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Missoula Ranger
District

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Upper Lolo Watershed Restoration

Environmental Assessment

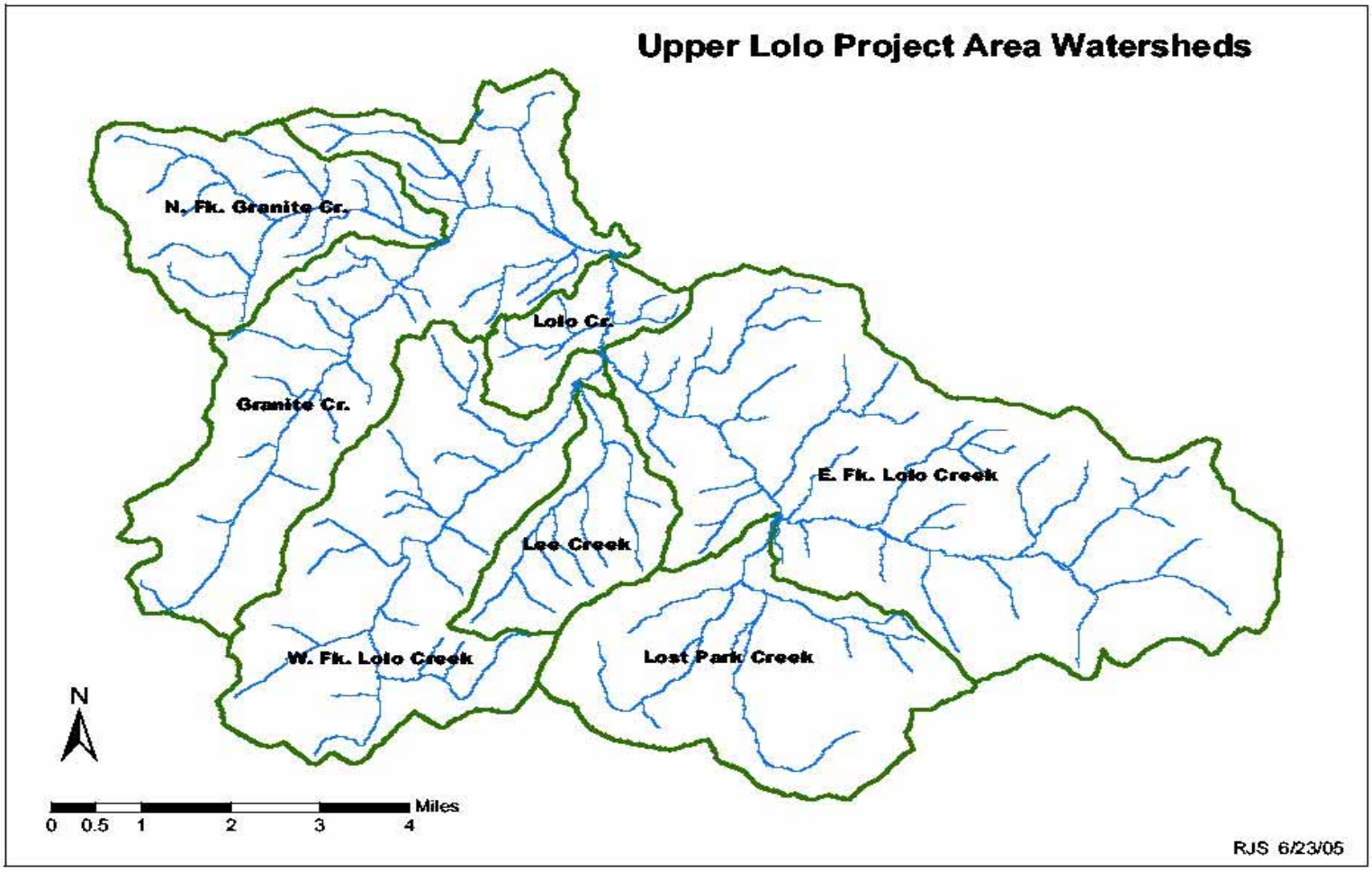

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Table of Contents

Chapter 1 - Purpose and Need for Action 1
Definition of Terms 1
1.1 Proposed action 2
1.2 Purpose and Need 3
1.3 Objectives 4
1.4 Scope 4
Issues identified during scoping 5
Issues eliminated from detailed study 6
1.5 Decisions to be made 6
1.6 Regulatory requirements 6
Chapter 2 - Alternatives 9
2.1 Introduction 9
2.2 History and process used to develop alternatives 9
2.3 Alternative evaluation and design 9
2.4 Alternatives considered and eliminated from study 10
2.5 Description of Alternatives 11
Alternative A, no action 11
Alternative B, proposed action: Restore Upper Lolo Watershed 11
2.6 Past, present and reasonably foreseeable actions 12
2.7 Comparing alternatives and predicted environmental effects 14
Chapter 3 - Affected Environment 17
3.1 Introduction 17
3.2 Description of affected resources 17
Roads 17
Soil and water 17
Fisheries 23
3.3 Description of resources not directly affected 26
Vegetation 26
Wildlife 28
Plants 28
Chapter 4 - Environmental Consequences 31
4.1 Introduction 31
4.2 Description of affected resources 31
Roads 31
Soil and water 33
Fisheries 37
4.3 Resources not directly affected 39
Vegetation 39
Wildlife 40
Plants 44
Chapter 5 - List of Participants 45

Chapter 1 - Purpose and Need for Action

Definition of Terms

This information is included here to help the reader understand terms and specifications used later in the document.

Road Management Definitions

"C" Restriction - Public motorized access is not allowed from Oct. 15 to June 15 except that snowmobiles are excluded from Oct. 15 to Dec. 1.

"F" Restriction - Public wheeled motorized access is not allowed from Oct. 15 to May. 15. Snowmobiles are excluded from Oct. 15 to Dec. 1.

"K" Restriction -Variable restriction on motorized access generally used to exclude wheeled motorized access on roads to provide for winter recreational activities such as snowmobiling.

"A" Restriction - Public motorized access is restricted yearlong.

"B" Restriction - Public motorized access is restricted yearlong except that snowmobiles are only restricted from Oct. 15 to Dec. 1.

Table 1.1 Lolo National Forest Road Closure Levels

Level	Device	Mitigation	Status
1	Gate	Blade, seed, fertilize. Normal drainage. Treat noxious weeds.	Remains on NFSR system; Maintenance Level 1
2	Gate, guardrail, concrete or earth barrier, or recontour at intersection	Type III dip , drivable waterbars, or outslope. Scarify 2-3 inches, seed and fertilize. May scatter slash on roadway. Treat noxious weeds.	Remains on NFSR system; Maintenance Level 1; if custodial care won't be performed, consider Closure Level 3 (self-maintaining).
3S Storage 3D Decommission	Recontour at intersection or rock or earth barrier	Waterbar or intermittent outslope. Remove CMP's and restore all watercourses to natural channels and floodplains. Rip 6-12 inches, seed and fertilize. May scatter slash on road. Treat noxious weeds.	3S -- Retain on NFSR system in long term storage (self-maintaining); generally up to approx. 20 years. 3D – Decommission, remove from NFSR system, road not needed for 20+ years generally.
4	Recontour at intersection or rock or earth barrier	Waterbar or intermittent outslope. Selective recontour along the road. Remove CMP's and restore all watercourses to natural channels and floodplains. Rip 12-18 inches, seed and fertilize. Scatter slash on recontoured slope. Treat noxious weeds.	Remove from NFSR system, road not needed for 30+ years generally.
5	Recontour	Recontour the entire road prism to almost pre-road conditions. Remove CMP's and restore all watercourses to natural channels and floodplains. Seed and fertilize. Scatter slash on recontoured slope. Treat noxious weeds.	Remove from NFSR system; road access not needed for 40+ years

Definitions

Permanently close- The road in question would be permanently removed from the National Forest System roads network.

Reclaim- The road in question would be permanently removed from the National Forest System roads network.

Decommission- The road would no longer function as a road, and would be officially removed from the system for a period of at least 20 years under a level 3-D (deep ripping, removal of culverts, installation of waterbars) or higher treatment.

Obliterate- The road prism is deep ripped, physical barriers are placed at intersections or they are recontoured, and culverts are removed.

Recontour- The land the road is on would be returned to more natural hydrologic function by deep ripping, culvert removal, and reshaping the road prism to closely match the original slope.

Classified Roads – Roads wholly or partially within or adjacent to National Forest lands that are determined to be needed for long-term motor vehicle access. This includes State, county, private and NFSR (National Forest System roads). (CFR 36 212.1)

Unclassified road- A road which is not currently identified and managed in the Forest roads inventory.

Jammer road- *Roads developed 30-40 years ago (also called unclassified roads.)* The high road densities that are characteristic of this road development are inappropriate under current management practices. In the analysis area, most of these types of unclassified roads have substantially vegetated and are generally not drivable by motorized vehicles. Jammer roads are currently not identified and managed in the Forest roads inventory.

Historic road- These are unclassified roads that were constructed 20 to 30 years ago which are no longer functioning as roads but have not been officially disposed to resource production. Typically these roads have only partially revegetated and have a road prism that is generally intact. In the analysis area, some of these roads have inadequate road prism drainage control and undersized culverts. Since these roads have not fully revegetated, the risk of sediment production is higher in comparison to the older unclassified roads that have more vegetation. Although vegetation cover is not as extensive on these roads, it generally prevents access by most motorized vehicles.

1.1 Proposed action

The Missoula Ranger District of the LNF (Lolo National Forest) is proposing to close and decommission some roads and improve a trail segment and some roads in Upper Lolo Creek, above Lolo Hot Springs. The project area drains into Lolo Creek, and then into the Bitterroot River southwest of Missoula, Montana.

The FS (USDA Forest Service) proposes to improve water quality and fish habitat while maintaining recreational and administrative access by:

- Removing or replacing 21 culverts that hinder fish passage or are undersized (not capable of handling a 100 year flood event).
- Permanently closing and reclaiming about 39 miles of overgrown historic roads and almost 24 miles of un-drivable jammer roads.

- Decommissioning just over 17 miles of FS roads that are no longer used. Most of these roads are currently closed to the public, except for snowmobile use.
- Reclaim about two miles of open, drivable FS road.
- Improving about 35 miles of major roads by applying BMP (Best Management Practices) upgrades to reduce sediment generated by the roads that is delivered into streams.
- Replace a culvert and improve drainage on Trail # 300.

The project area is located primarily within T11N, R23W, and R24W, with a small portion in R22W (see vicinity map 1-1). The Upper Lolo Creek Watershed is approximately 45,700 acres in size. The watershed is part of the Bitterroot River Sub basin of the Upper Clark Fork River. The principal tributaries in Upper Lolo Creek are Lee Creek, Granite Creek, and both the East and West Forks of Lolo Creek. Specialist reports later in this document may address different creeks, or only a portion of those listed here depending on the importance of the tributary to the resource being considered. Road mileages in specialist reports and tables may also differ for the same reason. Approximately 37 percent of the watershed area is owned by private landowners, the remainder is administered by the FS.

