the design and construction of channel and river bank features. Natural river channel design accentuates the central tendency of stream channels for self stabilization, and allows for the development of a self maintaining stream channel over time (Rosgen 1994, 1996). River channels restored using natural channel design contain the bankfull discharge (approximated by the 1.5 year return interval flood) and provide an accessible floodplain for flows exceeding this discharge.

The restored channels would be designed to minimize near-term lateral channel migration while allowing long-term channel adjustment within the respective floodplains. A principal focus of the restoration will be to establish robust vegetative assemblages along existing and reconfigured river banks and across the reconfigured floodplain to dissipate stream energy and protect stream banks at a variety of flows. While there will be numerous in-stream structures to control the grade of the stream bed and provide in-channel features, the Natural Resource Trustees recognize that the long-term functionality of the restored river is dependant on the establishment and maturation of plant species suitable for the site. Wherever possible, existing vegetation would be would be left undisturbed on site or would be salvaged and transplanted into appropriate locations on the floodplain and streambanks.

Channel and floodplain restoration would begin in 2006 in the Clark Fork River at a stable river section immediately downstream from Turah Bridge, approximately 5 miles upstream from the confluence of the Clark Fork and Blackfoot rivers. It is likely that the stable river section will be associated with the now abandoned Chicago, Milwaukee, St. Paul and Pacific railroad grade on the southwest side of the Clark Fork River valley. Where possible, the restored river channel would incorporate abandoned channel sections and meander bends to develop the sinuous profile for the appropriate stream type for this geomorphic setting in the Clark Fork River valley.

The wide valley bottom and low gradient of the Clark Fork River valley above the confluence of the Clark Fork and Blackfoot rivers indicates that a single thread, meandering river with access to a low floodplain is the appropriate stream type for this setting. From the initial upstream point of channel reconfiguration downstream to immediately upstream of the confluence, restoration would construct a C4 type channel as described by Rosgen (1994, 1996). A C4 type channel is a two stage channel designed to contain the 1.5 year flood event, and to allow flows exceeding the 1.5 year event to dissipate across a well-vegetated floodplain. In a properly functioning two-stage river system, the floodplain becomes the primary river channel associated with infrequent high magnitude flood discharge. Data and analysis described and presented in the Restoration Plan support construction of a Rosgen C4 channel type and flat floodplain upstream from the confluence with the Blackfoot River.

The river floodplain at the upstream end of the restoration would be approximately 2,500 feet wide, and would extend laterally across SAA4 and SAA5. The floodplain would gradually narrow as restoration progressed downstream, until the restored floodplain was approximately 1,100 feet wide at Duck Bridge.

The channel and floodplain would be constructed with consistent overall downstream gradient. Establishing a consistent downstream floodplain gradient will require that a substantial volume of the existing, post 1907 deposition above the east and west banks of the Clark Fork River be redistributed outside the restored Clark Fork River floodplain. Redistribution of deposition will begin be initiated in SAAs 4 and 5 and continue downstream to Duck Bridge, eliminating the lower valley bottom gradient section in the existing longitudinal profile, caused by deposition at the upstream delta where river flow entered Milltown Reservoir.

Redistribution of the deposition in the reconstructed floodplain area in SAAs 4 and 5 would occur in several ways. At the upstream end of the redistribution area, floodplain grading may consist of leveling the constructed floodplain area and filling minor depressions (existing wetlands would be retained). Progressing downstream, the volume of soil required for removal to achieve gradient consistency would increase. Deposited soils within the floodplain area would be moved laterally away from the river channel to the outer edge of the constructed 100-year floodplain and be deposited to form terraces at the lateral extent of the estimated 100-year flood event. Additional depositional material would be transported to SAA1 and used as backfill, as needed and required. Soil from SAAs 4 and 5 used for backfill within the 100-year floodplain or floodprone area would meet a maximum standard for metals concentration established by the USEPA and State; soils exceeding this standard would be removed from the 100-year floodplain and isolated by berms, or disposed of by appropriate means (Martin 2004).

The restored C4 channel constructed downstream to and past Duck Bridge would rapidly transition into a B3c channel type immediately upstream from the confluence with the Blackfoot River. This transition is required to accommodate an increase in valley bottom gradient. The floodplain would continue to be narrowed from Duck Bridge downstream to the confluence of the Clark Fork and Blackfoot rivers. At the confluence, the constructed floodprone area would be approximately 400 feet in width. This width is consistent with a Rosgen B3c channel, which is the intended functional model for this section of river under the Restoration Plan. Removing the remnant railroad grade at Duck Bridge and the remaining railroad bridge piers would permit the construction of a wider, more consistent transition zone from a C4 to a B3c channel.

As proposed, the final, single thread channel through the SAA1 area would be inundated during the winter of 2008 and 2009. Additional restoration of the floodplain, such as grading, planting and similar actions, will likely continue through 2009 and may extend into 2010.

From the confluence of the Blackfoot and Clark Fork rivers downstream, the channel would exhibit a sloping floodprone area at the bankfull elevation at the edge of the channel, characteristic of a Rosgen B3 channel type. This design would facilitate floodplain revegetation with appropriate riparian and wetland species. The Blackfoot River upstream of the confluence and the Clark Fork River below the confluence and through the area of the Milltown Dam should be a B3c channel type.

A variety of structures incorporating native material such as large wood, rock, and vegetation would be used to create the complex channel habitat features and secondary habitats such as complex pools and diverse channel margins. The Restoration Plan proposes to create pools approximately every 200 to 800 feet (site and reach dependant) with abundant instream structures to provide and maintain these pools and other habitat transitional features such as glides and runs.

Following the completion of the grading and excavation elements of the restoration, extensive revegetation of the area will occur. The vegetation plan has not been finalized at the time of the preparation of the biological opinion. However, as a Natural Resource Trustee, the Service will be directly involved in the development and implementation of the vegetation and vegetation monitoring plans, both essential to the Restoration Plan.

The long term success of reestablished riparian vegetation and improved streambank stability will, in part, be influenced by the degree to which the Clark Fork River retains a natural stream channel morphology. Although riparian vegetation factors significantly into streambank stability in this stream type, other stream channel characteristics influence lateral stability (Rosgen 1994).

Channel shape and pattern are integral to channel stability. Developing the stream configuration (alignment, pattern, profile, sinuosity) appropriate for the geomorphic setting is an essential element of natural stream design. For example, Schmetterling and Pierce (1999) found that, when tailored to specific morphological channel types, instream restoration structures withstood significant flood events when materials of the appropriate size and origin were used.

Implementation of the Restoration Plan in the Clark Fork River from the point of initiation downstream to and past the Milltown Dam site will result in areas of the streambank and floodplain with limited stabilizing vegetation immediately following completion. As noted above, construction of the restored channel and 100-year floodplain will occur through SAAs 4 and 5. Sediment accumulations areas 4 and 5 exhibit elevated levels of metals and arsenic, though the concentration of metals and arsenic varies spatially, typically with higher concentrations downstream. In SAAs 4 and 5, much of the sediment deposited on the floodplain after 1907 would be removed during the final floodplain grading. Sediments identified as exhibiting levels of metals and arsenic above specific, predetermined concentrations would be isolated or removed to an appropriate repository (Martin 2004), such that phytotoxic conditions are unlikely to develop. The floodplain within SAAs 4 and 5 would receive revegetation treatments following completion of grading, and monitoring would ensure that revegetation was effective in stabilizing streambanks and the 100-year floodplain.

