3.2. WATERSHED

SCOPE OF THE ANALYSIS

The watershed resources section considers physical processes such as water yield and sediment yield, including effects on channel morphology and water quality. It is closely linked to Section 3.1 (soils) and Section 3.3 (fisheries), generally deriving information from the former and contributing information to the latter.

The geographic scope of the analysis for watershed resources includes two 5th code watersheds, American River and Crooked River. American River contains fifteen 6th code subwatersheds (also known as prescription watersheds). Project activities are located in nine of the fifteen 6th code subwatersheds in American River. Crooked River contains five 6th code subwatersheds. Project activities are located in four of the five subwatersheds in Crooked River. Maps 7a and 7b show the project area watersheds. The affected area for cumulative effects analysis includes the American and Crooked River watersheds and the mainstem South Fork Clearwater River to the Forest Boundary below the Mt. Idaho Bridge.

The temporal bound for the water yield analysis from project activities is about ten years. Full recovery for a regeneration harvest to recover to pre-treatment conditions in terms of water yield is considerably longer. However, most effects from timber harvest should be manifested within ten years. Water yield effects from existing activities are considered since the late 1950s, which is about when timber harvest records begin. Timber harvest activities associated with the early mining period (1860s – 1930s) are assumed to have recovered in terms of water yield. Large wildfires have not occurred in American River since 1919 and in Crooked River since 1945. Water yield effects from historic fires are assumed to have largely recovered.

The temporal bound for the sediment yield analysis from project activities is about ten years. Sediment yield effects from project activities are expected to be recovered within that time period, since no new permanent roads are being constructed. Roads are considered to have sediment yield effects throughout their life. Sediment yield effects from existing roads are considered since the late 19th century.

REGULATORY FRAMEWORK

NEZ PERCE NATIONAL FOREST PLAN DIRECTION

The Nez Perce Forest Plan directs that soil and water resources be managed at levels designed to meet management objectives for watersheds. Water quality is to be managed by applying best management practices (BMPs) and through scheduling the rate and location of activities to ensure that State water quality standards are met or exceeded.

Appendix A to the Forest Plan established fish/water objectives for each prescription watershed in the project area. The Plan recognizes that many of these watersheds do not meet fish/water quality objectives under existing conditions. The Plan stipulates that an upward trend in aquatic habitat carrying capacity be established in below-objective watersheds. This is accomplished by limiting new disturbances, allowing natural recovery to occur and/or implementing activities that would improve aquatic conditions. Discussion of aquatic trends is provided in Section 3.3 (fisheries). Guidelines for percent sediment yield over base and entry frequency per decade were also established in the Forest Plan. Information from Forest Plan Appendix A for the project area watersheds is found in Appendix E (Tables E-1 and E-2). Watershed boundaries used in the analysis are found in Appendix E and shown in detail on Maps 7a and 7b.

CLEAN WATER ACT AND IDAHO STATE WATER QUALITY STANDARDS

The Clean Water Act stipulates that states are to adopt water quality standards. Included in these standards are provisions for identifying beneficial uses, establishing the status of beneficial uses, setting water quality criteria, and establishing BMPs to control non-point sources of pollution.

Under the Idaho Water Quality Standards, designated beneficial uses exist for American and Crooked Rivers (IDAPA 58.01.02). Tributaries of American and Crooked Rivers within the project area do not have designated beneficial uses. However, they do support existing beneficial uses and these are protected under the water quality standards. There are numerous private water uses adjacent or downstream of the project area. Designated and existing beneficial uses are detailed in sections 3.2. (American River) and 3.2. (Crooked River).

The South Fork Clearwater River Subbasin Assessment and Total Maximum Daily Loads (TMDLs) addresses water-quality-limited streams listed under Section 303(d) of the Clean Water Act. The Assessment and TMDLs is a joint effort of the Idaho Department of Environmental Quality, the Environmental Protection Agency, and the Nez Perce Tribe (IDEQ et al, 2004). The Nez Perce National Forest participated in the assessment and TMDL development, with technical input and representation on the Watershed Advisory Group. The TMDL was issued as a final document in March 2004. The TMDL is awaiting approval by the EPA as of April 2004.

Using the currently-approved1998 list, there are no 303(d) listed streams within the project area. However, the entire project area contributes to the South Fork Clearwater River, which is listed for water temperature and sediment. TMDLs were developed for the South Fork Clearwater River for water temperature and sediment. The sediment TMDL targets a 25 percent reduction in human-caused sediment yield to the South Fork Clearwater River. No specific targets were set for tributaries, but it was recognized that much of the sediment yield reduction would need to take place in the tributaries. The water temperature TMDL calls for canopy density or shade targets on a stream reach basis throughout the subbasin. Different analytical approaches were used for forested reaches than for the non-forested reaches and the mainstem South Fork Clearwater River.

In June 2003, the IDEQ issued a draft integrated 303(d)/305(b) report for Idaho. The following project area streams were proposed for listing under Section 5 as impaired waters for water temperature: American River (below East Fork American River), Crooked River, East Fork Crooked River, Relief Creek, and Sawmill Creek. The South Fork Clearwater River was proposed for listing for water temperature and sediment. Once the South Fork Clearwater River TMDL is approved by EPA, all of the streams above would be moved to Section 4a, as waters having an approved TMDL.

IDAHO FOREST PRACTICES ACT

The Idaho Forest Practices Act regulates forest practices on all land ownerships in Idaho. Forest practices on national forest lands must adhere to the rules pertaining to the Act (IDAPA 20.02.01). The rules are also incorporated as BMPs in the Idaho Water Quality Standards.

IDAHO STREAM CHANNEL PROTECTION ACT

The Idaho Stream Channel Protection Act regulates stream channel alterations between mean high water marks on perennial streams in Idaho. Instream activities on national forest lands must adhere to the rules pertaining to the Act (IDAPA 37.03.07). The rules are also incorporated as BMPs in the Idaho Water Quality Standards.

EXECUTIVE ORDERS 11988 AND 11990

These federal executive orders provide for protection and management of floodplains and wetlands. Numerous floodplains and wetlands exist within the project area.

ANALYSIS METHODS

Existing condition synthesis was obtained from the South Fork Clearwater Landscape Assessment (USDA Forest Service, 1998). Other information was obtained from field work conducted in the summer of 2003. Field work included road and culvert surveys, resource conditions within proposed units, and headwater channel surveys. GIS- generated reports were also used. This analysis compares the effects of the alternatives on five resource areas:

INDICATOR 1 – WATERSHED CONDITION

Watershed condition indicators are a series of metrics that can be used to index the level of disturbance in a watershed. They are usually expressed as densities or discrete amounts of various disturbances within a watershed. For example, road density expressed in miles of road per square mile of watershed area (mi/mi^2) is a common watershed condition indicator. Extensions of that include road density within riparian habitat conservation areas (RHCAs) or landslide prone terrain (LSP). Other indicators include various forms of timber harvest density, such as percent of the watershed harvested, percent of RHCAs harvested and percent of LSP terrain harvested.

Various guidelines have been employed to rate watershed condition based on these indicators. One local version is a matrix that rates watersheds into low, moderate or high condition based on assembling a broad array of indicators (NOAA Fisheries et al, 1998).

INDICATOR OF WATERSHED CONDITION – ROAD DENSITY

INDICATOR 2 - WATER YIELD

Equivalent Clearcut Area (ECA) analysis is a tool used to index the relationship between vegetation condition and water yield from forested watersheds. The basic assumptions of the procedure are that removal of forest vegetation results in water yield increases and that ECA can be used as an index of these increases. Depending on the interaction between water yield, sediment yield, and stream channel conditions, such increases could have impacts on stream channels.