1.2 Purpose and Need

The purpose of this project is to improve water quality and aquatic habitat by reducing the amount of non-natural sediment delivered to streams by forest roads. The need for the project is discussed below.

In 1996 and 2003, the MTDEQ (State of Montana Department of Environmental Quality) listed Lee, Lost Park, Granite, East Fork Lolo and West Fork Lolo creeks as water quality impaired (303(d)) and unable to fully support the beneficial uses of fisheries or aquatic life. This is probably due to habitat alterations and siltation. Likely causes of the impairment include building and maintaining roads, winter sanding Highway 12, and old logging practices.

In 1999, the LNF completed an EA (Ecosystem Analysis) of the Upper Lolo Watershed. The purpose of the analysis was to find out if conditions in the watershed were consistent with standards for the area established in 1986 by the Lolo Forest Plan. The report found that conditions were below standards for watershed and fisheries, and that sediment from forest roads and Highway 12 were responsible for an estimated 99 percent of non-natural sediment. Sediment from the watershed adversely affects downstream fish populations.

In 2003 the MTDEQ completed a WQRP (Water Quality Restoration Plan) and TMDL (Total Maximum Daily Loads) for the Upper Lolo Creek area. The plan outlines steps that can be taken to improve water quality, including:

- Upgrading forest roads to meet BMPs.
- Reclaiming forest roads that are no longer needed for forest management.
- Replacing undersized culverts to better accommodate large floods.
- Reducing sediment delivery from Highway 12, through improved sediment traps, plowing techniques, and guardrail cleaning.

- Removing fish passage barriers that significantly affect the connectivity of native fish habitats.

1.3 Objectives

The objectives of the Upper Lolo restoration project are to:

- Improve fish habitat connectivity by removing or replacing structures that prohibit fish passage. MI (Measurement Indicator): Number of structures replaced or removed.
- Improve aquatic habitat and water quality by reducing sediment deposition from forest roads by applying upgrades. MI: Miles of road improved.
- Reduce overall road density and improve watershed hydrologic function by decommissioning surplus forest roads. MI: Miles of road decommissioned, obliterated, or put into storage.
- Maintain motorized recreation and administrative access. MI: Miles of groomed snowmobile trails decommissioned, miles of OHV (off highway vehicle) access reduced.

1.4 Scope

This section, defines the limits of the EA, relates a brief history of the project, and identifies relevant planning documents, and resource issues that helped shape the proposed action. The section also identifies resource issues eliminated from detailed analysis.

Project history

There are more than 330 miles of forest road on LNF and PCTC (Plum Creek Timber Company) lands intermingled in the watershed. Most of the roads were built for logging, but recreational use such as OHV/snowmobile use, rock climbing, crystal collecting, and hiking has become increasingly important in the last decade.

Following a watershed assessment in 1989, the Lolo put a 10 year moratorium on timber harvest on NF (National Forest) lands in Upper Lolo Creek because of adverse cumulative effects on water quality and fish habitat.

In 1996 and 2003 the State of Montana identified five creeks in the project area as “water quality limited,” meaning the water doesn’t meet state standards for aquatic life and fisheries. These creeks are the East and West forks of Lolo Creek, Lost Park, Lee and Granite creeks.

In 1998, bull trout were listed as a threatened species in Montana, Idaho, Washington, Oregon, and Nevada. Bull trout are found in four creeks in the project area, namely the East and West forks of Lolo Creek, Lost Park, and Granite creeks.

In 2003, the LNF and the State of Montana agreed to a WQRP, including a TMDL plan for the amount of sediment that can be delivered into the Upper Lolo Creek basin. The agreement identified where sediment was coming from, set goals for correcting problems, and assigned responsibility for restoration to the landowners. The LNF agreed to meet water quality standards and to take restoration actions identified in the WQRP.

In 2005, the LNF looked at how roads in the watershed are used (recreational traffic, legal requirements providing access to adjacent landowners and cost-share agreements, management needs for firefighting) in addition to assessing the aquatic risks.

Planning documents

This project area has had several EAs completed over the last few years. Two recent reports used in this analysis are:

- Upper Lolo Creek Report, Lolo National Forest 1999; and
- WQRP and TMDL for the Upper Lolo Creek TMDL Planning Area, Montana Department of Environmental Quality, 2003.

The 1999 Upper Lolo Creek Report is an analysis of the existing condition of the watershed, and how it departs from forest plan standards. Issues addressed in the report include: Industrial forestland ownership pattern and its effect on adjacent lands, aquatic and wildlife habitat needs, landscape vegetation composition and function, and administrative and recreational transportation needs.

The 2003 TMDL report discusses issues surrounding water quality. Watershed characteristics, water quality concerns, pollutant source inventory, an estimate of existing pollutants, water quality goals, and restoration targets are all part of the information found in the report. This report, along with the Upper Lolo Creek report is included in the project file.

The LNF has decided to address issues related to road sediment delivery and fish passage in this project. These issues are recognized to be the primary factors contributing to the MTDEQ 303(d) listing.

Issues identified during scoping

Issues that were identified during our scoping process focused on motorized recreation, fish passage, stream condition, timber harvesting, and noxious weeds.

Change in motorized recreation access

One major concern raised during scoping was recreational access for motorized users. This project proposes to close about 82 miles of historic, un-drivable jammer roads, and FS system roads which are no longer needed for administrative purposes. Many of the roads in the project area provide winter recreation opportunities for snowmobiles. In the summer and fall there is recreational use for hunting, rock climbing, and OHVs.

Fish passage and stream condition

Roads next to streams that do not meet Montana BMP requirements and culverts that prohibit fish passage or are undersized for a 100 year flood event are common within the project area. BMPs are designed to minimize sediment delivery to streams from road surfaces. Culverts that prohibit fish passage are barriers to linking aquatic habitats. Undersized culverts are likely to fail in a large storm event and deliver a pulse of sediment to adjacent water bodies.

Issues eliminated from detailed study

The following issues were not given detailed consideration under this proposal.

Timber harvesting

This analysis does not address timber harvesting. Future analysis is likely to include timber harvesting and vegetative rehabilitation.

Paving forest roads

Paving forest roads near streams may have adverse impacts on native fish populations. No paving is proposed in this project.

Noxious weeds

Noxious weeds are present in the project area. Weed treatment in the project area will follow Forest Plan Amendment 11 guidance, and will be conducted in accordance with product label directions.

1.5 Decisions to be made

The Missoula District Ranger is the responsible official and must decide:

- Whether to accept and implement the proposed action; and
- What mitigation and/or monitoring measures are required to meet forest standards and reduce resource conflicts.

The Missoula District Ranger must determine if the proposed action would or would not be a major federal action that would significantly affect the quality of the human environment. If it were determined the project would have a significant effect, then an EIS (Environmental Impact Statement) and Record of Decision would have to be prepared before the proposed action could be implemented.

1.6 Regulatory requirements

This section discusses the regulatory requirements the FS must consider and comply with during the planning process.

Clean Water Act

The MTDEQ is responsible for administering the Federal Clean Water Act requirements in Montana. The MTDEQ has divided Montana into TMDL planning areas, and is evaluating each planning area to identify WQLS (Water Quality Limited Streams). This project analysis and design has specifically addressed issues as identified in the WQRP prepared by the MTDEQ.

Montana Streamside Preservation Act

The FS, Region One and the Montana Department of Fish, Wildlife, and Parks signed a MOU (Memorandum of Understanding) in 1978, establishing the process of how the National Forests within Montana would implement the 1975 Natural Streambed and Land Preservation Act. Through this MOU and FS Manual Supplements, the process has been refined. Annually, the appropriate fisheries biologist reviews Forests' projects and

submits a permit for those projects that impact any fishery related streams, stream banks or channels, and their fish and game resources. The LNF would comply with this act by obtaining the necessary permits before project implementation.

Endangered Species Act and sensitive species

The ESA (Endangered Species Act) (PL 93-205), FS manual 2670.11, 2670.21 and 2670.31, and Lolo Forest Plan standards 24 and 27, all require that the LNF not only manage for endangered, threatened, and proposed species, but also recover them. The ESA states that all federal departments and agencies shall seek to conserve endangered and threatened species. The Forest Service Manual directs the Forests to manage National Forest System habitats and activities for threatened and endangered species to achieve recovery objectives so that special protection measures provided under the ESA are no longer necessary. The Lolo Forest Plan follows this direction and states all threatened and endangered species occurring on the Lolo will be managed for recovery to a non-threatened status. Formal consultation with the U. S. Fish and Wildlife Service is required only when a project may affect a listed species (50 CFR 402.14).

The Forest Service Manual and the Lolo National Forest Plan require the LNF to manage for sensitive species. The Forest Service Manual defines sensitive species as those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers, density or habitat capability that would reduce a species' existing distribution [FSM 2670.5(19)]. The Forest Service Manual directs the Forests to develop and implement management practices to ensure that sensitive species do not become threatened or endangered because of Forest Service actions (FSM 2670.22 and 2670.32). Lolo forest plan standard 27 also directs the Forest to manage sensitive species to maintain population viability. There are no forest management areas specific to sensitive species. Interim management recommendations outline plans to manage for viable populations of sensitive species in Region 1 (USFS 1992).

The proposed project would have no adverse impacts to any endangered, threatened, or sensitive fish, wildlife, or plant species, except for possible negative short term effects to bull trout. Refer to Chapters 3 and 4 for detailed discussion of the expected effects for each of these resources.

National Historic Preservation Act

Section 106 of the National Historic Preservation Act requires the Forest to consider the effects of proposed actions on historic resources. The Lolo Trail, a National Historic Landmark, passes through the project area. This trail is also the route of two national historic trails; The Lewis and Clark and the Nez Perce trails. The Lolo Trail was an important travel corridor for the Salish and Nez Perce peoples to access buffalo hunting areas and salmon fisheries of the Lochsa. The route was used by the Lewis and Clark Expedition in 1805 and 1806.

The proposed project may replace a culvert and improve drainage within the National Historic Landmark boundary. Consultation with Montana SHPO (State Historic Preservation Office) would occur before any trail work would be done. This project

would have no effect to significant heritage resources. Documentation from the Forest archaeologist is available in the project file.

National Forest Management Act

All resource plans, management practices, and activities proposed in this project have been evaluated for consistency with Lolo Forest Plan direction relevant to the project area. This requirement is documented by resource in the specialist reports available in the project file at the Missoula Ranger District.

Chapter 2 - Alternatives

2.1 Introduction

This chapter describes Alternative A, no action, and Alternative B: the proposed action. Based on the information presented in Chapter 3 and Chapter 4, this chapter presents the effects of each alternative in a summary and comparative form. This chapter will provide the decision maker and the public a clear basis for comparison and choice between the two alternatives.

2.2 History and process used to develop alternatives

The Council for Environmental Quality regulations requires analysis of Alternative A, no action. The no action alternative is used to help provide baseline information for the comparison of effects between alternatives as discussed in Chapter 2.

