Cottonwood Creek
Total Maximum Daily Load Implementation Plan

Table of Contents

1.0 Executive Summary

TMDL AT A GLANCE

Hydrologic Unit Code:	*South Fork of the Clearwater River #17060305*
§303(d) Listed Segments:	*Cottonwood Creek (source to mouth) #3288; Red Rock Creek #3289, South Fork Cottonwood #3290; Long Haul Creek #5221; Shebang Creek #5644; Stockney Creek #7288*
Water Quality Concerns:	*Sediment, Temperature, Nutrients, Dissolved Oxygen, Pathogens, Ammonia, Habitat and Flow Alteration*
Designated Beneficial Uses:	*Secondary Contact Recreation, Agricultural Water Supply, Cold Water Biota, Salmonid Spawning*
Sources Considered:	*Permitted Point Sources: Cottonwood Wastewater Treatment Plant*
	Nonpoint Sources: Agriculture, Livestock, Timber Harvest, Storm water, Roads, Septic Systems

Cottonwood Creek is a second order tributary of the South Fork Clearwater River located in Idaho County, Idaho. Cottonwood Creek flows from an elevation of 5,730 feet at Cottonwood Butte, east across the Camas Prairie, to an elevation of 1,332 feet at its confluence with the South Fork of the Clearwater River, near Stites, Idaho. It flows roughly from west to east and the mainstem is about 30 miles long. A waterfall approximately 9 miles upstream from the mouth of Cottonwood Creek restricts fish passage upstream. The 5 major tributaries to Cottonwood Creek are Stockney Creek, Shebang Creek, South Fork of Cottonwood Creek, Long Haul Creek, and Red Rock Creek.

The Cottonwood Creek watershed has an area of 124,439 acres. The topography of the watershed encompasses steep forested lands in the headwaters, rolling cropland associated the Camas Prairie, and deep canyons where Cottonwood Creek dissects the Camas Prairie in the eastern half of the watershed. Land uses consist of cropland (74%), pastureland (7%), rangeland (13%), forestland (6%), and urban/industrial (<1%). A small urban area of the City of Cottonwood and a small portion of the City of Grangeville are within the watershed.

Section §303(d) of the Federal Clean Water Act requires States to develop a Total Maximum Daily Load (TMDL) management plan for water bodies determined to be water quality limited. A TMDL documents the amount of a pollutant a water body can assimilate without violating a state's water quality standards and allocates that load capacity to known point sources and nonpoint sources. TMDLs are the sum of the individual waste load allocations for point sources and load allocations for nonpoint sources for nonpoint sources, including a margin of safety and natural background conditions.

In 1994, 1996, 1998, and 2000 Cottonwood Creek from its headwaters to the South Fork Clearwater was classified as a high priority water quality limited segment as a high priority water quality limited segment under §303(d) of the Clean Water Act. The TMDL was

completed in December 1999 and approved by EPA in May 2000. Pollutants of concern include: sediment, temperature, pathogens, nutrients, dissolved oxygen, ammonia, habitat alteration, and flow.

Three of the 5 tributaries to Cottonwood Creek were listed on the 1994 §303(d) list; the two others were added on the 1998 §303(d) list. The listed pollutants were a subset of those identified for the mainstem. Although the TMDLs for the tributaries are not due until 2001 or 2006, they are proactively addressed in the Cottonwood Creek TMDL as sources of pollutants to the mainstem.

The Idaho Water Quality Standards designate salmonid spawning, cold water biota, secondary contact recreation, and agricultural water supply as beneficial uses for Cottonwood Creek. 1995 and 1996 beneficial use studies indicated that Cottonwood Creek and its tributaries do not provide full support of beneficial uses because of macroinvertebrate population impairment and exceedances of water quality standards.

The primary nonpoint sources of pollutants in the Cottonwood Creek watershed are agricultural practices and runoff, livestock grazing, timber harvest activities, urban runoff, and land development activities. Storm water discharge systems, septic system failure and several other discrete sources are included with these nonpoint sources for loading analysis due to a lack of data and methodology for separate evaluation. The Cottonwood wastewater treatment plant is the only permitted point source. This plant is permitted to discharge to Cottonwood Creek November through March and land applies its wastewater during other times of the year.

Since portions of Cottonwood Creek lie within the Nez Perce Reservation, a Memorandum of Agreement was developed between the Nez Perce Indian Nation, the U.S. Environmental Protection Agency, and the State of Idaho Division of Environmental Quality to develop the TMDL, with the advice of the Cottonwood Creek Watershed Advisory Group WAG. In the Memorandum of Agreement, the parties agreed to utilize the State of Idaho's water quality standards for development of the TMDL.

The TMDL examines whether the estimated load capacities for pollutants in Cottonwood Creek are currently exceeded. Targets, loading analyses, and load allocations are presented for sediment, temperature, nutrients/dissolved oxygen, temperature, pathogens, and ammonia.

As additional information becomes available during the implementation of the TMDL, the targets, load capacity, and allocations may need to be changed. In the event that new data or information show that changes are warranted, TMDL revisions will be made with assistance of the Cottonwood Creek WAG. Because the targets, load capacity, and allocations will be re-examined and potentially revised in the future, the Cottonwood Creek TMDL is considered to be a phased TMDL. Although specific targets and allocations are identified in the TMDL, the ultimate success of the TMDL is not whether these targets and allocations are met, but whether beneficial uses and water quality standards are achieved.

Water quality standards for the state of Idaho are intended to provide protection of designated beneficial uses. TMDL targets are based on these water quality standards. Numeric water

quality criteria are used where they exist. Narrative water quality criteria have been interpreted and applied to Cottonwood Creek for sediment and nutrients. Load capacities reflect these water quality targets for Cottonwood Creek based on available or estimated instream flow data. Load allocations presented distribute the existing pollutant loading from both point and nonpoint sources within the watershed, based on available load capacity of Cottonwood Creek.

The following discussion explains how all the listed parameters were addressed in the TMDL. The Executive Summary Loading Table (Table 1) at the end of this Section summarizes pollutant and loading allocations.

1.1 Sediment

Both fine sediment and coarse sediment impair salmonid spawning and rearing in Cottonwood Creek. Therefore, both fine and coarse sediment TMDL analyses were conducted.

The fine sediment TMDL analysis shows that to meet the total suspended sediment at Lower Cottonwood Creek, the suspended sediment load needs to be reduced about 60% during the critical time period of January through May. Estimated load reductions for the 5 tributaries range from 60 to 95 percent.

Bedload modeling indicates that to stabilize the streambed at bankfull discharge, the streambed stability needs to be increased about 46%. Quantitative load allocations for the coarse sediment TMDL are not specified because there is not a direct linkage between the bed stability index and sediment load. A decreasing trend toward background sediment production, transport, and delivery by subwatershed is the goal of the coarse sediment load allocation scheme. Reducing coarse sediment delivery to Cottonwood Creek and timing of peak flood flows through best management practices will help improve the water quality of Cottonwood Creek. Future analysis of sediment sources and flow impacts will be used to help develop the sediment TMDL implementation plan.

1.2 Temperature

The Cottonwood Creek Total Maximum Daily Load (TMDL) was established to address thermal loading (heat) for the protection of steelhead salmon spawning and other cold water biota. Mainstem Cottonwood Creek from headwaters to mouth is protected for salmonid spawning (9^0C daily average, January 15 through July 15). Tributaries are required to meet cold water biota standards (19^0C daily average, year-round).

This TMDL establishes percent reduction targets (instream temperature) for non-point sources in each subwatershed. These percent reduction targets are linked to “Percent Increase in Shade” targets for each subwatershed, thereby reducing the overall rate of increase in instream temperature throughout the watershed. Management activities within a watershed, such as removing riparian shade trees, harvesting of the conifer overstory, grazing in riparian areas, and introducing bedload sediment which results in increased surface area, can increase the amount of solar radiation reaching the stream.

The amount of heat energy (i.e. loading capacity) which would meet State water quality temperature standards in the creek was determined by applying a modeling technique. Model results indicate that a 30 to 86% increase in shade is necessary in order to attain and maintain State water quality standards, depending on stream reach. It is recognized that meeting the criteria will best be accomplished by additionally promoting channel restoration that leads to a narrower, deeper channel, colder water contributions from improved segments upstream, and/or increases in flow.

1.3 Nutrients/Dissolved Oxygen

Idaho's water quality criteria for nutrients states, "Surface waters of the State shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses." Impairment of recreational uses in the Cottonwood Creek watershed from excessive aquatic growth is not believed to be a problem due to low boating and swimming recreational use; however, impairment of aquatic life beneficial uses is considered to be a problem based on low dissolved oxygen levels observed in watershed streams.

The nutrient and dissolved oxygen TMDLs are combined. As part of these TMDLs, a key assumption is made that by meeting the instream nutrient target the dissolved oxygen water quality standard will be achieved as well. The TMDL establishes DO and percent saturation targets that are consistent with state water quality standards. The water quality standards states that for cold water biota, " a one day minimum of not less than 6.0 mg/L or 90% of saturation, which ever is greater." Both of these criteria are targets for Cottonwood Creek, which is designated for cold water biota and salmonid spawning. The five major tributaries have not been specifically designated and are presumed to be protected for cold water biota; therefore, the DO criteria for cold water biota will be the target for these tributaries.