Water yield increases can be directly modeled, but equivalent clearcut area (ECA) is often used as a surrogate. The ECA model is designed to estimate changes in mean annual streamflow resulting from forest practices or treatments (roading, timber harvest, and fires), which remove or reduce vegetative cover, and is usually expressed as a percent of watershed area (Belt, 1980). The index takes into account the initial percentage of crown removal and the recovery through regrowth of vegetation since the initial disturbance. For purposes of this assessment, ECA will be used to index changes in water yield through time based on timber harvest and roading disturbances.

There are a number of physical factors that determine the relationship between canopy conditions and water yield. These include interception, evapotranspiration, shading effects and wind flux. These factors affect the accumulation and melt rates of snow packs and how rainfall is processed. The ECA analysis takes into account the initial percentage of crown removal and the recovery through vegetative re-growth since the initial disturbance in the case of timber harvest or fire. Within the habitat types being treated under this project, the time frame for complete ECA recovery to occur is estimated to be 65 to 85 years (USDA Forest Service, 1974).

Additional factors affecting water yield include compacted surfaces due to roads, skid trails, and landings. Existing and new roads are considered as permanent openings in the ECA model. Decommissioned roads are considered as openings, so the road decommissioning projects do not contribute to reductions in ECA.

Various ECA thresholds of concern have been in use in the Northern Region since the 1960s (Gerhardt, 2000). Early cutting guides recommended a limit of 20-30 percent ECA within a watershed (Haupt, 1967). More recently, ECA thresholds have been rejuvenated through consultation under the Endangered Species Act. A recent Biological Opinion stipulated that watershed analysis should be conducted prior to actions that would increase ECA in 3rd to 5th order priority watersheds where ECA exceeds 15 percent (National Marine Fisheries Service, 1995).

Recently, concern over water yield changes relative to stream channel condition has focused on smaller headwater catchments. Research in the nearby Horse Creek watershed study have demonstrated instantaneous peak flow increase up to 34 percent and maximum daily flow increases up to 87 percent, resulting from road construction and timber harvest in small catchments (King, 1989). Recent observations have suggested that channel erosion from these streams may be contributing to increased bedload sediment in the 3rd order receiving channel (Gerhardt, 2002).

The studies by Belt (1980) and King (1989) have also served as field tests of the ECA procedure. Belt concluded that the ECA procedure is a rational tool for evaluation of hydrologic impacts of forest practices. King recommended local calibration of the model and a greater emphasis on conditions in 1st and 2nd order headwater streams.

INDICATORS OF WATER YIELD - EQUIVALENT CLEARCUT AREA

INDICATOR 3 - SEDIMENT YIELD

Sediment yield is defined as the movement of sediment past a point in the stream system over a period of time. On the Nez Perce National Forest, sediment yield is generally modeled using NEZSED, which is the Forest's adaptation of the R1R4 Sediment Yield Guidelines (USDA Forest Service, 1981). The model accounts for natural background sediment and activity sediment generated from roads, timber harvest, and fire. The activity sediment is estimated from surface erosion processes and small mass failures (< 10 yd^3). Sediment yield is commonly expressed as tons/year or percentage over baseline. Appendix A of the Nez Perce National Forest Plan stipulates guidelines for sediment yield and entry frequency on a subwatershed basis (USDA Forest Service, 1987).

The proposed timber harvest, road activities and watershed improvement activities could affect sediment yield over time. Harvest and road related activities have the potential to increase sediment production and delivery into streams. Watershed improvement projects have the potential to produce sediment in the short-term, but many are designed to result in long-term reductions in sediment on a watershed basis. Sediment yield modeling is used as one indicator to determined trends in water quality and fish habitat conditions.

NEZSED has been tested using locally collected sediment yield data (USDA Forest Service, 1998). Results of the individual tests varied with some predictions being over and under, with others being close, to measured values. The net result is that the model has been determined to be a reasonably realistic tool for alternative assessment. The model has limitations in that it does not incorporate certain processes related to activity-generated sediment yield, including stream bank erosion and mass failures >10 yds^3 in size.

INDICATORS OF SEDIMENT YIELD: SEDIMENT YIELD PERCENT OVER BASE

INDICATOR 4 - CHANNEL MORPHOLOGY

Water and sediment yield can interact to change channel morphology conditions through erosion of stream channels or deposition of sediment. Channel morphology can also be affected directly through activities such as road encroachment, stream crossings and in-channel improvements. Sediment delivery and routing processes vary by upland settings, stream types and disturbance level and type.

Sediment routing considers the disposition of sediment within the watershed system, including processes of erosion, deposition, storage and transport. It includes upslope and instream components. The upslope component includes initial detachment, erosion and delivery efficiency. The instream component includes suspended and bedload sediment yields, as well as substrate deposition and composition. The instream component also includes consideration of streamflow and channel morphology, both of which influence the capability of the stem to transport or deposit sediment.

INDICATORS OF CHANNEL MORPHOLOGY: CHANNEL GEOMETRY AND SUBSTRATE COMPOSITION.

INDICATOR 5 - WATER QUALITY

Water quality includes physical and chemical characteristics of water. Parameters commonly measured include pH, alkalinity, hardness, specific conductance, nutrients, metals, sediment and water temperature. Many of these parameters are affected only to a slight degree, or not at all, by forest practices. Water temperature controls the rate of biologic process, is of critical concern for fish populations, and is a primary indicator of habitat conditions. It is also a key parameter in the South Fork Clearwater River TMDL.

Indicators of water temperature: Water temperature, canopy density in forested reaches, and percent shade in non-forested reaches and main steam South Fork Clearwater River.

3.2.1. AMERICAN RIVER

INTRODUCTION

The American River watershed is about 91.6 square miles in area, with about 15 percent private land and 13 percent managed by the BLM. Major tributaries of American River include East Fork American River, Kirks Fork and Elk Creek. American and Red Rivers join to form the South Fork Clearwater River. From there, it is 62.5 miles to its confluence with the Middle Fork Clearwater River.

The geology, soils and landforms of the watershed are described in Section 3.1 (soils). The stream channels in this watershed are predominately low to moderate gradient, with higher gradient channels in the mountain uplands. Much of the mainstem has been dredged and the natural vegetation community has been lost, but it was probably predominately a grass/sedge and shrub meadow, interspersed with conifers.

Percent of stream gradient classes by prescription watershed are shown in Appendix E, (Table E-3).

Elevations in the American River watershed range from 3,880 feet at the confluence with Red River to 6,847 feet at Anderson Butte. Precipitation ranges from 30 to 50 inches (University of Idaho, 1993). Much of the precipitation falls as snow from November through March. Snowmelt is the predominate factor leading to a spring peak in the hydrograph, which typically occurs from mid to late May. Springtime flows are often augmented by rains. Winter peak flows are rare, with only about 3 percent of flood peaks occurring during the period of November through March (USDA Forest Service, 1998). Lowest flows typically occur during the late summer and early fall. An annual hydrograph showing median, minimum and maximum flows for the USGS stream gage on the upper South Fork Clearwater River is found in Appendix E (Figure E-3). American River, though ungaged, exhibits a similar flow regime.

BENEFICIAL USES

Under the Idaho Water Quality Standards, designated beneficial uses in American River are cold-water communities, salmonid spawning, primary contact recreation, domestic water supply and special resource water (IDAPA 58.01.02). No tributaries in the project area have designated beneficial uses, but existing uses generally include cold-water communities, salmonid spawning and secondary contact recreation.

A search of non-federal water rights applications, permits, decrees, licenses, claims and transfers was made for areas affected by project activities. The selected areas included all lands east of American River and downslope of the project area, as well as the mainstem of American River from the project area to its confluence with Red River. Using these criteria, 38 private water uses were located. Since de minimus domestic claims do not require a water right, there are likely to be more uses than identified. A summary of identified water uses follows:

Table 3.5 – Number of Potentially Affected Water Uses - American River

Source Name	Domestic Irrigation	Domestic Stock	Irrigation Stock	Domestic	Irrigation	Stock	Mining	Industrial
American River	1		1	2	4	1	1	1
Whitaker Creek					2			
Queen Creek							1	
Kirks Fork							1	
Unnamed Stream	1							
Spring		3		6				
Groundwater	1			12				

A number of consumptive use claims have been filed in American River by the Nez Perce Tribe, Bureau of Land Management, and the Forest Service. In addition, instream flow claims are being pursued for the mainstem of American River by the Nez Perce Tribe and the Forest Service. Tribal consumptive and instream flow claims accrue from treaty rights that were recently negotiated in a settlement under the Snake River Basin Adjudication. Forest Service instream flow claims are being pursued using the State of Idaho's process, which involves working through the ongoing South Fork Clearwater River State Water Plan.