In 2003 the MTDEQ completed a WQRP and TMDL for the Upper Lolo Creek Watershed. The plan outlines steps that can be taken to improve water quality in the area. The interdisciplinary team prepared Alternative B: Upper Lolo Watershed Restoration Project to meet the needs and objectives as described in Sections 1.2 and 1.3 of this document.

On April 20, 2005, a scoping letter was sent to approximately 20 individuals, government agencies, and organizations describing the proposal and asking for feedback. An article on the project was published in the newspaper of record, *The Missoulian*, in May of 2005. Seven responses were received.

On June 29, July 15, and August, 3 2005, field trips were conducted with the Lolo Watershed Group, conservation organizations, and interested individuals to show examples of erosion problems and discuss the proposed action.

Comments received by mail and during field trips were generally in support of the project, and brought up issues related to road density and the effect on water quality, recreational motorized access, and noxious weed management.

2.3 Alternative evaluation and design

Alternatives were developed to meet objectives of the project while avoiding adverse impacts to other resource values. A decision between alternatives will be made based on the expected effects of implementing each alternative.

Evaluation and decision criteria

The following indicators were used to evaluate the alternatives:

- Fish barriers removed or replaced.
- Miles of road with BMP improvement.
- Miles of road decommissioned, obliterated, or put into storage.
- Miles of groomed snowmobile trails decommissioned.
- Miles of OHV access reduced.

Mitigation

Design criteria and mitigation measures can be used as needed to diminish adverse environmental effects under various road closure levels. Mitigation techniques applied would be used as needed on a site specific basis.

Generally, only structures at drainages would be removed. Structures which are used to drain ditches generally will not be removed unless they are located within an area to be recontoured under level 4 or 5 closures or unless the ditch carries a significant amount of water.

Mitigation for the water resource would include using short term sediment buffering devices (straw bales, coconut mats, etc.) at stream crossings where work would be performed.

Impacts for fisheries would be mitigated by timing implementation of any in-stream work to the period between July 15 and September 1. This time period is a window during which trout are not spawning and so are not likely to be present in tributary streams.

The project would not impact any threatened or endangered terrestrial species; therefore no specific mitigations are required. Individual elk may be temporarily displaced during project implementation, but analysis of these effects is not practical at this time as the timing for work is indefinite and depends on a variety of factors.

In order to mitigate for botanical resources, FS road 33114 would receive a modified level 3 treatment. This modification will avoid impact to the existing *Orogenia fusiformis* occurrence, while leaving most of the road open as potential habitat for further colonization. Site specific mitigation details for the botany resource are available in the project file.

2.4 Alternatives considered and eliminated from study

A focus on restoration

An alternative was suggested that represented an all-encompassing, ideal scenario for watershed restoration in the Upper Lolo Creek area. It included provisions for consolidating PCTC lands with LNF lands; arriving at road densities of less than 2 miles per square mile within the project area within a short timeframe; focusing management on restoration activities; adopting the principles for restoration as outlined in the Citizens Call for Ecological Forest Restoration; managing under a fire use regime when naturally ignited fires occur; including economic benefits of road closures and improvements; and including a well-defined and prioritized schedule for road decommissioning and improvement.

Budgetary and scheduling concerns were the primary reasons for not considering this alternative in detail. The costs associated with watershed restoration are high. The agency budgets do not afford many opportunities to conduct restoration activities without an associated revenue generating project, such as a timber sale.

It is expected that a combination of appropriated and contributed funding will be necessary to implement the projects outlined in this analysis. To that end, it is also

expected that we will need to accomplish projects as money becomes available, and perhaps not in a pre-scheduled timeframe.

The proposed action is a good starting point and allows us to make some headway toward restoration. We will strive for a more ideal alternative in the future.

Reduce road density to 1.5 miles per square mile

A second alternative was proposed to reduce road density to 1.5 miles of road per square mile. This alternative was not developed for several reasons.

Many of the roads administered by the FS in the project area provide access to private land. The FS is required by law to provide access to private holdings. Many of these roads are under cost share agreements with PCTC. The agreements preclude the Forest from closing these roads. Fire fighting, recreation, and vegetation management require road access. If the Forest adopted a goal of reducing road density to 1.5 miles per square mile of forest roads in the area, it would not be acceptable for administrative and public access.

Treat all roads with a level 2 closure

Level 2 closure implies the road will be kept on the NF road system, and recurring maintenance is required. Undersized CMPs (corrugated metal pipes) would remain in place. The cost of upgrading CMPs to withstand 100 year flood events would be prohibitive, especially since many of the roads are surplus. This level of closure includes scarification of the road rather than deep ripping. Scarification is not as effective in restoring soil infiltration and reducing compaction. The Forest wants to improve the hydrologic function of the watershed, and also reduce maintenance requirements and costs, particularly for roads which are no longer needed.

2.5 Description of alternatives

Alternative A, no action

The no action alternative would continue current management. This alternative would not alter conditions in the watershed. Sedimentation from forest roads and fish passage restriction by undersize CMPs would continue. Recurring activities in the area include public recreation like snowmobiling and hunting, and administrative activities like road maintenance.

Alternative B, proposed action: Restore Upper Lolo Watershed

This alternative would close approximately 39 miles of historic road, 17 miles of un-drivable road, 24 miles of jammer road, and 2 miles of open system road. Methods would include level 3, level 4, and level 5 decommissioning. This alternative would also apply BMP upgrades on about 35 miles of major roads, remove or replace 21 culverts that hinder fish passage or are undersized, and replace a culvert and improve drainage on trail #300.

About 54 miles of road are proposed for treatment by level 3 closures. This includes installing waterbars or intermittent out-slope, removal of culverts, restoration of watercourses to natural channels and floodplains, ripping to a depth of 6-12 inches,

seeding and fertilizing the roadbed, and scattering slash on the disturbed area. Seeding and fertilizing may not be necessary in a forested environment, and will be considered on a site specific basis.

There are about 12 miles of road proposed for treatment with level 4 closures. This is similar to level 3, except with selective recontouring the road prism at locations other than intersections, mostly in areas next to watercourses.

Level 5 closures would be used on roads next to running streams, on every other road in areas of high road density, and particularly on jammer road systems. Closure methods used for jammer roads will be site specific and so specific mileages would vary. In addition to many of the jammer roads, there are about 3 miles total of National Forest System road and historical road proposed for treatment at level 5. This involves recontouring the road prism to near pre-road condition, removal of culverts, restoration of watercourses to natural channels and floodplains, seeding and fertilizing disturbed areas where necessary, and scattering slash on recontoured slopes.

Estimated cost of implementing BMPs on roads 9942, 699, and 2195 is $749,000. Decommissioning cost is estimated at $256,000. Replacement of drainage structures is estimated at $349,000. The total cost is estimated at $1,354,000. The costs described above are for implementation only, and do not include engineering or field data collection costs.

About 78 miles of road in the analysis area are under cost share agreements with PCTC. Under these agreements, the initiating party is responsible for the cost of improvements unless the other party agrees to share in the expense. Discussion of cost sharing with PCTC for improvements outlined in this project has not been initiated to date.

2.6 Past, present and reasonably foreseeable actions

The watershed has a long history of human use. American Indians used the area as a travel corridor and food gathering area. The historic Lolo trail, used by American Indians and the Lewis and Clark expedition passes through the area. In 1903 a hotel was constructed at the Lolo Hot Springs. Large bands of sheep grazed the area from about 1910 to1940.

About 38 percent of the watershed is privately owned. PCTC owns most of the private land in the area, except about 272 acres around Lolo Hot Springs. PCTC is an industrial forestry company that manages their land for forest products. Industrial forestry began in the area around 1950, and continues today.

The Lolo Hot Springs Resort is a privately owned business that operates near the project area. The Resort is a year round center for dispersed recreation, including hiking, rock climbing, cross-country skiing, horseback riding, ATV rentals, and snowmobiling.

The Lolo Pass Visitor Center is near the area. The facility is maintained by the Clearwater National Forest, and provides dispersed recreation opportunities similar to the Lolo Hot Springs.

About 63 percent of the watershed area is NF land. Active timber harvesting began in the 1950’s, but was suspended for a 10 year period beginning in 1989. The suspension was due to cumulative effects of all harvesting in the watershed. Concerns related to elk

security, water quality/yield, and fish habitat prompted the temporary suspension of NF harvesting.

An extensive road system was developed with the cooperation of other landowners in the area. A cost share agreement resulted in a single road system to serve all lands. Parties to the agreement have exchanged road easements and shared costs of development and maintenance.

Past activities

Road building, industrial forestry, NF harvesting, and sanding of Highway 12 have had the greatest impact on the Upper Lolo Creek Watershed. One result of these activities has been increased sediment delivery to creeks. Many roads are adjacent to stream channels, or have multiple stream crossings. Roads generally contribute to sediment delivery by increased overland flow, surface erosion, and failure of crossings during flood events due to undersized culverts.

Prior to the mid 1980's, clear-cuts commonly went through riparian areas. Historic harvesting practices did not apply buffer areas (areas of no or limited cutting) near streams. This practice, along with road right of way clearing, has impacted aquatic habitat by removal of coarse woody debris that could have been recruited for habitat needs.

Present actions

Recreation and industrial harvesting are the primary activities in the watershed today.

Current forestry practices on all ownerships must comply with the State of Montana BMP laws, which help protect aquatic resources by restricting the use of mechanized equipment and tree removal associated with harvesting inside riparian zones.

Motorized recreation can disturb wildlife. Many roads administered by both NF and PCTC are gated to prevent motorized access for recreational purposes and to provide wildlife security.

Reasonably foreseeable actions - future actions

PCTC will likely continue industrial harvesting, which may or may not include additional road construction.

As part of the TMDL plan, PCTC has agreed to upgrade roads in high priority watersheds (Granite Creek, E. and W. Fork Lolo Creeks) to meet BMP standards, correct fish passage barriers and reclaim surplus roads by 2010, as well as ensure new culverts meet at least a 50 year peak flow event. Any new road construction will meet enhanced standards, such as gravelling road treads that cross streams. For watersheds that contain bull trout, Plum Creek has agreed to provide stream protections above the level required by the State of Montana Streamside Management Zone regulations.

2.7 Comparing alternatives and predicted environmental effects

Recreation

Alternative A would not change recreational use in the project area because current management of the area would not change under this alternative.

Alternative B would have a minimal effect on public recreational opportunities in the area, particularly for motorized access. Roads closed by level 3 and level 4 closure would become more difficult for motorized recreation. Motorized wheeled access would not be possible, and snowmobile access would be increasingly difficult as revegetation occurred. With level 4 closures, snowmobile access would be very difficult on restored slopes. Areas where culverts are removed or waterbars are installed may become difficult to pass. Roads closed by level 5 closures would become impassible to OHV and snowmobile users, as the road prism would be obliterated. Many of these roads are already closed due to vegetation in the road or are currently off limits to public use, so the overall impact to motorized users would not be great.

