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LOWER RED RIVER MEADOW STREAM RESTORATION PROJECT

PRELIMINARY

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1996

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1. PURPOSE OF AND NEED FOR ACTION

1.1 PROPOSED ACTION

As part of a continuing effort to restore anadromous fish populations in the South Fork Clearwater River basin of Idaho, Bonneville Power Administration (BPA) proposes to fund the Lower Red River Meadow Restoration Project (Project). The Project is a cooperative effort with the Idaho Soil and Water Conservation District, Nez Perce National Forest, Idaho Department of Fish and Game (IDFG), and the Nez Perce Tribe of Idaho. The proposed action would allow the sponsors to perform stream bank stabilization, aquatic and riparian habitat improvement activities on IDFG's Red River Management Area and to secure long-term conservation contracts or agreements for conducting streambank and habitat improvement activities with participating private landowners located in the Idaho County, Idaho, study area.

This Preliminary Environmental Assessment (EA) examines the potential environmental effects of stabilizing the stream channel, restoring juvenile fish rearing habitat, and re-establishing a riparian shrub community along the stream. The project area incorporates portions of four separate land parcels located in the South Fork Clearwater River sub-basin for potential inclusion in the Project. These parcels include the Gibler Ranch, IDFG's Red River Wildlife Management Area (RRWMA), the Johnson Ranch, and Ketchum Ranch. Five proposed activities are analyzed: stream channel stabilization; fish habitat restoration; re-establishment of a riparian shrub community; operation and maintenance (O&M); and monitoring and evaluation (M&E).

1.2 PURPOSE OF AND NEED FOR ACTION

The proposed action is intended to meet the need for off-site mitigation of adverse effects on the Clearwater River basin anadromous fish habitat caused by the construction and operation of the hydroelectric dams and reservoirs on the Snake and Columbia rivers.

The purposes of the proposed action are to:

- Maintain consistency with the Northwest Power Planning Council's (Council) 1995 Fish and Wildlife Program (F&W Program);
- Continue the long-term effort of state, Tribal, and Federal agencies to mitigate anadromous fish populations and to improve anadromous fish spawning and rearing habitat in the South Fork Clearwater basin;
- Increase quality and quantity of spring chinook salmon spawning and rearing habitat on lower Red River stream segments located in Idaho County, Idaho; and to
- Demonstrate the compatibility of fish habitat improvement with private land management.

1.3 BACKGROUND

1.3.1 Mitigation Process under the Northwest Power Act

Under provisions of the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (Act), BPA protects, mitigates, and enhances fish and wildlife and their habitats affected by the construction and operation of the Federal hydroelectric system in the Columbia River Basin by implementing measures consistent with the Council's F&W Program and other purposes of the Act. 16 U.S.C. 839b(h)(10)(A). The mitigation BPA funds must be "in addition to, not in lieu of, other expenditures authorized or required from other entities under other agreements or provisions of law." Therefore, the mitigation BPA proposes includes only actions that other entities are not required to fund and would not otherwise fund. Under the Act, BPA has the authority and obligation to fund fish and wildlife mitigation activities that are consistent with the Council's F&W Program, and other environmental laws. The initial phase of mitigation planning for anadromous fish habitat losses was submitted to the Council for amendment into the F&W Program in 1989.

The proposed action is consistent with the goals and objectives of the Act and the Council's F&W Program. The stream and habitat improvement measures proposed for the Project would help to increase overall fish production in the Clearwater drainage and provide mitigation for anadromous fish and fish habitat losses resulting from construction and operation of the lower Snake and Columbia rivers' hydroelectric dams and reservoirs.

Consistent with Section 704(d)(1) Fish Habitat Improvement Projects on Tributaries to the Salmon and Clearwater rivers, of the Council's F&W Program, BPA proposes to fund projects that will help reach the Council's mitigation goals. The Council reviewed and approved the proposed Project in 1990.

1.3.2 Relationship to Other Actions

The Preliminary EA incorporates concepts from and is consistent with the following Federal, state and Tribal resource plans:

- | | |
|-------------------------------------|--------------------------------------|
| • Nez Perce National Forest | Nez Perce National Forest Plan, 1987 |
| • Nez Perce Tribe of Idaho | Nez Perce Tribal Hatchery Plan, 1992 |
| • Idaho Department of Fish and Game | Anadromous Fish Management Plan |
| | Resident Fish Management Plan |
| | Elk Management Species Plan |
| | Nongame Species Plan. |

Potential activities proposed in the Preliminary EA are also consistent with the goals and policies of the following Federal and Regional plans, programs, and agreements:

- | | |
|--|--|
| • Idaho Soil and Water Conservation District | Five Year Plan (as amended) |
| • Pacific Northwest Power Planning Council | Columbia River Basin Fish and Wildlife Program and Amendments, 1982. |

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 INTRODUCTION

Over the past ten years the BPA, Nez Perce National Forest, Nez Perce Tribe of Idaho, Idaho Department of Fish and Game (IDFG) and others have implemented a number of watershed rehabilitation projects throughout the Red River drainage to improve water quality conditions. Improvements have concentrated on public lands, but some have occurred on private lands. These projects have involved construction of over 300 standard stream structures (log and rock weirs; small k-dams; log and rock deflectors; trees; and root wad and rock placement), and various bank cover revegetation efforts. While 82 percent of these projects have been effective in providing local fish habitat benefits, all have helped to reduce the rate of sediment transport (Siddall, 1992). Since 1991, stream rehabilitation efforts on the Red River have shifted from the standard instream structural work to larger river reconstruction efforts, as well as sediment source reduction projects in the uplands.

This chapter describes a No-Action Alternative (Alternative A), and a Stream Stabilization and Habitat Restoration Alternative (Alternative B). Alternative B presents the project location, long term agreements, site planning requirements, and stream stabilization and habitat restoration activities that are proposed. Other alternatives are not discussed because the Council's F&W Program mitigation projects are site-specific proposals approved through an annual prioritization process. If BPA does not fund the Lower Red River Meadow Stream Restoration Project, allocations currently budgeted for this project would be transferred to other approved F&W Program mitigation projects.

2.2 ALTERNATIVE A: NO-ACTION ALTERNATIVE

In Alternative A, BPA would **not fund** activities on the lower Red River that would help to mitigate adverse affects on Snake River anadromous fish caused by construction and operation of the Snake River and Columbia River dams and reservoirs. Under this alternative, the Idaho Soil and Water Conservation District, IDFG, Nez Perce National Forest, and the Nez Perce Tribe of Idaho would pursue limited funding opportunities with others to secure and improve project area water quality, riparian vegetation, and instream conditions that are more suitable for fish spawning and rearing habitat.

Selection of Alternative A would require BPA to fulfill it's mitigation responsibilities elsewhere. Selection of Alternative A would continue the existing trend of low productivity for chinook salmon and resident salmonid populations in the project area, barring the funding of improvements by other sources. Streambank erosion would continue to degrade water quality through increased rates of turbidity and sediment deposition. As a result, the degraded fish habitat conditions presently found in the project area would continue to decline, confounding interagency and Tribal efforts to protect salmon and steelhead trout populations in the upper reaches of the Red River drainage.

2.3 ALTERNATIVE B: STREAM STABILIZATION AND HABITAT RESTORATION ALTERNATIVE

Under the provisions of Alternative B, BPA would fund Project activities that are intended to meet the need for off-site mitigation of adverse effects on anadromous fish habitat. BPA funding would enable the Idaho Soil and Water Conservation District to secure the long-term contracts or agreements with the private landowners and public managers in the project area that are necessary to increase the quality and quantity of juvenile chinook salmon spawning and rearing habitat on the lower stream segments of the Red River.

Alternative B would allow BPA to reimburse the Idaho Soil and Water Conservation District for long-term contract costs necessary to secure conservation contracts and fund stream stabilization, fish habitat improvement, re-establishment of riparian vegetation, and O&M activities. If fully implemented, Alternative B would allow the Idaho Soil and Water Conservation District to initiate or subcontract the mitigation of about 7.1 km (4.4 mi.) of anadromous fish rearing and spawning habitat within the next five years.

2.3.1 Alternative B Description

2.3.1.1 Project Area Location

The Red River is the easternmost drainage of the South Fork of the Clearwater River. The stream originates in North Central Idaho about 6.4 km (4 mi.) northwest of Green Mountain at an elevation of approximately 1,829 m (6,000 ft), and flows west about 45.1 km (28 mi.) to its confluence with the American River. At that point, the two rivers become the South Fork of the Clearwater River. The South Fork next joins the Middle Fork 100 km (62 mi.) downstream forming the mainstem Clearwater River near Kooskia, Idaho.

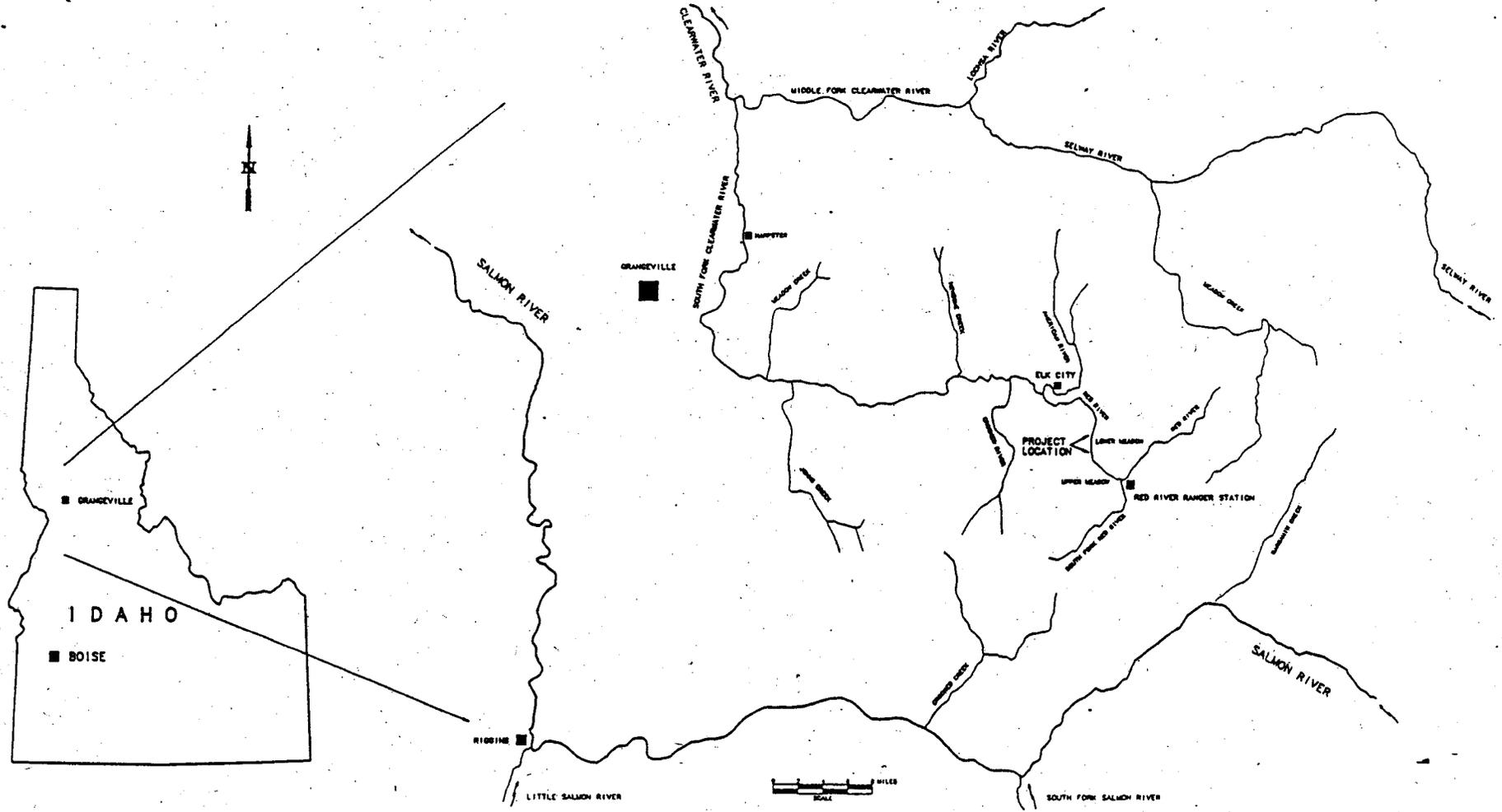
As shown in the project location map, the study area is located approximately 4.8 km (3 mi.) downstream from the confluence of the mainstem Red River and the South Fork Red River. Elk City, the closest community, is about 13 km (8 mi.) to the northwest.