EXISTING CONDITION AND ENVIRONMENTAL EFFECTS

This section discusses the environmental effects of implementing the no action and action alternatives. Existing conditions are described under the no action alternative, but future effects of implementing no actions are also discussed. Long term trends in aquatic conditions are discussed in Section 3.3 (fisheries), with supporting information in Appendix E.

3.2.1.1. INDICATOR 1 – WATERSHED CONDITION INDICATORS

Existing watershed condition indicators were compiled for American River using corporate databases and GIS overlays. They are summarized in the table below:

Table 3.6 : Watershed Condition Indicators

Watershed Name	Area (mi^2)	Road Density (mi/ mi^2)	RHCA Road Density (mi/ mi^2)	LSP Roads (miles)	Timber Harvest (% wsd area)	RHCA Harvest (%RHCA area)	LSP Harvest (acres)
Upper American River	10.1	2.0	0.6	0	11	4	0
Middle American River*	5.1	3.0	2.7	0	13	5	0
East Fork American River*	8.6	1.0	0.7	0	6	3	0
Flint Creek	9.2	3.1	1.7	0	23	13	0
Whitaker Creek	1.4	3.9	2.6	0	27	23	0
Queen Creek	1.7	4.3	3.7	0	33	22	0
Box Sing Creek	1.4	3.3	3.1	0	16	8	0
Kirks Fork	9.8	0.6	0.5	0	4	3	0
Lower American River*	6.8	2.0	3.5	0	NA	NA	NA
Entire American River	91.6	2.3	1.9	0.4	NA	NA	NA

* Data compiled for composite watersheds, not pure watersheds

RHCA = Riparian Habitat Conservation Area

LSP = Landslide Prone Terrain

ALTERNATIVE A (NO ACTION ALTERNATIVE)

Various watershed road density criteria have been used to assess watershed condition. Local guidelines have been developed that suggest <1 mi/mi^2 is one indicator of good watershed condition, 1-3 mi/mi^2 is moderate and >3 mi/mi^2 is low (NOAA Fisheries, et al 1998). Of the 9 project prescription watersheds in American River, 5 are in the low condition category and only 2 are in the high condition category.

The density and distribution of roads within most of the subwatersheds indicate there is a high probability that the hydrologic regime (i.e. timing, magnitude, duration, and spatial distribution of runoff) is substantially altered. Road surfaces limit infiltration which causes surface runoff during storm events and snow melt. Insloped roads with ditches have the greatest effect. Native surface roads with traffic can often develop ruts, which cause runoff to be concentrated on the road surface. Roads are also subject to surface and mass erosion. Surface erosion is the dominant erosion process on roads in American River. Field inventories have identified problem areas and prioritized needs.

Timber harvest has affected a relatively high proportion of Queen, Whitaker and Flint Creeks. This has affected water yield and timing through reductions in forest canopy and soil compaction from skid trails and landings. A relatively high proportion of RHCAs have been harvested in Whitaker and Queen Creeks. Though unquantified, a considerable amount of timber harvest has occurred in Lower American River. Mass erosion is a relatively minor process in American River. There is a minimal amount of past roading and timber harvest on landslide prone terrain.

Post-project road density is shown in Table 3.7 below. The changes in road density are the result of road decommissioning.

Table 3.7: Post-Project Road Density by Alternative

Watershed Name	Area (mi^2)	Alt A (existing)	Alt B	Alt C	Alt D	Alt E
Upper American River	10.1	2.0	2.0	2.0	2.0	1.9
Middle American River*	5.1	3.0	2.5	2.5	2.5	2.2
East Fork American River*	8.6	1.0	1.0	0.9	0.9	0.8
Flint Creek	9.2	3.1	2.8	2.8	2.8	2.1
Whitaker Creek	1.4	3.9	3.5	3.4	3.4	3.4
Queen Creek	1.7	4.3	4.3	3.2	3.0	2.7
Box Sing Creek	1.4	3.3	2.9	3.0	2.9	2.7
Kirks Fork	9.8	0.6	0.6	0.6	0.6	0.6
Lower American River*	6.8	2.0	1.9	1.9	1.9	1.9
Entire American River	91.6	2.3	2.2	2.2	2.2	2.1

* Data compiled for composite watersheds, not pure watersheds

ACTION ALTERNATIVES (DIRECT/INDIRECT EFFECTS)

The lowest road densities result from Alternative E, which has the most aggressive road decommissioning package. Of the action alternatives, B decommissions the least amount of road and results in the highest remaining road density.

CUMULATIVE EFFECTS

The changes in overall road density at the scale of the American River watershed are very slight. The foreseeable BLM Eastside Township Project proposes to decommission a small amount of existing road.

3.2.1.2. INDICATOR 2 – WATER YIELD

ECA was calculated by prescription watershed for each alternative. The calculations take into consideration effects of harvest and temporary road construction. Road decommissioning was not modeled as decreasing ECA even though the roads would recover vegetation over time. The ECA analysis does not include the effects of insect and disease agents.

Table 3.8 shows the estimated per year ECA for each alternative for each prescription watershed in American River. Existing condition is represented by Alternative A. Year 2005 represents the modeled peak activity year. ECA recovery begins the following year and occurs gradually from then on.

Table 3.8: % ECA by Alternative (2005)

Watershed Name	Area (mi^2)	Alt A (existing)	Alt B	Alt C	Alt D	Alt E
Middle American River*	23.8	3	4	4	4	4
East Fork American River*	18.4	7	10	8	9	8
Flint Creek	9.2	8	10	8	12	10
Whitaker Creek	1.4	10	13	13	13	12
Queen Creek	1.7	13	17	18	18	15
Box Sing Creek	1.4	6	14	14	14	8
Kirks Fork	9.8	2	4	4	4	2
Lower American River*	91.6	9	10	10	10	10

* Composite watersheds were combined with upstream watersheds for ECA analysis

ALTERNATIVE A – NO ACTION ALTERNATIVE

Under this alternative, no management actions, including vegetation treatments, road reconditioning, or temporary road construction would occur. Associated restoration activities, such as road decommissioning, soil restoration, stream channel enhancements, and stream crossing improvements also would not occur.

There would be no change short or long-term, in flow timing and quantity associated with roads because no road decommissioning would occur. Soil compaction would continue to reduce water infiltration, so affects to water yield would remain the same.

Watershed recovery would continue at the current rate, in the absence of a large disturbance such as wildfire or flood. Effects to water yield from a potential fire are highly variable depending on timing, location, size, weather, and suppression activities. Runoff timing and quantity would reflect the magnitude of the disturbances. The risk of peak flow would depend on the extent of the vegetation change, conditions of the soil, floodplain and channel condition, and weather following natural events.

ALTERNATIVES B, C, D, AND E (ACTION ALTERNATIVES)

DIRECT AND INDIRECT

None of the action alternatives exceeds 20 percent ECA within a watershed. The highest levels are found in Queen, Box Sing and Whitaker Creeks, respectively. These are small prescription watersheds with channels that would be considered relatively sensitive to changes in watershed conditions. Overall, Alternative D shows the largest increases in ECA and Alternative E shows the smallest.

Road decommissioning and soil restoration would contribute to a reduction in compaction, thus improving infiltration and reducing surface runoff. This effect would be most pronounced in Alternative E and least in Alternative B. Road miles of decommissioning and acres of soil restoration by prescription watershed are found in Appendix D.