Activities such as hunting, hiking, or crystal collecting may be affected. Foot traffic will be more difficult on recontoured slopes and ripped roadbeds, and will become increasingly difficult as revegetation occurs. As with motorized use, many of the roads proposed for closure are currently impassible to non-motorized users due to vegetated roadbeds, so the overall impact for recreationists should not be substantial.

The following table indicates the change in management of the National Forest System Roads in the analysis area from the existing condition under the action alternative.

Table 2-1. Forest road summary by alternative

	Alternative A (no action)		**Alternative B (proposed action)**	
	Miles	Change	Miles	Change
Open	18.76 mi	0	16.98 mi	- 1.78 mi
Seasonal restriction				
C restriction	0.09 mi	0	0.09 mi	0
F restriction	18.94 mi	0	15.60 mi	-3.34 mi
K restriction	51.33 mi	0	51.00 mi	-0.33 mi
Yearlong restriction				
A restriction	6.66 mi	0	5.69 mi	-0.97 mi
B restriction	64.19 mi	0	46.91 mi	-17.28 mi
Decommissioned road	0	-	(23.70) mi	-
Total	159.97 mi	-	136.27 mi	-23.70 mi

Fisheries and stream condition

Under alternative A, no action, there would not be any change in fishery or stream condition. Forest roads would continue to deposit non-natural sediment loads into streams by surface erosion. Undersized culverts would remain a problem. Fish passage would continue to be restricted, and many of the structures in place are not designed to withstand a 100 year flood event and so are likely to fail. Culvert failure is associated with sediment delivery.

With alternative B, proposed action, an improvement in both stream and fishery conditions would be expected in the long term. Stream conditions would be improved by

reducing long term sediment deposition (tons/year) from forest roads. Fisheries would be improved by removing 21 structures which are impassible for fish.

Table 2-2. Comparison of Alternatives

Objective	Alternative A (no action)	Alternative B (proposed action)
Improve fish habitat connectivity		
Fish barriers removed	0	4
Improve aquatic habitat / water		
Miles of road with BMP improvements	0	35.65
Number of culverts replaced (Fish passage and 100-year flood)	0	17
Reduce road density and improve hydrologic function		
Miles road level 3 closure	0	54
Miles road level 4 closure	0	12.3
Miles road level 5 closure	0	3.06 + many jammer rds
Maintain adequate recreational and administrative access		
Miles groomed snowmobile trails reduced	0	0
Miles OHV access reduced	0	0

Chapter 3 - Affected Environment

3.1 Introduction

This chapter describes resources that would likely be affected by implementation of the proposed action. With the description of alternative A, no action in Chapter 2 and the predicted effects outlined in Chapter 4, this chapter will help establish a baseline for comparison of environmental effects between alternatives.

3.2 Description of affected resources

Roads

Existing road system

There has been extensive road system development within the project area including both primary access (arterials and collectors) as well as local roads that consist primarily of timber resource access roads. This development has occurred on both NF land and the intermingled corporate land. Many of the local roads are not needed for timber access based on current yarding technology and land management philosophy. A significant portion of the primary access road system and some of the local roads are managed and maintained under a co-operative agreement between the FS and PCTC which is the primary private land owner in the area. Although road system development in the area has been almost exclusively associated with access for timber management, recreational activities on the existing road system have become increasingly important and include general dispersed recreation activities, snowmobiling, cross country skiing and mountain biking.

The existing NF road system in the analysis area is comprised of unclassified and classified roads. An unclassified road is one that is on NF lands, but is not managed as part of the forest transportation system (36 CFR 212.1). Classified roads are wholly or partially within or adjacent to National Forest lands, and are determined to be needed for long-term motor vehicle access. This includes State, County, private and National Forest System roads (CFR 36 212.1). There are some private roads in the area, most of which belong to PCTC, and also a private road that provides access to other private land in the area. Federal Highway US 12 crosses the analysis area in a north-south direction.

Approximately 44% (71 miles) of the National Forest road system in the analysis area is presently closed to public wheeled motorized access on a yearlong basis. There is extensive public snowmobile recreational activity in the analysis area. Several roads in the analysis area are used as a designated ski trail and hiking trail, while additional roads in the area are used for other non-motorized recreational activities. A comprehensive roads analysis is available in the project file.

Soil and water

Physical setting

The major streams in the Upper Lolo Analysis Area are the West Fork of Lolo Creek, Lee, Granite, North Fork Granite, and the East Fork of Lolo Creek. Elevations range from

4400 feet at Granite Creek to 6500 feet along the Idaho-Montana divide. Average annual precipitation is approximately 50-60 inches per year and varies from 80 inches along the divide to 30 inches per year in extreme lower elevations. Available snowmelt is the main source of rise in the spring hydrograph. Summer thunderstorms are quite frequent and cause streams to rise abruptly, but for relatively short durations.

The area's geology is primarily Idaho Batholith, a large granitic intrusion into the local metasedimentary rocks. The granitic bedrock in most places is highly weathered. Mountain glaciers occupied much of the area. This glaciation has left the upper elevations steep and dissected with valley bottom deposits of glacial materials. The ice-modified landscapes have high water tables and have many seeps associated with them. The majority of the geology within the analysis area has a high erosion potential if disturbed due to the non-cohesive and infertile nature of granite. Steep slopes, high water table, high drainage density, and high annual precipitation magnify the potential for erosion once the soil mantle is disturbed. When disturbed, erosion is usually in the form of surface erosion and minor slumping, not mass failures.

Dominant Land Systems Inventory (LSI) (USDA, 1988) units in the project area are: 10UC, 10UB, 30KB, 30KA, 30GB, 30QB, 30SA, 33UA, 32KA, 38KA, 41KA, 42KA, 46KA, 48KA, 60 KA, 64KA, 64KB, 64MC, 64MD, 64MG, 64QE, 64QB, and 64QG. LSI numbers relate to landform, first letter to geology and parent material, second letter to habitat type (habitat type is not defined below). Several maps and overlays of the LSI groups are available in the soil and water specialist report in the project file.

Table 3-1. Upper Lolo Watershed LSI components

10	Floodplains and low stream terraces
30	Moderate relief mountain slopes, 30-55%
32	Broadly convex ridges
33	Broadly convex ridges strongly frost churned
38	Undulating uplands, old ice cap features
41	Steep subalpine ridges, headwalls, and mountain slopes
42	Glacial cirque bottoms
46	Glacial valley trains - 10-35% slopes
48	Glaciated and 55-75% slopes
60	Stream break lands - GT 65% slopes
64	Steep mountain slopes - GT 55% slopes
U	Undifferentiated alluvium on terraces/floodplains
K	Weakly consolidated, weathered granitic rock
G	Well weathered granitics, fine textured
Q	Weakly weathered metasedimentary rocks
S	Mica schist and associated rocks
M	Moderately weathered metasedimentary rocks

Dominant human influences

The primary influence in the planning area is roads – U.S. Highway 12 and forest roads. Timber harvest and grazing have also played an influential role in the watershed. Because this project focuses on roads and associated structures, discussion of impacts related to harvesting and grazing will be limited in this document.

State Highway 12 parallels the West Fork of Lolo Creek and is within 300 ft. of the stream throughout the majority of its length. The highway is a constant sediment source from induced stream bank erosion, eroding ditches and fill slopes, and highway winter

sanding. Field crews working in the West Fork of Lolo Creek refer to the bottom being filled with "sand dunes" of highway sand. Samples taken of sand collected on the roadway and stream have asphalt in them as well.

Roads affect runoff production and consequently, sediment delivery. Because their surfaces are compacted, infiltration is limited which potentially increases and speeds runoff and increases sediment delivery to the stream network. Ditches route runoff along roads, and sometimes to streams. Streams in the analysis area show above natural levels of depositional sediment based on field observations, measurements, and modeling. Cumulative particle distributions for channel types located in Lost Park, E. Fork of Lolo, and the N. Fork of Granite Creeks show that the heavily developed drainages have higher percentages of fine sediment in their substrates than the “reference” stream—N. Fork Granite Creek. Road erosion typically has resulted in trenches or raveling down the travel way and ditch, sometimes trenches are up to 3-5 feet deep and hundreds of feet long.

There are many stream crossings in the Upper Lolo Watershed, and many have failed in the past mainly because culverts are undersized, but some failures were due to lack of maintenance. Large failures caused by inadequate culvert size have recently been repaired on roads No. 2195 and No. 9942 (see the soil and water section of Chapter 4 for details on road densities, crossing numbers, and crossing densities).

As flood waters are forced into the normal active channel by road confinement, stream energy is not dissipated on the floodplain as it would naturally. When channels are straightened and have less floodplain than what they developed under, increased bank erosion results. The consequences of bank erosion in the analysis area are many. Streams have become wider and shallower and are much less efficient at transporting flow and sediment - at a time when both sediment and water yields have increased. Active and potential woody debris recruitment has been affected by road encroachment which in turn has affected energy dissipation capabilities and aquatic habitat. Removal of woody debris and riparian shrubs along portions of the mainstem, downstream of the analysis area, has compounded the problem significantly. Analysis of aerial photographs beginning in the 1930’s revealed that the streams have become unstable and developed more depositional bars than reference reaches. Beaver activity was present in the past, but is not now evident. The West and East Forks of Lolo Creek have lost significant amounts of stream length in sensitive response reaches. A portion of Granite Creek that is very sensitive, but where the road is greater than 300 feet from the stream, has not noticeably changed at all in the last 60 years.

Highway spills are a constant threat and have occurred in the past (Watershed report, asphalt spill, 1979). The potential for fish kills from spills of toxic materials is high.