Stabilizing vegetation is anticipated to further develop in the years following implementation. The Natural Resource Trustees are currently developing performance standards for revegetation of the streambanks and floodplain; performance standards will be evaluated through implementation of the Restoration Monitoring Plan, currently being developed.

Potential effects to bald eagles The Natural Resource Trustee restoration of the Clark Fork River has a high potential to impact nesting bald eagles in an established nesting territory on the east side of the Clark Fork River. Restoration actions will likely occur within and in close proximity to the nest site area and primary use area prior to, during and following nest selection, egg laying, incubation, hatching and fledging as described in the *Montana Bald Eagle Management Plan* (BOR 1994) (USEPA and FERC 2004b). It is anticipated that restoration activities such as grading and channel excavation in Zones 1 and 2 will be completed within 1 nesting year. Revegetation of the streambanks and floodplain will likely require an additional year, and subsequent entries to the site may be required.

Restoration actions in the vicinity of the current nest tree may begin as early as or continue into January 2006. If this occurs, the bald eagles nesting at site 007-078-02 may opt to use an alternate nest location. If this should occur, impacts to this nesting pair of bald eagle may be limited to initial disturbance, but may not impact nesting or nest success.

Potential effects to bull trout As described above, the Milltown Dam spillway and radial gate are scheduled to be removed in the fall and winter of 2005 and 2006, and the combined flow of the Clark Fork and Blackfoot rivers is to be routed through a new river channel created through the spillway area in March, 2006. Restoration of the Clark Fork River is also scheduled to begin in 2006. Adult bull trout ascending the Clark Fork River in May through July of 2006, if they are, in fact capable of navigating the USEPA's 3850 foot long bypass channel, may be in the restoration area while restoration activities are occurring. As such, mechanical impacts to bull trout may occur should heavy equipment be operating in the river channel at this time. Should channel restoration result in a portion of any river channel being abandoned, adult bull trout could be stranded in the abandoned river section.

Sediment generated by implementation of the remedial actions may continue to be delivered to the Clark Fork River at above a theoretical background level until treated or otherwise impacted areas become stabilized by riparian vegetation. Downstream sedimentation could continue sporadically following completion of the restoration, though quantities would be extremely minor in comparison to that delivered during the removal of SAA1 sediments.

Part B. Water quality effects on bull trout

Implementation of the Revised Proposed Plan will result in elevated concentrations of sediment, arsenic and copper in the Clark Fork River below Milltown Dam for the duration of the implementation phase of the Revised Proposed Plan. The Service recognizes that adverse impacts to bald eagles and bull trout may result from elevated levels of TSS (potential impacts to bald eagles from elevated TSS are discussed under Part A, above), and to bull trout from arsenic and copper in the Clark Fork River below Milltown Dam. Impacts to bull trout will vary as levels of these substances vary with differing aspects of the project.

Several elements of the design of the Revised Proposed Plan are intended to minimize concentrations of TSS, metals and arsenic in river flow downstream from the action area, and thus minimize the effects of degraded water quality to bull trout. These elements were discussed in Part A, above, and are briefly described here. The staged drawdown of the Milltown Reservoir is intended to manage the rate at which metals-laden sediment is entrained by the water leaving the reservoir. The staged drawdown allows for the controlled release of reservoir sediment at managed rates over time. The staged drawdown initially begins with the gradual drawdown of Stage 1, during which the surface water level of the reservoir will be lowered a maximum of 2 feet per day. The gradual drawdown allows managers to slow the rate of sediment entrainment by reducing the rate of reservoir drawdown.

At the initiation of Stage 2 of the permanent drawdown, the temporary bypass channel will be inundated with flow from the Clark Fork River. The bypass channel isolates river flow from SAA1, effectively eliminating the entrainment and downstream delivery of the sediments with the highest concentrations of metals and arsenic in the project area. The bypass channel will be constructed to contain the 100-year flood event. Construction of the bypass channel to this construction magnitude further reduces the possibility of the entrainment of metals and arsenic being transported downstream.

The USEPA has determined, through analysis and conference with the Natural Resource Trustees, that other elements found at elevated levels in water and sediments of the Clark Fork River, are unlikely to be mobilized in substantial quantities as to represent a potential risk to human or aquatic life as a result of implementation of the Revised Proposed Plan (CH2MHILL 2000). These elements, lead, zinc and cadmium, are not discussed further in this biological opinion.

In the following discussion, mobilized sediment is expressed as a concentration of total suspended solids (TSS) in milligrams per liter (mg/L) or as a volume in cubic yards (cy). For consistency and readability, the Service has converted measurements of sediment in tons to sediment in cy using the conversion rate of 1.18 tons per cy, as described by Booth (2004).

A summary of the work on metals toxicity and impacts to aquatic resources specific to the upper Clark Fork River can be found in the *Public Review Draft Clark Fork River Ecological Risk Assessment* (ISSI Consulting 1999) and in the *Draft Milltown Reservoir Sediments Operable Unit Ecological Risk Assessment Addendum* (CH2MHILL 2000), a portion of which is attached as Appendix A.

1. Implementation of the Revised Proposed Plan

Envirocon (2004a) modeled the transport of sediment generated by implementation of the Revised Proposed Plan using the U.S. Army Corps of Engineers computational model *HEC 6, Scour and Deposition in Rivers and Reservoirs*. HEC 6 is a single dimensional sediment transport model, designed to simulate and predict changes in river profiles from scour and deposition, and has been in use for sedimentation studies for over 25 years (Envirocon 2004a).

Envirocon chose a modeling time period of 4.3 years, a period thought sufficient to implement the three stages of the Revised Proposed Plan. Envirocon's modeling analysis predicted impacts to water quality under three differing modeled flow scenarios during the 4.3 year period:

, a series of average annual flows;
, a 25-year flow event occurring in 2007 after removal of Milltown Dam and average annual flows other modeled years; and
, low flow in 2007 and average annual flows in other years.

The 25-year flow event was based on the 1975 hydrograph; the low flow event was based on the 1992 hydrograph.

Envirocon (2004a) suggests that the estimates of peak TSS concentrations developed using the HEC 6 model of implementation of the Revised Proposed Plan are conservative, and may over estimate the volume of sediment that is scoured from the reservoir and river channels and entrained during implementation of the project. Conservative input assumptions to the HEC 6 modeling process include the volume of sediment released during the staged drawdown, mathematical equations used in the HEC 6 model, alluvial grain-size gradation and transport properties (Envirocon 2004a; USEPA and FERC 2004a). Envirocon (2004a) concluded that as a result of using conservative assumptions, the predicted TSS concentrations associated with varying aspects of the Revised Proposed Plan could represent over-predictions by 33 percent or more. The Service knows of no plan to validate these or other predictions generated by the HEC 6 model.

The HEC 6 modeling predicted that about 406,000 cy of sediment would be scoured from the Milltown Reservoir and the river channels upstream of the reservoir (up to Stimson Dam) during the modeled 4.3 year implementation period. An estimated 20 percent of the scoured sediment would originate from the Clark Fork River upstream from Duck Bridge. Approximately 29 percent would originate from the Clark Fork River between Milltown Dam and Duck Bridge, and slightly over 50 percent would originate from the Blackfoot River from the confluence of the Blackfoot and Clark Fork Rivers upstream to the base of Stimson Dam (Envirocon 2004a).