CUMULATIVE EFFECTS

Preliminary ECA calculations were provided by the BLM for the proposed action under the Eastside Township Project. These are reflected in Table 3.9 below. Only those watersheds containing proposed BLM activities are shown.

Table 3.9: % ECA for 2005 (Including Eastside Township Project)

Watershed Name	Area (mi^2)	Alt A (existing)	Alt B	Alt C	Alt D	Alt E
Middle American River*	23.8	3	4	5	5	4
East Fork American River*	18.4	7	11	9	10	8
Whitaker Creek	1.4	10	19	19	19	18
Queen Creek	1.7	13	20	21	21	18
Box Sing Creek	1.4	6	18	18	18	11
Kirks Fork	9.8	2	4	4	5	3
Lower American River*	91.6	9	10	10	11	10

* Composite watersheds were combined with upstream watersheds for ECA analysis

With the addition of the Eastside Township Project, the larger watersheds show only slight increases in ECA (≤ 1 percent), some of which do not show when rounded to the nearest percent. More substantial increases in ECA (3 - 6 percent) are seen in Whitaker, Queen and Box Sing Creeks. This is a reflection of relative size of the treatments in these small watersheds.

3.2.1.3. INDICATOR 3 – SEDIMENT YIELD

This section compares the existing condition to the action alternatives for effects on sediment yield. The indicator used for sediment yield is tons per year, expressed as a percent over natural baseline sediment yield. Base or natural yield represents the tons of sediment that are produced and subsequently transported out of the subwatershed each year from an natural condition. The existing sediment yield over base represents activity generated tons of sediment transported annually produced by previous activities such as roads, timber harvest and fire.

Sediment yield was modeled for each prescription watershed. The primary sediment producing activities modeled include temporary road construction, road reconstruction, road decommissioning and timber harvest. Effects were modeled for a 10-year period (2003 - 2012 assuming project activities will begin in 2005). Activities occurring throughout the lifetime of the project are modeled as occurring all in 2005. Modeling was done on a peak year basis in order to meet the assumptions under which Appendix A of the Nez Perce Forest Plan was developed.

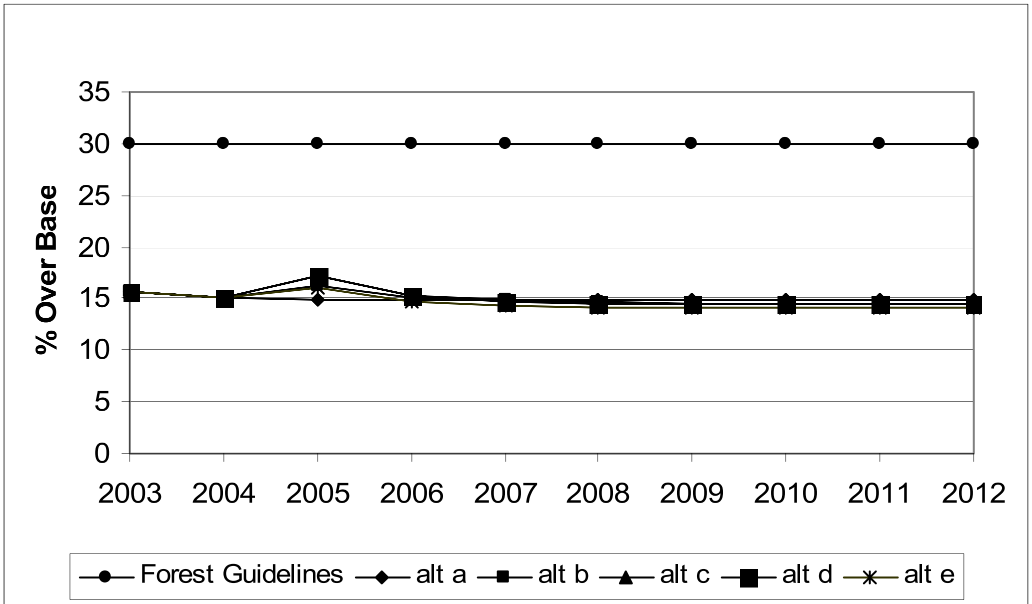
Table 3.10 shows the estimated sediment yield over base for each alternative for each prescription watershed in American River. Year 2003 represents the existing condition, 2005 represents the modeled peak activity year and 2012 represents the conditions at the end of the modeled period, when annual sediment yield from all activities has ceased or stabilized. Figure 3.1 is a time trend graph of sediment yield over base for Lower American River. Graphs for the remaining analysis points are found in Appendix E.

Table 3.10: % Over Base Sediment Yield by Alternative

Watershed Name	Area (mi^2)	Year	Alt A (existing)	Alt B	Alt C	Alt D	Alt E
Middle American River*	23.8	2003	13	13	13	13	13
		2005	12	13	13	14	13
		2012	12	12	12	12	11
East Fork American River*	18.4	2003	12	12	12	12	12
		2005	12	14	13	17	14
		2012	12	11	11	11	9
Flint Creek	9.2	2003	15	15	15	15	15
		2005	15	19	23	23	20
		2012	15	14	13	13	11
Whitaker Creek	1.4	2003	66	66	66	66	66
		2005	31	38	39	38	35
		2012	31	30	30	30	30
Queen Creek	1.7	2003	37	37	37	37	37
		2005	37	40	54	58	41
		2012	37	37	32	32	30
Box Sing Creek	1.4	2003	21	21	21	21	21
		2005	21	34	37	34	26
		2012	21	19	19	19	19
Kirks Fork	9.8	2003	5	5	5	5	5
		2005	5	8	10	8	6
		2012	5	5	5	5	5
Lower American River*	91.6	2003	16	16	16	16	16
		2005	15	16	17	17	16
		2012	15	15	14	14	14

* Composite watersheds were combined with upstream watersheds for sediment yield analysis

Figure 3.1 – Lower American River Sediment Yield



ALTERNATIVE A – NO ACTION ALTERNATIVE (EXISTING CONDITION)

Existing sediment yields in 2005 are all 15 percent over base or less, with the exception of Whitaker, Queen and Box Sing Creeks. Activity on private land resulted in a significant modeled sediment yield peak in Whitaker Creek in 2003.

ALTERNATIVES A, B, C, D, AND E (ACTION ALTERNATIVES)

Sediment yields in the peak activity year of 2005 all stay below Forest Plan sediment yield guidelines. Entry frequency guidelines are also met with this action. Peak year sediment yield in most watersheds is highest under Alternative D. Peak year sediment yield is lowest in either Alternative B or E, depending on the watershed. In most cases, the chronic sediment yield over base is lower in 2012 than in pre-project conditions. This reflects the effect of decommissioning and improvements on existing roads. The decreases in chronic sediment yield are greatest under Alternative E.

CUMULATIVE EFFECTS (INCLUDES FFAS)

Figure 3.1 shows the percent over base sediment yield for Lower American River. This includes past activities on private and BLM lands, as well as actions on national forest lands. Foreseeable actions in American River include the BLM's Eastside Township Project. NEZSED results are not currently available for this action, since not enough detail is known about the project.

3.2.1.4. INDICATOR 4 – CHANNEL MORPHOLOGY

ALTERNATIVE A – NO ACTION ALTERNATIVE

Channel gradients for subwatersheds in American River are found in Appendix E, Table E-3. Following those tables is a general discussion of erosion, sediment transport and sediment deposition processes. Channel morphology in project subwatersheds has been altered through three primary processes: sediment deposition, channel encroachment and dredge mining.

Sediment deposition has occurred in areas subjected to significant development activity, including roading and other development. Channel encroachment has occurred where roads and other activities have taken place adjacent to streams and their floodplains. The highest road densities in riparian areas are found in the Middle American, Whitaker, Queen, Box Sing and Lower American subwatersheds. Dredge mining has occurred primarily along American River and in the lower ends of its tributaries. Implementation of Alternative A would leave these conditions unchanged.