The nutrient TMDL used literature-derived targets for total inorganic nitrogen and total phosphorus. An averaging period of May through October was selected for estimating nutrient loading based on an assumption that this is when impairment is likely to occur and also that nutrients are not stored in the system. Since the City of Cottonwood wastewater treatment plant does not discharge during this time period, no waste load analysis and allocation was necessary. Using data collected from May 1997 through October 1997, nutrient loads and load capacities were estimated for the 5 major tributaries and lower Cottonwood Creek. Results consistently indicated significant reductions are necessary to meet the selected targets. Estimated phosphorus reductions ranged from 83 - 93%. Estimated nitrogen reductions ranged from 56 to 89%.

1.4 Pathogens

A BASINs nonpoint source modeling analysis was conducted for the pathogens TMDL using the State water quality criteria for fecal coliform bacteria. The mainstem of Cottonwood Creek and all tributaries were evaluated for secondary contact recreation. Red Rock was evaluated for primary contact recreation. This model estimates nonpoint source loadings of bacteria for specific land uses in a watershed. Modeled instream bacteria concentrations were then calibrated with actual instream bacteria concentration data. Results indicated a needed load reduction ranging from 23 to 88% for the subwatershed streams. The Cottonwood WWTP is not a

significant source of bacteria loading and therefore is given a WLA at its existing permitted limit. Significant sources appear to be runoff from animal wastes, septic tank failures, and cattle in streams.

1.5 Ammonia

The TMDL for ammonia involves comparing instream total ammonia concentrations to Idaho water quality criteria for cold water biota. The salmonid spawning criteria for ammonia are the same as those for cold water biota. The criteria are based on the toxic effects of ammonia to aquatic life and are pH and temperature dependent. The nutrient effect of ammonia is evaluated in the nutrient TMDL. The existing, although limited, ammonia data shows that ammonia problems exist in Upper Cottonwood Creek sub-watershed during the months of November through March when the City of Cottonwood discharges. Ammonia concentrations in this watershed increase in November and gradually decrease in March. Fore the Cottonwood Creek TMDL, the WLA for the City of Cottonwood during the critical time period (May – September) is 0lbs/day because the City does discharge during this time period. Based on the available data, ammonia concentrations increase during the time which the City of Cottonwood discharges (November – April). Thus the TMDL requires a 5 % reduction in total ammonia from the City of Cottonwood during the November – April time period to ensure water quality standards are met.

1.6 Flow and Habitat

Flow and habitat are identified on the §303(d) list as impairing uses in Jim Ford and Grasshopper Creeks. The TMDL does not address flow and habitat issues because these parameters are not currently required to be addressed under §303(d) of the Clean Water Act.

Table 1: Executive Summary Loading Table

Pollutant	Target	Subwatershed	Load	Load Capacity	Reduction Needed	
Fine Sediment	50 mg/l TSS monthly average during critical time period (January - May)	Stockney	1,720 tons	206 tons	88%	
		Upper Cottonwood	147 tons	59 tons	60%	
		Shebang	401 tons	80 tons	80%	
		SF Cottonwood	1,332 tons	67 tons	95%	
		Long Haul	494 tons	74 tons	85%	
		Red Rock	321 tons	116 tons	64%	
		Lower Cottonwood	4,645 tons	1811 tons	61%	
Coarse Sediment	Increase streambed stability about 46%	Bankfull width/depth ratio below 40 - 53% change				
		Pool frequency greater than 3 pools per 100 meters - 83% change				
		Increasing trend in residual pool volume				
		Depth fines of 5 year mean not to exceed 27 percent with no individual year to exceed 29 percent and subsurface fines <0.85 mm not to exceed 10 percent				
Temperature	9°C/48°F during salmonid spawning period (January 15 - July 15) 19°C/66°F during other times of the year	Subwatershed	Frequently Occurring Temperature	Load Capacity	% Temperature reduction	% Shade Increase
		Stockney	15°C/59°F	9°C/48°F	40%	47%
		Upper Cottonwood	18°C/64°F	9°C/48°F	25- 50%	44%
		Shebang	16°C/61°F	9°C/48°F	44%	76%
		SF Cottonwood	18°C/64°F	9°C/48°F	50%	44%
		Long Haul	19°C/66°F	9°C/48°F	53%	86%
		Red Rock	18°C/64°F	9°C/48°F	50%	75%
		Lower Cottonwood	21°C/70°F	9°C/48°F	50- 57%	30%
Total Inorganic Nitrogen	0.30 mg/l during growing season of April through October	Stockney	6,596 lbs/season	1,225 lbs/season	85%	
		Upper Cottonwood	1,174 lb/season	637 lbs/season	56%	
		Shebang	1,716 lbs/season	637 lbs/season	70%	
		SF Cottonwood	2,527 lbs/season	752 lbs/season	76%	
		Long Haul	1,682 lbs/season	752 lbs/season	64%	
		Red Rock	6,412 lbs/season	836 lbs/season	89%	
		Lower Cottonwood	32,441 lbs/season	6,470 lbs/season	91%	

Pollutant	Target	Subwatershed	Load	Load Capacity	Reduction Needed
Total Phosphorus	0.10 mg/l during growing season of April through October	Stockney	1285 lbs/season	408 lbs/season	91%
		Upper Cottonwood	514 lbs/season	212 lbs/season	89%
		Shebang	436 lbs/season	212 lbs/season	87%
		SF Cottonwood	842 lbs/season	251 lbs/season	92%
		Long Haul	410 lbs/season	251 lbs/season	83%
		Red Rock	1,045 lbs/season	279 lbs/season	93%
		Lower Cottonwood	7,104 lbs/season	2,157 lbs/season	92%
Ammonia	IDAPA 16.01.02.250.02.c.iii 1.24 mg/l (November - April) 0.16 (May - October)	Upper Cottonwood City of Cottonwood (WLA)	784 lbs/season	742 lbs/season	5%
Bacteria	10% MOS in target Point Source (City of Cottonwood) remains at existing permit limit of 100 fcu/100ml <u>Secondary Contact Recreation</u>: 720 cfu/100 mL instantaneous and 180 cfu/100 mL 30-day geometric mean <u>Primary Contact Recreation (Red Rock):</u> 450 cfu/100 mL instantaneous and 45 cfu/100 mL 30-day geometric mean target	Stockney	72,200,000 bcfu/year	20,900,000 bcfu/year	71%
		Upper Cottonwood	28,000,000 bcfu/year	15,400,000 bcf/year	45%
		Shebang	107,000,000 bcfu/year	12,800,000 bcfu/year	88%
		SF Cottonwood	9,610,000 bcfu/year	7,400,000 bcfu/year	23%
		Long Haul	14,400,000 bcfu/year	8,930,000 bcfu/year	38%
		Red Rock	47,500,000 bcfu/year	15,700,000 bcfu/year	67%
		Lower Cottonwood	168,000,000 bcfu/year	82,300,000 bcfu/year	51%

cfu - colony forming units; bcfu - billion cfu/year; lbs - pounds; °C - degrees centigrade;
°F - degrees Fahrenheit; MOS - margin of safety

2.0 Introduction

The goal of the Cottonwood Creek Implementation Plan is to mitigate the effects of sediment, nutrients, pathogens and temperature on the waters of Cottonwood Creek in order to restore the designated beneficial uses. This implementation project will be phased due to the large size of the Cottonwood Creek watershed (124,439 acres). This plan outlines the approach to meeting this goal.

Agricultural nonpoint sources will be addressed through application of cropland BMP's that will reduce sediment and nutrients leaving the fields. Sediment originating from the existing road system will be addressed through conversion of cropped county road right-of-ways, which serve as conduits for sediment and nutrients, to permanent vegetation and to replace damaged culverts. Bacteria concerns will be addressed through replacing failed septic systems that are contributing pathogens to the waters of Cottonwood Creek and the tributaries to Cottonwood Creek.

Additional stream restoration work will include installation of buffer strips in riparian areas that will filter sediment, nutrients and pathogens and will provide shade to reduce water temperatures. Grazing and livestock concerns will be addressed by providing off-site watering for pasture and feeding operations, as well a other selected BMP's, to reduce the nutrients, sediment and pathogens inputs to Cottonwood Creek and the tributaries to Cottonwood Creek.

This plan will also provide for monitoring effectiveness of BMP's applied for reducing pollutant loading, and monitoring their impacts on the designated beneficial uses. Emphasis will be placed on implementation of a water quality information and education program that will encourage landowners to participate in water quality activities in the Cottonwood Creek watershed. Newsletters, tours, Sixth Grade Field Day outreach and public meetings will be the main emphasis of this objective.