The 406,000 cy of sediment would be in addition to the estimated 126,000 cy that move through Milltown Reservoir from upstream in the Clark Fork and Blackfoot rivers each year. The sediment load of the Clark Fork River below Milltown Dam is anticipated to be elevated for the entire duration of implementation of the Revised Proposed Plan. However, the largest volume of the sediment routed downstream from the implementation area of the Revised Proposed Plan would be generated in 2005 and 2006 (assuming the implementation begins late 2004 or early 2005) (Envirocon 2004a).

For comparison, the 406,000 cy of sediment predicted to scour within the 4.3 year modeled period is considerably less than the 647,500 cy of total sediment measured in the Clark Fork River at the USGS gaging station at East Missoula during 1996 and 1997, 2 recent high-flow years. In 1996, an estimated 269,500 cy of sediment passed Milltown Dam, and in 1997, an estimated 378,000 cy of sediment passed (USEPA and FERC 2004).

Envirocon (2004a) predicts three distinct peaks in TSS concentration associated with specific elements of the proposed action. These peaks are very similar for the three flow scenarios that Envirocon (2004a) modeled. The first peak in TSS concentration is expected to occur during the initial permanent drawdown of the reservoir in Stage 1. The permanent drawdown of the Milltown Reservoir is scheduled to begin in December 2004, and would be accomplished by gradually lowering the reservoir level by opening the radial gate. The gradual 8 to 10 feet drop in reservoir level during Stage 1 is anticipated to result in a peak concentration of 1,049 mg/L TSS as measured at the USGS gaging station in East Missoula, 2.8 miles downstream. The duration of river flow at the peak concentration of 1049 mg/L TSS is expected to be about 3 days. See Table 3.

Table 3. Anticipated peak TSS concentrations and duration*

Stage	***Probable period****	***Peak Concentration***	***Duration***
Stage 1	12-04 to 03-05	550 to 1,049 mg/L	3 days
Stage 2	11-05	550 to 1,219 mg/L	4 days
Stage 3	03-06 or 04-06	700 to 1,854 mg/L	5 days

* data from Envirocon (2004a) ** Based on implementation schedule as of September 2004

The concentrations of total recoverable metals and arsenic in discharge during the Stage 1 drawdown is anticipated to be comparatively less than in the Stage 2 and 3 drawdowns (Envirocon 2004a; Booth 2004). As described under Part A, the reservoir surface level would drop approximately 10 feet during Stage 1. The upstream extent of water impounded by the reservoir would migrate downstream to about Duck Bridge, the approximate upstream extent of SAA1. The water level at Duck Bridge would drop roughly 9 feet below the full pool reservoir level. A large portion of the TSS moving downstream during Stage 1 would originate from channel scour of the Clark Fork River upstream from SAA1 (Envirocon 2004a), where sediments composing the river channel contain substantially lower copper and arsenic concentrations than those sediments immediately upstream from the dam. Envirocon (2004a) predicted that the majority of sediments generated by implementation of the Revised Proposed Plan will enter the water column during Stage 1; 220,760 cy of sediment will enter the water column during water year 2005 (October 2004 through September 2005).

The second peak in TSS concentration is expected to occur immediately following routing the flow of the Clark Fork and Blackfoot rivers through the powerhouse penstocks, initiating Stage 2 of the permanent drawdown. As presently scheduled, this drawdown would occur in November 2005 and would lower the surface water level by an additional 6 feet. The predicted peak TSS concentration in river water following this action is 1,219 mg/L, and the expected duration of this concentration is 4 days. See Tables 3 and 4.

The third and final peak in TSS concentration is predicted to occur following the removal of the dam spillway and radial gate and routing the combined flow of the Clark Fork and Blackfoot rivers through the constructed channel, effectively lowering the surface water level an additional 14 to 17 feet. This action initiates Stage 3 of the permanent drawdown, and is currently scheduled for March 2006. The predicted peak TSS concentration at the initiation of Stage 3 would be 1,854 mg/L and the expected duration would be 5 days. See Tables 3 and 4.

Envirocon (2004a) predicted that the TSS concentrations following the Stage 1, 2 and 3 peak discharges would decrease to below the mid-term TSS standard of 170 mg/L within 1 to 2 weeks after initiation of each drawdown event. Further, Envirocon (2004a) predicted that the TSS concentrations following the Stage 1, 2 and 3 peak discharges would decrease below the long-term TSS standard of 86 mg/L within 1 to 3 months after initiation of each drawdown. Modeling results indicated that during most of the 4.3-year construction period, TSS concentrations immediately downstream of the Milltown Dam site would be 50 mg/L or less, which would meet all temporary construction-related TSS standards (Envirocon 2004a; USEPA and FERC 2004a). See Table 4.

Table 4. Proposed temporary construction related water quality standards*

Cadmium-acute AWQC	2 µg/L	Short term (1 hour)
Copper-80% of TRV (dissolved)	25 µg/L	Short term (1 hour)
Zinc-acute AWQC (dissolved)	117 µg/L	Short term (1 hour)
Lead-acute AWQC (dissolved) Federal drinking water standard (dissolved)	65 µg/L 15 µg/L	Short term (1 hour) Long term (30 day average)
Arsenic- acute AWQC (dissolved) Federal drinking water standard (dissolved)	340 µg/L 10 µg/L	Short term (1 hour) Long term (30 day average)
Iron-AWQC (dissolved)	1000 µg/L	Short term (1 hour)
Total suspended solids	550 mg/L 170 mg/L 86 mg/L	Short term (day) Mid term (week) Long term (season)

Table 4. Proposed temporary construction related water quality standards*
* All water hardness AWQC and the copper TRV assume a hardness of 100 mg/L TRV - toxicity reference value, used in the ROD for the Clark Fork River Operable Unit AWQC - Federal Ambient Water Quality Criteria

Note that most elemental temporary construction related water quality standards are the same as Federal ambient water quality criteria or drinking water standards, with the exception of copper. The toxicity reference value for copper exceeds the Federal ambient water quality criterion of 14 µg/L by 20 µg/L. The toxicity reference value is derived from water quality data specific to the upper Clark Fork River, and is specific for the protection of salmonids in this system (USEPA 2004a).

The Service assumes that Federal ambient water quality criteria are sufficiently protective of aquatic life such that bull trout are not likely to suffer adverse effects at concentrations below these criteria. Further, the Service assumes that the locally-derived toxicity reference value for copper is sufficiently protective of salmonids such that concentrations at or below the 80 percent level of the toxicity reference value do not result in mortality of bull trout.

The three flow regimes modeled exhibited a noticeable difference in TSS concentrations during runoff in 2007 when predicted peak TSS is about 400 mg/L under the 25-year high-flow regime and less than 200 mg/L under the average flow and low-flow regimes.

Potential effects to bull trout Maximum TSS concentrations would occur immediately downstream from Milltown Dam and would extend to the confluence of the Clark Fork and Bitterroot rivers. Dilution of the TSS concentration will begin approximately 6.25 miles downstream where flow from Rattlesnake Creek enters the Clark Fork River. Impacts stemming from sand and fine material moving downstream will become progressively less as additional tributary flow enters the river. The flow of the Bitterroot River is roughly equivalent to the flow of the Clark Fork River downstream from Milltown Dam. See Table 2. It is anticipated that the maximum TSS concentration of sediment generated during implementation of the Revised Proposed Plan would be reduced by 50 percent as Clark Fork River flow integrates with that of the Bitterroot River. The volume of flow of the Clark Fork River is seven times greater as it enters Thompson Falls Reservoir than when it passes Milltown Dam (USEPA and MDEQ 2004) as a result of inflow from downstream river tributaries. The Service does not anticipate adverse impacts to bull trout from elevated TSS downstream from the Bitterroot River, except during peak flows as described above.