Regulatory framework

The following documents provide guidance and regulations for managing watershed resources:

- Lolo Forest Plan Objectives, Standards and Guidelines
- INFISH portion of Forest Plan, including interim RMO (Riparian Management Objectives)
- Montana Forestry BMPs

- Clean Water Act
- National Non-point Source Policy (December 12, 1984), the Forest Service Non-point Strategy (January 29,1985), and the USDA Non-point Source Water Quality Policy (December 5, 1986)
- Montana State Water Quality Standards

Montana State Water Quality Limited Streams

Lee, Lost Park, Granite, East Fork Lolo and West Fork Lolo creeks are listed in the State 305(b) 1996 Report as water quality limited water bodies [i.e., 303(d) listed]. For each the probable impaired uses are aquatic life support and cold water fishery. The probable cause of each can be referenced and includes primarily siltation, but also includes other habitat alterations, flow alteration, and thermal modifications. Probable sources can also be referenced and include silviculture, logging road construction/maintenance, agriculture, grazing, highway/road/bridge construction, irrigated crop production, etc. The 2004 303(d) list of impaired water bodies includes the following segments:

Table 3-2. 2004 303(d) listed water bodies

Water body segment	Use support	Probable sources of impairment
Probable causes of impairment : Siltation, other habitat alterations		
Lolo Creek (headwaters to Sheldon Creek)	*Partial support*: aquatic life, cold water fisheries *Full support:* recreation, agriculture, industrial use *Not assessed:* drinking water	Silviculture, construction, highway/road/bridge construction, habitat modification (other than hydromodification)
Granite Creek (entire)	*Partial support:* aquatic life, cold water fisheries *Full support:* agriculture, industrial use *Not assessed*: drinking water, recreation	Silviculture, logging road construction/maintenance
East Fork Lolo Creek (entire)	*Partial support:* aquatic life, cold water fisheries *Full support:* recreation, agriculture, industrial use *Not assessed:* drinking water	Silviculture, logging road construction/maintenance, highway maintenance and runoff
West Fork Lolo Creek (entire)	*Not supported:* aquatic life, cold water fisheries *Not assessed:* drinking water, recreation, agriculture, industrial use	Silviculture, habitat modification (other than hydromodification), bank or shoreline modification/destabilization, highway maintenance and runoff
Lost Park Creek (entire)	*Partial support*: aquatic life, cold water fisheries *Full support:* agriculture, industrial use *Not assessed:* drinking water, recreation	Silviculture, habitat modification (other than hydromodification), bank or shoreline modification/destabilization, highway maintenance and runoff
L*ee Creek* (entire)	*Partial support:* aquatic life, cold water fisheries *Full support:* drinking water, swimming, agriculture, industrial use	Silviculture, logging road construction/maintenance, habitat modification (other than hydromodification), bank or shoreline modification/destabilization

From a management perspective in 303(d) listed watersheds, the Forest Service is obligated to successfully implement FS standards and guidelines to maintain desirable stream and water quality conditions. In areas where we do not meet standards and guidelines, all of our actions must be accountable to improving the condition.

Existing conditions

The Rosgen Stream Classification System is an excellent tool for stratifying streams and for determining how they function naturally and respond to certain influences. The basic classification (Level I), consists of A, B, C, D, E, F, and G channel types. Generally, Level II classification pertains to the channel substrate as either being bedrock, boulder, cobble, gravel, sand, or silt/clay (e.g. 1, 2, 3, 4, 5, and 6, respectively). Channel types vary in their sensitivity to disturbance and their recovery potential, once disturbed. Generally speaking, the A, C, and E type channels in the project area are very sensitive to disturbance, while the B type channels are moderately sensitive. The A type channels have very poor recovery potential, but the remaining types have good to excellent recovery potential. Table 3-3 below displays the major stream types and the percentage within each drainage.

Table 3-3. Major stream types

Stream Type	A	B	C	D	E
Analysis area	57	34	6	1	2
West Fork Lolo Creek	55	31	6	2	6
East Fork Lolo Creek	60	35	3	1	0
Lost Park Creek	44	56	0	0	0
Lee Creek	69	25	6	0	0
Granite Creek	54	32	10	1	3
North Fork Granite	60	29	11	0	0

Road density

Road densities in the major drainages are high and have steadily increased (refer to soil and water discussion in Chapter 4). Recent research has shown that generally when a drainage has a road density of about 2 miles/sq. mile, water quality and stream conditions begin to be negatively impacted (UCRB, 1996). An independent analysis on the Lolo has found similar results. That is, at road densities around 2 miles/sq mi., streams show signs of negative impacts (Riggers et al 1998).

According to the "Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin", many of the aquatic strong holds occur in areas of low road density. The higher the road density, the lower the proportion of sub watersheds that support strong populations of key salmonids. Table 3-4 shows these road density classes (USDA, 1996).

Table 3-4. Road density classes

Road density class	Road density
Extremely high	4.7 + road miles/square mile
High	1.7-4.7 road miles/square mile
Moderate	0.7-1.7 road miles/square mile
Low	0.1-0.7 road miles/square mile
Very low	0.02-0.1 road miles/square mile

Most jammer-type roads are not indicated on maps, but they are common. Surveys have not been conducted on the majority of jammer and non-system roads in the analysis area due to budget and personnel constraints. However, surveys completed (less than 15% of the analysis area) indicate plugged or partially plugged culverts, failing log culverts, perched outlets, and other outdated structures on approximately two-thirds of the roads surveyed.

Sediment and water yield

Initial cumulative effects analyses for the Upper Lolo Creek area date back to 1987. A WATBAL computer model run was completed in 1989 for the major basins in this analysis area. Sediment modeling for the Upper Lolo Creek Analysis Area was repeated in 1997-1998; results are displayed in Table 3-5. What is most notable about these results is the disproportionate amount of sediment produced by roads relative to past timber harvest.

Table 3-5. Total fine sediment delivery

	Sediment delivered	Increase above natural
Natural fine sediment delivery	562 cu yd/year	N/A
Fine sediment generated from roads	2,364 cu yd/year	421%
Fine sediment generated from timber harvest	19 cu yd/year	3%
Capacity of one dump truck is 10-12 cubic yards		

Looking at each drainage separately, sediment production varies. Lost Park Creek is producing the most and Lee Creek is producing the least. There is a significant difference between all of the drainages and the North Fork of Granite Creek. Obvious differences in the North Fork of Granite Creek are lower road densities, fewer stream crossings, and fewer roads paralleling the stream.

Measured data verifies the same trend - fine sediment production is substantially increased above natural amounts for the entire analysis area, but differs by drainage. All drainages have very high sediment outputs except the North Fork of Granite Creek. Suspended sediment during spring runoff was measured in Lee, Lost Park and the North Fork of Granite creeks for a period of 10 years and is described in monitoring reports in the early 1990s. The two developed drainages, Lost Park and Lee Creek had much higher magnitudes and variance of suspended sediment than the North Fork of Granite Creek (Lolo Watershed Monitoring Report, 1990).

Another analysis adds additional confirmation. Table 3-6 displays the results of measured data verses modeled data for Lee, Lost Park and North Fork of Granite Creeks. Total annual fine sediment yields were calculated using measured values taken during 100 days of peak runoff each year for 10 years. During this peak runoff period about 85 percent of the total annual sediment load is transported. The remaining15 percent is typically generated from storm peak flows which were added to get the total annual amount. Rain-on-snow events are not accounted for in modeled or measured values, which suggest that values may be higher.

Table 3-6. Comparing measured sediment delivery to modeled

Stream	Measured	Modeled
Lee Creek	150 cu yd/year	230cu yd/yea
Lost Park Creek	242 cu yd/year	410cu yd/yea
N Fork Granite Creek	161 cu yd/year	132cu yd/yea

It is important to recognize that neither the measured or modeled data takes into account potential crossing failures, ditch erosion, nor other failures observed in the analysis area. Neither the model nor measured values account for severe storms such as rain-on-snow events which may also occur in this area. And, it is unlikely that measured data was taken during the timeframe that culvert failure and major ditch erosion occurred. Consequently,

it is realistic to say that the WATSED model and measured values are conservatively estimating sediment outputs and likely are under-estimating what is actually occurring.

Fisheries

The primary streams in the Upper Lolo analysis area include the West Fork and East Fork of Lolo Creek, Granite Creek, and Lee Creek. These streams collectively form the headwaters of Lolo Creek, a significant tributary to the lower Bitterroot River. Lolo Creek is a priority bull trout watershed, meaning it is key for recovery of this species. It is also an important west slope cutthroat rearing tributary for the Bitterroot River.

Fish populations

Historically, fish populations in the Lolo Creek drainage were dominated by fluvial west slope cutthroat and bull trout which migrated out of the Bitterroot River to spawn in Lolo Creek. Resident forms of these two species occupied smaller tributaries and headwaters of larger streams in the drainage. Other species, such as mountain whitefish, suckers, squawfish, sculpins and dace were also present, and were important components of the aquatic ecosystem.

Lolo Creek was probably one of the most significant spawning and recruitment tributaries to the lower half of the Bitterroot River due to its relatively large size, location in an area with few other large tributaries, and abundance of low gradient C channel types which provide high quality spawning habitat. Within the Upper Lolo Analysis Area (i.e., East Fork, West Fork, Granite Creek) the most significant spawning tributaries for fluvial cutthroat and bull trout from the Bitterroot River were found. Snowshoe Falls, about half-way up the West Fork, was generally a barrier to upstream migration. However, westslope cutthroat were able to move above the falls at some time in the past, because there are currently resident populations in this area. The rest of the stream network was generally accessible to migratory fish.

Because Lolo Creek drains relatively unproductive granitic geologies, fish population densities were probably never as high as in similar streams flowing through metasedimentary geologies. However, the higher proportion of C and E channel types (which generally provide more complex habitat per unit area than B and A types) in the watershed, relative to other similar sized streams, may have compensated for the low productivity of the soils.

Currently, fish populations in the Lolo Creek drainage are well below historic levels, and are composed of very different species assemblages. In addition to the above mentioned species, non-native rainbow, brown, and brook trout are present in relatively high densities throughout the watershed. The once large migratory runs of cutthroat and bull trout are fewer now, and are replaced by relatively large spawning runs of rainbow and brown trout. Resident brook trout occur in relatively high densities in most tributary streams in the watershed. These fish significantly affect native populations of west slope cutthroat and bull trout through hybridization, displacement, and competition, resulting in smaller populations of natives.

Recent snorkel surveys to determine bull trout presence and distribution in the watershed has shown bull trout to be present in more watersheds than originally expected. To date,

they have been identified in Lost Park Creek, West Fork Lolo Creek, Granite Creek, North Fork Granite Creek, Howard Creek, Grave Creek, Cooper Creek, and the South Fork Lolo Creek complex. Due to the presence of bull trout in such a high percentage of tributaries in the watershed, the entire Lolo Creek Watershed has been listed as a Bull Trout Priority watershed under the Terms and Conditions of the U.S. Fish and Wildlife Service Steelhead/Bull trout Biological Opinion for National Forest Land Resource Management Plans. It is important to note that this new information is only indicating that bull trout are present in these streams, and does not infer anything about population levels or viability.

There are several human-related factors which have contributed to the currently low populations of native species in the watershed. Habitat changes resulting from road construction, logging and grazing have had significant effects in the watershed. The removal of willows and cottonwood stands from low gradient reaches, and the consequential reduction in beavers and their positive influences on habitat, has also had an effect on habitat potential in the watershed. The mainstem is unstable due to a combination of these factors. Barriers at road crossings and from irrigation withdrawals make it difficult or impossible for remaining fluvial fish to access much of the available spawning and rearing habitat in tributary streams. Loss of downstream migrating juvenile fish to irrigation ditches is probably another significant factor. Fishing regulations may also affect populations by inadequately protecting west slope cutthroat trout. Finally, exotic species and habitat impacts in the Bitterroot River have an off-site effect on populations in Lolo Creek and the Upper Lolo Analysis Area.

Fish habitat

For fisheries habitat analyses, the reference conditions database developed from surveys across the forest from 1989 to 1995 is used as reference (Riggers et al, 1998). Streams in the analysis area are compared to groupings of similar streams in un-roaded areas across the forest, stratified by channel type, stream order, and primary geology. This enables us to depict the existing condition of surveyed streams in the analysis area based on means and ranges from streams representing natural conditions.