ALTERNATIVES B, C, D, AND E

The action alternatives are expected to have relatively little effect on channel morphology. Generally, the ECA and sediment yield estimates are at levels where little channel erosion or deposition is anticipated. The highest estimated sediment yields are in Queen Creek in Alternatives C and D. The FISHSED analysis found in Section 3.3 (Fisheries) elaborates further on these effects.

There are no new stream crossings on temporary roads. Several stream crossing improvements should improve channel morphology conditions in their immediate vicinity. Some of the road decommissioning involves crossings and riparian areas. Channel morphology should be improved in those areas.

3.2.1.5. INDICATOR 5 – WATER QUALITY

ALTERNATIVE A – NO ACTION ALTERNATIVE

Water temperature was recorded at several locations in the American River watershed during the summer of 2003. These sites were American River at the Forest boundary, East Fork American River, Flint Creek, Queen Creek, Kirks Fork and American River at the mouth. These data are shown in Appendix E. The data show a considerable variation across the watershed. Violations of the Idaho salmonid spawning criterion of not-to-exceed 13˚ C were noted at all sites at certain times. Violations of the Idaho cold water communities of not-to-exceed 22˚ C were noted at American River at the Forest Boundary and at the mouth. Violations of the EPA criterion of not-to-exceed 10˚ C (as a 7-day average of daily maximums) were noted at all sites. Some basic metrics from the 2003 data are shown in Table 3.11 below.

Table 3.11 – Summary of 2003 Water Temperature Data

Stream Name/Site	Number of Days ≥ 20˚C	Maximum Instantaneous (˚C)
American River at Forest Boundary	31	22.9
East Fork American River	0	17.5
Flint Creek	0	19.8
Queen Creek	0	17.0
Kirks Fork	7	20.6
American River near mouth	46	25.6

Under the no action alternative, insect and disease agents may tend to reduce shade over time in some riparian stands. Shade in dredge-mined reaches would tend to increase very slowly over time as these areas are naturally recolonized by riparian vegetation. These reaches are mostly outside the project area.

A number of water quality parameters were sampled at stream sites in American River during the period 1977-1981. Summaries of data for pH, conductivity and hardness for Upper American

River, Flint Creek and Lower American River are found in Table E.6. These data show that pH is near neutral to slightly acidic, which is considered normal for area streams. Conductivity and alkalinity are both relatively low, indicating relatively low amounts of dissolved constituents and also relatively low biological productivity.

Alternatives B, C, D, and E

All alternatives are designed to minimize effects on streamside shade. Timber harvest and temporary road construction will not occur in Riparian Habitat Conservation Areas (RHCAs). Under all action alternatives, insect and disease agents may tend to reduce shade over time in some riparian stands. There may be some incidental shade reductions at stream crossing improvement sites. An example would be if some roadside vegetation was removed during replacement of an existing culvert. This approach is expected to be in compliance with the South Fork Clearwater River water temperature TMDL. Beyond sediment yield described above, there would be little change in most water quality parameters. Beneficial uses would be protected in all alternatives.

Irreversible or Irretrievable Effects (All Indicators)

There are no effects to watershed resources in American River from this project that are considered to be fully irreversible or irretrievable. Construction and obliteration of temporary roads will leave some residual effects in terms of soil conditions and interruption of groundwater flow paths. Sediment delivered to low gradient stream reaches tends to have a long residence time, but eventually will be transported or reorganized by high stream flows. No long term geomorphic changes in stream channels are predicted from project activities.

3.2.2. Crooked River

Introduction

The Crooked River watershed is 71.3 square miles in area, with about 1 percent private land and 1 percent managed by the BLM. Crooked River joins the South Fork Clearwater River at River Mile 59.5. The East and West Forks of Crooked River form the mainstem near the old Orogrande town site. From there, Crooked River flows approximately 12 miles to its mouth.

The geology, soils and landforms of the watershed are described in Section 3.1 (Soils). Mainstem Crooked River is mostly contained in an alluvial valley, with breaklands in the lower reaches and mountain uplands in the upper portions. The West and East Forks start at the headwaters with V-shaped valley bottoms and have short reaches of trough-shaped valleys before they flatten out just before they join. The remaining twelve miles of the mainstem flow through a low gradient flat-bottom valley. Much of the mainstem has been dredged and the natural vegetation community has been lost, but it was probably predominately a grass/sedge and shrub meadow, interspersed with conifers. Percent of stream gradient classes by prescription watershed are shown in Appendix E, Table E.4.

Elevations in the watershed range from 3825 feet at the mouth to 8127 feet on the ridge above Rainbow Lake. The climate and hydrograph of Crooked River are similar to American River, with some minor variations. The headwaters of Crooked River are higher in elevation and have a northerly aspect. This tends to retard snowmelt from the upper watershed and contributes to later streamflows and cooler water temperatures. An annual hydrograph showing median, minimum and maximum flows for the USGS stream gage on the upper South Fork Clearwater River is found in Appendix E (Figure E-3). Crooked River, though ungaged, exhibits a similar flow regime.

EXISTING BENEFICIAL USES

Under the Idaho Water Quality Standards, the designated beneficial uses in Crooked River are cold-water communities, salmonid spawning and secondary contact recreation (IDAPA 58.01.02). No tributaries in the project area have designated beneficial uses, but existing uses generally include cold-water communities, salmonid spawning and secondary contact recreation.

A search of non-federal water rights applications, permits, decrees, licenses, claims and transfers was made for areas affected by project activities. The selected areas included all lands within Crooked River that are downslope or downstream of the project area. Using these criteria, 7 private and State water uses were located. Since de minimus domestic claims do not require a water right, there are likely to be more uses than identified. A summary of identified water uses follows:

Table 3.12 – Number of Potentially Affected Water Uses Crooked River

Source Name	Domestic/Stock	Domestic	Industrial	Fish Propagation
Crooked River			1	2
Quartz Creek	1			
Mary Ann Creek			1	
Unnamed Stream		1		
Spring		1		

A number of consumptive use and instream flow claims have been filed in Crooked River by the Nez Perce Tribe and the Forest Service. Tribal consumptive and instream flow claims accrue from treaty rights that were recently negotiated in a settlement under the Snake River Basin Adjudication. Forest Service instream flow claims are being pursued using the State of Idaho's process, which involves working through the ongoing South Fork Clearwater River State Water Plan.

EXISTING CONDITION AND ENVIRONMENTAL EFFECTS

This section discusses the environmental effects of implementing the no action and action alternatives. Existing conditions are described under the no action alternative, but future effects of implementing no actions are also discussed. Long term trends in aquatic conditions are discussed in Section 3.3 (fisheries), with supporting information in Appendix E.

3.2.2.1. INDICATOR 1 – WATERSHED CONDITION

Existing watershed condition indicators were compiled for Crooked River using corporate databases and GIS overlays. They are summarized in the table below:

Table 3.13 : Watershed Condition Indicators

Watershed Name	Area (mi^2)	Road Density (mi/ mi^2)	RHCA Road Density (mi/ mi^2)	LSP Roads (miles)	Timber Harvest (% wsd area)	RHCA Harvest (%RHCA area)	LSP Harvest (acres)
Middle Crooked River*	22.6	1.8	1.9	1.8	10	6	69
Relief Creek	11.7	3.3	2.9	0.9	30	21	57
Lower Crooked River*	14.8	3.2	3.3	4.5	18	8	40
Entire Crooked River	71.3	1.9	2.1	8.5	12	7	166

***** Data compiled for composite watersheds, not pure watersheds

RHCA = Riparian Habitat Conservation Area

LSP = Landslide Prone Terrain

ALTERNATIVE A – NO ACTION ALTERNATIVE

EXISTING CONDITION

Road densities are highest in Relief Creek and Lower Crooked River, with both exceeding 3 mi/mi^2. There are considerable amounts of road in RHCAs in all three project prescription watersheds. The county road along Crooked River is located almost entirely within the RHCA. There are also more existing roads and timber harvest on landslide prone terrain in Crooked River than in American River, though landslide prone terrain comprises a relatively small proportion of Crooked River compared to areas of steeper landscapes lower in the South Fork Clearwater subbasin.