2.3.1.2 Idaho Soil and Water Conservation District/ Landowner Agreements

- Idaho Soil and Water Conservation District would secure individual long-term agreements with willing private landowners. By signing individual agreements, the Idaho Soil and Water Conservation District would agree to implement stream restoration, habitat enhancement, fencing, and other site improvements as described in Sections 2.3.2.2 and 2.3.2.3. Individual landowners would agree to participate in site-planning, as appropriate, and allow the stream stabilization and habitat enhancement activities to occur on their property. Individual landowners would also allow or perform long-term O&M and M&E activities, as described in Section 2.3.2.4 and 2.3.2.5. The long-term agreements could incorporate conservation easement language to reimburse private landowners for the use of their land.

RED RIVER MEADOW RESTORATION

PROJECT LOCATION MAP



LINE TYPES		LEGEND		PROJECT LOCATION WITHIN STATE OF IDAHO AND CLEARWATER BASIN		IDAHO SOIL AND WATER CONSERVATION DISTRICT	
4/10/05	=====	FLOW DIRECTION	—————>	DATE	REVISIONS	INITIALS	RED RIVER MEADOW RESTORATION PROJECT
LARGE STREAMS	=====	CITIES AND TOWNS	■				
SMALL STREAMS	=====						RIVER MASTERS ENGINEERING
TRIBUTARIES	=====						SHEET NUMBER
							RED RIVER
							01

SCALE: AS SHOWN
 DESIGNED BY: T.O. SHARPLES
 SURVEY DATE: 08/19/05
 DRAWN BY: T.O. SHARPLES
 ENGINE DATE: 09/27/05
 CHECKED BY: T.O. SHARPLES

P.O. BOX 306, PALLASNA, WA 99163
 PHONE (509) 332-7010

- Idaho Soil and Water Conservation District and the IDFG would enter into a separate interagency agreement to implement site planning, stream stabilization, habitat restoration, O&M and M&E activities as described in Sections 2.3.2.1, 2.3.2.2, 2.3.2.3, 2.3.2.4, and 2.3.2.5.

2.3.1.3 Idaho Soil and Water Conservation District/BPA Funding Agreement

Interagency Work Group participants proposing a wildlife mitigation project would be required to negotiate with BPA for long-term management and O&M funding purposes. The terms and conditions for permanent protection of wildlife habitat and long-term funding of site-specific management activities would be formally stipulated either in a binding contract or Memorandum of Agreement, as appropriate. Terms and conditions should include, but are not limited to, total land protection and management activities, costs, and the overall length of the site-specific agreement in terms of years.

2.3.2 Stream Stabilization and Habitat Restoration

2.3.2.1 Site Planning Requirements

A detailed site-specific plan (Site Plan) would be developed for each public or private land parcel included in the Project consistent with: (1) design criteria established for the overall project area (see Appendix B); and (2) individual landowner/landholder management objectives. The Site Plan would document the site-specific stream restoration and habitat enhancement activities, cultural resource protection efforts as appropriate, and O&M operations to be implemented at each property (see Sections 2.3.2.2, 2.3.2.3, 2.3.2.4, and 4.3.1). Exhibits shall include, but are not limited to: site-specific cultural and other field survey results; engineering specifications for all planned stream restoration and habitat enhancement activities; state and Federal permit approvals; time schedules, equipment, and personnel needs. Completed Site Plans shall receive a peer review prior to submission to BPA.

To ensure impacts are within the range of those addressed in the EA, completed Site Plans would be submitted to BPA and reviewed prior to implementation. If environmental effects are found to be outside of those disclosed in the EA, further coordination would be required with appropriate Tribal and state programs, BPA, and/or other Federal reviewing agencies as necessary to ensure consistency with permitting or other environmental compliance requirements. An amendment or supplement to the EA would be necessary prior to final funding decisions. When Site Plan effects fall within the range of those addressed in the EA, a Memorandum to the Official File would be completed and the final decision on funding could proceed.

2.3.2.2 Proposed Stream Stabilization and Fish Habitat Restoration Activities

Restore Channel Meander Pattern

- a) raise surface water elevations by installing low head rock weirs or rock berm grade control structures of less than 0.3 m (1 ft), or by increasing channel length
- b) reopen historic channels, reshape existing channels, or excavate new channels 0.9 to 1.8 m deep by 9.1 to 18.2 m wide (three to six ft deep by 30 to 60 ft wide) using a

- track-mounted excavator or back-hoe to re-establish historic meander patterns, decrease width/depth ratios, increase channel length, increase sinuosity ratio, or decrease channel gradient as required for restoration of fish habitats
- c) use excavated materials to fill in existing channel or remove excavated material from construction sites to off-site areas, using a rubber-tired front-end loader to prevent fill material from entering the stream

Restore Channel Geometry

- a) reshape existing, abandoned, or new river channels using a track-mounted excavator or back-hoe to increase channel low flow depths 0.9 to 1.8 m (three to six ft)
- b) reshape or create natural bankfull channel widths 9.1 to 18.2 m (30 to 60 ft) to safely carry floodflows and maximize fish habitat
- c) remove excavated material from construction sites using a rubber-tired front end loader to prevent fill material from entering the stream

Stabilize Stream Banks

- a) install and anchor large woody debris, boulders, and plant cuttings, using track mounted excavator or other heavy equipment on the outside edge of meander bends and at toe of bank of newly constructed stream channels, as required to deflect the force of the stream and reduce sedimentation levels
- b) install and anchor large woody debris to stabilize existing cutbanks using track mounted excavator or other heavy equipment as required to deflect the force of the stream and to reduce sedimentation levels
- c) establish the streamside component of the riparian shrub community between the stabilizing structures and top of slope

Restore Instream and Overhead Cover

- a) install and anchor large woody debris in the new channels using a track-mounted excavator, back-hoe or other heavy equipment as necessary to create a variety of plunging, parallel, debris jam, deflector, spanning, or jetty structures as necessary for re-establishment of diverse fish habitat conditions
- b) establish riparian shrub and wetland herbaceous plant communities to provide vegetative cover

Protect Instream Habitat

- a) divert water around the construction sites using coffer dams or other temporary structures when working in the active channel
- b) trap sediment from in-channel and streambank construction activities using settling basins, geotextile materials, strawbales, or other erosion control measures
- c) prevent erosion of stock-piled soils using berms, silt fences, or seeding as required by site conditions
- d) re-establish vegetative cover on disturbed access areas to control erosion and maintain forage and upland habitat values
- e) monitor water quality during construction to assure water quality rules and regulations are maintained

2.3.2.3 Proposed Re-establishment of Riparian Shrub Community

Restore and Protect Riparian Shrub Communities

- a) establish willows, alders, sedges, and rushes in the riparian zone to reduce bank erosion and increase bank stability, streamside shade, terrestrial food (insect) sources, and protection of undercut banks required for fish cover
- b) fence project area perimeter with four strand barbed wire or pole fencing to control domestic livestock trespass
- c) construct upslope livestock water sources to reduce domestic livestock trespass

2.3.2.4 Proposed Operation and Maintenance Activities

As part of this alternative, BPA funding of O&M would be negotiated and documented in each Site Plan. Proposed O&M activities within the project area may include:

- a) fence maintenance to control domestic livestock trespass
- b) maintenance of livestock water sources
- c) vegetation management: hand removal of noxious weeds; replanting of riparian vegetation as necessary to maintain vertical and structural habitat values
- d) maintenance of instream structures during low water periods to ensure woody debris is replaced or remains anchored properly
- e) management of public access by permanent or seasonal closures
- f) amendment and update of site plans

2.3.2.5 Proposed Monitoring and Evaluation Activities

Additional long-term monitoring by participating landowners would occur as appropriate to evaluate changes in site-specific and/or overall project area conditions. Monitoring activities could include:

- a) channel cross section surveys to document changes in channel shape and width/depth ratios
- b) aerial photography or field surveys to evaluate channel meander patterns
- c) fisheries habitat and fish population surveys
- d) stream bank stability surveys
- e) stream temperature and shade surveys
- f) riparian vegetation community composition and channel feature photopoints
- g) historic, prehistoric and traditional cultural use sites surveys
- h) wildlife habitat use surveys
- i) public use surveys
- j) instream and gravel quality surveys

2.4 POTENTIAL ISSUES AND CONCERNS

The environmental analysis presented in chapter 4 specifically addresses the potential management concerns and public issues that could result as a consequence of implementing the proposed actions. Identified below, these questions include:

- How would proposed activities be implemented to meet or exceed state and federal water quality standards?
- How would fish and wildlife and their associated habitats, including threatened and endangered species, be affected?
- How would wetlands and the floodplain be affected?
- How would existing native plant communities be impacted?
- How would cultural resources be protected?
- How would private property rights be protected?
- How would future public use be managed?

3. AFFECTED ENVIRONMENT

3.1 PHYSICAL ENVIRONMENT

3.1.1 Climate

Overall, the physical environment of the Red River drainage is characterized by mid-elevation mountains at elevations ranging from 1,189 m to 1,829 m (3,900 to 6,000 ft). Average annual precipitation ranges from 76.2 cm to 101.6 cm (30 in to 40 in) per year, with snow contributing greater than 50 percent of the total.

3.1.2 Geology

The rolling upland topography is characterized by moderate 20 to 30 percent slopes and dendritic drainage patterns. In this drainage, the well-weathered bedrock materials (hard crystalline granite, gneiss, schist, and quartzite) are highly fractured and highly erodible, generating mostly sand to gravel sized soil materials.