2. Elevated total suspended solids

Suspended sediment can have both acute and sublethal effects on salmonids (Sigler et al. 1984). Potential effects on fish resulting from elevated TSS concentrations can vary from behavioral avoidance and sublethal effects at relatively low TSS concentrations to paralethal and lethal effects at considerably higher TSS concentrations (Newcombe and Jensen 1996). In general, short-term TSS concentrations have to be very high (10,000 mg/L) to cause acute lethal effects. As such, sublethal and paralethal effects are much more likely to result from most activities that produce moderate amounts of TSS for limited periods of time. Behavioral effects could include an alarm reaction, abandonment of cover and possible avoidance response. Sublethal effects include short-term to long-term reduction in feeding rate and success, increased rate of coughing and respiration, impaired homing, poor condition, and moderate habitat degradation. Paralethal effects include reduced growth rate, delayed hatching, reduced fish density, and moderate habitat degradation (Newcombe and Jensen 1996). The severity of effects on fish increase as a function of the product of concentration and the duration of exposure (Newcombe and Jensen 1996). A detailed discussion of the potential effects of elevated suspended solids is attached as Appendix A.

The temporary construction related water quality standards (Table 4) for the Revised Proposed Plan are more protective (below) than concentrations at which paralethal and lethal effects to fish are predicted to occur, as identified by Newcombe and Jensen (1996) in their predictive model. Short-term concentrations of TSS that meet or are below the construction related TSS standard would not be expected to result in lethal effects to bull trout. Total suspended solids at the concentrations and durations predicted by Envirocon (2004a) using the HEC 6 model could, however, be associated with behavioral, sublethal, and some paralethal effects to bull trout based on Newcombe and Jensen's (1996) predictive model.

The USEPA and FERC (2004a) anticipate that any TSS effects to bull trout that result from implementation of the Revised Proposed Plan and occur during the 4.3-year implementation period would be manifested at behavioral, sublethal, and paralethal effects levels based on Newcombe and Jensen's (1996) predictive model (USEPA and FERC 2004a). The USEPA and FERC (2004a) also suggest that more sensitive individual bull trout could be killed at anticipated TSS concentrations, based on Newcombe and Jensen's (1996) empirical TSS model for lethal effects thresholds.

The USEPA and FERC (2004a) note that Newcombe and Jensen (1996) used empirical data from their model to predict "thresholds of ill effect" for lethal effects to salmonids from concentrations of TSS. Newcombe and Jensen (1996) interpreted these thresholds to be "an approximated response of the more 'sensitive' individuals within a species group." The empirical lethal effect threshold at 1 day of exposure to suspended sediment ranges from148 to 1,097 mg/L TSS, and the threshold at 6 days of exposure ranges from between 55 to 403 mg/L TSS (Newcombe and Jensen 1996). The ranges bracketed by these thresholds reflect the variability of responses reported in different studies that were used in their model. The variability reported by Newcombe and Jensen (1996) is likely related to the differing variables in the studies they evaluated. Variable differences included differing salmonid species, water temperature, particle size, particle angularity, and interactions between TSS and metals (USEPA and FERC 2004a). USEPA and FERC (2004a) also note that many of the variables that would contribute to the lethal response to elevated TSS concentrations were not addressed Newcombe and Jensen's (1996) model.

The peak concentrations predicted by Envirocon (2004a) to occur during Stages 1, 2 and 3 of the permanent drawdown of Milltown Reservoir substantially exceed the empirical lethal effects thresholds of TSS levels as described by Newcombe and Jensen (1996). In addition, TSS concentrations would remain elevated and within the 6-day empirical lethal effects threshold for an extended period following each of the three peak concentrations.

Following the initial peak concentrations at the initiation of each of the Stage1, 2 and 3 drawdowns, concentrations of TSS are anticipated to range from 170 to 550 mg/L TSS for 1 to 2 weeks, and remain elevated at concentrations ranging from 86 to 170 mg/L for 1 to 3 months (Envirocon 2004a). These TSS concentrations and durations of exposure could result in paralethal effects to salmonids. Lethal effects to the more sensitive individuals could also occur at these concentrations and durations. Sublethal and behavioral effects to salmonids also would be anticipated during those times TSS concentrations exceed temporary construction-related daily, weekly, and seasonal TSS standards, based on Newcombe and Jensen's (1996) criteria. The Service notes, however, that during most of the 4.3-year construction period, TSS concentrations are anticipated to be about 50 mg/L or less, which would meet all temporary construction-related TSS standards, and is likely to result in few, if any adverse impacts to bull trout. TSS concentrations would be highest at the Milltown Dam site and decrease progressively down river as more water enters the Clark Fork.

Restoration actions proposed in the Restoration Plan for the Clark Fork and Blackfoot rivers upstream of the remediation area have the potential to temporarily impact downstream water quality through the suspension and transport of TSS caused by disturbing streambanks and channel sediments. In the long term, restoration actions are intended to reduce erosion by establishing soil binding vegetation and constructing river channels and floodplains that limit streambed and bank erosion. The floodplain and channel sediments outside the remediation area on the Clark Fork and Blackfoot Rivers contain lower levels of contamination than sediments within the remediation area. As such, upstream sediments mobilized by restoration activities are not anticipated to cause exceedences of temporary construction-related water quality standards for contaminants. The TSS caused by the restoration work would be limited to concentrated work areas, and the highest TSS concentrations would occur when water first re-enters the restored river channels. The Natural Resource Trustees have completed projects of this type in the past, and will use appropriate BMPs to control sediment delivery and reduce TSS during and following completion of construction activities.

Potential effects to bull trout The Service anticipates that restoration actions would not result in the temporary construction-related TSS standards established for this project to be exceeded (see Table 4). The quantity of sediment transported will be much less than that caused by removal of Milltown Dam. The levels of TSS caused by the restoration actions are not anticipated to be lethal to bull trout, except possibly the more sensitive individuals, and will not permanently decrease bull trout habitat in the Clark Fork or Blackfoot rivers, which is consistent with the findings for remediation-generated TSS using Newcombe and Jensen's (1996) predictive and empirical criteria for predicting TSS effects on salmonids. See Appendix A. The fate and transport of TSS caused by the restoration actions will be similar to the modeled fate and transport of TSS caused by dam removal and other remedial actions.

There is considerable uncertainty as to the actual TSS concentrations that will occur during implementation of the Revised Proposed Plan. There is substantial uncertainty in the modeled results as presented by Newcombe and Jensen (1996) in applying this model to predict the TSS thresholds of lethal effects to bull trout in the Clark Fork River. The Service anticipates that there will be sublethal and paralethal impacts to bull trout as a result of elevated TSS concentrations downstream from the Milltown Dam site as a result of implementation of the Revised Proposed Plan. Total suspended solids at the predicted concentrations could result in mortality to more sensitive individuals in the population of bull trout in the vicinity of the Milltown Dam during implementation of the Revised Proposed Plan.