Table 3.14 – Post-Project Road Density by Alternative

Watershed Name	Area (mi^2)	Alt A (existing)	Alt B	Alt C	Alt D	Alt E
Middle Crooked River*	22.6	1.8	1.7	1.6	1.6	1.6
Relief Creek	11.7	3.3	2.9	2.9	2.9	2.6
Lower Crooked River*	14.8	3.2	3.1	3.1	3.1	3.0
Entire Crooked River	71.3	1.9	1.8	1.8	1.8	1.7

***** Data compiled for composite watersheds, not pure watersheds

ALTERNATIVES B, C, D, AND E

DIRECT AND INDIRECT

The lowest road densities result from Alternative E, which has the most aggressive road decommissioning package. Of the action alternatives, B decommissions the least amount of road and results in the highest remaining road density.

CUMULATIVE EFFECTS (INCLUDES FORESEEABLE FUTURE ACTIONS)

The changes in overall road density at the scale of the Crooked River watershed are very slight. The BLM Whiskey South Project decommissions no additional existing roads in Crooked River.

3.2.2.2. Indicator 2 – Water Yield

ECA was calculated by prescription watershed for each alternative. The calculations take into consideration effects of harvest and temporary road construction. Road decommissioning was not modeled as decreasing ECA even though the roads would recover vegetation over time. The ECA analysis does not include the effects of insect and disease agents.

Table 3.15 shows the estimated per year ECA for each alternative for each prescription watershed in Crooked River. Existing condition is represented by Alternative A. Year 2005 represents the modeled peak activity year. ECA recovery begins the following year and occurs gradually from then on.

Table 3.15: % ECA by Alternative (2005)

Watershed Name	Area (mi^2)	Alt A (existing)	Alt B	Alt C	Alt D	Alt E
Middle Crooked River*	44.8	2	5	5	5	4
Relief Creek	11.7	8	13	14	15	12
Lower Crooked River*	71.3	5	8	8	8	7

* Composite watersheds were combined with upstream watersheds for ECA analysis

Alternative A – No Action Alternative

Existing ECA is highest in Relief Creek and lowest in Middle Crooked River. In all cases, the existing ECA is below 15 percent of the watershed area. Existing ECA is unknown for Silver and Quart Creeks, which are two major tributaries of Middle Crooked River. However, there are relatively high levels of existing timber harvest and roads in both subwatersheds.

Under this alternative, no management actions, including vegetation treatments, road reconditioning, or temporary road construction would occur. Associated restoration activities, such as road decommissioning, soil restoration, stream channel enhancements, and stream crossing improvements also would not occur.

There would be no change short or long-term, in flow timing and quantity associated with roads because no road decommissioning would occur. Soil compaction would continue to reduce water infiltration, so affects to water yield would remain the same.

Watershed recovery would continue at the current rate, in the absence of a large disturbance such as wildfire or flood. Effects to water yield from a potential fire are highly variable depending on timing, location, size, weather, and suppression activities. Runoff timing and quantity would reflect the magnitude of the disturbances. The risk of peak flow would depend on the extent of the vegetation change, conditions of the soil, floodplain and channel condition, and weather following natural events.

Alternatives B, C, D, and E

Direct and Indirect

None of the action alternatives exceeds 20 percent ECA within a watershed. The highest levels are found in Relief Creek. Though not analyzed separately, relatively high ECA values may result in Silver and Quartz Creeks. Overall, Alternative D shows the largest increases in ECA and Alternative E shows the smallest.

Road decommissioning and soil restoration would contribute to a reduction in compaction, thus improving infiltration and reducing surface runoff. This effect would be most pronounced in

Alternative E and least in Alternative B. Road miles of decommissioning and acres of soil restoration by prescription watershed are found in Appendix D.

CUMULATIVE EFFECTS (INCLUDES FORESEEABLE FUTURE ACTIONS)

The selected alternative of the BLM's Whiskey South Project includes timber harvest, temporary road construction and prescribed fire treatments in Lower Crooked River. These activities were evaluated for peak year ECA and the results are combined with those of the American/Crooked Project in Table 3.16 below:

Table 3.16: % ECA for 2005 (Including Whiskey South Project)

Watershed Name	Area (mi^2)	Alt A (existing)	Alt B	Alt C	Alt D	Alt E
Lower Crooked River*	71.3	5	8	8	9	8

* Composite watersheds were combined with upstream watersheds for ECA analysis

The addition of 243 acres of ECA from the Whiskey South Project increased the 2005 Lower Crooked River ECA by 1 percent in Alternative D and E. There was no change in Alternative B or C, once the ECA was rounded to the nearest full percent.

3.2.2.3. INDICATOR 3 – SEDIMENT YIELD

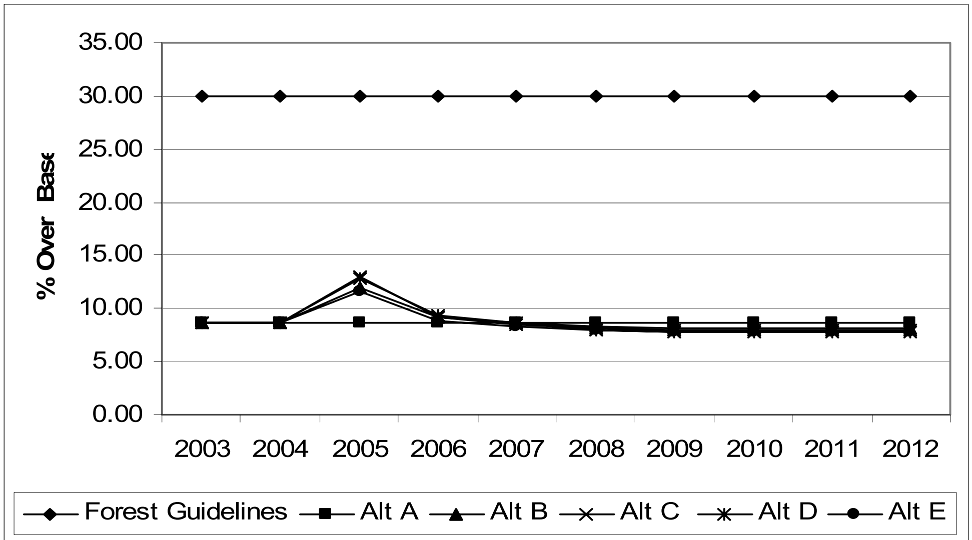
Table 3.18 shows the estimated sediment yield over base for each alternative for each prescription watershed in Crooked River. Year 2003 represents the existing condition, 2005 represents the modeled peak activity year and 2012 represents the conditions at the end of the modeled period, when annual sediment yield from all activities has ceased or stabilized. Figure 3.2 is a time trend graph of sediment yield over base for Lower Crooked River. Graphs for the remaining analysis points are found in Appendix E.

Table 3.17: % Over Base Sediment Yield by Alternative

Watershed Name	Area (mi^2)	Year	Alt A (existing)	Alt B	Alt C	Alt D	Alt E
Middle Crooked River*	44.8	2003	5	5	5	5	5
		2005	5	7	8	7	7
		2012	5	5	4	4	4
Relief Creek	11.7	2003	17	17	17	17	17
		2005	17	24	27	28	22
		2012	17	15	15	15	15
Lower Crooked River*	71.3	2003	9	9	9	9	9
		2005	9	12	13	13	12
		2012	9	8	8	8	8

* Composite watersheds were combined with upstream watersheds for sediment yield analysis

Figure 3.2: Lower Crooked River Sediment Yield



ALTERNATIVE A (NO ACTION ALTERNATIVE)

EXISTING CONDITION

The highest existing sediment yield is in Relief Creek. Middle Crooked River has the lowest existing sediment yield. Existing sediment yield is unknown for Silver and Quartz Creeks, which are two major tributaries of Middle Crooked River. However, there are relatively high levels of existing timber harvest and roads in both subwatersheds.