3.1.3 Soils

Naturally occurring sediment sources are the result of channel erosion processes and, to a lesser degree, surface erosion. Typically, mass erosion or slumping is an infrequent occurrence in the drainage (Green, 1992). The finer grained soil types common to the project area valley and stream bottoms are highly erodible. The upper soil layers are deep, 61 cm to 152.4 cm (24 in to 60 in), and typically include sandy, silt, and clay loams that overlie coarser gravel substrata (Nez Perce National Forest, 1988).

A soil evaluation of the Project area was conducted in 1995. Results of soil tests conducted by the University of Idaho Analytical Sciences Laboratory and the Acme Analytical Laboratory, Vancouver, British Columbia, indicate that the lower Red River meadow soil medium is suitable for plant growth provided adequate moisture is available at the rooting depth of the plants. The study report further indicates that soil fertility levels are adequate for riparian plant growth and phytotoxic heavy metal concentrations are not present, based on total elemental analysis (McGeehan et. al., 1995).

3.1.4 Water

3.1.4.1 Water Quantity

Surface Water: Stream flow records over a 20-year period exhibit a hydrograph pattern of high flows that generally occur between April and June. Average annual flows are estimated at 4 m³/s (136 cfs) with bankfull flows near 24 m³/s (846 cfs). Bankfull flows which typically occur in May are a key factor in shaping and/or maintaining stream channel morphology and thus are critical considerations for stream stabilization designs. Low stream flows normally occur from August through October, with average monthly flows that range from 0.9 to 1.1 m³/s (32 cfs to 39 cfs). Because low flows influence the survival of salmonid populations, they are also considered as critical design factors for habitat restoration plans (River Masters Engineering, 1994).

Ground Water: Hydrology is dominated by snowmelt runoff, which is normally slow and sustained. Deep upland soil mantles with interspersed volcanic ash layers readily absorb snowmelt, although greater water yields after fires often increase channel scour and produce higher seasonal water tables in the lower elevation meadows.

Water table levels in the lower meadow project area vary seasonally and annually in relationship to precipitation amounts. In normal water years, areas of the riparian zone meadows can be inundated in April and totally dry by late June. Although the fine grained soils are capable of wicking moisture into the soil profile 61 cm to 76.2 cm (24 in 30 in) when in contact with water, the water levels in the overall project area now drop (in down-cut channels) up to 1.5 m (5 ft) over the summer months. As the water table drops, the upper ground level layers of the soil profile dry out creating arid soil conditions directly adjacent to the stream (Bauer, 1994a).

3.1.4.2 Water Quality

The majority of the Red River watershed is presently managed by the Nez Perce National Forest. Existing watershed conditions were recently evaluated (1992) as part of a continuing forest-wide process to identify surface erosion potential and the ability of various stream channels to transport sediment. The Red River watershed received a rating of high concern/priority in this evaluation due to the extent of past land disturbing activities. As documented in the Nez Perce National Forest Plan (1987), water quality degradation of the Red River is primarily the effect of nonpoint source activities resulting in increased stream sediment and temperatures. Because the Red River watershed was rated of high concern, the objective for Red River watershed rehabilitation was established at 90 percent of natural conditions (Nez Perce National Forest, 1987). Presently, the watershed is considered to be 50 percent of natural condition, indicating that sediment supply from existing sources far exceeds the ability of the stream to transport it.

The potential for effectively reducing sediment supply from bank erosion in the area of the proposed project has already been clearly demonstrated. Recently, the Nez Perce National Forest, Red River Ranger District conducted the Red River Ranch Project, a 610 m (2000 ft) channel and riparian area restoration effort that resulted in an annual reduction of 272,160 kg/yr. (300 tons/year) of sediment into the Red River. This compared to the one time input of 58,968 kg (65 tons) that was generated during the construction period. As shown in Table 3.1, background and project-generated sediment levels were monitored and documented prior to, during, and after, the project to identify both background sediment levels of the Red River system and the short-term sediment increases resulting from instream construction work (Gloss, 1995).

Table 3.1 Red River Ranch: Sediment Yield, 1991.

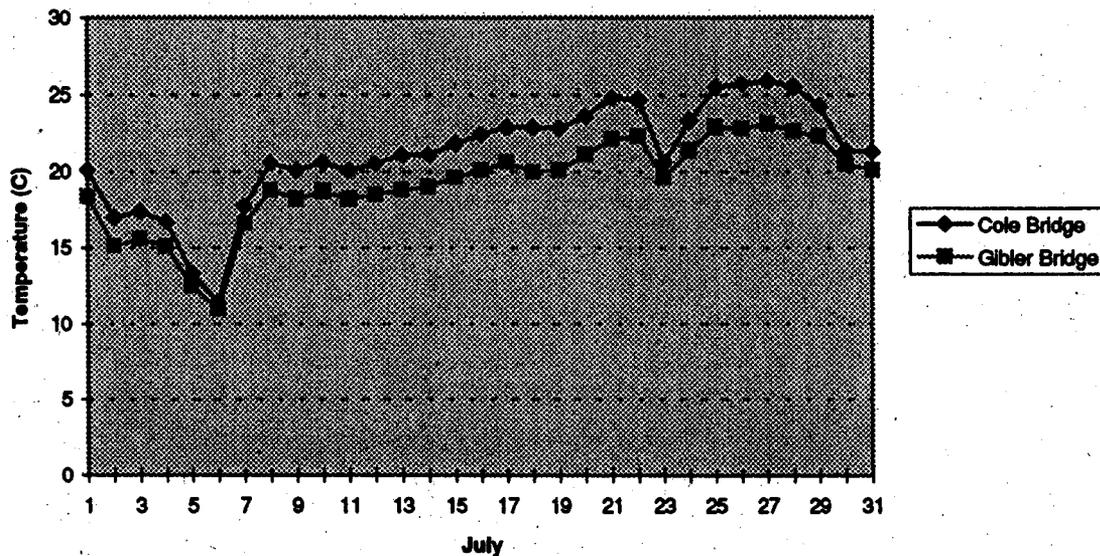
Pre-Project - Average Annual Sediment Yield	3000 (tons/year)
Pre-Project - Bank Erosion Yield	300 (tons/year)
Post-Project - Site Specific Bank Erosion Yield	near zero
During Project - (July 23-August 2, 1991) Suspended Sediment Below Project	76 (tons)
During Project - Suspended sediment above Project Area (July 23-August 2, 1991)	11 (tons)

Note: Multiply number of tons by 907.2 to compute number of kilograms.

Stream temperatures: Water temperatures are an important factor in regulating aquatic life. Conditions which exceed the optimum temperature for salmonids reduce growth rates and adversely affect survival. The upper optimum temperature limit for salmonids is 13° to 16°C (55° to 61°F) (Bjornn and Reiser, 1991). The Idaho Water Quality Standards specify a maximum criterion for short-term exposures (less than 24 hours) of 22°C (72°F), and a maximum weekly average temperature of 19°C (66°F) (Idaho Department of Health and Welfare, 1992).

Thermographs were placed in the upper reach (Cole Bridge) and the lower (Gibler Bridge) reach of the project area from mid-June to mid-September, 1994, to collect stream temperature data (Bauer, 1994b). As shown in Figure 3.1, stream temperatures increased an average of about 2°C (3.6°F) as the water flowed through the meadow area. During July and August the daily maximum stream temperatures at the lower end of the meadow exceeded the maximum state criterion of 22°C (72°F) about 40 percent of the time. The high stream temperatures beyond the critical threshold for salmonid species, help explain the low number of salmon and trout presently observed in the Red River project area.

Figure 3.1 Maximum Temperature - Red River, July 1994



3.1.4.3 Floodplains and Wetlands

The 7.1 km (4.4 mi.) project area is located entirely within the Red River floodplain in a wide and flat bottomland meadow setting. A comparison of past to present floodplain conditions was completed by contrasting aerial photographs from 1936 and 1985 in an effort to document channel meander pattern, sinuosity, and stream gradient changes within the floodplain zone. Presently, high bankfull flows are increasing streambank erosion at a very high rate, widening the stream channel and decreasing the stream depth.

The existing RRWMA and Ketchum reaches have a meandering stream pattern. Nearly every outside bend has a vertical cut created by eroding stream banks. At the present, the outside stream banks are sparsely vegetated with shallow rooted grasses and forbs. This contrasts with the typical inside bend with its exposed gravel bar and dense sedge and rush vegetation. Average bank stability percentages are calculated by dividing the length of the unstable bend by the length of the stable bend. Typically, bank stability percentages for a natural stream are around 90 percent. As shown in Table 3.3, the bank stability percentages of the project area stream reaches range from a low of 39 percent at the Ketchum property to a high of 66 percent at the Gibler property.

The stream channel through the Gibler and Johnson properties was dredge mined in the late 1940s and early 1950s. Sections of the RRWMA were also channelized by cutting off meander bends to make a straighter channel. As discussed in Section 3.5.1.1, the stream channel length on three of the four properties was reduced in overall length by 33 percent. Sinuosity ratios (stream length/valley length) were also reduced on three of

the project area properties with the greatest change occurring on the RRWMA. Stream gradients were increased in these channels up to 30 percent. Over time, high flows have further downcut the active stream channel to the point that the abandoned channels and former meander bends are now situated approximately 0.6 m (2 ft) above it.

Although the lowest river reach (Ketchum property) was not dredge mined or straightened, the active stream channel has been impacted by upstream actions that increased water velocities through the reach. Presently, the Red River channel in this area has downcut to the point that it also experiences severe bank erosion during high stream flow periods.

Table 3.2: Red River Stream Channel Features 1936-1985.

Channel Characteristics	Gibler Ranch	RRWMA	Johnson Ranch	Ketchum Ranch
Existing Channel Length (1985) feet	2,550	7,950	4,050	8,250
Historic Channel Length (1936) feet	3,375	12,300	6,900	7,800
Percent change	-24	-35	-41	+5
Existing Sinuosity (1985) ratio	1.00	1.56	1.06	1.77
Historic Sinuosity (1936) ratio	1.32	2.41	1.80	1.68
Existing Gradient (1985) percent	0.30	0.26	0.28	0.18
Historic Gradient (1936) percent	0.23	0.17	0.17	0.19

Note: Multiply number of feet by 0.3048 to compute number of meters.

3.2 BIOLOGICAL RESOURCES

3.2.1 Fisheries

Historically, the Red River supported a large diversity of anadromous and resident salmonid species including chinook salmon, steelhead trout, Westslope cutthroat trout, bull trout, and mountain whitefish. Other resident fish species included smaller populations of brook trout, mountain sucker, longnose dace, speckled dace, Pacific lamprey, and sculpin. Over time both resident and anadromous salmonid populations have declined in proportion to the rate of habitat and water quality degradation.