3. Elevated metals and arsenic concentrations

Implementation of the Revised Proposed Plan will likely mobilize metals and arsenic contained in reservoir sediments through a variety of mechanisms. Copper and arsenic pose risks for aquatic organisms depending, on site specific water chemistry. The toxicity of many metals is inversely proportional to water hardness (Hale 1977 and Wilson et al. 1981 *in* Nelson et al. 1991). Water temperature, pH, total organic carbon, TSS and dissolved oxygen concentration also influence toxicity (Nelson et al. 1991). Combinations of two or more metals may act synergistically or additively in impact to salmonids, and pose greater risks despite concentrations for each being below its own toxicity threshold (Wels and Wels 1991). Conversely, combinations of two or more metals can also work antagonistically, reducing metals toxicity in some situations.

Fish may be exposed to chemicals of concern by three pathways, direct contact (olfactory, gill respiration, lateral line) with chemicals dissolved or suspended in river water, ingestion of food items with chemicals of concern incorporated into their tissues, and incidental ingestion of contaminated sediments during normal feeding activities. The concentration value used for evaluating hazard from direct contact with surface water may be expressed either as total recoverable metals or as dissolved metals. In general, effects of direct contact exposure are better correlated with dissolved rather than total metal concentrations. Fish weighing about 0.4 grams appear to be the most sensitive to copper (SRC 2001), though recent work indicates that substantially larger fish (143 grams) exhibit adverse impacts at short term, low (10 µg/L) concentrations of copper (Baldwin et al. 2003).

Behavioral avoidance is thought to be one of the most sensitive sublethal responses of fish to metals contamination (Beitinger and Freeman, 1983 *in* Hansen et al. 1999). Laboratory study results indicate trout detect dissolved copper at concentrations as low as a few micrograms per liter and, under laboratory exposures to aqueous copper, trout actively seek to avoid higher copper levels. Behavioral avoidance experiments have shown that trout and salmon can detect low levels of metals and actively select lower metals concentrations when lower concentrations are accessible. Woodward et al. (1997) documented avoidance behavior in cutthroat trout for dissolved copper (6 µg/L) and zinc (28 µg/L) in laboratory tests. Further, cutthroat trout acclimated for 90 days to zinc at 55 µg/L, preferred lower concentrations (28 µg/L) when lower concentrations were accessible (Woodward et al.1997). Juvenile brown trout tend to avoid dissolved copper concentrations greater than 55 µg/L at a water hardness of 16 mg/L (USDI 2001). Woodward et al. (1995) showed that brown trout avoided mixtures where copper and zinc were present in dissolved concentrations as low as 6.5 and 32 µg/L, respectively.

Note that background conditions of flow from the upper Clark Fork River exhibits metals concentrations similar to and exceeding those described in the preceding paragraph. Elevated concentrations of arsenic and metals in flow from the upper Clark Fork River are a product of the continuous downstream migration of soil and sediment from the floodplain and river channel of the upper Clark Fork Rive downstream. Clark Fork River flow entering the project area exhibits dissolved metals concentrations similar to those concentrations known to cause an avoidance response in laboratory experimentation. See Table 5. As such, an avoidance response by fish to flow from the Clark Fork River within the action area is considered possible (SRC 2001).

Table 5. Surface water concentrations of total and dissolved metals and arsenic, 1991-1996

		Turah (N=46)		**Reference streams** (N=73)	
Element	***Statistic***	***Total***	***Dissolved***	***Total***	***Dissolved***
Arsenic	Max	33.0	13.0	14.0	7.0
	Median	8.0	5.0	1.0	1.0
Cadmium	Max	1.0	0.5	0.5	0.5
	Median	0.5	0.1	0.5	0.1
Copper	Max	180.0	19.0	16.0	7.0
	Median	17.0	4.0	2.0	0.5
Lead	Max	33.0	1.0	25.0	2.0
	Median	3.0	0.3	0.5	0.3
Zinc	Max	270.0	22.0	50.0	24.0
	Median	30.0	6.0	5.0	1.5

Source: ISSI Consulting Group. 1999. Clark Fork River Ecological Risk Assessment, Public Review Draft. USEPA Concentrations in micrograms per liter (µg/L).

Fish population responses to elevated copper levels in the field are not fully understood. However, field studies have also documented the avoidance of metal concentrations by fish in the wild. Spawning Atlantic salmon in New Brunswick displayed avoidance behavior of metals (primarily copper and zinc) at thresholds of 17 to 21 µg/L for dissolved copper mixed with 210 to 258 µg/L dissolved zinc originating from hardrock mining activities (Sprague et al. 1965 *in* Henry and Atchison 1991; Saunders and Sprague 1967). On the Coeur d'Alene River, Goldstein et al. (1999) reported migrating adult male Chinook salmon preferred the North Fork (low contamination) to the South Fork (elevated levels of cadmium, lead, and zinc). Streams downstream from areas of intensive hard-rock mining in the Coeur d'Alene River basin, Idaho contained fewer native fish species and lower abundances as a result of metal enrichment, not physical habitat degradation (Maret and MacCoy 2002).

Metals and arsenic-total Envirocon (2004a) predicted total copper and total arsenic concentrations in surface waters downstream of the Milltown Dam site using results of HEC 6 modeling and linear regressions with strong correlations between total copper and total arsenic concentrations and TSS concentrations. The predicted range of total copper during the duration of the project is 7 to 550 µg/L, averaging 22 µg/L. The predicted range of total arsenic during the duration of the project is 4 to 90 µg/L, averaging 6 µg/L. Envirocon (2004a) reported that the highest total metals concentrations would likely occur immediately downstream from Milltown Dam. At the predicted peak TSS concentration of 1,854 mg/L, immediately following the initiation of the Stage 3 drawdown, the predicted peak downstream total copper and total arsenic concentrations are estimated to be approximately 550 µg/L and 90 µg/L, respectively. Envirocon (2004a) reported that for comparison purposes, maximum total copper and arsenic concentrations in the Clark Fork River at the USGS gaging station at East Missoula during the 1996 ice scour event were 400 µg/L and 69 µg/L, respectively.

Metals and arsenic-dissolved The USEPA has determined that metals toxicity to aquatic life is caused primarily by dissolved metals. Regression analysis, HEC 6 model TSS predictions, and various partitioning coefficients were used by Envirocon (2004a) to estimate concentrations of dissolved copper and dissolved arsenic in surface waters. Locations considered were at the Milltown Dam site and at the USGS gaging station at East Missoula, 2.8 miles below the dam site (Envirocon 2004a).

The Revised Proposed Plan would remove approximately 2.6 mcy of sediment with elevated levels of copper and arsenic from SAA1. These sediments are currently saturated from the water level in the full pool of Milltown Reservoir. To facilitate removal, the sediments in SAA1 would be dewatered by gradually lowering the reservoir in Stages 1, 2 and 3. Analysis indicates, however, that the dewatering process can be enhanced by several mechanisms (Envirocon 2004d).

The Revised Proposed Plan indicates that SAA1 sediments could be "preloaded" with a layer of dry, uncontaminated material to consolidate (reduce pore size) saturated SAA1 sediments and reduce water content, reducing weight and volume of sediments to be removed and transported to Opportunity Ponds. Were preloading to occur, dry soil and rock would be imported from off-site sources early in Stage 1, and would be placed to a depth of 9 feet over SAA1 sediments. While it is unlikely that the entire SAA1 area would be covered with preload at one time, Envirocon (2004d) modeled the movement of pore water from the SAA1 area into surrounding environs as a continuous event.