3.0 Beneficial Use Status

The beneficial uses designated for Cottonwood Creek and the tributaries of Cottonwood are summarized in Table 2. Historic impacts and current management practices within the Cottonwood Creek watershed have impaired the beneficial uses of Cottonwood Creek and tributaries within the watershed. Lack of plant diversity within the riparian community, impaired stream hydrology, stream channel straightening, and other stream channel related problems have contributed to the degradation of the river system. Nutrient and sediment exceed recommended levels within the Cottonwood Creek Watershed. The identified problems impact the beneficial uses of Cottonwood Creek.

Table 2. Summary of Current Beneficial Uses and Their Status within the Cottonwood Creek Watershed

Beneficial Uses	Upper Cottonwood Creek	Lower Cottonwood Creek	Upper Stockney Creek	Shebang Creek	Long Haul Creek	South Fork	Red Rock Creek	Lower Stockney Creek
Cold Water Biota	Not full support	Not full Support	Needs Verification	Not full support*	Not full support*	Not full support*	Not assessed	Not full support*
Salmonid Spawning	Not full support	Not full Support	Not assessed*	Not assessed*	Not assessed*	Not assessed*	Not assessed*	Not assessed
Agricultural Water Supply	Not assessed	Not Assessed	Not assessed*	Not assessed	Not assessed*	Not assessed*	Not assessed	Not assessed*
Secondary Contact Recreation	Not assessed	Not Assessed	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed

**Not a designated Beneficial Use*

4.0 Problem Identification

4.1 Historical Perspective

In 1962, the Idaho Department of Fish and Game (IDFG) identified low flows and high temperature as problems on Cottonwood Creek *(Murphy and Metsker 1962)*. In 1974, the IDFG studied the lower 9 miles of Cottonwood Creek for salmonid spawning potential *(Mallet 1974)*. Although no spawning sites were identified, the lower reach was found suitable for spawning. Steelhead, rainbow trout and whitefish were identified in the stream.[1]

In 1983, the Idaho Agricultural Pollution Abatement Plan listed Cottonwood Creek and Stockney Creek as Agricultural Nonpoint Source Water Quality Priority Streams.

In 1984, the Bureau of Land Management (BLM) performed a riparian assessment on the lower reach of Cottonwood Creek. The assessment rated poor on all habitat parameters *(USDI 1984)*, due mainly to lack of riparian vegetation and degraded streambanks.

In 1985 and 1986, the Idaho County Soil & Water Conservation District sponsored an agricultural water quality planning project funded by the Division of Environment (DOE), to study water quality on Stockney Creek, a tributary of Cottonwood Creek *(Latham 1986)*. The study concluded that bacteria generated from livestock were a probable source of contamination, but the implementation of Best Management Practices (BMP's) would not significantly improve the beneficial uses of the creek.

1 Approximately 9 miles upstream from the mouth of Cottonwood Creek, there exists a 41 foot waterfall that serves as a barrier to fish migration to the upper reaches of Cottonwood Creek.

The Nez Perce Tribe conducted two studies during the 1980's. In 1984, redside shiners, speckled dace, sculpin, bridgelip sucker, northern squawfish and chisel mouth were identified *(Fuller et al 1984)*. Both the 1984 and 1985 studies *(Fuller et al 1985)*, recommended riparian enhancement along the entire length of Cottonwood Creek and instream structures in the lower reach of the creek in order to enhance the fisheries potential.

In 1986, the Division of Environmental Quality conducted a study that determined that the City of Cottonwood wastewater lagoons were not in compliance with the National Pollutant Discharge Elimination System *(Moeller and Latham 1986)*. The studies determined the discharge from the lagoons significantly impacted Cottonwood Creek in respect to pH, BOD, nitrogen, phosphorus, bacteria, and suspended solids. The results of this study questioned the appropriateness of salmonid spawning and cold water biota as beneficial uses for the upper portion of Cottonwood Creek.

In 1987, the BLM identified significant numbers of cold water biota *(USDI 1987)* in the lower reaches of Cottonwood Creek. Although the biota was primarily of the pollution tolerant taxa and the diversity was low, the numbers were sufficient to provide nutrients for salmonids should the substrate conditions improve.

In 1991 the USDA Soil Conservation Service[2] (SCS), at the request of the Idaho County Soil and Water Conservation District, conducted a Preliminary Investigation of Cottonwood Creek. The report identified agricultural chemicals, sediment from all land uses, bacteria from livestock operations, municipal wastewater, a gold mining operation and the lumber mill in Grangeville as potential pollution sources.

In 1992, the DEQ conducted a Beneficial Use Attainability Assessment for Cottonwood Creek *(Richards 1992)* which concluded that the designated beneficial uses of salmonid spawning and cold water biota (as well as secondary contact recreation and agricultural water supply) were appropriate and attainable. The reported habitat assessment scores indicated serious problems with water quality and the riparian zones.

In the years 1994 to 1996, the Nez Perce Tribe monitored water quality parameters at 2 stations along Cottonwood Creek. One station was near the mouth of Cottonwood Creek and the other was approximately 2.5 miles above the confluence with Red Rock Creek. Parameters measured were flow, temperature, dissolved oxygen, pH, turbidity, suspended solids and conductivity. Temperature monitoring on Red Rock Creek exceeded the cold water biota standard during the summer months in 1995 but not in 1994. Dissolved oxygen was measured below the state standard in September of 1994. Turbidity levels range from 0 to 1000 NTU. The data should be considered as qualified due to a lack of instrument calibration. The trends are considered accurate (Wren 1999).

In 1995 and 1996, the DEQ's Beneficial Use Reconnaissance Project (BURP) ranked the beneficial uses of salmonid spawning and cold water biota *"not full support"* for the upper and lower reaches of Cottonwood Creek.

2 Presently named the Natural Resources Conservation Service (NRCS).

In 1997 and 1998 the Nez Perce Tribe conducted BURP surveys on Red Rock Creek and portions of Stockney Creek and the main stem of Cottonwood Creek. Results of the survey have not been evaluated for beneficial use support at this time.

The 1998 303 (d) List, submitted to the Environmental Protection Agency (EPA) for approval, listed Cottonwood Creek (from headwaters to mouth), Stockney Creek, Long Haul Creek, Shebang Creek, South Fork of Cottonwood Creek and Red Rock Creek as water quality impaired streams.

4.2 Problem Statement

Historic impacts and current management practices within the Cottonwood Creek watershed have impaired the beneficial uses of Cottonwood Creek and tributaries within the watershed. Lack of plant diversity within the riparian community, impaired stream hydrology, stream channel straightening, and other stream channel related problems have contributed to the degradation of the river system. Nutrient and sediment exceed recommended levels within the Cottonwood Creek Watershed. These pollutants also contribute to problems within the Clearwater River.

4.3 Impacts to Beneficial Uses

Agricultural Water Supply

- Lack of summer water flow in upper reaches of the watershed for livestock
- Possible increase in bacteria and other pathogens

Salmonid Spawning

- Increases stream temperature
- Loss of spawning habitat
- Low summer flows
- Extreme annual variation in flow
- Loss of instream cover

Cold Water Biota

- Increased stream temperature
- Loss of instream cover
- Low summer flows
- Extreme annual variation in flow
- Loss of rearing habitat

Secondary Contact Recreation

- Increased bacteria

- Low summer flow

4.4 Impacts to Other Resources within the Watershed

- Crop yield losses from erosion and sedimentation
- Flood damage from high intensity runoff events
- Reduction in wildlife populations and species diversity
- Loss of long term soil productivity
- Increased operations and maintenance costs on roads, culverts and borrow pits

4.5 Causes of Impacts to Beneficial Uses

Agricultural Water Supply

- Hydrologic modification from the change in vegetative cover and increased drainage density
- Animal feeding operation (AFO)
- Septic system failure
- Storm runoff from urban areas

Cold Water Biota

- Hydrologic modification from the change in vegetative cover and increased drainage density
- Annual cropping tillage practices
- Unrestricted access to riparian areas by livestock
- County and private roads, culvert sizing and placement, right-of-way farming
- Animal feeding operations (AFO)
- Septic system failure
- Stream channel modifications
- Inadequate riparian canopy cover
- Lack of riparian plant diversity
- Erosion, sheet and rill, gully
- Storm runoff from urban areas

Salmonid Spawning

- Hydrologic modification from the change in vegetative cover and increased drainage density
- Annual cropping tillage practices
- Unrestricted access to riparian areas by livestock
- County and private roads, culvert sizing and placement, right-of-way farming
- Animal feeding operations (AFO)
- Septic system failure
- Stream channel modifications

- Inadequate riparian canopy cover
- Lack of riparian plant diversity
- Erosion, sheet and rill, gully
- Storm runoff from urban areas

Secondary Contact Recreation

- Unrestricted access to riparian areas by livestock
- Animal feeding operations (AFO)
- Hydrologic modification from the change in vegetative cover and increased drainage density
- Septic system failure
- Sewage treatment plant
- Storm runoff from urban areas

4.6 Effects of Pollution

In general, the following effects result from excess sediment, nutrients, bacteria, and elevated water temperatures:

- Decline in the fisheries population due to the degradation of spawning and rearing habitat.
- Reduction in population densities and composition of aquatic biota
- Decline in primary contact recreation use such as swimming
- Decline in secondary contact recreation use such as fishing
- Crop damages and losses due to erosion and sedimentation
- Reduction in yield from lack if proper nutrient and pest management
- Lethal or near lethal seasonal water temperature extremes for fisheries and biota
- Reduction in wildlife populations and species diversity due to degradation and loss of riparian and wetland habitat
- Increased contribution of pathogens from failing septic systems

4.7 Sources of Pollution

Many of the pollutants contributing to the water quality problems in the project area originate from agricultural sources, forestry sources, urban sources, and grazing activities in riparian areas adjacent to cropland, pastureland, rangeland, and forestland. Table 3 lists pollution sources by subwatershed.