3.2.1.1 Fishery Habitat Conditions

Instream Turbidity: Sediment levels affect aquatic organisms both as suspended material in the water column and as deposits on the substrate. Suspended sediment or turbidity affects salmonid species by delaying migration and decreasing their sight feeding ability (Bjornn and Reiser, 1991; Lloyd et al., 1987). Sight feeding of salmonids is impaired by turbidity levels in the range of 25 to 70 nephelometric turbidity units (NTU). The effect of turbidity depends on the magnitude and duration of turbidity. Deposited sediment reduces habitat space by filling in pools and interstitial spaces between cobble and boulders. Fine sediments inhibit the flow of water to incubating salmonid eggs and decreases the intergravel dissolved oxygen levels. As a result, emergence of fry is delayed or fry become trapped and mortality increases (Chapman and McLeod, 1987). To decrease adverse affects to aquatic

organisms, Idaho Department of Health and Welfare (1994) water quality standards specify that turbidity generated from any activity shall not exceed a one time increase of 50 NTU over background levels, or an increase of 25 NTU over background levels for a ten day duration.

Physical Habitat: Fisheries rearing habitat in the Red River project area is limited due to the low number of pools that are found. Presently, the predominant habitat type consists of riffles and runs. Summer water temperatures are high due to the increased rate of solar input, lack of stream shading, and the shallow nature of the river channel. Instream habitat conditions were inventoried in 1994 using Nez Perce National Forest fisheries habitat survey methods. The stream channel through the entire project area is characterized as wide and shallow with little fishery habitat diversity. As shown in Table 3.3, the habitat survey identified virtually no fish cover associated with instream and stream bank conditions, lack of sufficient riparian vegetation to provide bank stability and shading, and an overall lack of pools (Bauer, 1994a). The only noticeable instream hiding cover is that associated with surface turbulence. With the exception of a single log deposited during a previous flood flow, the stream lacks the instream woody debris typically associated with meadow streams. Essentially, no boulders occur naturally in the meadow, although several have been brought to the RRWMA in an attempt to stabilize the stream banks.

Table 3.3: Instream Channel Conditions by Land Ownership.

Habitat Feature	Gibler	RRWMA	Johnson	Ketchikan
POOLS				
Number	0	6	1	3
Pool/ Riffle Ratio (ft)	0:100	17:83	14:76	26:74
Average Depth (ft)	--	3.4	3.5	3.8
STREAM BANKS				
Percent Stability	66	47	52	39
Percent Undercut	0	0.7	0	0
Percent Overhanging Vegetation	0	0.4	0	0
Percent Riparian Shrub	0	0	0	2
INSTREAM COVER				
Woody Debris (Amount of)	0	1	0	0
Boulders (Number of)	0	19	1	1
Percent Instream Vegetation	< 1	< 1	< 1	< 1

Note: Multiply number of feet by 0.3048 to compute number of meters.

3.2.1.2 Red River Fish Populations

Over the past several years, IDFG has collected information on fisheries populations using redd counts, weir counts, and snorkel transects to better evaluate the effect of hatchery supplementation and habitat treatments in the Red River system. Overall, the redd counts and weir counts indicate that spring chinook salmon have responded well to hatchery supplementation techniques when sufficient adults return to the spawning grounds. Returning adult numbers are highly variable, however, due to external influences such as dam passage, ocean survival, fishing pressure, and climatic changes. For example, redd counts in Red River in the period 1980 to 1993 varied from five to 92 with a median count of 58 (IDFG, 1993). In 1994, a year spring chinook salmon numbers declined dramatically throughout the Snake River Basin, only 23 redds were counted in the Red River drainage.

Six IDFG snorkel transects are located in the Red River project area reaches. In 1993, resident fish densities were recorded along with densities of chinook salmon and steelhead. Because dace and other minnow species are favored by the shallow warmer waters, they were the most commonly observed. Additional monitoring results indicate that all salmonid species presently occur at extremely low population levels. Brook trout or bull trout were not observed within the six transects, although these fish occur in other reaches of the watershed. Steelhead trout juveniles were observed in very low numbers. Twenty-nine cutthroat trout were encountered at one transect which

translates to a fish density of 0.29 fish/100 m². Whitefish were counted on three transects providing fish density ranges from 0.3 to 2.23 fish/100 m². Age 0+ chinook salmon were counted at all six transects providing a fish density range of 0.01 to 3.52 fish/100 m². Juvenile chinook salmon numbers were highly variable and fish densities were not calculated because of their irregular distribution related to schooling behavior and their selection of specific micro-habitats.

3.2.2 Wildlife

Historically, the project area bottomlands supported a wetland ecosystem that was typified by a riparian shrub overstory and a sedge/rush understory. Over time wildlife habitat values were dramatically altered by human activities. More recently, the stream has downcut and lowered the water table to a point where meadow soils now dry out early in the summer. As a result, the former wetland meadow system can only support the grass community within a limited growing season. Commonly, the present day meadow begins to "green-up" in May and provides a dense stand of grasses and forbs by June. As the meadows dry out in early July, grass production drops off dramatically. Although the project area meadows provide sufficient early spring forage for the existing elk, deer, and geese populations, conditions are unsuitable for wetland dependent species.

The RRWMA was purchased by BPA and others and transferred to the IDFG in part to protect a major elk calving area. Elk calving ordinarily occurs in this portion of the project area from mid-March through mid-June when the meadow grasses provide a reliable source of forage. During the calving period, the cow elk typically use the lodgepole pine at the edge of the meadow for hiding cover and the grassy meadow for the calving area. In the summer, the elk herd moves to higher ground, returning to the lower elevations (including the calving meadows) in winter. White-tailed deer, moose, bear, geese, and ducks are other prominent wildlife species commonly observed in the meadow. According to landowners, beaver were also common prior to channel changes and removal of the riparian shrub community in the early 1950s.

3.2.3 Riparian Vegetation

Historically, shrubs and small trees dominated the project area riparian vegetation, in association with a rich assemblage of herbaceous species. The former diversity of native plant species can be observed today inside an enclosure at the lower end of the project area and at other undisturbed riparian areas in the project vicinity. Based on such observations, the major riparian shrub species were a variety of willows, especially Booth's willow, Geyer's willow, and Drummond's willow. Dusky willow is believed to have been the most predominant species found on the sand and gravel bars located near the edge of the river. Other native shrubs contributing to the diversity and structure of the woody vegetation included speckled alder, red-osier dogwood, whiplash willow, and black twin-berry. The many grasses and sedges persisting today were certainly part of the original vegetation, but their original diversity and extent

have been altered by the agricultural practices and the hydrologic changes that have occurred (Brunsfield, 1994).

Today, the existing riparian vegetation (See Appendix A) is composed almost entirely of low herbaceous grass species (Brunsfield, 1994). Typically, the grassy vegetation is sparse or absent on the streambanks due to high levels of bank erosion and grazing animals. Native plant communities are broadly divided into two types: the sedge and rush dominated species on wetter soils, and herbaceous species on the drier meadow soils. Moist soil types presently support a variety of obligate plant species, (capable of surviving only in a single environment), and facultative plant species (adaptive to varying environments). Common native plants include a variety of sedge, rush, bulrush, aster, and lupine species. Because most of the upland meadows are used for hay production, a high percentage of exotic grass species including timber oatgrass, redtop bentgrass, and Kentucky bluegrass are present. Herbaceous plants growing on the drier meadow soils commonly include a variety of facultative species such as Oregon yampah, sheep sorrel, Scotch bluebell, prairie smoke, and yarrow.

3.2.4 Threatened and Endangered Species

The grizzly bear and gray wolf are Federally-listed species identified by the US Fish and Wildlife Service (USFWS) as potentially occurring in the project vicinity. Jeff Adams of the United States Forest Service (USFS) reported (1995) that, although the project area is located adjacent to the Bitterroot Grizzly Bear Recovery Area, grizzly bear sightings have not occurred near the project vicinity for the past 20 years. Numerous probable sightings of lone gray wolves during winter months, however, have occurred within 10 km (6 mi.) of the project area from the late 1970s through the early 1990s. Although wolf habitat is considered good in the surrounding areas, no known breeding pairs have been documented near the project vicinity.

The spring/summer chinook salmon that occur in the Red River project area are not designated under the Endangered Species Act (ESA) since these populations are derived from hatchery stock. Available information from the National Marine Fisheries Service (NMFS) indicates that the listed Snake River salmon species and/or critical habitats are not in the project area or immediately downstream from it. The closest critical habitat for endangered wild salmon occurs on the mainstem Clearwater River 145 km (90 mi.) downstream.

3.3 SOCIAL, ECONOMIC, AND CULTURAL RESOURCES

3.3.1 Cultural Resources

Although human activity in the lower Red River vicinity has a long history, no significant cultural resources eligible for National Register listing have been recorded in the immediate vicinity of the project area. Because of the amount of standing water and overall wet nature of the floodplain zone, it is believed that Nez Perce or other Indian Tribes most likely used the project area meadows either for a travel corridor, or for seasonal hunting and gathering activities. Immediately adjacent to the valley

bottom to the east and west are higher and drier locations that are believed to have been more suitable for camp sites (Luttrell, 1995). The gold strikes of the 1860s brought large numbers of European settlers traveling through the country, and the Red River valley was used as a stagecoach route. The meadows were likely used to graze large herds of horses that were used to haul goods, timber, and supplies to the miners. As mining methods evolved, the Red River drainage was mined by placers, hydraulic mining, and dredge mining. The Raymond townsite post office located on the Red River meadow was recorded on the United States Geological Survey report of 1898 (Elsensohn, 1951). Buildings from this period are still in evidence in the uplands overlooking the meadows.

Private properties including the ranches in the Red River meadow were homesteaded early in the 1900s. The Forest Reserve system established in 1897 included the Red River drainage. The Nez Perce National Forest was later created in 1908, and the Red River ranger station was constructed in 1937. Fish were planted in the upper Red River drainage from the Grangeville hatchery as early as 1938 (Elsensohn, 1951). Dredge mining took place in Crooked River, Elk Creek, American River, and the Red River meadow in the late 1940s. Grazing and haying activities increased in importance from the early 1900s as livestock, both horses and cattle, were brought in for production purposes by the homesteaders.

3.3.2 Land Use Activities

3.3.2.1 County Planning and Implementation

Although Idaho County does not have a current Comprehensive Land Use Plan or Zoning Ordinance, agricultural practices continue to be one of the dominant land uses within the project area (Enneking, 1995). Subdivision Regulations for Idaho County (Ordinance No. 20) presently provide definitions and the rules and regulations for the approval of plats, subdivisions, dedications and vacations of public right of way and easements within the unincorporated areas of the county. The unincorporated project area lands within Idaho County jurisdiction are encircled by the Nez Perce National Forest. Current land uses are described further by individual property.

Gibler Ranch: The Gibler property was homesteaded in the early 1900s and used for livestock production until recently when the property was subdivided among second and third generation family members. The property is presently used for recreational home sites and horse pasture.

Red River Wildlife Management Area: The RRWMA property was purchased in 1993 and is managed for fish and wildlife purposes by the IDFG. Recommendations for additional fish and wildlife improvement projects, public wildlife viewing, or use as an outdoor education center may be proposed under direction of the advisory committee comprised of purchase contributors, adjacent landowners, and agency representatives.

Johnson Ranch: The Johnson property is a working cattle ranch managed for agricultural production. The east side of the meadow is presently used as a hay field. The west side is used as cattle pasture. During winter and spring seasons, about 125 cow/calf pairs have free access to the riparian and stream bank areas.