ALTERNATIVES B, C, D, AND E

DIRECT AND INDIRECT

All peak year sediment yield increases fall below the Forest Plan sediment yield guideline of 30 percent over base. Entry frequency guidelines are also met with this action (see below under cumulative effects). Though not analyzed separately, relatively high sediment yield values may result in Silver and Quartz Creeks.

CUMULATIVE EFFECTS (INCLUDES FORESEEABLE FUTURE ACTIONS)

The selected alternative of the BLM's Whiskey South Project includes timber harvest, temporary road construction and prescribed fire treatments in Lower Crooked River. These activities were evaluated using NEZSED and the results are combined with those of the American/Crooked Project in Table 3.18 below:

Table 3.18: % Over Base Sediment Yield (Including Whiskey South)

Watershed **Name**	**Area (mi²)**	**Year**	**Alt A (existing)**	**Alt B**	**Alt C**	**Alt D**	**Alt E**
Lower Crooked River*	71.3	2003	9	9	9	9	9
		2005	9	13	14	14	13
		2012	9	8	8	8	8

* Composite watersheds were combined with upstream watersheds for sediment yield analysis

The BLM activities were combined into a 2005 peak year for purposes of the analysis, in order to check compliance with Forest Plan sediment yield and entry frequency guidelines. When added to the American/Crooked activities, each alternative increased approximately 1 percent over base in 2005. There was no change in 2012. The combined Whiskey South and American/Projects can be considered as a single entry in the Lower Crooked River prescription watershed, given that the activities are occurring in close proximity in time and, when combined, do not exceed the sediment yield guidelines of 30 percent over base. Though analyzed in separate documents, the scope and scale of effects are consistent with that of a single entry.

3.2.2.4. Indicator 4 – Channel Morphology

Alternative A (No Action Alternative)

Existing Condition

Channel gradients for subwatersheds in Crooked River are found in Appendix E, (Table E.4). Following those tables is a general discussion of erosion, sediment transport and sediment deposition processes. Channel morphology in project subwatersheds has been altered through three primary processes: sediment deposition, channel encroachment and dredge mining.

Sediment deposition has occurred in areas subjected to significant development activity, including roading and other development. Channel encroachment has occurred where roads and other activities have taken place adjacent to streams and their floodplains. The highest road densities in riparian areas are found in the Relief Creek and Lower Crooked River subwatersheds. Dredge mining has occurred along most of the mainstem of Crooked River and in the lower ends of Relief Creek. Implementation of Alternative A would leave these conditions unchanged.

Alternatives B, C, D, and E

Direct/Indirect Effects

The action alternatives are expected to have relatively little effect on channel morphology from increase sediment yield. Generally, the ECA and sediment yield estimates are at levels where little channel erosion or deposition is anticipated. The highest estimated sediment yields are in Relief Creek in Alternatives C and D. The FISHSED analysis found in Section 3.3 (Fisheries) elaborates further on these effects.

There are no new stream crossings on temporary roads. Several stream crossing improvements should improve channel morphology conditions in their immediate vicinity. Some of the road decommissioning involves crossings and riparian areas. Channel morphology should be improved in those areas.

In Crooked River, the project proposes instream improvement work in sections of Crooked River, Relief Creek and Quartz Creek. Alternatives B, C, and D propose relatively low levels of work, involving mostly maintenance of existing improvements and riparian planting. The levels of work are increased in Alternative E. Alternative E also provides for more elaborate instream and floodplain improvements in about 0.5 miles of Relief Creek and 0.8 miles of Crooked River. These projects are listed in Appendix D.

Cumulative Effects

The addition of the BLM's Whiskey South Project in Lower Crooked River will have little additional effect on channel morphology

3.2.2.5. INDICATOR 5 – WATER QUALITY

ALTERNATIVE A (NO ACTION ALTERNATIVE)

EXISTING CONDITION

Water temperature was recorded at several locations in the Crooked River watershed during the summer of 2003. These sites were Quartz Creek, Silver Creek, Relief Creek, Crooked River below Relief Creek and Crooked River near the mouth. These data are shown in Appendix E. The data show a considerable variation across the watershed. Violations of the Idaho salmonid spawning criterion of not-to-exceed 13˚ C were noted at all sites at certain times. Violations of the Idaho cold water communities of not-to-exceed 22˚ C were not noted in Crooked River. Violations of the EPA criterion of not-to-exceed 10˚ C (as a 7-day average of daily maximums) were noted at all sites. Some basic metrics from the 2003 data are shown in Table 3.19 below.

Table 3.19 – Summary of 2003 Water Temperature Data

Stream Name/Site	Number of Days ≥ 20˚C	Maximum Instantaneous (˚C)
Quartz Creek	0	15.2
Silver Creek	0	16.0
Relief Creek	4	20.2
Crooked River below Relief Creek	0	18.7
Crooked River near mouth	26	21.7

Under the no action alternative, insect and disease agents may tend to reduce shade over time in some riparian stands. Shade in dredge-mined reaches would tend to increase very slowly over time as these areas are naturally recolonized by riparian vegetation.

A number of water quality parameters were sampled at stream sites in Crooked River during the period 1974-1980. Summaries of data for pH, conductivity and hardness for Crooked River and Relief Creek are found in Table E.7. These data show that pH is near neutral to slightly acidic, which is considered normal for area streams. Conductivity and alkalinity are both relatively low, indicating relatively low amounts of dissolved constituents and also relatively low biological productivity. Mann and Von Lindern (1988) found relatively high dissolved iron concentrations in dredge ponds adjacent to Crooked River.

ALTERNATIVES B, C, D, AND E

DIRECT/INDIRECT EFFECTS

All alternatives are designed to minimize effects on streamside shade. Timber harvest and temporary road construction will not occur in Riparian Habitat Conservation Areas (RHCAs). Under all action alternatives, insect and disease agents may tend to reduce shade over time in some riparian stands. There may be some incidental shade reductions at stream crossing improvement sites. An example would be if some roadside vegetation was removed during replacement of an existing culvert. Riparian planting would occur along Quartz Creek, Relief Creek and Crooked River. This would be less in Alternatives B, C and D and greatest in Alternative E. Over time, shade would be increased in these reaches and summer water temperatures may be slightly reduced. This approach is expected to be in compliance with the South Fork Clearwater River water temperature TMDL.

Beyond sediment yield described above, there would be little change in most water quality parameters. Beneficial uses would be protected in all alternatives. There is some potential to liberate mercury during instream improvement projects that involve disturbance of substrate materials. This potential would be least in Alternatives B, C and D, since the least amount of area would be disturbed. In addition, the instream construction work in these alternatives involves maintenance of areas that were previously disturbed in the 1980s and 1990s, thus it is less likely that mercury exists in the substrate. The potential to release mercury in deleterious amounts is considered to be slight in all action alternatives.

IRREVERSIBLE, IRRETRIEVABLE EFFECTS (WILL ALSO DO THIS FOR ALL RESOURCES AT THE END OF CHAPTER 3)

There are no effects to watershed resources in Crooked River from this project that are considered to be fully irreversible or irretrievable. Construction and obliteration of temporary roads will leave some residual effects in terms of mixed soil horizons and interruption of groundwater flow paths. Sediment delivered to low gradient stream reaches tends to have a long residence time, but eventually will be transported or reorganized by high stream flows. The instream improvements are intentionally designed to be effective in the long term, but can be removed or reconfigured in the future if warranted.

3.2.3. MAINSTEM SOUTH FORK CLEARWATER RIVER

BENEFICIAL USES

Under the Idaho Water Quality Standards, designated beneficial uses in the South Fork Clearwater River and are cold-water communities, salmonid spawning, primary contact recreation and special resource water (IDAPA 58.01.02).