Table 3. Pollution Sources and Their Locations within the Cottonwood Creek Watershed

Non-Point Sources	Upper Cottonwood Creek	Lower Cottonwood Creek	Stockney Creek	South Fork Cottonwood Creek	Red Rock Creek	Long Haul Creek	Shebang Creek
Agriculture	X	X	X	X	X	X	X
Livestock	X	X	X	X	X	X	X
Urban	X	NONE	NONE	NONE	NONE	X	NONE
Construction	X	X	X	X	X	X	X
Septic Systems	X	X	X	X	X	X	X
Roads	X	X	X	X	X	X	X
Wildlife							
Mining		X	X	X		X	X
Point Source	X						

4.8 Point Sources

There is one point source located within the Cottonwood Creek watershed, the City of Cottonwood Wastewater Treatment Plant. Pollutant source controls associated with the City of Cottonwood Wastewater Treatment Plant will be implemented through the US EPA NPDES permit program responsible for regulation of such sources. Minor adjustments to the City of Cottonwood Wastewater Treatment Plant are expected as the plant was recently upgraded and uses a seasonal agroforesty land application system rather than direct discharge to the creek during critical times.

5.0 Critical Areas

5.1 Definition

Critical areas are defined in the Idaho State Agricultural Water Quality Program Handbook as, *"Those acres or sources of agricultural pollution identified by the Soil Conservation District as having the most significant impact on the quality of the receiving waters in the project area."*

Through a consensus planning approach, the problems associated within the watershed were identified (see Problem Identification section). Critical areas within the Cottonwood Creek Watershed are those areas identified by treatment unit by the Idaho County SWCD which when treated can provide the most significant positive impact on water quality of receiving waters in the project area. The key pollutants affecting water quality in Cottonwood Creek and tributaries are sediment, nitrogen, phosphorus, bacteria and other pathogens. Elevated water temperature is a problem throughout the watershed. The following treatment units located on private land are considered critical: Treatment Units: 1, 2, 6, 7, and 8. Table 4 summarizes the treatment units.

Table 4. Critical Areas By Treatment Unit

Treatment Unit	Land Use	Unit	Number
TU 1	Cropland		
	0-12% slope	Acres	75,379
TU 2	Cropland		
	13-25%	Acres	16,409
TU3	Pastureland	Acres	8,505
TU4	Rangeland	Acres	15,934
TU5	Forest land	Acres	7,067
TU 6	Riparian	Acres	5,759[3]
TU 7	AFOs	Number	160
TU 8	Roads	Miles	291

5.2 Rationale

Non-Irrigated Cropland – Treatment Units 1 and 2:

Critical acres within the CROPLAND treatment unit have one or more of the following resource problems:

- Acres with sheet and rill erosion exceeding "T"[4]
- Acres with classic or ephemeral gully erosion.

Riparian Areas – Treatment Unit 6:

Critical acres within the RIPARIAN treatment unit have one or more of the following resource problems:

- All riparian acres subject to disturbance associated with agriculture, grazing or accelerated streambank erosion
- Areas where manure has potential to be washed into streams by spring runoff or by runoff from thunderstorms
- Areas with unrestricted direct access to surface water by livestock
- Areas where streambank conditions are defined as being in poor to fair condition and/or are identified as having moderate to severe problems (measured in linear feet)
- Areas with inadequate multi-layered riparian vegetation
- Areas with lethal or near lethal instream water temperature extremes
- Areas which lack instream structure and habitat diversity.

Animal Feeding Operations (AFOs) - Treatment Unit 7:

Critical areas within the ANIMAL FEEDING OPERATION (AFO) treatment unit are those areas with one or more of the following resource problems:

- Those areas that have a direct impact on the water quality of Cottonwood Creek and its

3 This figure represents the total riparian acreage in the watershed. Critical area is approximately 3,129 acres.

4 "T" refers to the tons per acre of soil that can be lost annually without reducing the productivity of the soil.

tributaries
- Areas where manure has potential to be washed into streams by spring runoff or by runoff from thunderstorms
- Areas with unrestricted direct access to surface water by livestock.

Roads:-Treatment Unit 8

Critical areas within the ROADS treatment unit are those areas with one or more of the following resource problems:
- Roads and road ditches that are actively eroding
- Roads and road ditches that are routing excess water through adjacent land and creating off-site erosion problems.

6.0 Septic Systems

Since private septic systems can also be a source of fecal coliform bacteria, it is necessary to roughly estimate the number of failing systems in a watershed. The North Central District Health Department personnel estimated that one-third of the systems in the watershed were failing (IDEQ 1999a and 1999c). To estimate the amount of fecal coliform being contributed by failing septic systems, the rural population was estimated, then the number of rural households, the number of septic systems and then the number of failing systems were tabulated.

Here is an example for Shebang Creek subwatershed:

233 people in watershed (estimated from 1990 Census block data)
2.66 people per household (County average from 1995 Idaho County population data)
233 people / 2.66 people per household = 88 households
88 households x 1 system per household = 88 septic systems
88 systems x 1/3 systems failing = 29 septic systems failing

Table 5 summarizes the estimated rural population, number of households, number of septic systems, and estimated system failures for each subwatershed.

Table 5: Estimated Rural Population, Households and Number of Septic Systems

Subwatershed	Estimated Rural Population[a]	Estimated Number of Failed Septic Systems
Stockney Creek	230	29
Upper Cottonwood Creek	120	15
Shebang Creek	233	29
South Fork Cottonwood Creek	58	7
Long Haul Creek	186	23
Red Rock Creek	196	25
Middle Cottonwood Creek[b]	43	5
Lower Cottonwood Creek[b]	39	5

[a] Population estimates based on U.S. Census data (ESRI 1999);Population and household calculations exclude the cities of Cottonwood and Grangeville
[b]Lower and Middle Cottonwood Creek watersheds were combined for the septic system calculations and modeling;

An estimated 138 septic tanks in the sub watershed are failing. Each of these systems may be contributing as a nonpoint source for increased bacteria and nitrogen to the watershed. Tables 6 addresses measures to reduce pollution by replacing 10 failing septic systems in South Fork Cottonwood Creek. Table 7 addresses future measures for the entire subwatershed. The effectiveness of these BMPs will be monitored as discussed in section 8, "Water Quality Monitoring."

Table 6: South Fork Cottonwood detailed BMPs for septic systems

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Grant Funds	Other Funds
Replacement of failing septic systems							
Inspection/Survey	Each	10	$1,000.00	10		0	$10,000.00
Inspection/Final	Each	10	$200.00	10		0	$2,000.00
Materials (Tank/Drain Field) Earthwork	each	10	$3,500.00	10		$24,500.00	$10,500.00
Totals						$24,500.00	$22,500.00

Table 7: Proposed Future Actions for all subwatersheds (South Fork Cottonwood,

Stockney, Long Haul, Shebang, Red Rock, Upper Cottonwood and Lower Cottonwood Creeks)

2001:
Conduct public meeting
Conduct survey of failing septic systems
Obtain landowner agreements to install BMPs to treat septic systems
Survey sites and design for 50% of the BMPs for septic systems
2002:
Design remaining septic systems
Survey sites and design remaining BMPs for septic systems
Install remaining targeted failing septic tanks

7.0 Priority Subwatersheds

The Cottonwood Implementation Plan is a phased plan due to the large size (124, 439 acres) of the Cottonwood Creek Watershed. The subwatersheds have been prioritized by looking at the TMDL allocations and the size of the subwatershed (see Table 8). Detailed Best Management Practice Lists for each subwatershed have been developed and can be found in Appendix A.

Table 8: Prioritized Sub-watersheds

Priority	Subwatershed	Acres
1	South Fork Cottonwood	12,557
2	Stockney	19,917
3	Long Haul	8,872
4	Shebang	18,332
5	Red Rock	26,482
6	Upper Cottonwood	10,098
7	Lower Cottonwood	28,181

8.0 Water Quality Monitoring

Monitoring will be an integral component of the overall implementation plan to measure the effectiveness of the applied BMP's on the TMDL pollutant levels and their impacts on the designated beneficial use status.