From this habitat data, it is evident that habitat conditions are generally below those found in reference stream systems. The percentage of pool area and the average pool volume in these streams is significantly less than in undeveloped watersheds, especially in Lost Park Creek. Sediment levels are elevated. The amount of eroding banks is higher than in reference watersheds. Again, Lost Park Creek has significantly more eroding banks than its reference stream data set. Wetted width/depth ratios and undercut banks are variable as compared to reference conditions, with Lost Park showing poor conditions for these variables and other streams showing good conditions for them. Also, there are several known migration barriers that impact fish populations differently than under reference conditions.

Past influences

The Upper Lolo Creek Analysis Area has experienced three significant human influences over the past several decades. The primary influence is roads – U.S. Highway 12 and forest roads. Timber harvest has also played an influential role in the watershed, as has

grazing. The combination of these influences has negatively affected the watersheds – their aquatic habitat and fisheries – by causing increased bank erosion, increased water yield, increased sediment, a reduction in stream shading and riparian health, and habitat fragmentation. These same influences have changed stream dimension, gradient, and pattern in some reaches, leading to further impacts to fisheries habitat.

Specific to the analysis area, State Highway 12 parallels the West Fork of Lolo Creek and is within 300 ft. of the stream throughout the majority of its length. The highway is a constant sediment source from induced stream bank erosion, eroding ditches and fill slopes, and from highway winter sanding. The highway negatively affects the West Fork by significantly altering stream morphology through direct and indirect changes in stream dimension, pattern, and gradient. Spawning habitat has been significantly reduced by large volumes of road sand filling in pool tail-outs and riffles. Many small tributaries are truncated and run through culverts, creating fish barriers. Highway spills are a constant threat and have occurred in the past (Watershed report, asphalt spill, 1979). The potential for fish kills from spills of toxic materials is high. The highway provides direct fishing access to most of the stream within the analysis area, resulting in significant impacts, especially to cutthroat, which are extremely vulnerable.

Forest road densities are very high, especially along stream corridors. The extensive road networks along and crossing riparian zones have the largest negative effect on streams and aquatic habitat, and also directly affect fish populations by providing easy access to fishing areas. Stream crossings are numerous and many have failed in the past mainly because they are under-sized, or due to lack of maintenance (e.g. pulling woody material and sediment from culvert inlets). Many ditches or ditch relief culverts divert sediment-laden water directly into stream courses. Eroding ditches and unprotected road surfaces are producing large quantities of sediment. This sediment is resulting in significant impacts to native fish populations through reductions in spawning success, habitat complexity, and aquatic insect productivity in the system. Table 3-7 shows the amount of roads paralleling streams within 300 and 100 feet for the total stream length and the sensitive stream lengths. As the table indicates, all of the streams have a high proportion of their length directly or indirectly affected by roads.

Table 3-7. Riparian roads paralleling streams

Basin	Road miles within 300' of stream	% Stream affected by road within 300'		Road miles within 100' of stream	% Stream affected by road within 100'	
		Overall	Sensitive		Overall	Sensitive
W Fork Lolo (w/ Lee)	25.2	64	90	5.9	17.4	22.6
W Fork Lolo (w/o Lee)	16.8	61	90	3.7	15.4	22.6
Lee	8.4	69	0	2.2	22.0	0
E Fork Lolo (w/ Lost Park)	36.6	55	88	10.2	18.0	23.5
E Fork Lolo (w/o Lost Park)	26.1	55	88	6.9	16.6	23.5
Lost Park	10.5	56	0	3.3	21.9	0
Granite (w/N Fork)	27.2	52	50	8.2	18.8	15.6
Granite (w/o N Fork)	21.0	59	48	6.6	23.1	16.1
N Fork Granite	6.2	37	100	1.6	10.7	0

Many of the culverts in the analysis area are barriers to fish migration during high flows. Recent research has shown that cutthroats migrate during peak flow periods, and the time frame in which they enter streams, spawn, and leave the stream is very short (Schmetterling, 1998). This data indicates that cutthroat must be able to access spawning tributaries under high flow conditions to spawn successfully. The existing culverts do not allow for this, and may be having significant effects on cutthroat populations. This impact may be similar for bull trout, but there is less data to support this conclusion since bull trout appear to migrate on the descending limb of the hydrograph and have more time between this period and when they need to spawn.

The majority of the geology within the analysis area has a high erosion potential if disturbed due to the non-cohesive and infertile nature of granite. Steep slopes, high water table, high drainage density, and high annual precipitation magnify the potential for erosion once the soil mantle is disturbed. When disturbed, erosion is in the form of surface erosion and minor slumping, not mass failures.

3.3 Description of resources not directly affected

Vegetation

Under the current proposal, there is no timber harvesting or vegetation management planned. A detailed report on vegetation conditions is available in the project file.

Current structure, composition and function

The current condition of forest vegetation in the project area is greatly affected by private industrial and federal management activities, and over 70 years of wildfire suppression. Other important factors are natural disturbances such as insects, diseases, windthrow, and natural forest succession. Historically, there was a mosaic of age classes on the landscape

created primarily by fire. That mosaic has been greatly reduced to essentially two age classes: seedling/sapling and mature/over mature. The seedling/sapling class resulted from harvesting; the mature/over mature class from fire suppression and continued forest succession.

Management opportunities and priorities

Appendix A of the 1999 report, “Upper Lolo Creek Report: Ecosystem Analysis at the Watershed Scale”, provides a summary of the prioritized potential management opportunities relative to vegetation.

Ecosystem burning (in areas where commercial harvesting is not feasible) – Approximately 4,000 acres of fire groups 4 and 6 exist in this EMA (ecosystem management area). Estimate that 20 to 30 percent or 800-1200 acres of these fire groups have good burning potential and need further project analysis. The existing conditions in these areas are outside of the desired condition.

Thin older lodgepole pine stands to reduce bark beetle risk and extend rotation length, approximately 640 acres in the upper East Fork Lolo Creek.

Seed tree and shelterwood harvests followed by prescribed fire from existing roads to alter small patch sizes into larger patches on about 1,960 acres. Seed tree and thinning would remove about one half of the stand volume and shelterwood about one third of the stand volume.

Selectively control existing noxious weeds primarily on winter range and along high traffic roads.

Remove encroaching tolerant Douglas-fir trees from habitat type group 2 sites in Spring Creek drainage by harvesting followed by prescribed burning in order to improve wildlife habitat.

Provide for standing fire killed trees through timber sale prescribed burning for wildlife habitat.

Restore whitebark pine by regeneration cutting high elevation north aspect stands.

Extend the presence of older lodgepole pine stands by thinning, create openings, and increase standing fire killed trees for wildlife habitat.

Wildlife

The primary purpose of this project is to improve water quality and fish habitat. However, security for elk, lynx, fisher, wolverine and grizzly bears (should they re-colonize the area) would be improved by road closures. Riparian dependant wildlife species would also benefit from bank stabilization and revegetation. The project satisfies several forest plan goals aimed at elk and other wildlife species, but these benefits are secondary to the primary objectives.

Since no vegetative treatment would occur under the action alternative, negative effects on wildlife would be limited to disturbance associated with road work. For this reason, discussion on wildlife will be kept brief in this document. A detailed discussion on wildlife can be found in the wildlife specialist report in the project file.

Threatened and Endangered species

The project area is potentially occupied by lynx, and gray wolves are known to be present. Grizzly bears are not currently present; however, the project area falls within the Bitterroot Recovery Area which was once occupied by grizzlies. Bald eagles may use the project area for foraging but no nesting is known to occur.

Most of the sensitive species present on the Lolo may occur within the project area. Table 4.7 in the next chapter addresses both the distribution and anticipated effects on all species of concern.

Management Indicator Species

Elk and pileated woodpeckers are the two management indicator species on the LNF. These species are both present within the project area. Guidelines for elk management are given in the forest plan and also in the Montana Elk Management Plan (MTFWP 2005). Elk population status is typically assessed within the EMU (Elk Management Unit) which is a Montana Fish Wildlife and Parks designation. This project area falls in the northern portion of the Bitterroot EMU which encompasses 927 square miles along the west side of the Bitterroot Valley. According to Montana Fish Wildlife and Parks, elk numbers in this EMU are near all time highs. Security is adequate in most areas but winter range is limited and elk security on winter ranges could be improved.

Plants

Botany technicians conducted surveys for sensitive plants during an earlier stage of this project in 2002. Roads 17906, 17907, 17908, and 17796 in the Granite Creek drainage and 17988, 17989, 17990, and 33148 in the West Fork Lolo Creek drainage were surveyed. More field surveys were conducted in the project area for suspected sensitive plants during the 2005 field season.

In some cases, roads were only partially suitable habitat, due to stretches of partial regeneration. Because the proposed project encompasses a large area, not every part of every road in the project area was surveyed. Roads at elevations of 6000-6600 feet were surveyed for *Mertensia bella* and roads closer to Lolo Hot Springs were surveyed for

*Orogenia fusiformi*s (tapered-root orogenia or turkey peas). Botanical field survey forms and maps are available in the botanist report in the project file.

One Regional Forester's Sensitive species, *Orogenia fusiformis* was found in the roadbed of road 33114 during one of the recent surveys. The location is mapped and is included in the project file.

The *Orogenia fusiformis* is on road 33114 between Mud Creek and West Fork Lolo Creek, just east of Highway 12. A level 3 closure is proposed for this road, which typically includes removing all culverts, ripping the soil, seeding, and piling light slash over the roadbed. Alternative treatment of road 33114 (as outlined in the project file) is recommended as mitigation for the *Orogenia fusiformis* population.

Chapter 4 - Environmental Consequences

4.1 Introduction

Chapters 3 and 4 of this document provide the basis for comparison between alternatives presented in Chapter 2. This chapter presents the predicted environmental effects of alternative A, no action, and alternative B, Upper Lolo Watershed Restoration Project.

4.2 Description of affected resources

Roads

Alternative A, no action

The no action alternative would not change road conditions in the project area. Structures that hinder fish passage and are also not capable of withstanding a 100 year flood event would remain in place. Surface erosion would continue to contribute sediment to adjacent water bodies.

Alternative B, proposed action

The action alternative would implement mitigation and alterations to the road system as funding became available to improve watershed resource conditions. This would include the application of BMPs to reduce sediment production and delivery on high risk roads and the replacement or removal of culverts that are acting as fish barriers and have deficient flow capacities. High road densities would be reduced by removing them from the road transportation system through the road decommissioning process. Some minor reductions in public and administrative access would occur as a result of this process.

Implementation of road management changes on NFSR (National Forest System Roads), HIR (Forest Historic Roads) and “Jammer” Roads under the action alternative would result in changes in NF road mileages and densities in the analysis area. Roads that would be decommissioned would receive mitigation that would reduce undesirable road related resource effects. These decommissioned roads would no longer function as roads and would be officially removed from the NF road network for a period of at least 20 years under a Level 3D closure or higher. Appendix A-1 in the roads analysis (available in the project file) describes road closure levels. The table below identifies these changes for the action alternative within the context of overall road mileages and densities in the analysis area.