Ketchum Ranch: The Ketchum property is currently leased for agricultural use or grazing purposes during the summer season. Fifty cow-calf pairs typically graze the area between June and October. The cattle have free access to the river throughout the summer. The meadow has a good stand of grass and is also used for hay production.

3.3.2.2 Prime Farmlands

At the present, there are no unique or prime farmland designations within the project area. This is primarily because of the limited growing season (Spencer, 1995).

3.3.2.3 Public Use

Public recreational use on project area lands is very low and comprised primarily of those pursuing hunting and fishing opportunities. At the present, hunting on private lands and fishing access is allowed by permission of the landowner.

4. ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

4.1.1 Alternative A: No-Action Alternative

Alternative A would permit the continuing decline of the Red River anadromous and resident salmonid populations and habitat conditions, increased streambank erosion, and continuing water quality degradation. If no-action is taken to conduct bank stabilization and riparian habitat restoration efforts, water quality degradation and higher flood risk conditions would persist through the project area. Further declines in native vegetation, fish, and wildlife populations are predicted. Selection of Alternative A would not meet the need or purposes of the proposed action, as defined in chapter 1.

4.1.2 Alternative B: Stream Stabilization and Habitat Restoration Alternative

In comparison to Alternative A, the objective of Alternative B is to reverse declining Clearwater River basin anadromous fish populations by improving the diversity and long-term quality of salmonid habitats within the lower Red River project area. Selection of Alternative B would result in measurable increases in streambank stability and water quality conditions, riparian vegetation, and fish and wildlife benefits within a single water year. With BPA funding, both public and private sites within the project area could be dedicated and managed for fish and wildlife values in perpetuity.

Selection of Alternative B would help to meet the need for mitigating adverse effects on Clearwater River basin anadromous fish habitat as a result of the construction and operation of the lower Snake River and Columbia River dams and reservoirs. Implementation of Alternative B would continue the long-term effort of state, Tribal, and Federal agencies to rebuild anadromous fish populations in the Clearwater basin; increase quality and quantity of juvenile chinook salmon spawning and rearing habitat on the lower Red River stream reaches located in Idaho County, Idaho; and demonstrate the compatibility of fish habitat enhancement with private land management. The potential environmental consequences of implementing Alternative B are discussed further in the remainder of this chapter.

4.2 PHYSICAL ENVIRONMENT

4.2.1 Climate

Implementation of Alternative B would have no impact on the regional climate within the project area. In the long-term micro-climate changes from increased shading and stream channel alterations would help to moderate stream temperatures providing more suitable conditions for salmonids.

4.2.2 Geology

Implementation of Alternative B would have no known impact on the bedrock geology within the project area or reduce the erodibility of soils generated from bedrock materials.

4.2.3 Soils

In the long-term, decreased bank erosion rates would help to maintain upland and riparian meadow soil conditions. Based on past monitoring of the Red River stream restoration projects, it is predicted that lateral bank erosion would be halted and the present rate of soil erosion would decrease substantially to less than 0.1 percent of existing conditions.

Channel stabilization and habitat restoration activities as proposed in Alternative B would bare, expose and compact soils at the access points for moving heavy equipment and at the stream channel construction sites to varying degrees in the near term. Care would be taken to minimize increases in the rate of soil transport and stream sedimentation and associated adverse water quality effects in such areas. Although negative stream sedimentation effects are predicted to be local and of short duration, erosion risks would be controlled in Alternative B by the quick re-establishment of native vegetation, planting of vegetative cover crops, or application of ground mulch as appropriate. Compacted soils would be disked and revegetated upon completion of construction activities. Upland soils would be revegetated with an appropriate mix of native grasses and herbaceous species. Riparian soils would be revegetated using seed, transplants, or nursery stock depending on site-specific conditions. As discussed further below (see section 4.1.1.2 Water Quality), sedimentation effects would be monitored and reduced through a variety of site-specific design, timing, and sediment control techniques.

4.2.4 Water

4.2.4.1 Water Quantity

Activities proposed in Alternative B would have no measurable effect on the net amount of surface water leaving the project area. However, differences may be observed in the timing of Red River flows as former riparian and wetland conditions are re-established. Ground water levels should become higher as the stream gradient is flattened and wetland acreage increases.

4.2.4.2 Water Quality

Sedimentation: Streambank stabilization and habitat restoration activities, as proposed in Alternative B, would decrease streambank erosion and reduce sediment input into the Red River. Although localized and of short duration, turbidity and sedimentation levels are predicted to increase during the time of construction. However, these short-term effects contrast with the potential for elimination of the current sediment entry levels indicated in Table 4.1.

Although estimates are not available for all of the project area properties, existing streambank erosion levels are very high for the RRRWA stream reaches. Based on measurements taken in 1994 of 22 eroding stream banks, annual losses of up to 0.9 m (3 ft) of streambank are common to many areas. Annual streambank erosion is estimated at a rate ranging from 1,425 to 4,279 metric tons/year (1,571 to 4,714 tons/year). Sediment that would be generated from instream channel work is estimated at about 142 metric tons (157 tons) by assuming a maximum suspended sediment concentration of 50 mg/l, flows of 1.4 m³/s (50 cfs), and a construction duration of 14 days. This volume of sediment is from two to six percent of the estimated annual stream bank loss for the RRRWA. Although these calculations may vary somewhat from actual sediment losses, the estimation illustrates that the long-term benefits of implementing stream restoration would greatly outweigh the short-term disturbance.

Table 4.1 Volume of Material Currently Entering Red River at the RRRWA.

Total Stream Length	8,400 feet	
Average Height	3.9 feet	
Lateral Bank Erosion Rate (ft)	Cubic Yards/Year	Tons/Year
0.1 ft ⁽¹⁾	120.9	157.2
1.0 ft ⁽²⁾	1,208.9	1,571.6
2.0 ft ⁽²⁾	2,417.8	3,143.1
3.0 ft ⁽²⁾	3,626.7	4,714.7

(1). Projected post-project erosion rates.

(2.) Existing erosion rates, actual length and heights were measured.

Multiply number of feet by 0.3048 to compute number of meters; multiply number of cubic yards by 0.9144 to compute number of cubic meters; multiply number of tons by 907.2 to compute number of kilograms. Conversion to tons is based on soil bulk density for sandy loam soils.

In an effort to reduce near-term adverse water quality effects, all construction work to be performed in or near the stream would be planned and/or coordinated with the State of Idaho and the United States Army Corps of Engineers. All necessary state and Federal permits would be obtained prior to all construction activity or other ground disturbing work with a potential for increasing soil erosion and sediment transport into the water. Sediment and turbidity levels generated by localized Alternative B actions would remain within the terms and conditions established by state and Federal regulations and permit requirements.

The installation of grade control structures, reshaping the stream channel, restoring instream habitat, and regrading streambanks could temporarily increase sedimentation in the stream course to varying degrees. Depending on site-specific conditions, Alternative B sediment effects would be further reduced through the application of the variety of design, timing, and site-specific sediment control techniques as described in Table 4.2.

A demonstration project to monitor and evaluate proposed water quality mitigation for cost effectiveness will be conducted during the first year of the project.

Table 4.2 Alternative B: Sediment Control Techniques.

Sediment Source	Potential Sediment Control Measures
Channel Construction (reopen abandoned channel or new channel)	<ol style="list-style-type: none"> 1. Channels excavated when dry and unconnected to an active channel 2. Channels revegetated, allowed to stabilize for approximately one year before connection to an active channel 3. Channels reconnected just prior to high-flows to flush sediment during the natural high turbidity period
Bank Stabilization	<ol style="list-style-type: none"> 1. Bank sloping conducted during low-flow period 2. Silt fence, hay bales, or other methods used where needed to prevent sediment transfer in runoff water 3. Disturbed banks revegetated with nursery stock transplants, or by seeding immediately following construction activities
Stream Crossings	<ol style="list-style-type: none"> 1. Stream crossings hardened with gravel 2. Silt fence/hay bales used to prevent sediment runoff
Existing Stream Channel Reconstruction	<ol style="list-style-type: none"> 1. Channel work completed within low-flow and instream access periods - July 15 to August 15 2. Water diverted around site in temporary or historic channel 3. Sediment Ponds used where needed 4. Revegetation completed during the construction season

Sediment Treatment Mitigation: Based on demonstration project results, each site plan will incorporate specific mitigative methods that are tailored to that site. Several of these methods will be evaluated for cost effectiveness during the first year demonstration project.

Because it is not possible to accurately predict the magnitude of sediment, mitigative measures and costs will be developed as part of each site plan. More specifically, various particle sizes of sediment will be generated by construction activities and will be treated at different efficiencies. Sand-size and larger particles have a faster settling rate and are expected to be trapped easily in pools or settling basins wherever stream velocities decrease rapidly. Silt and clay size particles require extended settling rates and will be more difficult to treat. These are the particle sizes that have been measured in previous projects as suspended sediment or measured in turbidity units.

There are three primary methods of sediment treatment to be tested. The advantages of and disadvantages of these approaches are discussed below: 1) Trap the sediment in downstream pools within the construction reach. 2) Use materials such as Sedimats instream to assist in trapping sediment and for eventual removal. 3). Use off-site settling ponds to trap the sediment off-site and therefore remove it from the system.

1) *Trap the sediment in downstream pools within the construction reach.*

Large pools in the existing stream channel are not numerous, but where they occur they provide a site for sediment trapping. Pools will rapidly settle out sand-size materials. Once the material is trapped, the removal of the material will be evaluated. If large amounts of sand have been collected the material can be removed with a sediment dredge and sprayed on the adjacent floodplain. Trapping efficiency may be increased by use of Sedimats in shallow zones upstream of the pools.

Advantages:

- a. Use of existing pools is inexpensive since no additional construction is required.
- b. The pools will be efficient in trapping sand.

Disadvantages:

- a. The pools will not provide sufficient settling time to provide reasonable treatment of fine sediments and downstream turbidity.
- b. Trapping the material within the stream channel leaves the material in the stream.

2) *Use materials such as Sedimats in-stream to assist in trapping sediment and for eventual removal.*

Sedimats or other fiber materials are placed in the stream in shallow water below the construction zone and the turbid water flows through the fibers. The sedimats are then removed to a streambank and used to assist in stabilizing the bank and as a seedbed or planting medium.

Advantages:

- a. Sedimats will increase the trapping-efficiency of sand and fine sediments.
- b. The material will provide additional value in bank stabilization.

Disadvantages:

- a. There are increased costs for the product and for labor to place and remove the material.
- b. The product may be difficult to use in practice, since it is difficult to remove the mat without losing some sediment back to the stream.
- c. The cost/benefit of the product is difficult to estimate prior to the application.

3) *Use off-site settling ponds to trap sediment.*

Settling ponds are excavated in the meadow and turbid water from the construction site is routed to the ponds to trap sediment. The ponds can later be used for wildlife enhancement. The efficiency of settling basins can be estimated by evaluating the particle settling rate and the volume of water. The estimated size of ponds would be calculated for each Site -Plan.