Dewatering rates could also be increased by drilling wells through the sediments into the underlying alluvium. Well pumps would create a hydraulic gradient under SAA1 sediment, drawing pore water into the alluvium to be pumped to the surface and ultimately to the Clark Fork River (Envirocon 2004d). Another opportunity to enhance the dewatering process would be to excavate pits or trenches at various locations into the SAA1 sediments, pile excavated sediments atop non excavated to drain and preload those below, and pump water that accumulates in the pits/trenches to the Clark Fork River.

Pore water pumped from wells, from pits or trenches in SAA1 is likely to exhibit elevated levels of metals and arsenic. Envirocon estimates that the greatest concentration of dissolved arsenic that could occur in pumped water would be equivalent to that found in well 900, located at the extreme downstream end of SAA1, where metals and arsenic concentrations in sediments are high (Envirocon 2004d). In-situ pore water from well 900 has contained dissolved arsenic concentrations as high as 10,000 µg/L, and dissolved copper concentrations as high as 173 µg/L. Analysis by Envirocon (2004d) indicates that total pore water from dewatering and active pumping would range from 0.25 to 0.58 cfs during the Stage 1.

At the 10,000 µg/L concentration, which represents the worst-case scenario (Booth 2004), pore water mixed with the average flow of the combined Clark Fork and Blackfoot rivers equates to an in-stream dissolved arsenic concentration 5.9 µg/L, a 2.1 µg/L increase above background, as measured at the USGS gaging station at East Missoula. The 173 µg/L dissolved copper pore water concentration, also the worst case scenario, equates to an in-stream dissolved copper concentration of 3.7 µg/L, a 0.058 µg/L increase over background. The 5.9 µg/L (dissolved arsenic) and 3.7 µg/L (dissolved copper) concentration represent anticipated maximum concentrations, and both are substantially below the long-term temporary construction related water quality standards of 10 µg/L and 25 µg/L, respectively (Envirocon 2004d). See Tables 4 and 5.

With or without enhanced dewatering of SAA1 sediments, the Revised Proposed Plan would create at least one such drainage trench- the bypass channel. The bypass channel would be excavated to a depth approximately 5 feet below the 1907 floodplain. The depth of this excavation would create a hydraulic gradient to the northeastern slope of SAA1. The rate of migration of pore water into the bypass channel would be dependent on the reservoir stage, as reduced water levels in the reservoir would decrease the hydraulic gradient. Assuming the unlikely scenario of unidirectional pore water flow into bypass channel (and not, for instance, into the Blackfoot River), the volume of pore water entering the bypass channel is anticipated to be approximately 0.13 cfs.

The initial inundation of the bypass channel with the entire flow of the Clark Fork River would occur prior to routing the combined river flow through the converted penstocks, likely to happen between November and February. The mean river flow in the Clark Fork River ranges from 724 cfs and 856 cfs from November to February. See Table 2. The 0.13 cfs would dilute into this volume of river flow, increasing the concentration of dissolved arsenic in Clark Fork River flow in the bypass channel from 1.5 µg/L to 1.8 µg/L and the concentration of dissolved copper from 0.026 µg/L to 0.031 µg/L.

Table 5 presents background concentrations of key elements in the Clark Fork River flow as measured at Turah Bridge. Note that an increase in dissolved arsenic concentration of 1.5 µg/L to 1.8 µg/L in the bypass channel of the Clark Fork River would result in an dissolved median concentration of from 6.5 µg/L to 6.8 µg/L. Note also that an increase in dissolved copper of 0.026 µg/L to 0.031 µg/L would result in an extremely minor increase to the median dissolved copper concentration in the bypass channel. Values for both arsenic and copper are below the long-term temporary construction related water quality standards for these elements. See Table 4.

Envirocon (2004a) stated that predicted dissolved copper concentrations are generally elevated following the initiation of the Stage 2 and Stage 3 drawdowns as a result of the mobilization of sediments from immediately upstream of Milltown Dam. Modeled dissolved copper concentrations peaked at approximately 23 µg/L immediately following dam removal, then rapidly declined to baseline levels of approximately 3 µg/L shortly after dam removal. Envirocon (2004a) reported that HEC 6 modeling runs estimated that dissolved copper concentrations downstream of the Milltown Dam site would not exceed the temporary construction-related dissolved copper standard of 25 µg/L. Dissolved copper concentrations would be expected to decline proceeding down river with dilution flows from tributaries.

A similar pattern was observed for predicted dissolved arsenic concentrations. A predicted peak of approximately 12 µg/L dissolved arsenic, which would slightly exceed the 10 µg/L temporary long-tern construction related standard(also the Federal drinking water standard) for 3 days , would occur immediately after initiation of Stage 2 and Stage 3 (Envirocon 2004a). Dissolved arsenic concentrations would then decline to a baseline level of approximately 4 µg/L. The values predicted by Envirocon (2004a) do not exceed the 340 µg/L short-term (1-hour) or the 10 µg/L long-term (30-day average) temporary construction standard (also the Federal ambient water quality criteria) for dissolved arsenic.

Potential effects to bull trout The Service anticipates that adverse impacts to bull trout may result from elevated levels of copper in river flow at the concentrations described above. However, the Service contends that the delivery of TSS and copper to downstream areas has will be minimized to a large extent by the measures incorporated into the Revised Proposed Plan to reduce the delivery of these substances to bull trout habitat. The Service does not anticipate adverse impacts to bull trout to result from elevated levels of arsenic in river flow.

2. Coarse and fine sediment and downstream deposition

Modeling results indicate that as a result of the high river velocity between Milltown Dam and Thompson Falls Reservoir, most of the fine sediments and sand will be transported downstream, mixed with channel sediment from the Bitterroot, Flathead and St. Regis rivers and other tributaries and accumulate in Thompson Falls Reservoir. Most fines will go through Thompson Falls Reservoir into Noxon Reservoir (USEPA 2004).

Envirocon (2004a) estimated that under average flow conditions it may take up to 1 year for coarse sands to move through the Clark Fork River downstream from Milltown Dam to the Bitterroot River, and as long as 10 to 11 years to travel approximately 150 miles from the Milltown Reservoir to Thompson Falls Reservoir. Envirocon (2004a) also predicted that the strategic timing of the three drawdown events with high flow periods will help minimize the amount of sediment deposition in the downstream Clark Fork River reach between Milltown Dam and the Bitterroot River. The HEC 6 model predicted that fine material (clays and silts) would travel through this river reach as wash load in 1 day or less with little to no dilution. The sediment modeling effort indicated that these fine materials (about 50 percent of the total release) will move through the system very quickly (USEPA 2004). Envirocon (2004a) estimated the wash load travel time of fines from the Milltown Dam site to Thompson Falls Dam would be approximately 45 hours.

The amount of sediment transported to downstream reservoirs as a result of construction activities at the Milltown site will be relatively small compared to the amount routinely transported. An estimated additional 406,000 cy of sediment will be transported from Milltown Reservoir during the 4-year construction period, compared to an estimated 1,860,000 cy of sediment transported from upstream to Thompson Falls Reservoir during a series of average flow years over a 4-year period (USEPA 2004). USEPA (2004) concluded that given the large amounts of sediment routinely deposited in downstream reservoirs, there should be little to no impact on the storage capacity of Thompson Falls Reservoir as a result of implementation of the Revised Proposed Plan.