Note that there a number of “jammer” roads and several HIR roads that are located along the analysis area boundary that would be decommissioned under Alternative B. Since the first portion of these roads in the analysis area would be decommissioned it would be necessary to also decommission the last portion of each road that is located just outside the analysis area. The total number of miles of additional “jammer” and HIR road decommissioning of this type is approximately 11 miles. NFSR 2182 is also located along the analysis area boundary. The last 0.74 miles of this road which is also just outside the analysis area would have to be decommissioned. All mileage references in the tables in the roads analysis report refer to mileages within the analysis area and thus do

not include the mileage identified above. Table 4-1 gives a summary of mileages of road management type for affected NFSR under Alternative A and Alternative B.

Table 4-1. Changes in road miles and densities

	NFS roads	Forest historical roads	"Jammer" roads	Private roads †	Federal highway	Total roads
Alternative A, no action						
Miles	159.97	48.08	23.63	158.76	7.81	398.25
Densities mi./sq. mi.	2.25	0.68	0.33	2.23	0.11	5.60
% Change	---	---	---	---	---	---
% Total	40%	12%	6%	40%	2%	
Alternative B, action alternative						
Miles	136.27	8.65 ‡	0	158.76	7.81	311.49
Densities mi./sq. mi.	1.92	0.12	0	2.23	0.11	4.38
% Change	-15%	-82%	-100%	----	----	-22%
% Total	44%	3%	0%	51%	2%	

† Includes 158.42 miles Plum Creek roads and .34 miles of other private roads

‡ The remaining HIR roads would become NFS roads and 0.17 miles would become a snowmobile trail.

The cumulative effect on roads in the planning area would be a slight reduction in administrative and public access, as described in Table 4-2.

Table 4-2. Decommissioning and road access

	Alternative A, no action	Alternative B, action alternative
Open and seasonally restricted roads		
Total open	89.12 miles	83.67 miles
Closure level 3D	0	3.58 miles
Closure level 4	0	1.87 miles
Closure level 5	0	0
Miles decommissioned	0	5.45 miles
Roads with "B" restriction		
Total open	64.19 miles	46.91 miles
Closure level 3D	0	14.81 miles
Closure level 4	0	2.13 miles
Closure level 5	0	0.34 miles
Miles decommissioned	0	17.28 miles
HIR and jammer roads		
Miles	71.71 miles	8.65 miles †
Closure level 3D	0	45.99 miles ‡
Closure level 4	0	8.28 miles ‡
Closure level 5	0	8.62 miles ‡
Miles decommissioned	0	62.89 miles

† Includes 158.42 miles Plum Creek roads and .34 miles of other private roads

‡ Besides the HIR roads identified for closure, closure levels 3D, 4 and 5 would be used on the jammer roads – 50% of the jammer roads at level 3D, 25% at level 4 and 25% at level 5

Soil and water

Alternative A, no action

Under the no action alternative, all watersheds except North Fork Granite Creek have road densities that exceed the 2.0 miles/sq mi value that indicates possible adverse impacts to water resources. In addition, all watersheds but North Fork Granite and Lost Park Creeks fall into the category of “extremely high” road densities defined in Table 3-4 of the Affected Environment section. The densities in North Fork Granite and Lost Park are considered “high”.

Alternative B, proposed action

As stated in the WQRP and TMDL for the Upper Lolo Creek TMDL Planning Area of 2003, “The greatest impairment sources [in the planning area] are from the approximately 330 miles of forest roads in the planning area and the sediment from Highway 12 sanding and bank erosion” (p.vi). The project proposed and analyzed in this document seeks to address the impacts of roads in the planning area. In addressing road-related impacts, including improving fish passage at stream crossings, this project would contribute toward accomplishment of the goals stated in the WQRP.

Watershed boundaries used for the analysis of impacts under this project differ slightly from those used for the Ecosystem Analysis at the Watershed Scale (EAWS, 1999); the latter document provided information that was used in the WQRP and TMDL (2003). Because of this, values shown in the Affected Environment (which includes EAWS data) differ slightly from those shown below. A map showing the boundaries used for the current analysis is in the soil and water specialist report in the project file.

A roads analysis process was used to set priorities for roads to decommission. Many factors, such as future access needs and wildlife security, were evaluated for each road in the project area. Rankings were given for the different factors based on potential risks to a given resource. A description of the process used is in the transportation planner’s report in the project file.

Priorities for culvert replacement were based on importance of a watershed to overall bull trout and west slope cutthroat trout populations, the severity of the barrier imposed by a culvert, and location of the barrier in the sub watershed. Priorities were also based on physical parameters reflecting the degree to which the culvert constricts a channel, the ability of the pipe to pass a 100-year flow event, and the amount of fill over a culvert (more fill means the potential for more sediment delivery to a stream if the culvert fails).

Roads within 300 feet of streams

Ketcheson and Megahan (1996) investigated sediment transport distances from forest roads in Idaho. Their study was conducted in the Idaho Batholith, which is comprised of highly erosive granitic materials, similar to those found in the project area. Following is information extracted from their article, showing sediment travel distances from various road features in Idaho.

Table 4-3. Sediment travel distances from road features

Source	Mean travel distance		Range of travel distance	
	Meters	Feet	Meters	Feet
Fill slopes	3.8 m	12.4’	0.4 - 66 m	1.3 - 216.1’
Cross drains	49.6 m	162.2’	10.7 - 183.6 m	35.0 - 600.4’
Rock drains	8.7 m	28.4’	1.2 - 33.9 m	3.9 - 110.8’
Berm drains	14.0 m	45.8’	3.7 - 54.6 m	12.1 - 178.5’
Landings	20.8 m	68.0’	8.8 - 106.3 m	28.8 - 347.6’

(from Ketcheson and Megahan, 1996)

In analyzing impacts for the project, roads within 300 feet (roughly 100m) of stream channels are considered to be potential contributors of sediment to streams. Based on information presented in Ketcheson and Megahan (Figure 4 in their article) it appears that the selection of 300 feet as a potential sediment transport distance is reasonable. A number of variables affect the actual distance that sediment will travel: smaller source areas for runoff, increased density of obstructions to overland flow, and gentler hillside gradients lead to shorter travel distances for sediment. Perennial and intermittent stream channels are both included in the analysis, the latter being included due to their importance in carrying stored sediment during times of peak runoff.

The following table compares the miles of road within 300 feet of channels, by watershed, that would remain open under the no action alternative and the proposed action.

Table 4-4. Roads within 300 feet of streams

Basin	Alternative A, no action	Alternative B, proposed action	
	Road miles	Road miles	Road miles with BMPs installed
Lost Park	11.1	9.1	4.5
Lee Creek	10.6	7.5	3.4
W Fork Lolo Creek	18.6	16.6	0.4
Granite Creek w/o N Fork	28.5	22.1	8.8
Granite Creek, w/ N Fork	6.8	5.6	0.2
E Fork Lolo Cr w/o Lost Park	31.4	25.8	6.5
Lolo Creek	5	3.6	0.6

As can be seen in Table 4-2, a substantial amount of road mileage near streams is proposed for decommissioning under the proposed action. There would be a short-term increase in the amount of sediment available for transport to streams due to ground disturbance from decommissioning. Long-term, sediment production would be reduced below pre-existing conditions, and reduced hydrologic connectivity would decrease the impact of these roads on surface runoff. Hickenbottom (2001) studied the effects of road recontouring in O’Brien Creek on the Lolo National Forest. Recontoured roads initially had higher surface runoff and higher sediment production than existing road components (cutslope, fillslope, road center, and road tread). After one year of revegetation, however, volumes of runoff and eroded sediment decreased to near natural slope conditions. Because of the granitic geology and high elevations in the planning area, most responses are not likely to be as rapid as those in the Hickenbottom study but the same trend would be expected.

Of the roads that would remain open under the proposed action, a substantial number would have BMPs implemented, which would reduce sediment production from roads

that would remain open and that are near streams. Such measures would reduce sediment delivery to streams and would reduce needed road maintenance in the long run. BMP practices include surfacing of roads to reduce erosion, improvement of road drainage, and other measures.

The Lolo National Forest has evaluated the implementation and effectiveness of road BMPs on a number of areas, and has found these measures are effective, based on visual observations (USDA-FS, Lolo NF, 2002). Further examples of erosion reduction from selected road treatments are shown below (from Burroughs, 1990; Burroughs and King, 1989):

Table 4- 5. The effectiveness of erosion control measures

Measure	Effectiveness
Seasonal road closure when roads are wet	Reduces rutting; trials showed ruts increase sediment production by 2.1 times more than an un-rutted road
Surfacing – trials used a 4-inch layer of rock 1½" or smaller – need at least 4" gravel for notable decrease in sediment production	Reduced sediment production by 79% compared to un-surfaced. 6" of gravel 1½" or smaller gravel reduced sediment production 70% to 92%.
Erosion mats on cutslopes	Sediment reduction of 95% on 1:1 slopes of gneiss and schist parent material

(Burroughs, 1990; Burroughs and King, 1989)

Actual BMP effectiveness depends on site conditions (steeper slopes and higher silt content lead to lower effectiveness) and on actual implementation methods. Both Burroughs (1990) and Burroughs and King (1989) stress the need to install protection measures as soon as possible after construction since most material is eroded in the first few years after construction: measures that are put in place immediately after ground disturbance have a greater chance of reducing sediment production when compared with measures that are installed later.

Road crossings

Schnackenberg and MacDonald (1998) found that the amount of fine particles in streams located in granitic terrains was correlated with the number of stream crossings. As stream crossing density (number of stream crossings by roads per area of watershed) increased, the amount of instream fine sediment increased. Following is an analysis of stream crossing density for the project area.

Table 4-6. Stream crossings and crossing density

Basin	Drainage area	Alternative A, no action		Alternative B, proposed action	
		# Crossings	Crossing density	# Crossings	Crossing density
Lost Park	9.8 sq mi	21 crossings	2.1 per sq mi	18 crossings	1.8 per sq mi
Lee	3.9 sq mi	26 crossings	6.7 per sq mi	18 crossings	4.6 per sq mi
W Fk Lolo	12.7 sq mi	40 crossings	3.1 per sq mi	36 crossings	2.8 per sq mi
Granite w/o N Fork	14.3 sq mi	56 crossings	3.9 per sq mi	44 crossings	3.1 per sq mi
Granite w/ N Fork	6.2 sq mi	14 crossings	2.3 per sq mi	14 crossings	2.3 per sq mi
E Fork Lolo w/o Lost Park	22.3 sq mi	64 crossings	2.9 per sq mi	55 crossings	2.5 per sq mi
Lolo	2.2 sq mi	12 crossings	5.5 per sq mi	11 crossings	5.0 per sq mi

The number of crossings and crossing density would decrease under the proposed action in all watersheds except for North Fork Granite Creek, where the number of crossings would not change between alternatives. This would lead to lower contributions of fine sediment from stream crossings under the proposed action than under the no action

alternative in all watersheds except North Fork Granite Creek, based on the findings of Schnackenberg and MacDonald (1998).