The IDEQ will perform routine analysis to determine the status of the designated beneficial uses in the watershed using the protocol set forth in the Beneficial Use Reconnaissance Project (BURP). BURP analysis will continue past the project expiration date. The Nez Perce Tribe (NPT) will continue their regular monitoring program for the Cottonwood watershed. Current tribal monitoring parameters include nitrates, nitrites, total inorganic nitrogen, total phosphorus, Ortho-phosphorous, ammonia, bacteria, total suspended solids (TSS), dissolved oxygen, pH, turbidity, temperature, flow and bedload. Samples are collected every 5 weeks. BMP effectiveness will be monitored by employees from the Soil Conservation Commission (SCC), Idaho Association of Conservation Districts (IASCD) and the Natural Resource Conservation Services (NRCS). A detailed monitoring plan with and time schedule can be found in Appendix

B.

9.0 Information and Education

Public awareness of the TMDLs will be enhanced through the implementation of these projects. The Idaho County Soil and Water Conservation District will implement an information and education program. The program will target project participants and other landowners and operators within the Cottonwood Creek watershed and Idaho County. Watershed meetings, tours, and newsletters will be used to highlight public awareness of BMP's and their effectiveness, the TMDL process and the progress of the implementation plan. Local media outlets will also be utilized to disseminate watershed activities and the broader issues of water quality to the general public.

Appendix A: Detailed BMP's for Subwatersheds

South Fork of Cottonwood Creek

Table A1: South Fork of Cottonwood Creek - Treatment Unit 1 and 2 - Cropland

	Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid (yrs)	C/S* Ratio %	Total Cost-Share	Operator Funds
327	Conservation Cover	Acre	51	$ 47.00	1	75%	$ 1,797.75	$ 599.25
328	Conservation Crop Rotation	Acre	7,728	N/C		N/C	$ -	$ -
329a	Direct Seeding - Continuous	Acre	1500	$ 50.00	5	90%	$ 337,500.00	$ 37,500.00
330	Contour/Cross Slope Farming	Acre	7,728	N/C		N/C	$ -	$ -
350	Sediment Basins - Construction	Each	10	$ 3,000.00	1	75%	$ 22,500.00	$ 7,500.00
350	Sediment Basin - Stand Pipe Inlet	Each	10	$ 280.00	1	75%	$ 2,100.00	$ 700.00
362	Diversions	Feet	5,000	$ 2.00	1	75%	$ 7,500.00	$ 2,500.00
386	Field Border	Acre	15	$ 47.00	1	75%	$ 528.75	$ 176.25
393	Filter Strips	Acre	10	$ 47.00	1	75%	$ 352.50	$ 117.50
410	Grade Stabilization - Culvert Outlet Installation	Each	10	$ 2,000.00	1	75%	$ 15,000.00	$ 5,000.00
410	Grade Stabilization - Stand Pipe Inlet	Each	10	$ 280.00	1	75%	$ 2,100.00	$ 700.00
412	Grass Waterway - Construction / Rebuilding	Feet	77,300	$ 1.35	1	75%	$ 78,266.25	$ 26,088.75
412	Grass Waterway - Seed & Fertilizer	Acre	54	$ 30.00	1	75%	$ 1,215.00	$ 405.00
484	Mulch Tillage	Acre	3,000	N/C		N/C	$ -	$ -
590	Nutrient Management	Acre	10,000	$ 0.50	5	75%	$ 18,750.00	$ 6,250.00
600	Terraces	Feet	25,000	$ 2.50	1	75%	$ 46,875.00	$ 15,625.00
620	Underground Outlet Pipe 4"	Feet	8,000	$ 0.76	1	75%	$ 4,560.00	$ 1,520.00
620	Underground Outlet Pipe 6"	Feet	8,000	$ 1.20	1	75%	$ 7,200.00	$ 2,400.00
620	Underground Outlet Pipe 8"	Feet	8,000	$ 1.80	1	75%	$ 10,800.00	$ 3,600.00
620	Outlet Protection	Each	30	$ 35.00	1	75%	$ 787.50	$ 262.50
638	Water & Sediment Control Basins - Construction	Each	10	$ 1,000.00	1	75%	$ 7,500.00	$ 2,500.00
638	Water & Sediment Control Basin - Stand Pipe Inlet	Each	10	$ 280.00	1	75%	$ 2,100.00	$ 700.00
	TOTALS						$ 567,432.75	$ 114,144.25

*** C/S = Cost Share**

Table A2: South Fork Cottonwood Creek - Treatment Unit 6 - Riparian

	Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid (yrs)	C/S* Ratio %	Total Cost-Share	Operator Funds
382	Fencing	Feet	10,500	$ 1.00	1	75%	$ 7,875.00	$ 2,625.00
322	Channel Vegetation - Trees	Each	2000	$ 3.00	1	90%	$ 5,400.00	$ 600.00
410	Grade Stabilization Structures	Each	3	$ 1,648.00	1	75%	$ 3,708.00	$ 1,236.00
516	Stockwater Development - Pipeline	Feet	1000	$ 1.00	1	75%	$ 750.00	$ 250.00
528a	Prescribed Grazing	Acre	207	$ 4.00	1	75%	$ 621.00	$ 207.00
561	Heavy Use Area Protection	Each	3	$ 1,200.00	1	75%	$ 2,700.00	$ 900.00
574	Stockwater Development - Water Development	Each	6	$ 1,200.00	1	75%	$ 5,400.00	$ 1,800.00
580	Streambank & Shoreline Protection	Feet	250	$ 25.00	1	75%	$ 4,687.50	$ 1,562.50
612	Tree and Shrub Planting	Acre	5	$ 1,200.00	1	75%	$ 4,500.00	$ 1,500.00
614	Stockwater Development - Trough	Each	6	$ 750.00	1	75%	$ 3,375.00	$ 1,125.00
	TOTALS						$ 39,016.50	$ 11,805.50

*C/S = cost-share

Table A3: South Fork Cottonwood Creek - Treatment Unit 7 - Animal Feeding Operations

	Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid (yrs)	C/S* Ratio %	Total Cost-Share	Operator Funds
313d	Waste Storage Structure - Berm	Feet	3,000	$ 2.00	1	75%	$ 4,500.00	$ 1,500.00
356	Dike	Feet	1,500	$ 5.00	1	75%	$ 5,625.00	$ 1,875.00
362	Diversion	Feet	3,000	$ 2.00	1	75%	$ 4,500.00	$ 1,500.00
382	Fence - heavy duty	Feet	10,000	$ 2.00	1	75%	$ 15,000.00	$ 5,000.00
393	Filter Strips	Acre	1	$ 47.00	1	75%	$ 35.25	$ 11.75
425	Waste Storage Pond	Each	1	$ 7,500.00	1	75%	$ 5,625.00	$ 1,875.00
516	Stockwater Development - Pipeline	Feet	1,000	$ 1.00	1	75%	$ 750.00	$ 250.00
574	Stockwater Development - Water Development	Each	3	$ 1,200.00	1	75%	$ 2,700.00	$ 900.00
590	Nutrient Management	Acre	30	$ 0.50	5	75%	$ 56.25	$ 18.75
614	Stockwater Development - Trough	Each	12	$ 750.00	1	75%	$ 6,750.00	$ 2,250.00
633	Waste Utilization	Acre	30	$ 1.50	3	75%	$ 101.25	$ 33.75
	TOTALS						$ 45,642.75	$ 15,214.25

*C/S = cost-share

Table A4: South Fork Cottonwood Creek - Treatment Unit 8 - Roads

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid (yrs)	C/S* Ratio %	Total Cost-Share	Other Funds
560 Acess Roads - Culvert installation	Feet	200	$ 7.60	1	75%	$ 1,140.00	$ 380.00
560 Acess Roads - 24" Steel Culvert	Feet	200	$ 15.00	1	75%	$ 2,250.00	$ 750.00
410 Drop Structures	Each	4	$ 900.00	1	75%	$ 2,700.00	$ 900.00
342 Critical Area Planting - grass	Acre	23	$ 310.00	1	75%	$ 5,347.50	$ 1,782.50
468 Lined Waterway	Feet	600	$ 10.00	1	75%	$ 4,500.00	$ 1,500.00
TOTALS						$ 15,937.50	$ 5,312.50

*C/S = cost-share

Stockney Creek

Table A5: Stockney Creek – Treatment 1 & 2– Cropland

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Total Cost-Share	Operator Funds
Conservation Crop Rotation	Acre	9,458	N/C		N/C	$0	$0
Contour/Cross Slope Farming	Acre	9,458	N/C		N/C	$0	$0
Direct Seeding - Continuous	Acre	1,800	$20	5	100%	$ 47,300	$0
Mulch Tillage	Acre	7,566	N/C		N/C	$0	$0
Terraces	Feet	25,000	$2.50	1	75%	$ 135,940	$45,310
Water & Sediment Control Basins	Each	10	$1,000	1	75%	$56,250	$18,750
Sediment Basins	Each	10	$ 3,000	1	75%	$ 105,750	$35,250
Waterways							
Construction	Feet	25,000	$1.35	1	75%	$95,680	$31,900
Seed & Fertilizer	Acre	66	$30	1	75%	$1,490	$490
Nutrient Management	Acre	9,458	$0.80	1	100%	$7,570	
Diversions	Feet	14,000	$5	1	75%	$52,500	$ 17,500
Filter Strips	Acre	13	$47	1	75%	$460	$150
Conservation Cover	Acre	63	$47	1	75%	$2,220	$740
Field Border	Acre	19	$47	1	75%	$670	$220
Stand Pipe Inlet	Each	20	$280	1	75%	$9,450	$3,150
Underground Outlet Pipe 4"	Feet	37,500	$0.76	1	75%	$21,380	$7,120
Outlet Protection	Each	20	$35	1	75%	$1,970	$660
TOTALS						**$852,920**	**$332,220**