Potential effect to bull trout The Service anticipates that the movement of a substantial volume of activity-created sediment from the implementation area of the Revised Proposed Plan could result in adverse impacts to bull trout habitat in the short and intermediate term. Initially following the initiation of stages 1, 2 and 3 of the staged drawdown, the fraction of large sands entrained from the reservoir will settle out of the water column and be deposited over the existing substrate of the Clark Fork River downstream from Milltown Dam. This material would reduce the volume of river channel pools, reducing migratory and overwintering habitat availability for bull trout. Deposition may also occur over portions of the river bed producing macroinvertebrates, important food resource for juvenile bull trout. These impacts are anticipated to gradually diminish as sediment migrates downstream and flow increases from tributary influx.

Part C. Long term effects on bald eagles and bull trout

The long-term effects of fully implementing the USEPA Revised Proposed Plan are ultimately very positive for bald eagles and bull trout. Full implementation of the Revised Proposed Plan results in removal of the Milltown Dam, removal of the Stimson Dam, elimination of the reservoirs created by these dams, and removal and disposal of 2.6 mcy of contaminated sediments from behind Milltown Dam. Full implementation also results in restoration of the lower reach of the Blackfoot River and approximately 4.5 miles of the Clark Fork River using the principals and methodology of natural river channel design.

Removal of the Milltown and Stimson dams will return uninhibited fish passage to the Blackfoot and upper Clark Fork rivers. While the Service anticipates adverse impacts in the short-term, the long term result of dam removal would be a substantial increase in the biomass of fish of various species ascending these rivers for breeding and rearing. With the impending clean up of mining wastes in the upper Clark Fork River and subsequent improvement in riparian and aquatic habitat conditions, the long term effect of implementation of the Revised Proposed Plan would be an enhanced forage base for bald eagles and bull trout, and improved habitat conditions for bull trout.

Full implementation of the Revised Proposed Plan would restore the function of bull trout habitat by removing impediments to migration, greatly reducing chemical contamination and reducing isolation from thermal refugia. In addition, removal of Milltown Dam would result in the virtual elimination of introduced northern pike from the confluence of the Blackfoot and Clark Fork rivers.

Part D. Summary of effects on bald eagles and bull trout

Summary of effects to bald eagles Implementation of the Revised Proposed Plan will result in a substantial increase in temporary, but year-round human activity at and around the immediate area of Milltown Reservoir. This activity could result in the disturbance of foraging bald eagles during the expected 5-year implementation period of the project. One element of the Revised Proposed Plan, the Natural Resource Trustee restoration of the Clark Fork River is likely to occur in the immediate vicinity of and within bald eagle territory 007-078, the *Milltown Reservoir* territory.

Removal of the Stimson and Milltown dams will eliminate the impounded water at and near the confluence of the Blackfoot and Clark Fork rivers. Loss of the reservoir pool would substantially reduce the surface area of water in the immediate vicinity of the confluence of these rivers, which will reduce the foraging area for bald eagles. The initial reduction in pool are may initially concentrate bald eagle prey into the shrinking reservoir, resulting in increased foraging efficiency during and immediately following in the initiation of Stages 1, 2 and 3 of the permanent drawdown. Removal of the reservoir pool may also reduce the foraging opportunity for bald eagles. However, increased biomass in the Blackfoot and Clark Fork rivers resulting from dam removal is anticipated to increase the forage base for bald eagles in the long term.

Bald eagle response to the proposed action The anticipated response of bald eagles to implementation of the Revised Proposed Plan is associated with disturbance at foraging areas and at the nest site. Disturbance at foraging areas may displace eagles to other locations on the Blackfoot and Clark Fork rivers. During the nesting season, this could result in reduced foraging efficiency by adults and reduced food volume to nestlings.

Disturbance at the nest site could result in breeding bald eagles selecting an alternate nest location during 1 year of the implementation period. The Service recognizes the potential for nest site abandonment/failure during the year restoration activities occur within Zone 1 of the

Milltown Territory. Nest failure or abandonment could result in the loss of one to three fledgling bald eagles from nest territory 007-078 for 1 or possibly 2 years.

Increased fishery biomass resulting from removal of the Milltown and Stimson dams is anticipated to result in maintained nest productivity for 007-078, and possibly an increase in nest territory density along the Clark Fork and Blackfoot rivers.

Summary of effects to bull trout Implementation of the Revised Proposed Plan has the potential to result in adverse impacts to bull trout in the Clark Fork and Blackfoot rivers during implementation of the project. Mechanical injury or death to adult and juvenile bull trout could occur during implementation of one or more of the numerous actions that require instream activities for demolition or construction of project related features. Elevated levels of TSS at and downstream from Milltown Dam could impair feeding or sheltering of adult and juvenile bull trout, and could result in the direct mortality of those bull trout exceptionally sensitive to moderately high levels of suspended sediment. Adverse effects to adult and juvenile bull trout could result from elevated levels of copper in the water column.

During at least one year during the implementation phase of the Revised Proposed Plan, an estimated nine bull trout will not be moved over the dam to breeding locations in the Blackfoot and Clark Fork rivers. The progeny of one to nine bull trout will be lost to the population(s) of these rivers as a result of the inability to move fish over the Milltown Dam.

Implementation of the Revised Proposed Plan would, however, eliminate the potential for releases of reservoir sediments with high levels of arsenic and copper generated by ice scour or during high flow events, thought responsible for fish mortality in 1996 and 1997. Implementation would also eliminate the Milltown Reservoir, which supports a breeding population of the predatory northern pike. Removal of the Milltown and Stimson dams will reestablish unimpeded fish passage to the Blackfoot and upper Clark Fork rivers from the middle Clark Fork.

Bull trout response to the proposed action The expected bull trout population response to implementation of the Revised Proposed Plan is associated with impacts to aquatic habitat and water quality that are expected to occur during the 5-year implementation of the Revised Proposed Plan. Impacts to bull trout will result from relatively high concentrations of TSS and dissolved copper and arsenic at various times during the implementation period and elevated concentrations of TSS during the entire implementation period of the project.

Impacts associated with elevated concentrations of TSS, dissolved copper and arsenic are likely to be greatest immediately downstream from the Milltown Dam site to the Bitterroot River, a distance of approximately 18 miles. Bull trout are considered rare in this portion of the Clark Fork River, and thought to occur at a density of one to three adult fish per mile. Bull trout will likely attempt to avoid elevated concentrations of TSS and dissolved copper and arsenic by seeking refuge in tributaries, where available. The Service recognizes that many or all bull trout in the Clark Fork River between the Milltown Dam site and Bitterroot River may be impacted by implementation of the Revised Proposed Plan and that individual bull trout that exhibit a higher degree of sensitivity to TSS, dissolved copper and arsenic may be lost to the population. The Service anticipates that from 18 to 54 adult bull trout between Milltown Dam and the Bitterroot River may be harmed by high levels on TSS and possibly dissolved copper.

No spawning areas for bull trout are known to exist from the Milltown Dam site downstream to the Bitterroot River, and it is unlikely this portion of the Clark Fork River is suitable as spawning habitat. While bull trout may be impacted in this portion of the Clark Fork River and some mortality may result, this area would be refounded from spawning areas upstream of the implementation area.