EXISTING CONDITION

The South Fork Clearwater River forms at the confluence of American and Red Rivers. Crooked River enters the South Fork about three miles below that point. The South Fork joins with the Middle Fork Clearwater River at Kooskia to form the Clearwater River. The main stem length of the South Fork is about 62.5 miles. In that distance, it falls about 2,700 feet, for an average stream gradient of 0.8 percent.

The South Fork main stem can be broken into several major reaches. From its origin to about Tenmile Creek, it is a relatively low gradient riffle/pool channel dominated by gravel and cobble substrate. Below Tenmile Creek, the river enters a confined canyon characterized by steeper stream gradient and large substrate dominated by boulders and cobbles. Downstream of Mill Creek, the river alternates between confined and less confined reaches. Near Threemile Creek, the river enters a broad, flat valley floor and is characterized by low gradient, a riffle/pool channel and dominated by gravel and cobble substrate (USDA Forest Service, 1998).

The South Fork has been highly altered by encroachment by State Highway 14 along much of its length. This has resulted in loss of floodplain function, simplification of the channel and loss of riparian vegetation. The upper reaches were also dredge mined. The lower few miles were diked after a flood in 1964, especially near Stites and Kooskia. Water temperature and suspended and deposited sediment conditions have all been determined to be elevated above natural conditions in the South Fork (IDEQ, et al, 2004).

CUMULATIVE ENVIRONMENTAL EFFECTS

Actions associated with the proposed projects may contribute to and/or reduce cumulative sediment in the South Fork Clearwater River downstream of project area, dependent on the analysis timeframe. The NEZSED model was used to calculate the predicted cumulative effects sediment yield based on the proposed timber harvest, road construction, road maintenance, and road reconstruction. As discussed in the Watershed Cumulative Effects section, these effects would be short-term only, and improvements in watershed condition over time would contribute to improved conditions in the river, assuming concurrent negative impacts do not occur off National Forest lands.

Several estimates of annual sediment yield have been made for the South Fork Clearwater River, generally covering the area upstream of the Forest Boundary at the Mt. Idaho Bridge (USDA Forest Service 1998, 1999 and IDEQ et al, 2004, page L-8). These estimates were made using two methods: 1) the NEZSED model; and 2) computations from suspended sediment samples collected during 1988 through 1992. The range of these estimates is from 14,600 to 17,800 tons/year. For purposes of comparing the alternatives, a figure of 16,000 tons/year is used. This is very close to the mean of the estimates. It is also very close to the figure computed in the South Fork Clearwater TMDL, when using NEZSED at the Forest Boundary. Thus, it forms a benchmark for the TMDL analysis.

Additional sediment yield from ongoing and foreseeable actions totals 170 tons/year. This is the combined peak year figure from the Meadow Face, Red Pines and Whiskey South Projects. Thus, the benchmark figure to which the American/Crooked Project is compared is 16,170 tons/year.

The comparisons are done in terms of the sediment yield associated with each alternative as a percent of the estimated annual sediment yield in the South Fork Clearwater River. The estimates from each alternative are for routed sediment yield delivered from American and Crooked Rivers to the South Fork Clearwater River for the peak activity year of 2005 (Table 3.20).

Table 3.20: Sediment Yield from American and Crooked Rivers to the South Fork Clearwater River

	Alt A (existing)	Alt B	Alt C	Alt D	Alt E
ALTERNATIVE GENERATED SEDIMENT YIELD (TONS/YR)	0	9	17	17	8
ALTERNATIVE GENERATED SEDIMENT YIELD (% OF SFCR)	0	0.2%	0.3%	0.3%	0.2%
TOTAL ROUTED SEDIMENT YIELD (TONS/YR)	193	227	243	241	223
TOTAL ROUTED SEDIMENT YIELD (% OF SFCR)	1.1%	1.4%	1.5%	1.5%	1.4%

The amount of sediment estimated to be delivered to the main stem South Fork Clearwater River as a direct result of each action alternative ranges from 0.2 percent to 0.3 percent of the estimated annual yield of the river. When natural, alternative and pre-existing activity sediment are added, the estimated contribution from American and Crooked Rivers ranges from 1.4 percent to 1.5 percent for each action alternative. The amounts and differences between alternatives are relatively inconsequential, when considered in relation to the total sediment yield of the South Fork Clearwater River at the Forest Boundary.

The South Fork Clearwater River was analyzed for cumulative effects, including an effort to quantify sediment yield increases. In general, sediment yield conditions have probably improved in recent years. This is partly because the level of activity, particularly road building on federal lands has been substantially less than during decades of the 1950s through the 1980s. Additionally, dredge and placer mining has been substantially reduced since the 1950s. In addition, a number of watershed and fisheries restoration projects have occurred within the South Fork Clearwater subbasin. Other proposed timber sales on national forest lands are subject to similar mitigation and upward trend requirements as the proposed American/Crooked Project.

If the Forest Plan guidance of upward trend in aquatic conditions for below objective watersheds is followed, along with the South Fork Clearwater River TMDLs for sediment and water temperature, aquatic conditions should continue to improve in the South Fork Clearwater River, when considered at the Forest Boundary near Mt. Idaho Bridge.

3.2.4. Watershed Section Summary

This provides an overall summary of the existing conditions and effects analysis relative to watershed resources in the American/Crooked Project.

Existing Conditions

In American River, subwatersheds within the project area mostly contain low to moderate gradient streams. The watersheds have a range of disturbance conditions, as indexed by existing road densities ranging from 0.6 to 4.3 mi/mi^2. Stream channels have been mostly affected by sediment deposition and road encroachment.

In Crooked River, subwatersheds within the project area have generally steeper stream gradients than American River. Watershed disturbances are more evenly distributed within the project subwatersheds, as indexed by existing road densities ranging from 1.8 to 3.3 mi/mi^2. Stream channels have been affected by sediment deposition and road encroachment. In addition, historic dredge mining was conducted in the mainstem of Crooked River and in lower Relief Creek. This completely altered the channel morphology, floodplain function and riparian vegetation.

The mainstem of the South Fork Clearwater River has been impacted by sediment deposition, road encroachment, dredge mining and removal of riparian vegetation. Certain impacts, such as the encroachment of State Highway 14 on the river, are essentially permanent in nature.

Project Effects

In American River, the project is expected to have some short term impacts, especially in terms of sediment yield, followed by long term improvements. The short term impacts are mostly in terms of sediment yield resulting from temporary road construction, road decommissioning, culvert removals and soil restoration.

In American River, all of the short term impacts fall within prescribed Nez Perce Forest Plan sediment yield and entry frequency guidelines. Long term trends of aquatic resources are discussed in Section 3.3 (fisheries). Alternative E has generally the widest spread between short term impacts and long term improvements. Alternative B, C and D scale roughly in that order in terms of the size of the short term impacts, relative to long term improvements in watershed condition.

In Crooked River, the project is also expected to have some short term impacts, especially in terms of sediment yield, followed by long term improvements. The short term impacts are mostly in terms of sediment yield resulting from temporary road construction, road decommissioning, culvert removals, soil restoration and instream improvements.

In Crooked River, all of the short term impacts fall within prescribed Nez Perce Forest Plan sediment yield and entry frequency guidelines. Long term trends of aquatic resources are discussed in Section 3.3 (fisheries). Alternative E has generally the widest spread between short term impacts and long term improvements. Alternative B, C and D scale roughly in that order in terms of the size of the short term impacts, relative to long term improvements in watershed condition.

Effects to the mainstem South Fork Clearwater River are expected to be relatively minor. The project is expected to produce a minor amount of short term additional sediment yield, followed by reductions of over time. No increases in water temperature are expected and a very slight reduction may occur over time as the effects of riparian planting on increasing shade begin to occur. The project is expected to comply with implementation guidelines under the South Fork Clearwater River TMDLs for sediment and water temperature.