**C/S = cost-share*

Table A6: Stockney Creek - Treatment Unit 6 - Riparian

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Total Cost-Share	Operator Funds
Buffer Strips	acre	10	$47	1	75%	$350	$120
Fencing	feet	20,000	$1	1	75%	$15,000	$5000
Stockwater Development							
Trough	each	6	$500	1	100%	$3,000	$0
Spring Development	each	6	$1,200	1	100%	$0	$0
Pipe	feet	2,600	$1	1	100%	$2,600	$0
Channel Vegetation - Trees	each	6,100	$2.70	1	100%	$16,470	$0
Heavy Use Area Protection	each	3	$1,200	1	75%	$2,700	$900
Prescribed Grazing	acre	580 ♦	$4	1	75%	$1,740	$580
Streambank and Shoreline Protection	feet	700	$25	1	75%	$13,125	$4,375
Stream Channel Stabilization	feet	100	$30	1	75%	$2,250	$750
TOTALS						**$57,240**	**$11,720**

Table A7: Stockney Creek - Treatment Unit 7 - Animal Feeding Operations

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Grant Funds	Other Funds
Fence	Feet	9,300	$1	1	75%	$6,980	$2,320
Dike	Feet	3,000	$5	1	75%	$11,250	$3,750
Diversion	Feet	14,000	$5	1	75%	$52,500	$17,500
Filter Strips	Acre	4.2	$7	1	75%	$150	$50
Waste Storage Facility	Each	6	$7.500	1	75%	$33,750	$11,250
Waste Utilization	Acre	360	$1	3	100	$1,080	$0
Stockwater Development							
Trough	Each	14	$500	1	75%	$5,250	$1,750
Development	Each	14	$1,200	1	75%	$12,600	$4,200
Pipeline	Feet	14,000	$1	1	75%	$10,500	$3,500
TOTALS						**$134,060**	**$44,320**

♦ Prescribed Grazing treatment extends beyond the riparian treatment unit to adjacent treatment units in selected areas.

Table A8: Stockney Creek - Treatment Unit 8 - Roads

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Grant Funds	Other Funds
Access roads							
Culverts	Each	6	$600	1	75%	$2700	$900
Drop Structure	Each	5	$900	1	75%	$3380	$1120
Critical Area Planting	Acre	19	$310	1	75%	$4,190	$1390
Lined Waterway	Feet	316	$10	1	75%	$3,560	$1190
TOTALS						**$17,620**	**$5,870**

Long Haul Creek

Table A9: Long Haul Creek - Treatment Unit 1 & 2 - Cropland

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Total Cost-Share	Operator Funds
Conservation Crop Rotation	Acre	4,733	N/C		N/C	$0	$0
Contour/Cross Slope Farming	Acre	4,733	N/C		N/C	$0	$0
Direct Seeding							
Rotational	Acre	709	$20	5	100%	$70,900	$0
Continuous	Acre	237	$20	5	100%	$23,700	$0
Mulch Tillage	Acre	3,786	$15	3	50%	$85,190	$85,180
Terraces	Feet	48,500	$2.50	1	75%	$90,940	$30,310
Water & Sediment Control Basins	Each	18	$ 1,000	1	75%	$13,500	$4,500
Sediment Basins	Each	23	$ 3,000	1	75%	$51,750	$17,250
Waterways							
Construction	Feet	47,300	$1.35	1	75%	$47,890	$15,970
Seed & Fertilizer	Acre	33	$30	1	75%	$740	$250
Nutrient Management	Acre	4,733	$ 0.80	1	100%	$3,790	$0
Pest Management	Acre	4,733	N/C		N/C	$0	$0
Diversions	Feet	9,700	$5	1	75%	$36,380	$12,120
Filter Strips	Acre	6	$47	1	75%	$210	$72
Critical Area Planting	Acre	3	$500	1	75%	$1,130	$370
Conservation Cover	Acre	32	$47	1	75%	$1,130	$374
Field Border	Acre	9	$47	1	75%	$320	$100
Stand Pipe Inlet	Each	18	$280	1	75%	$3,780	$1,260
Underground Outlet Pipe 4”	Feet	9,000	$0.76	1	75%	$5,130	$1,710
Outlet Protection	Each	18	$35	1	75%	$470	$160
TOTALS						**$ 436,950**	**$169,620**

**C/S = cost-share*

Table A10: Long Haul Creek - Treatment Unit 6 - Riparian

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Total Cost-Share	Operator Funds
Buffer Strips	Acre	20	47	1	75%	$710	$230
Fencing	Feet	2,500	1	1	75%	$1,880	$620
Stockwater Development							
Trough	Each	2	500	1	100%	$1,000	$0
Pipe	Feet	1,000	$1	1	100%	$1,000	$0
Channel Vegetation							
Trees	Each	3,500	2.70	1	100%	$9,450	$0
Grade Stabilization	Each	3	648	1	75%	$ 3,708	$1,236
Prescribed Grazing	Acre	220 ♦	$4	1	75%	$660	$220
Streambank and Shoreline							
Protection	Feet	550	$25	1	75%	$10,312	$3,437
Stream Channel Stabilization	Feet	300	$30	1	75%	$6,750	$2,250
TOTALS						**$35,470**	**$7,990**

**C/S = cost-share*

Table A11: Long Haul Creek - Treatment Unit 7 - Animal Feeding Operations

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Grant Funds	Other Funds
Fence	Feet	2480	$1	1	75%	$1860	$620
Dike	Feet	800	$5	1	75%	$3,000	$1,000
Diversion	Feet	4,000	$5	1	75%	$15,000	$5,000
Filter Strips	Acre	1.2	$7	1	75%	$40	$20
Waste Storage Facility	Each	3	$7,500	1	75%	$16,880	$5,620
Waste Utilization	Acre	180	$1	3	100%	$540	$0
Stockwater Development							
Trough	Each	4	$500	1	75%	$1,500	$500
Development	Each	4	$1,200	1	75%	$3,600	$1,200
Pipeline	Feet	4,000	$1	1	75%	$3,000	$1,000
TOTALS						**$ 45,420**	**$14,960**

♦ Prescribed Grazing treatment extends beyond the riparian treatment unit to adjacent treatment units in selected areas.

Table A12: Long Haul Creek - Treatment Unit 8 - Roads

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Grant Funds	Other Funds
Unimproved Dirt Roads							
Access Roads							
Culverts	Each	3	$ 600	1	75%	$1,350	$450
Drop Structures	Each	3	$900	1	75%	$2,030	$670
Critical Area Planting	Acre	0.5	$310			$120	$40
Improved Dirt Roads							
Critical Area Planting	Acre	12	$ 310	1	75%	$2.790	$ 930
Lined Waterway	Feet	316	$10	1	75%	$2,370	$790
Improved Roads							
Lined Waterway	Feet	316	$10	1	75%	$2,370	$790
TOTALS						**$ 11,030**	**$3,670**

Shebang Creek

Table A13: Shebang Creek - Treatment Unit 1 & 2 - Cropland

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Total Cost-Share	Operator Funds
Conservation Crop Rotation	Acre	10,038	N/C		N/C	$0	$0
Contour/Cross Slope Farming	Acre	10,038	N/C		N/C	$0	$0
Direct Seeding							
Rotational	Acre	1,506	$20	5	100%	$150,600	$0
Continuous	Acre	501	$20	5	100%	$50,100	$0
Mulch Tillage	Acre	8,030	$15	3	50%	$180,680	$180,670
Terraces	Feet	83,800	$2.50	1	75%	$157,130	$52,370
Water & Sediment Control Basins	Each	44	$1,000	1	75%	$33,000	$11,000
Sediment Basins	Each	50	$ 3,000	1	75%	$ 112,500	$37,500
Waterways							
Construction	Feet	100,000	$1.35	1	75%	$ 101,250	$33,750
Seed & Fertilizer	Acre	69	$30	1	75%	$1,550	$520
Nutrient Management	Acre	10,038	$0.80	1	100%	$8,030	$0
Pest Management	Acre	10,038	N/C		N/C	$0	$0
Diversions	Feet	10,000	$5	1	75%	$37,500	$12,500
Filter Strips	Acre	14	$47	1	75%	$490	$170
Critical Area Planting	Acre	7	$500	1	75%	$2,630	$870
Conservation Cover	Acre	67	$47	1	75%	$2,360	$790
Field Border	Acre	20	$47	1	75%	$710	$230
Stand Pipe Inlet	Each	44	$280	1	75%	$9,240	$3,080
Underground Outlet Pipe 4"	Feet	22,000	$0.76	1	75%	$12,540	$4,180
Outlet Protection	Each	44	$35	1	75%	$1,160	$380
TOTALS						**$861,470**	**$338,010**