Advantages:

- a. Settling ponds remove sand and fine sediment generated during construction from the stream system.
- b. The sediment pond can provide wildlife value to the project after use as a settling basin.
- c. The pond is more cost-effective if additional fill material is needed to fill in the existing channel that will be abandoned.

Disadvantages:

- a. Constructing a settling basin adds another major activity to a very tight construction window and increases the project cost.
- b. To be effective in trapping the clay and silt size particles the settling basin must be a substantial size as estimated above, smaller ponds will not accomplish the objective of reducing off-site turbidity.

Temperature: Because shade producing vegetation does not exist in the project area riparian zone, proposed Alternative B activities such as channel reconstruction, streamside plantings, and fencing, would not have an immediate effect on high summer stream temperatures. In the long-term, the decrease of channel widths and the protection of growing riparian vegetation would have a positive effect by reducing stream temperatures to levels that are beneficial for salmonid populations (Betscha et al., 1987). As the riparian vegetation becomes mature and provides an overhead canopy and the surface area of the stream is decreased and deepened, the amount of solar radiation reaching the stream surface would be reduced. The high thermal input and temperature gains currently experienced are expected to decrease in proportion to the amount of shading and channel alteration received.

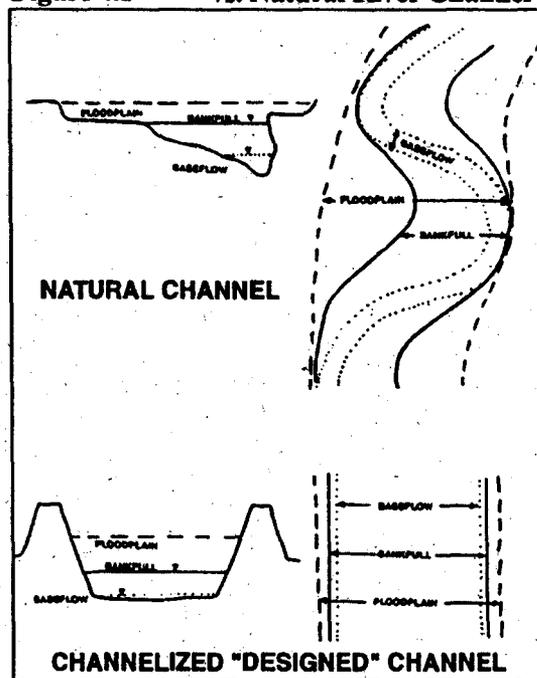
4.2.4.3 Floodplain/Wetlands

Restoring channel meander patterns, geometry, stable streambanks, and fish and wildlife habitat, as proposed in Alternative B, would not result in adverse effects to the existing Red River floodplain. Restoration of the historic floodplain and protection of the riparian zone would return the project area channel to a naturally meandering stream pattern. Near and long-term benefits would include the avoidance of accelerated bank erosion and sediment deposition problems presently associated with the channelized stream course. As shown in Figure 4.1, a natural channel configuration includes a low flow channel, a bankfull - or normal - high water channel, and an established floodplain. Based on the experience of other restoration projects that have utilized natural stability principles, the return of historic channel length, sinuosity ratios, and gradients have decreased streambank erosion and sediment deposition rates. Other advantages of Alternative B actions would include the protection of the floodplain. This would be accomplished by restoring a narrower stream channel containing deeper pools and revegetated zones. In the long-term, re-established vegetation would help to dissipate the energy of bankfull flood flows, while increasing fish and wildlife habitat values. Over time, as natural stream dynamics are returned to the entire 7.1 km (4.4 mile) project area cumulative benefits such as increased bank

stability, visual values, water quality, riparian function, terrestrial and aquatic habitat conditions, and increased salmonid biomass are expected. The success rate for salmonid habitat improvement, the central objective of Alternative B, would be greatly improved because the existing long-term physical problems associated with stream temperature, sediment deposition and lateral bank erosion would be minimized (Platts and Nelson, 1989).

To avoid increased flooding risk to downstream properties, the technical interagency workgroup will complete a demonstration project on the RRWMA to test the features that will be used in the overall project.

Figure 4.1 Comparison of Channelized vs. Natural River Channel



Source: Dave Rosgin, Wildland Hydrology

4.3 BIOLOGICAL RESOURCES

4.3.1 Fisheries

4.3.1.1 Instream Habitat Effects

Alternative B would reintroduce the original diversity of instream and riparian habitats, rather than create one type of fish habitat at the expense of others. Because of the limited fish habitat conditions in the project area, there are no anticipated adverse effects on salmonid habitat features. The project goals of improving salmonid habitat conditions would provide long-term beneficial effects for all fish and associated habitats. Observable results could occur within a single water year. The design criteria for the

project would be applied on a site-specific basis to assure that bank stabilization and habitat restoration objectives are met. The Project design criteria are briefly summarized in Appendix B.

4.3.1.2 Fish Population Effects in Red River

Due to the adverse conditions of high temperature and shallow water, there are very few salmonid fish in the meadow reach of Red River during the summer (Brostrum, 1995). However, short-term and localized disturbances of existing fish populations may occur whenever the existing channel is treated for bank stabilization or channel shaping. Potential near-term fishery effects would include increased rates of turbidity. Adverse water quality effects on fish would be minimized by timing of activities, inspection of the site for presence of sensitive species, and if necessary capture and removal of fish above the treatment site. As part of Alternative B, potential fishery effects would be further minimized by complying with all terms and conditions established in Federal and state permits or other applicable requirements. To minimize impacts to spawning, rearing, and migration of anadromous and resident salmonids, in-channel work would only be allowed from July 15 through August 15, to comply with IDFG guidelines.

Bottom substrate distribution was measured in seven reaches within the lower Red River meadow using the Wolman Pebble Count procedure (Bauer, 1994a). The median particle size, the D50, was within the range for very coarse gravel to small cobble. Because the stream has been altered to a run/riffle habitat, fine sediment deposition now only occurs in side channels, alcoves, and deep pools even though there is a large supply of fine sediment within the watershed.

The proposed project will affect sediment deposition on the stream bottom in several ways. In the short-term, during project construction, some fine sediment will increase in the substrate within the construction zone. The fine sediments that affect fish spawning and rearing (up to 6 mm), however, will be trapped in the downstream sediment trap or removed through the use of sedimats. Therefore, only a short reach of stream from which fish have already been removed, can be affected. Within the first year this minor contribution of sediment will be flushed out of the system. In the long term, as discussed in Section 4.2.4.2, the net balance of sediment will be dramatically reduced in comparison to short-term generated sediment due to the bank stabilization procedure.

No measurable adverse effects to fish are predicted as a result of protecting stream banks through fencing and re-establishing native plants. In the long-term, such activities are essential to the restoration of salmonid rearing habitat. Restored rearing habitat is necessary for the return of healthy Clearwater River basin salmonid populations.

4.3.2 Wildlife

Due to the presence of water, restoration of native plant cover types in riverine or creek bank zones could improve wildlife habitat quality in a relatively short period, or to the point of observable results within two to five years. In the long-term, stream stabilization and riparian habitat restoration activities as proposed in Alternative B would encourage shallower groundwater tables in localized areas and surface flows with clearer, colder water. Submersed macrophytes may increase in these areas providing increased substrate for macroinvertebrates, fish and wildlife. In the long-term, the increase in the amount of submersed macrophytes and invertebrates in the river system would benefit waterfowl and other avian species that feed on these plants and animals in direct proportion to the amount of food supply available. Over time, restoration of habitats adjacent to riverine areas would provide increased cover for elk, deer, and moose and contribute to improved water quantity and quality. As open water areas such as off-channel ponds, wetted abandoned oxbows, wetted lowland areas, and low velocity areas within the stream channel are expanded, habitat quality for non-game species such as perching birds, small mammals, reptiles and amphibians would increase.

Cattle redistribution would lessen the problems of bank erosion, and riparian shrub revegetation would promote bank stabilization. Changes in livestock distribution should increase plant cover, improving wildlife benefits within a three-to-five-year period, and ensure that wildlife populations are not further reduced. Over time, as native trees are re-established and allowed to mature, cavity dependent birds such as mountain bluebird and Lewis' woodpeckers could be provided with increased nesting habitat. Perching birds and raptors would benefit from any increased diversity of forest layers.

Wildlife disturbances due to construction of stream channels, floodplains, and other habitat restoration activities are expected to be of short duration, and localized in nature. To avoid potential adverse effects to existing wildlife populations, Alternative B activities would be completed in a manner and time frame that would least disturb the wildlife present. All access to the RRRWMA area would be restricted through the elk calving period (March 15 through June 15) to avoid potential elk calving effects. Any work in or near waterbodies involving the use of heavy equipment would comply with terms and conditions established in Federal and state permits to avoid critical waterfowl nesting and small mammal denning periods. It is predicted, however, that any near-term disturbance of wildlife could be offset within three to five years by the greatly increased habitat values. To avoid recurring disturbances, reconstruction of habitats would be designed to the extent possible for minimizing the amount of annual O&M required. M&E activities such as stream temperature sampling and visual surveys of fish and wildlife habitat would have no known adverse environmental effects.

4.3.3 Riparian Vegetation

An important objective of Alternative B is to restore the riparian shrub community. Negative near-term effects are not anticipated as a result of the revegetation, fencing, and weed control activities. Because the native riparian plant species have a diversity of functions to which native fish species are adapted, restoring the original riparian

vegetation would optimize conditions for population growth of native fish species. Because of the lack of a diverse native plant community in the project area, the riparian zone would be re-established to the middle elevation community type as exists in other reaches of the Red River and as documented by Brunsfeld and Johnson (1985), and Hansen et al. (1988). Native shrub cuttings and seed sources would be obtained within the drainage and grown to container stock to supplement natural seed dependent revegetation.

Alternative B would increase the quality and diversity of the riparian cover types now present along the Red River. Some short-term disturbance of existing riparian vegetation could occur in localized construction areas at the time streambanks are stabilized and other construction is occurring. In the long-term, control of grazing practices within the riparian corridor would allow for quicker restoration of native shrubs and herbs, and could allow hardwood trees to propagate. Because land use practices have decreased habitat values for most of the riparian cover types, longer periods may be required to restore native plant communities. Depending on local site conditions, however, it is expected that vegetation replanting and redistribution of cattle out of the riparian zone could increase fish and wildlife habitat benefits within a three to five-year period. In some areas, such as inside meander bends and gravel bars, the existing sedge/rush community with its high resiliency to disturbance would recover quickly from established root systems. In heavily degraded areas, habitat improvement could require a longer period, ranging from ten to 20 years, and take at least three years for an observable response. Because the continuation of uncontrolled livestock grazing is incompatible with riparian restoration, potential effects to vegetation would be avoided by fencing, establishing riparian pastures, herding, or other livestock management methods.

4.3.4 Threatened and Endangered Species

The two Federally-listed species that may occur within the project area vicinity at various times are gray wolf and grizzly bear. In the long-term, restoration of riparian vegetation would benefit small mammal and other wildlife prey species by increasing escape cover, nesting and foraging opportunities. All activities that increase prey species would also be beneficial for predators, including the gray wolf and the grizzly bear.