Milltown Reservoir has resulted in degraded habitat conditions at the confluence of the Blackfoot and Clark Fork rivers. Degraded habitat has fostered the development of a reproducing population of northern pike, an introduced predatory species. Implementation of the Revised Proposed Plan will greatly reduce the predatory influence of northern pike in this critical portion of the rivers, and promote greater bull trout recruitment to the spawning population.

Reestablishing unimpeded migration from the lower and middle Clark Fork River to headwater spawning tributaries in the Blackfoot River, Little Blackfoot River and upper Clark Fork River is anticipated to result in an overall increase in the number of bull trout in the Clark Fork River Basin.

VI. Cumulative effects

Cumulative effects include the effects of future State, tribal, local or private actions reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

The primary risk to bull trout in the action area the Milltown Dam and the Reservoir it impounds. Dewatering from agriculture, interactions with non native species, habitat degradation from grazing in riparian areas, warm water temperatures have further degraded existing habitat and are expected to continue (MBTSG 1995). Other risks include environmental instability from fire, flood, and drought. Hazards to bull trout from these risks are elevated because of the fragmented state of this subpopulation as a result of thermal, chemical, and hydroelectric barriers.

In 1998, the State and Atlantic Richfield Company reached a partial settlement of the natural resource damage lawsuit via a two-step consent decree settling some of the state’s claims and establishing a process by which remaining claims would be resolved. Among other provisions, the state received approximately $130 million to restore or replace the injured natural resources in the Clark Fork River basin to baseline conditions and $80 million to implement the Superfund remedy on Silver Bow Creek. The State reserved its restoration damages claims for Butte Area

One, the Clark Fork River, and the Anaconda Uplands.

The State is seeking costs necessary to restore the Clark Fork River and adjacent riparian lands to baseline conditions in their claim. The State developed a restoration plan which, if implemented, would direct restoring the injured resources. The State's existing plan is being revised following issuance of USEPA's record of decision for the upper Clark Fork River cleanup issued April 2004. Actions proposed in the State's Restoration Determination Plan which would go beyond the scope of this proposed action, in order to restore fish and wildlife populations and habitat, may include additional removal, additional streambank work, additional topsoil media, water flow enhancement, and additional vegetation requirements. The implementation of USEPA's remedial action may be coordinated to the maximum extent possible with the possible implementation of the State's restoration plan in order to avoid duplication of effort and unnecessary costs and to maximize the benefits to the area. Projects funded from such settlements will be restorative in nature and contribute to the recovery of bull trout over the long term (USEPA 2002b).

VII. Conclusion

a. Jeopardy analysis for bald eagles

After reviewing the status of the bald eagle in Montana and in Recovery Zone 7, the environmental baseline of the area, the status of nest territory 007-078 and cumulative effects, it is the Service's biological opinion that implementation of the Revised Proposed Plan is not likely to jeopardize the continued existence of the bald eagle. Implementing regulations for section 7 (50 CFR §402) define "jeopardize the continued existence of" as "to engage in an action that reasonably 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." This conclusion is based on:

- Implementation of the Revised Proposed Plan is anticipated to directly affect one bald eagle nesting territory and may indirectly affect one other to a limited extent.

- The upper Clark Fork River currently supports 12 nesting territories at a comparatively high nesting density.

- Production at the 12 nesting territories on the upper Clark Fork River exceeds the average production in Montana and in Bald Eagle Recovery Zone 7, indicating that habitat along the upper Clark Fork River is sufficient to support nesting bald eagles at this density.

- DDT was banned in the United States in 1972.

- Delisting criteria have been met in Montana.

Implementation of the Revised Proposed Plan would not likely reduce the reproduction, numbers, or distribution of bald eagles in the Clark Fork River Basin to the extent that the likelihood of persistence in Pacific Northwest bald eagle recovery zone is appreciably reduced. As implementation of the Revised Proposed Plan is not likely to reduce appreciably the likelihood of survival or recovery of the bald eagle in the Pacific Northwest recover zone, it is unlikely that the proposed action would jeopardize the continued existence of bald eagles in North America.

b. Jeopardy analysis for bull trout

The Service has reviewed the current status of bull trout in the Columbia Basin DPS and the environmental baseline for the action area. The Service also has considered the potential effects of implementation of the Revised Proposed Plan and potential cumulative effects. It is the Service's biological opinion that implementation of the Revised Proposed Plan, as proposed, is not likely to jeopardize the continued existence of the Columbia Basin DPS of bull trout, as listed. Implementing regulations for section 7 (50 CFR §402) define "jeopardize the continued existence of" as "to engage in an action that reasonably 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." This conclusion is based on:

, The Service recognizes 141 subpopulations of bull trout in the Columbia River DPS. Implementation of the Revised Proposed Plan has the potential to impact three of these subpopulations: the upper Clark Fork, middle Clark Fork and Blackfoot River. The three potentially impacted subpopulations represent only 3 percent of the subpopulations recognized by the Service.

, Removal of the Milltown and Stimson dams will re-establish connectivity from the middle Clark Fork River into the upper Clark Fork and Blackfoot Rivers, re-establishing known migratory pathways for bull trout to spawning areas and thermal refugia.

, Implementation of the Revised Proposed Plan would not impact any spawning or rearing habitat for bull trout.

, Adverse impacts to bull trout and bull trout habitat stemming from increased sediment yields are temporary in nature, and, in most cases, are not anticipated to be lethal to adult bull trout.

, Removal of the 2.6 mcy of contaminated sediment from upstream of Milltown Dam would partially restore the natural chemical and biological processes of the Clark Fork River.

, Impact minimization measures employed by the USEPA during the implementation of remedial action are likely to be effective in reducing sediment generated by these actions.

Summary Conclusion Implementation of the Revised Proposed Plan is anticipated to improve habitat for bull trout in the Clark Fork River in the long term. Following implementation of the Revised Proposed Plan, the potential for ice scour of contaminated sediments in Milltown Reservoir is expected to be greatly reduced. Milltown Reservoir will virtually be eliminated, which is anticipated to result in a substantial improvement in water quality and bull trout habitat. Restoration of the principal channel of the Clark Fork River promoting natural river form and function would foster vegetative recovery of streambanks and disturbed areas on the 100-year floodplain. Vegetative recovery would greatly enhance bull trout habitat in the Clark Fork River.

Restoration of the historic connectivity between the lower Clark Fork River and spawning, rearing and thermal refuge habitat in the upper Clark Fork and Blackfoot rivers, coupled with a substantial improvement in water quality and reduced introduced predators, is anticipated to result in a positive bull trout population response in the long term. Bull trout numbers are expected to increase in the Blackfoot River and in Rock Creek with adult bull trout returning to spawning habitat from overwintering habitat downstream from the former location of Milltown Dam. Bull trout numbers are also expected to increase with improved survival of juvenile bull trout moving downstream. With the eventual clean up of the upper Clark Fork River, numbers of bull trout in the upper Clark Fork River and tributaries are expected to increase dramatically (USDI 2004c).

Implementation of the Revised Proposed Plan would not likely reduce the reproduction, numbers, or distribution of bull trout within the Clark Fork River to the degree that the likelihood of bull trout persistence in upper Clark Fork River is appreciably reduced. As implementation of the Revised Proposed Plan is not likely to reduce appreciably the likelihood of survival or recovery of the subpopulation encompassing the action area, it is unlikely that the proposed action would jeopardize the continued existence of the bull trout Columbia River DPS.

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