Table A14: Shebang Creek - Treatment Unit 6 - Riparian

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Total Cost-Share	Operator Funds
Buffer Strips	Acre	2	$47	1	75%	$70	$20
Fencing	Feet	10,800	$1	1	75%	$8,100	$2,700
Stockwater Development							
Trough	Each	6	$500	1	100%	$3,000	$0
Pipe	Feet	1,750	$1	1	100%	$1,750	$0
Channel Vegetation							
Trees	Each	3,000	$2.70	1	100%	$8,100	$0
Heavy Use Area Protection	Each	1	$ 1,200	1	75%	$900	$300
Livestock Exclusion	Acre	60	N/C		N/C	$0	$0
Prescribed Grazing	Acre	375 ♦	$4	1	75%	$1,130	$370
Streambank and Shoreline							
Protection	Feet	400	$25	1	75%	$7,500	$2,500
Stream Channel Stabilization	Feet	200	$30	1	75%	$4,500	$1,500
TOTALS						**$35,050.50**	**$7,390**

Table A15: Shebang Creek - Treatment Unit 7 - Animal Feeding Operations

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Grant Funds	Other Funds
Fence	Feet	2,170	$1	1	75%	$1,630	$540
Dike	Feet	700	$5	1	75%	$2,630	$870
Diversion	Feet	3,000	$5	1	75%	$11,250	$3,7500
Filter Strips	Acre	1	$7	1	75%	$40	$10
Waste Storage Facility	Each	5	$7,500	1	75%	$28,130	$9,370
Waste Utilization	Each	300	$1	1	100%	$900	$0
Stockwater Development							
Trough	Each	3	$500	1	75%	$1,130	$370
Development	Each	3	$1,200	1	75%	$2,700	$900
Pipeline	Feet	3,000	$1	1	75%	$2,250	$750
TOTALS						**$50,660**	**$16,560**

♦ Prescribed Grazing treatment extends beyond the riparian treatment unit to adjacent treatment units in selected areas.

Table A16: Shebang Creek - Treatment Unit 8 - Roads

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Grant Funds	Other Funds
Unimproved Dirt Roads							
Access Roads							
Culverts	Each	4	$600	1	75%	$1,800	$600
Drop Structures	Each	3	$ 900	1	75%	$2,030	$670
Critical Area Planting	Acre	0.5	310			$120	$40
Improved Dirt Roads					75%		
Critical Area Planting	Acre	12	$310	1	75%	$2,790	$930
Lined Waterway	Feet	317	$10	1	75%	$2,380	$790
Improved Roads							
Lined Waterway	Feet	317	$10	1	75%	$2,380	$790
TOTALS						**$ 11,500**	**$3,820**

Red Rock Creek

Table A17: Red Rock Creek - Treatment Unit 1 &2 - Cropland

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Total Cost-Share	Operator Funds
Conservation Crop Rotation	Acre	11,782	N/C		N/C	$0	$0
Contour/Cross Slope Farming	Acre	11,782	N/C		N/C	$0	$0
Direct Seeding							
Rotational	Acre	1,767	$20	5	100%	$176,700	$0
Continuous	Acre	589	$20	5	100%	$58,900	$0
Mulch Tillage	Acre	9,426	$15	3	50%	$ 212,090	$212,080
Terraces	Feet	83,600	$2.50	1	75%	$156,750	$52,250
Water & Sediment Control Basins	Each	68	$ 1,000	1	75%	$51,000	$17,000
Sediment Basins	Each	59	$ 3,000	1	75%	$132,750	$44,250
Waterways							
Construction	Feet	110,000	$1.35	1	75%	$111,380	$37,120
Seed & Fertilizer	Acre	72	$30	1	75%	$1,620	$540
Nutrient Management	Acre	4,733	$0.80	1	100%	$3,790	$0
Pest Management	Acre	11,782	N/C		N/C	$0	$0
Diversions	Feet	16,500	$5	1	75%	$61,880	$20,620
Filter Strip	Acre	15	$47	1	75%	$530	$180
Critical Area Planting	Acre	6	$500	1	75%	$2,250	$750
Conservation Cover	Acre	78	$47	1	75%	$2,750	$920
Field Border	Acre	22	$47	1	75%	$780	$250
Stand Pipe Inlet	Each	68	$280	1	75%	$14,280	$4,760
Underground Outlet Pipe 4"	Feet	34,000	$0.76	1	75%	$19,380	$6,460
Outlet Protection	Each	68	$35	1	75%	$1,790	$590
TOTALS						**$1,008,620**	**$397,770**

Table A18: Red Rock Creek - Treatment Unit 6 - Riparian

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Total Cost-Share	Operator Funds
Fencing	Feet	30,000	$1	1	75%	$ 22,500	$7,500
Stockwater Development							
Trough	Each	6	$500	1	100%	$3,000	$0
Pipe	Feet	3,000	$1	1	100%	$3,000	$0
Channel Vegetation							
Trees	Each	2,000	$2.70	1	100%	$5,400	$0
Grade Stabilization	Each	2	$ 1,648	1	75%	$2,472	$824
Livestock Exclusion		100	N/C		N/C	$0	$0
Prescribed Grazing	Acre	575 ♦	$4	1	75%	$1,730	$570
TOTALS						**$38,100**	**$8,900**

**C/S = cost-share*

Table A19: Red Rock Creek - Treatment Unit 7 - Animal Feeding Operations

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Grant Funds	Other Funds
Fence	Feet	7,440	$1	1	75%	$5,580	$ 1,880
Dike	Feet	2,400	$5	1	75%	$9,000	$3,000
Diversion	Feet	11,000	$5	1	75%	$41,250	$13,750
Filter Strips	Acre	3.2	$7	1	75%	$110	$40
Waste Storage Facility	Each	7	$7,500	1	75%	$39,380	$13,120
Waste Utilization	Acre	420	$1	3	100%	$1,260	$0
Stockwater Development							
Trough	Each	11	$500	1	75%	$4,130	$1,370
Development	Each	11	$1,200	1	75%	$9,900	$3,300
Pipeline	Feet	11,000	$1	1	75%	$8,250	$2,750
TOTALS						**$118,860**	**$39,190**

♦ Prescribed Grazing treatment extends beyond the riparian treatment unit to adjacent treatment units in selected areas.

Table A20: Red Rock Creek - Treatment Unit 8 - Roads

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Grant Funds	Other Funds
Unimproved Dirt Roads							
Access Roads							
Culverts	Each	10	$ 600	1	75%	$4,500	$1,500
Drop Structures	Each	7	$900	1	75%	$4,730	$1,570
Critical Area Planting	Acre	1.5	$310			$350	$120
Improved Dirt Roads							
Critical Area Planting	Acre	34	$310	1	75%	$7,910	$2,630
Lined Waterway	Feet	898	$10	1	75%	$6,740	$2,240
Improved Roads							
Lined Waterway	Feet	898	$10	1	75%	$6,740	$2,240
TOTALS						**$ 30,970**	**$10,300**

Upper Cottonwood Creek

Table A21: Upper Cottonwood Creek - Treatment Unit 1 & 2 - Cropland

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Total Cost-Share	Operator Funds
Conservation Crop Rotation	Acre	3,153	N/C		N/C	$0	$0
Contour/Cross Slope Farming	Acre	3,153	N/C		N/C	$0	$0
Direct Seeding							
Rotational	Acre	473	$20	5	100%	$47,300	$0
Continuous	Acre	158	$20	5	100%	$15,800	$0
Mulch Tillage	Acre	2,522	$15	3	50%	$56,750	$56,740
Terraces	Feet	19,100	$2.50	1	75%	$35,810	$11,940
Water & Sediment Control Basins	Each	12	$1,000	1	75%	$9,000	$3,000
Sediment Basins	Each	16	$3,000	1	75%	$36,000	$12,000
Waterways							
Construction	Feet	31,500	$1.35	1	75%	$31,890	$10,640
Seed & Fertilizer	Acre	22	$30	1	75%	$500	$160
Nutrient Management	Acre	3,153	$0.80	1	100%	$2,520	$0
Pest Management	Acre	3,153	N/C		N/C	$0	$0
Diversions	Feet	3,800	$5	1	75%	$14,250	$4,750
Filter Strips	Acre	4	$47	1	75%	$140	$50
Critical Area Planting	Acre	2	$500	1	75%	$750	$250
Conservation Cover	Acre	21	$47	1	75%	$740	$250
Field Border	Acre	6	$47	1	75%	$210	$70
Stand Pipe Inlet	Each	12	$280	1	75%	$2,520	$840
Underground Outlet Pipe 4"	Feet	6,000	$0.76	1	75%	$3,420	$1,140
Outlet Protection	Each	12	$35	1	75%	$320	$100
TOTALS						**$257,920**	**$101,930**