It is anticipated that near term adverse effects on gray wolf would be minimal because of their preference for remote locations. Disturbance of gray wolf during initial habitat enhancement work would be slight because the majority of work would occur from mid-June through September, a time when gray wolves are not normally observed near the project area. After completion of stream stabilization and habitat restoration activities, the potential for disturbance of lone gray wolves wandering through the project vicinity would decrease. In the long-term, gray wolf observations could increase as prey numbers and hunting opportunities improve. Adverse effects on gray wolves during reproductive periods would not be expected because it is unlikely they would select the project area for denning or rendezvous locations, even if proposed work activities were not implemented.

Potential adverse effects on grizzly bear are not expected because it is unlikely they would be found in the project vicinity during or after work activities.

No adverse effects are predicted to listed Snake River anadromous fish species because the non-hatchery wild species and/or their designated critical habitats are not found in the project area vicinity.

4.4 CULTURAL RESOURCES AND LAND USE ACTIVITIES

4.4.1 Cultural Resources

As part of Alternative B, archaeological, cultural, and historic resources must be carefully managed to prevent them from being destroyed. To avoid potential adverse effects, BPA and/or other qualified cultural resource staff would participate in the Site-Plan process with responsibility for coordinating cultural resource surveys and all other efforts required to protect cultural resources. Completed Site Plans would be submitted to appropriate review agencies prior to initiation of ground altering activities. In the event that cultural resources are encountered during future construction or management activities, work would be immediately halted in the vicinity and a professional archaeologist would be notified.

Although no cultural resource sites were formally observed during the RRWMA cultural resource survey (1995), six wooden bridge features or structures were recorded as isolated finds. Results indicate, however, these isolated finds are not significant or potentially eligible for listing on the National Register. In addition, the streambank stabilization and habitat restoration activities, as proposed in Alternative B, would have a low potential for affecting undiscovered archaeological sites. This is largely due to the wet floodplain nature of the project area which argues against its use as a prime habitation locale. The historic use of the area as a hay ground may have further compromised cultural resources that may have been present at one time. With the concurrence of review agencies, it is recommended that the RRWMA portion of the Project could proceed without further regard to cultural resources (Luttrell, 1995).

4.4.1.1 Undiscovered Archaeological Sites

In the long-term, streambank stabilization and restoration of native and perennial vegetation in the aquatic and riparian zones would serve to reduce lateral stream bank erosion and simultaneously protect, preserve, stabilize, or enhance archaeological sites in areas further away from the active stream channel. To better identify potential or undiscovered archaeological sites, cultural surveys would be conducted prior to ground disturbing activities by qualified cultural and historical staff at all properties secured for the Project. Depending on site-specific conditions, four categories of cultural resource protection may be used as appropriate. In order of priority, these include:

- (1) **Avoidance (Protection):** Site-specific cultural resource survey findings would be used to document features or structures that must be totally avoided because of their historic or cultural importance. In such locations, Project activities would not

be allowed, or activities would be restricted to those specific actions identified by the qualified cultural resource staff. For example, areas where pit houses or burial sites are located would be avoided.

- (2) **Buffer Zones (Preservation):** Buffer zones could be established to increase protection of sensitive sites where little human activity is desired. Thick native shrub and forest species would be used for establishing these barriers. Because the buffers would be composed of natural vegetation, they would not draw undue attention to the locations they are helping to preserve.
- (3) **Stabilization:** Stabilization of sensitive cultural resource sites would be used in areas where the sites are in danger of being lost because of potential streambank erosion or past land use practices. Such sites would be stabilized to varying degrees by the re-establishment of perennial vegetation. Streambank stabilization and habitat enhancement activities as proposed in Alternative B would be designed whenever possible to provide fish and wildlife benefits while stabilizing historic or cultural sites.
- (4) **Revegetation (Enhancement):** Revegetation would be conducted in a manner similar to stabilization, but could be used in areas where cattle grazing, or other land use activities have removed the ground cover. The goal of revegetation would be to provide riparian habitat and to protect a cultural resource site from looting or vandalism.

4.4.2 Land Use Activities

4.4.2.1 County Planning and Implementation

Because the proposed stream stabilization, habitat enhancement, and O&M activities would not change existing agricultural or other private land practices within the project area, Alternative B objectives would be consistent with current Idaho County land use direction. Adverse effects to private property rights or to public management objectives are not expected, as site-specific land use changes would occur only at the consent of the landholder.

As part of Alternative B, long-term agreements would be established with public and private landholders for use of property where habitat restoration and stabilization activities would occur. In the long-term, stream stabilization and habitat restoration activities would benefit existing agricultural uses in areas directly adjacent to the riparian zone. For example, the increase in water tables would enhance plant growth in the meadow and lengthen the period for grazing or hay production. Streambank stabilization and construction of natural floodplains would slow the lateral soil erosion processes on individual properties and provide better flood protection. Because funding could be negotiated to prioritize project funding for fencing, weed control, and construction of upslope livestock water sources, adverse financial effects would not occur to those individual landowners wishing to be part of the Project. Other more intangible benefits would include the satisfaction of participating in a local effort to restore fish and wildlife resources that would enrich their grandchildren, great grandchildren, and the future generations of the Pacific Northwest.

4.4.2.2 Prime Farmlands

No effects on prime and unique farmlands would occur as a result of Alternative B. Although soil types in the project area are not designated as unique or prime, streambank stabilization and habitat restoration would be a beneficial activity that would serve to preserve, stabilize, and enhance existing soil productivity levels.

4.4.2.3 Public Use

Because hunting and fishing participants are largely from the local vicinity, near-term changes in the type or amount of recreation visitor use is not expected. Any future public education and/or public viewing opportunities with the potential for increasing the amount and/or type of visitor use would occur only at the RRRWMA. Because public education and viewing opportunities would be restricted during the elk calving period (March 15 through June 15), and public access on private lands would occur only at the discretion of the landowner, no adverse effects are predicted as a result of Alternative B. To avoid public safety concerns, construction zones would be closed during site-specific work phases.

5. COMPLIANCE WITH ENVIRONMENTAL PROTECTION STATUTES

5.1 FEDERAL REQUIREMENTS APPLICABLE TO THE PROPOSED ACTION

Consistent with the requirements of the National Environmental Policy Act (NEPA) and the implementing regulations issued by the Council on Environmental Quality (40 C.F.R. 1500), this EA includes a review of project compliance with relevant statutes and the executive orders listed below.

- **Endangered Species Act: 16 U.S.C. 1531 et seq.**

BPA consultation with the USFWS and the NMFS pursuant to Section 7 of the ESA has been completed. The USFWS concurred in a letter dated April 5, 1995, that adverse effects on listed species are not anticipated. NMFS reported in a letter dated January 11, 1995, that listed Snake River salmon species or designated critical habitats are not located within the project area vicinity.

- **Cultural Resource Legislation, Executive Order 11593; Archaeological and Historical Preservation Act of 1966 as amended, 16 U.S.C. 469 et seq., Public Law 92-291**

BPA contacted the Idaho State Historical Society (SHPO) in November, 1994, to request a search of the state data base of listed cultural resource sites within the overall project area. The SHPO responded that no significant cultural resources have been recorded in the immediate vicinity. A cultural resource field survey for the RRWMA portion of the project area was completed by professional Eastern Washington University archaeological staff in May, 1995. The survey findings indicate a low probability for the presence of prehistoric and historic resources, of significance (Luttrell, 1995). In the event that undiscovered cultural resources are encountered during future construction phases of the project, work would be halted to avoid adverse effects and a professional archaeologist notified.

The study report concludes that stream stabilization and habitat restoration activities at the RRWMA may proceed without further regard to cultural resources, upon the concurrence of review agencies. In a letter dated November, 1995, the SHPO concurred that the RRWMA portion of the Project could proceed with no further review.

Additional cultural resource field surveys would be undertaken when or if private landowners in the study area become part of the Project. No ground disturbing activities would be initiated until cultural resource field surveys were completed and documented as part of the individual Site Plan. If cultural or historical resources are discovered during a field survey, BPA, Idaho Soil and Conservation District, Idaho Department of Fish and Game, and the Nez Perce Tribe of Idaho would report findings and discuss mitigation measures with the appropriate SHPO authorities. Because BPA would not fund stream

stabilization and habitat restoration activities that adversely impact historical or cultural resources, no adverse impacts to historical properties or cultural resources are anticipated.

- **Executive Order 11990: Protection of Wetlands**

All Federal agencies are required to minimize the loss or degradation of wetlands under the provisions of this directive. The Project objectives of rehabilitating riparian habitat and restoring wetland conditions for fish and wildlife habitat are consistent with this directive. The stream stabilization and habitat treatments should result in a long term net gain of wetland acres.

- **Effects on the Waters of the United States; Permits for Structures in Navigable Waters, Rivers and Harbors Act, 33 U.S.C. 401 et seq., Federal Water Pollution Control Act (See 404 as amended); Clean Water Act, 33 U.S.C. 1251 et seq.**

Sections 10, 401, and 404 permits, as required, will be obtained prior to proposed construction activities within the existing waterway. Although no structures in the navigable waters of the United States, and no discharges of dredged or fill materials into waters or wetlands are proposed, the permitting process will help to ensure that adequate sediment and erosion control plans are developed for site-specific stream stabilization and habitat restoration activities.

- **Executive Order 11988, Floodplain Management and Department of Energy Guidelines (10 C.F.R. 1022)**

A Notice of Floodplain and Wetland Involvement for the Project was published in the Federal Register in March, 1995. Proposed stream stabilization and habitat restoration treatments would result in the reconstruction and long-term protection of a natural floodplain throughout the project area.

Action is not required under the following regulations as a result of Lower Red River Meadow Stream Restoration Project implementation:

Federal Insecticide, Fungicide, and Rodenticide Act: 7 U.S.C. 136 et seq.
Federal Land Policy and Management Act: 43 U.S.C. Chapter 35
Toxic Substances Control Act: 15 U.S.C. 2601 et seq.
Coastal Zone Management Act Consistency
Energy Conservation at Federal Facilities: 42 U.S.C. 8241 et seq.
Wild and Scenic Rivers Act, as amended, 16 U.S.C. 1271 et seq.
Wilderness Act
Noise Control Act
Safe Drinking Water Act
Global Warming

5.2 STATE AND LOCAL REQUIREMENTS APPLICABLE TO THE PROPOSED ACTION

All activities would occur in compliance with environmental requirements of the State of Idaho and Idaho County. Activities that may affect natural resources would occur in compliance with the rules and regulations of the Idaho Department of Health and Welfare - Division of Environmental Quality (IDHW-DEQ) for water quality, air quality, solid waste, and hazardous materials; with Idaho Department of Water Resources (IDWR) for stream channel protection; with Idaho Department of Lands for forest practice activities.

- **Idaho Water Quality Standards and Wastewater Treatment Requirements**

Idaho water quality standards address changes to dissolved oxygen, pH, temperature, bacteria, nutrients, and sediment. The primary water quality concern is the introduction of suspended sediment from channel construction activities. These activities would be conducted to comply with the turbidity standards specified in the water quality standards. IDHW-DEQ is responsible for making the 401 certification under the Clean Water Act.