**C/S = cost-share*

Table A22: Upper Cottonwood Creek - Treatment Unit 6 - Riparian

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Total Cost-Share	Operator Funds
Buffer Strips	Acre	11	$47	1	75%	$390	$130
Fencing	Feet	20,500	$1	1	75%	$15,380	$5,120
Stockwater Development							
Trough	Each	5	$500	1	100%	$2,500	$0
Pipe	Feet	2,500	$1	1	100%	$2,500	$0
Tree Plantings	Each	7,500	$2.70	1	100%	$20,250	$0
Grade Stabilization	Each	5	$ 1,648	1	75%	$6,180	$2,060
Heavy Use Area Protection	Each	2	$ 1,200	1	75%	$1,800	$600
Livestock Exclusion	Acre	130	N/C		N/C	$0	$0
Prescribed Grazing	Acre	510 ♦	$4	1	75%	$1,530	$ 510
Streambank and Shoreline Protection	Feet	750	$25	1	75%	$14,060	$4,690
Stream Channel Stabilization	Feet	550	$30	1	75%	$12,380	$4,120
TOTALS						**$76,970**	**$17,230**

**C/S = cost-share*

Table A23: Upper Cottonwood Creek - Treatment Unit 7 - Animal Feeding Operations

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Grant Funds	Other Funds
Fence	Feet	2170	$1	1	75%	$1,630	$540
Dike	Feet	700	$5	1	75%	$2,630	$870
Diversion	Feet	3,0000	$5	1	75%	$11,250	$3,750
Filter Strips	Acre	1	$7	1	75%	$40	$10
Waste Storage Facility	Each	3	$7,500	1	75%	$16,880	$5,620
Waste Utilization	Acre	180	$1	3	100%	$540	$0
Stockwater Development							
Trough	Each	3	$500	1	75%	$1,130	$370
Development	Each	3	$1,200	1	75%	$2,700	$900
Pipeline	Feet	3,000	$1	1	75%	$2,2500	$750
TOTALS						**$39,050**	**$12,810**

♦ Prescribed Grazing treatment extends beyond the riparian treatment unit to adjacent treatment units in selected areas.

Table A24: Upper Cottonwood Creek - Treatment Unit 8 - Roads

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Grant Funds	Other Funds
Unimproved Dirt Roads							
Access Roads							
Culverts	Each	10	$600	1	75%	$4,500	$1,500
Drop Structures	Each	5	$900	1	75%	$3,380	$1,120
Critical Area Planting	Acre	2	$310	1	75%	$470	$150
Improved Dirt Roads							
Critical Area Planting	Acre	34	$310	1	75%	$7,910	$2,630
Lined Waterway	Feet	898	$10	1	75%	$6,740	$2,240
Improved Roads							
Lined Waterway	Feet	898	$10	1	75%	$6,740	$2,240
TOTALS						**$ 29,740**	**$9,880**

Lower Cottonwood Creek

Table A25: Lower Cottonwood Creek - Treatment Unit 1 & 2- Cropland

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Total Cost-Share	Operator Funds
Conservation Crop Rotation	Acre	3,720	N/C		N/C	$0	$0
Contour/Cross Slope Farming	acre	3,720	N/C		N/C	$0	$0
Direct Seeding							
Rotational	Acre	558	$20	5	100%	$ 55,800	$0
Continuous	Acre	186	$20	5	100%	$ 8,600	$0
Mulch Tillage	Acre	2,976	$15	3	50%	$66,960	$66,960
Terraces	Feet	20,300	$2.50	1	75%	$38,060	$12,690
Water & Sediment Control Basins	Each	20	$1,000	1	75%	$15,000	$5,000
Sediment Basins	Each	19	$ 3,000	1	75%	$42,750	$14,250
Waterways							
Construction	Feet	37,200	$1.35	1	75%	$37,670	$12,550
Seed & Fertilizer	Acre	26	$30	1	75%	$590	$190
Nutrient Management	Acre	3,720	$0.80	1	100%	$ 2,980	
Pest Management	Acre	3,720	N/C		N/C		
Diversions	Feet	4,100	$5	1	75%	$15,380	$5,120
Filter Strips	Acre	5	$47	1	75%	$180	$60
Critical Area Planting	Acre	2	$500	1	75%	$750	$250
Conservation Cover	Acre	25	$47	1	75%	$880	$300
Field Borders	Acre	7	$47	1	75%	$250	$80
Stand Pipe Inlet	Each	20	$280	1	75%	$4,200	$1,400
Underground Outlet Pipe 4"	Feet	10,000	$0.76	1	75%	5,700	$1,900
Outlet Protection	Each	20	$ 35	1	75%	530	$170
TOTALS						**$306,280**	**$120,920**

Table A26: Lower Cottonwood Creek - Treatment Unit 6 - Riparian

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Total Cost-Share	Operator Funds
Fencing	Feet	15,000	$1	1	75%	$11,250	$3,750
Stockwater Development							
Trough	Each	2	$500	1	100%	$1,000	$0
Spring Development	Each	1	$1,200	1	100%	$1,200	$0
Pipe	Feet	1,000	$1	1	100%	$1,000	$0
Channel Vegetation							
Trees	Each	750	$2.70	1	100%	$2,030	$0
Prescribed Grazing	Acre	631 ♦	$4	1	75%	$1,893	$631
Streambank and Shoreline							
Protection	Feet	300	$25	1	75%	$5,630	$1,870
TOTALS						**$24,000**	**$6,250**

Table A27: Lower Cottonwood Creek - Treatment Unit 7 - Animal Feeding Operations

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Grant Funds	Other Funds
Fence	Feet	3,100	$1	1	75%	$2,330	$ 770
Dike	Feet	1000	$5	1	75%	$3,750	$1,150
Diversion	Feet	5,000	$5	1	75%	$18,750	$6,250
Filter Strips	Acre	1.5	$7	1	75%	$50	$20
Waste Storage Facility	Each	2	$7500	2	75%	$11,250	$3,750
Waste Utilization	Each	400	$1	3	100%	$1,200	$0
Stockwater Development							
Trough	Each	5	500	1	75%	$1,880	$620
Development	Each	5	$1,200	1	75%	$4,500	$1,500
Pipeline	Feet	5,000	$1	1	75%	$3,750	$1,250
TOTALS						**$47,460**	**$15,410**

♦ Prescribed Grazing treatment extends beyond the riparian treatment unit to adjacent treatment units in selected areas. Treated acreage exceeds that of the riparian treatment unit for the sub-watershed.

Table A28: Lower Cottonwood Creek - Treatment Unit 8 - Roads

Best Management Practice	Unit	Units Needed	Unit Cost	Times Paid	C/S* Ratio %	Grant Funds	Other Funds
Unimproved Dirt Roads							
Access Roads							
Culverts	Each	12	$600	1	75%	$5,400	$1,800
Drop Structures	Each	8	$900	1	75%	$5,400	$1,800
Critical Area Planting	Acre	2	$310			$470	$150
Improved Dirt Roads							
Critical Area Planting	Acre	42	$310	1	75%	$9,770	$3,250
Lined Waterway	Feet	1109	$10	1	75%	$8,320	$2,770
Improved Roads							
Lined Waterway	Feet	1109	$10	1	75%	$8,320	$2,770
TOTALS						**$ 37,680**	**$12,540**

Appendix B: Detailed Monitoring Tasks and Time Schedule

Nez Perce Tribe Monitoring

The Nez Perce Tribe is conducting water quality monitoring at 3 sites in the Cottonwood Watershed 6 week intervals. Sites include:

- Cottonwood Creek @ mouth
- Mainstem Cottonwood Creek at Columbia Crossing
- Red Rock Creek at mouth

Parameters sampled include bacteria, flow, TSS, bedload, and nutrients (TP, NH4-N, TKN, NO3-NO2, orthophosphate), and ammonia. Hydrolab readings are taken for temperature, dissolved oxygen, pH, turbidity, and specific conductivity. A hydrologic assessment is completed once a year at the sites including a cross-section survey, and a longitudinal profile.

The Tribe will also be conducting R1/R4 stream inventories on selected canyon reaches for habitat parameters including fine sediment, bankfull width and depth, residual pool volume, pool frequency, large woody debris, bank stability, and percent shade. These surveys will be conducted approximately every 5 years to assess improving trends.

Thermographs for temperature monitoring are located at the following nine sites:

- Cottonwood Creek headwaters on Butte
- Mainstem, airport bridge
- South Fork Cottonwood Creek
- Stockney Creek @ mouth
- Shebang Creek @ mouth
- Long Haul Creek @ mouth
- Red Rock Creek @ mouth
- Cottonwood Creek at mouth
- Cottonwood Creek, upstream confluence with Red Rock Creek

DEQ

DEQ will continue to use the BURP monitoring program in the Cottonwood Creek Drainage.

IASCD / SCC

IASCD and/or SCC personnel will collect data in addition to the data collected by DEQ and the NPT to provide a complete set of data. Prior to Best Management Practice installation a complete set of reference point data for each pollutant in each subwatershed is desired.

Monitoring will begin in the South Fork of Cottonwood and progress to the other sub-watersheds as they are implemented (following the prioritization in Table 8). A minimum of two permanent monitoring locations will be established in each subwatershed. Samples will be collected bi-

weekly when water levels allow.

BMP effectiveness monitoring will be completed to assess the effectiveness of each group of practices installed.