- **Stream Channel Protection Act**

The Stream Channel Alterations Rules and Regulations and Minimum Standards implement the Stream Channel Protection Act. These rules address requirements for stream crossings and streamside work conducted under the average high water mark of the stream. Project activities will be conducted in compliance with requirements of the stream channel alteration permit as required by the IDWR.

- **Idaho Forest Practices Act**

Cull logs and root wads would be collected for use in stabilizing stream banks. Any forest practice activities associated with collecting these materials would comply with the Idaho Forest Practices Act, Rules and Regulations administered by the Idaho Department of Lands.

6. CONSULTATION AND COORDINATION

6.1 COORDINATION

The Preliminary EA was sent to the State of Idaho, INEL Oversight Program, Clearinghouse, the Nez Perce Tribe of Idaho, and the interested public, for review and comment on May 22, 1996. The comment period will close on June 7, 1996.

6.2 AGENCIES AND PERSONS CONTACTED

The following individuals were contacted for information and comments regarding the Proposed Action:

- Bonneville Power Administration Allyn Meuleman, Robert Shank, Robert Walker, Nancy Weintraub
- Eastern Washington University Jerry Galm, Charles Luttrell
- Nez Perce Tribe of Idaho Rudy Carter, Paul Kucera, Arthur Taylor, Chris Webb,
- USDA Natural Resources Conservation Service Richard Spencer
- USDA Forest Service Jeff Adams, Nick Gerhardt, Dave Gloss, Rick Golden, Kathy Moynan
- US Fish and Wildlife Service Bob Kibler, Charles Lobdell
- US Army Corps of Engineers James Smith
- National Marine Fisheries Service Brian Brown
- Idaho Soil and Water Conservation District Steve Bauer
- Idaho Office of Archaeology and Historic Preservation Robert Yohe II
- Idaho Department of Environmental Quality Dan Stewart
- Idaho Department of Fish and Game Jody Brostrom, Herb Pollard, Jim White
- Idaho County Commission George Enneking
- River Masters Engineering Tom Bumstead

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APPENDIX A: RED RIVER SPECIES LIST

Fish

Chinook salmon	<i>Oncorhynchus tshawytscha</i>
Steelhead trout	<i>Oncorhynchus mykiss</i>
Westslope cutthroat trout	<i>Oncorhynchus clarki lewisi</i>
Bull trout	<i>Salvelinus confluentis</i>
mountain whitefish	<i>Prosopium williamsoni</i>
Brook trout	<i>Salvelinus fontinalis</i>
Mountain sucker	<i>Catostomus platyrhynchus</i>
Longnose dace	<i>Rhinichthys cataractae</i>
Speckled dace	<i>Rhinichthys osculus</i>
Pacific lamprey	<i>Lampetra tridentata</i>
Sculpin	<i>Cottus sp.</i>

Vegetation

Booth's willow	<i>Salix boothi</i>
Geyer's willow	<i>Salix geyeriana</i>
Whiplash willow	<i>Salix lasiandra var.</i> <i>caudata</i>
Dusky willow	<i>Salix melanopsis</i>
Drummond's willow	<i>Salix drummondii</i>
Speckled alder	<i>Alnus incana</i>
Black twin-berry	<i>Lonicera involucrata</i>
Little meadow-foxtail	<i>Alopecurus aequalis</i>
Beaked sedge	<i>Carex rostrata</i>
Sedge	<i>Carex lenticulari</i>
Small-winged carex	<i>Carex microptera</i>
Inflated sedge	<i>Carex vesicaria</i>
Woolly sedge	<i>Carex lanuginosa</i>
Dagger-leaf	<i>Juncus ensifolius</i>
Northern rush	<i>Juncus alpinus</i>
Slender rush	<i>Juncus tenuis</i>
Long-styled rush	<i>Juncus longistylis</i>
Western mannagrass	<i>Glyceria occidentalis</i>
Tall mannagrass	<i>Glyceria elata</i>
Small-fruit bulrush	<i>Scirpus microcarpus</i>
Reed canarygrass	<i>Phalaris arundinacea</i>
Great northern aster	<i>Aster modestus</i>
Large-leaved lupine	<i>Lupinus polyphyllus</i>
Curly dock	<i>Rumex crispus</i>
Self-heal	<i>Prunella vulgaris</i>
Twin arnica	<i>Arnica sororia</i>
Timber oatgrass	<i>Danthonia intermedia</i>
Redtop bentgrass	<i>Agrostis alba</i>

Kentucky bluegrass	<i>Poa pratensis</i>
Oregon yampah	<i>Perideridia oregana</i>
Sheep sorrel	<i>Rumex acetosella</i>
Scotch bluebell	<i>Campanula rotundifolia</i>
Northwest cinquefoil	<i>Potentilla gracilis</i>
Yarrow	<i>Achillea millifolium</i>
Sweet marsh groundsel	<i>Senecio foetidus</i>
Prairie smoke	<i>Geum triflorum</i>

Mammals

Beaver	<i>Castor canadensis</i>
Grizzly bear	<i>Ursus arctos</i>
Black bear	<i>Ursus americanus</i>
Elk	<i>Cervus elaphus</i>
Moose	<i>Alces alces</i>
White-tailed deer	<i>Odocoileus virginianus</i>
Gray wolf	<i>Canis lupus</i>

APPENDIX B: DESIGN CRITERIA

Design Criteria

- Target species are spring/summer chinook salmon, steelhead trout, cutthroat trout, and bull trout.
- Habitat design incorporates utilization periods for target species and the requirements of stream flow and channel characteristics.
- Riparian vegetation will be re-established using native species and will be used for streambank stabilization, shade, and instream cover.
- Gradient, sinuosity, and meander patterns are designed based on historic conditions and to maximize fish habitats.
- Design stream flows include low flow, average annual flow, and flood flows.
- Channel width, water depth, and velocity are based on design discharges, sediment transport, and to maximize salmonid habitats.
- Habitat diversity is based on macro and micro habitats required for spawning, juvenile rearing, adult holding, and migration.
- Instream cover design will incorporate large woody debris, undercut banks, overhanging vegetation, submerged vegetation, water surface turbulence, water depth, and cobble substrates.
- Instream work will be restricted to a short period, July 15 to August 15, to avoid disturbance of fish spawning, rearing, and migration periods.

Life History and Fish Habitat Requirements

Life history and habitat requisites for the benefiting salmonid species are described to provide additional context for habitat restoration objectives. This information was abstracted from the Biological Assessment for the Selway River (Nez Perce National Forest, 1994) and the Biological Evaluation for Castle Creek (Paradis and Siddall, 1993).

Fall Chinook Salmon

The fall run chinook salmon is listed as endangered for the Clearwater River Basin under the ESA. The designated critical habitat for fall chinook salmon in the Clearwater basin extends from its confluence with the Snake River at Lewiston, Idaho, upstream to the mouth of Lolo Creek. Designated critical habitat includes the water of

the Clearwater River and the adjacent riparian zones. The designated critical habitat is approximately 56 km (90 mi) downstream from the mouth of Red River. Fall chinook life history is based on information on spawning and rearing in the nearby Snake and Salmon Rivers. Fall chinook begin entering the Columbia River in August and continue through October, with the peak occurring in early September. Adults generally arrive in the Clearwater River in October. Returning adults have generally spent three to five years in the ocean. Spawning occurs from November through December with incubation and emergence occurring November through May. Typical fall chinook life history does not include over-wintering of juveniles. Rearing of 0+ juveniles occurs May through August, with smolts emigrating in the same year from June to August.

Spring Chinook Salmon

Prior to construction of the dam on the South Fork of the Clearwater River in 1911, Red River supported excellent runs of spring chinook salmon. In 1963, following removal of the dam, the Idaho Department of Fish and Game undertook an extensive reintroduction of chinook salmon and steelhead trout to the South Fork Red River drainage. Rearing ponds were constructed near the confluence of the mainstem Red River and the South Fork Red River in 1977 to raise chinook fry to pre-smolt size. These ponds are stocked with fry in the spring and released as pre-smolts in the fall to over-winter in Red River and the South Fork Clearwater River. An adult trap was added to the facility in 1985 to capture adult chinook salmon for use as brood stock. Adult counts at the weir and redd counts in Red River document the successful re-establishment of these runs.

Spring chinook salmon spawning runs begin in Red River in early June. The peak of the run usually arrives at the Red River weir in mid-June. Spawning occurs in August and September with the peak period occurring in August. Incubation occurs over the winter with emergence in April through June. Juveniles rear throughout the summer and seek suitable over-wintering habitat as temperatures decrease in the fall. Because habitat in the Red River is degraded juveniles are presumed to emigrate downstream into the South Fork until they encounter suitable over-wintering habitat. Smolts emigrate in the spring from March through May.

Chinook salmon prefer low gradient meadow streams for spawning and rearing. The presence of numerous slow-water areas, sediment-free cobble substrate, stream temperatures below 16 °C (61 °F) and large woody debris and undercut banks are essential elements for spawning and rearing.

Steelhead Trout

Steelhead trout utilize the South Fork Clearwater River and tributaries for spawning, rearing, and migration. Adult steelhead trout migrating in the Columbia River enter freshwater in July and August and arrive in the Clearwater drainage throughout the fall

Characteristic Stream Flows

Average Annual Flow	136 cfs
Average Flood Flow	836 cfs
Seven-day Average Low Flow	19 cfs
Average Flood Flow, 10 yr. recurrence	1254 cfs
Average Flood Flow, 100 yr. recurrence	1756 cfs

These flows are then used to develop channel design flows and channel cross-sectional shape. The bottom width of the channel is 30 feet with a side slope of 2.5 horizontal feet to 1 vertical feet.

Hydraulic Geometry

Flow	Discharge	Width	Depth	Velocity
Seven-Day Average Low Flow	19	38	0.68	0.72
Average Annual Flow	136	37	1.62	2.24
Average Flood Flow	846	51	4.35	4.08

The generalized channel shape is therefore designed to accommodate the average annual flood flow of 846 cfs. Flows above this level will spill into the flood plain and will provide the benefits of flooding to the riparian vegetation and aquifer recharge as in a natural channel.

Land use in the Red River Wildlife Management Area (RRWMA), the second property on the meadow, will be enhanced and improved by the alteration of channel shape and flooding characteristics. The adjacent meadow which now had upland species with little wildlife benefit will be converted to highly desirable wetland shrubs, forbes, sedges, and other wetland species. No structures, bridges, roads or other improvements are within the overflow zone and therefore will not be affected.

Land use on the property directly downstream from the RRWMA is pasture and hayland and is used for cattle production. There are no structures other than an old bridge next to the creek. The site-plan, which has not been completed for this reach of the river, will carefully consider the change in flood plain adjacent to the property and would include the objectives of the landowner. If the landowner is concerned about the temporary inundation of the streamside zone adjacent to the stream during the spring then the design will assure that their portion of the pasture is not inundated. However, if the positive benefits of temporary water in the pasture are accepted by the landowner then the design will incorporate these considerations.