Culvert removal involves a short-term disturbance to channels at the crossing site, with an associated release of sediment to a stream during and immediately after removal. With care, the amount of short-term impact may be quite small. On Siegel Creek (on the Lolo National Forest), sediment delivery downstream of the site where a 72-inch culvert was removed was monitored during and after culvert removal. There was a pulse of increased sediment during removal, but levels decreased to pre-removal levels within approximately 24 hours. Total sediment introduced to the stream was 1-2 cubic yards from a total fill removal of 420 cubic yards. Complete rehabilitation of the site, including stabilization of the section of channel that was reconstructed, was achieved within two years.

In addition to removing a number of stream crossings, the proposed action would replace a number of undersized culverts. On the LNF, sizing criteria have been changed to reduce adverse impacts from crossing structures. New culverts are sized to accommodate 100-year flows and have diameters at least as great as bank full width to allow for natural flow velocities through structures. Culverts in the planning area would be replaced to meet these criteria as funding permits.

Road density

As stated in the affected environment section of this document, it appears that road densities at or above approximately 2 miles/sq mile are associated with negative impacts to water quality and channels. The following table displays road mileage information and road densities, by watershed, in the planning area under both alternatives.

Table 4-7. Road miles, density and decommissioning

Basin	Basin roads w/out jammers	Roads to decommission			Without Jammer roads			
					Alternative A, no action		Alternative B, proposed action	
		NFS roads	HIR roads	Jammer roads	Road density	FS road density on FS lands	Road density	FS road density on FS lands
Lost Park	42.7 mi	2.3 mi	2.6 mi	0	4.3 mi/sq mi	4 mi/sq mi	3.8 mi/sq mi	3.7 mi/sq mi
Lee	30.4 mi	0	9.1 mi	0	7.8 mi/sq mi	4.2 mi/sq mi	5.5 mi/sq mi	2.5 mi/sq mi
W Fork Lolo	66 mi	5.3 mi	3 mi	1.9 mi	5.2 mi/sq mi	3.1 mi/sq mi	4.5 mi/sq mi	2.2 mi/sq mi
Granite w/o N Fork	85.5 mi	10.3 mi	4.4 mi	12.9 mi	6 mi/sq mi	5.1 mi/sq mi	4.9 mi/sq mi	4 mi/sq mi
Granite w/ N Fork	13.3 mi	0.9 mi	0	3.6 mi	2.1 mi/sq mi	1.1 mi/sq mi	2 mi/sq mi	0.9 mi/sq mi
E Fork Lolo w/o Lost Park	124.1 mi	1.9 mi	19.4 mi	4.6 mi	5.6 mi/sq mi	3.1 mi/sq mi	4.6 mi/sq mi	3 mi/sq mi
Lolo	14.7 mi	3 mi	0.4 mi	0.4 mi	6.7 mi/sq mi	5.7 mi/sq mi	5.1 mi/sq mi	3.2 mi/sq mi

Cumulative watershed impacts of the proposed action would include: a decrease in the potential for accelerated runoff, an increase in floodplain function (where road fill is removed from floodplains), a more natural hydrologic regime, and less sediment delivery to channels from road grading (since there would be less road to grade).

Cumulative impacts of culvert removal or replacement would be recovery of channel form and improved channel function in the vicinity of crossings, and lower risk of culvert failure (and accompanying accelerated sediment delivery from failed road fills).

This proposal will fully implement the restoration priorities as outlined in the TMDL plan on NF lands within the watershed.

Fisheries

Alternative A, no action

The no action alternative would not have an immediate influence on fish habitat or populations. Current management of the watershed area would continue.

Road impacts have been identified as one of the primary contributors to reduced aquatic habitat quality in the analysis area (WQRP and TMDL for Upper Lolo Creek, 2003). Increased erosion and sediment loading to streams as a result of roads is the key factor. Roads are also largely responsible for fragmenting fish populations into small watersheds separated by culverts.

Alternative B, proposed action

A roads analysis process was used to set priorities for roads to decommission. Many factors, such as future access needs and wildlife security, were evaluated for each road in the project area, and rankings were given for the different factors based on potential risks to a given resource. A description of the process used is in the transportation planner's report in the project file.

The soil and water report lists the miles of road within 300 feet of channels, by watershed, that would remain open under the no action alternative and the proposed action. Under the proposed action, nearly 20 percent of the roads within 300 feet of streams would be removed. This will result in a significant improvement to aquatic habitat. Sediment will be reduced over the long term, and riparian vegetation will be allowed to recover, providing for natural fluvial processes, overhead shade, and large woody debris recruitment. The greatest benefits will be observed in Granite Creek, where the highest percentage of near-stream roads would be removed, and where the soils are most erosive, but benefits will occur in all watersheds within the project area. There will be a short-term increase in the amount of sediment available for transport to streams due to ground disturbance from decommissioning, however, this increase will not significantly affect aquatic habitat due to mitigation measures incorporated into the project.

High overall road densities in the watershed (roads over 300 feet from stream channels) can also negatively affect fisheries and aquatic habitat, mainly through road surface and ditch erosion that adds sediment to stream channels. The soil and water report lists road densities, by watersheds, outside of 300 feet from streams. The proposed action addresses this issue by removing some roads and applying BMPs to many of those that are needed for long term access. Road densities outside of 300 feet from streams will be reduced by over 25 percent in the watershed, with overall road densities changing from 3.9 to 2.8 miles/mile^2. While these densities are still relatively high, the change will contribute to a

reduction in sediment within stream channels, and an overall improvement in fisheries and aquatic habitat conditions.

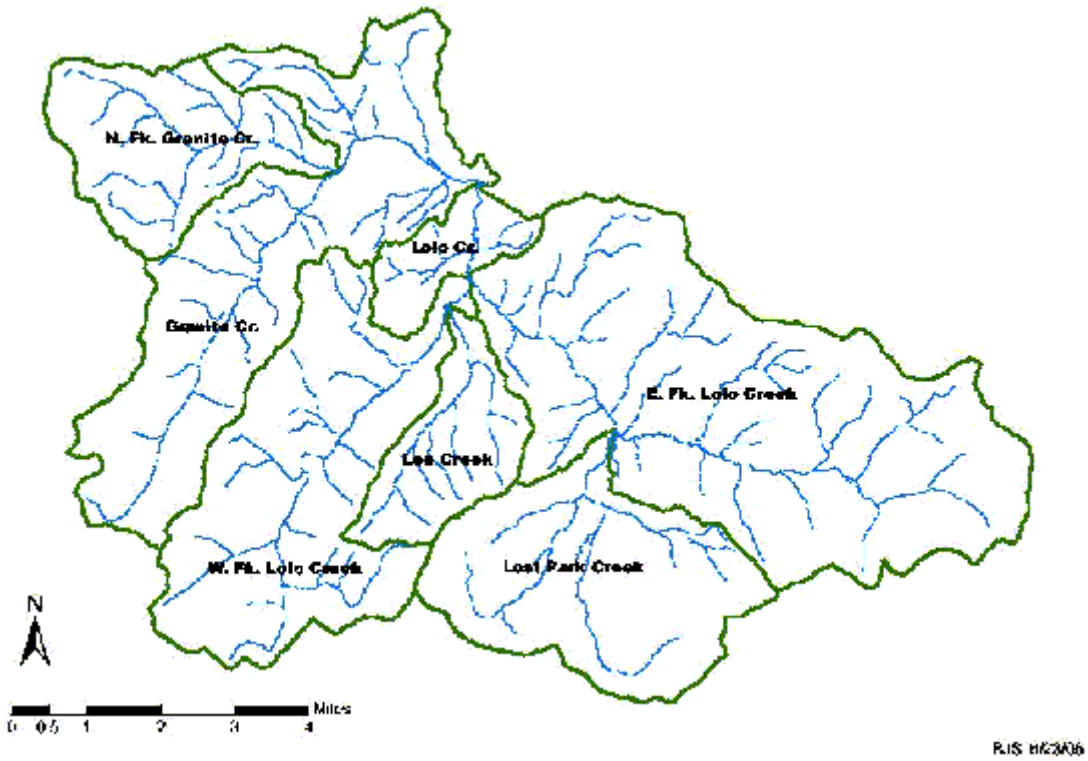
Many of the remaining roads will have BMP work completed on them to reduce erosion and sediment routing to streams. The LNF has evaluated the effectiveness of road BMPs on a number of areas, and has found these measures are effective, based on visual observations (USDA-FS, Lolo NF, 2002). Overall, the near 20 percent reduction in near-stream roads, the 25 percent reduction in roads not near streams, and the implementation of effective BMPs will reduce the amount of sediment entering streams in the analysis area. This will translate into improved aquatic habitat conditions and healthier, more robust native fish populations.

Road crossings

Numerous barriers to fish movement were identified at road crossings in the project area. Removing or replacing these crossings to provide for fish passage is one primary objective of the proposed action.

Priorities for culvert replacement were based on the importance of a watershed to overall bull trout and westslope cutthroat trout populations, using existing population information, habitat potential, and watershed location. Watersheds were ranked from most important to least important, as follows: 1) Granite Creek (including North Fork Granite), 2) East Fork (including Lost Park), 3) Lee Creek, 4) West Fork Lolo Creek, and 5) Lolo Creek. Figure 4-6 shows the watershed boundaries within the project area.

Figure 1. Upper Lolo project area watersheds



Further prioritization was based on the severity of the barrier imposed by a culvert, the location of the barrier in the sub watershed, physical parameters reflecting the degree to

which the culvert constricts a channel, the ability of the culvert to pass a 100 year flow event, and the amount of fill over the culvert.

As a result of the road decommissioning proposed in the project, the number of stream crossings would decrease by approximately 16 percent (see the soils and water report for a list of stream crossings, by watershed). A total of 37 existing crossings would be removed (removal of culverts or recontouring), and this would improve fish passage to several miles of suitable habitat in the project area. Most of these crossings are partial fish barriers – they restrict upstream movement during some flow conditions, and have more impact on smaller fish and those with slower swimming capabilities. Since they are only partial barriers, they do not keep non-native species out, so the removal of these barriers has no effect on increasing the likelihood of non-native invasion and potential hybridization. Removing the barriers will result in healthier, fitter native populations, and this in itself provides some resistance to non-native invasions.

Culvert removal involves a short-term disturbance to channels at the crossing site, with an associated release of sediment to a stream during and immediately after removal. See the soils and water report for a more detailed explanation of this process. The effect on fisheries is generally minimal, because mitigation measures that reduce the amount of sediment entering the stream and restrict the time period of impacts to the non-spawning season, are incorporated. Previous culvert removal and replacement projects on the LNF have shown recovery of the affected stream reach to be rapid. Fish movement through the project area is generally immediate.

There will be nearly 200 culverts remaining in the project area following road decommissioning activities. These culverts will be replaced to meet fish passage and flow criteria as funding permits.

Overall and cumulatively, the removal of a significant number of fish barriers through this project would result in a considerable improvement in local habitat conditions at the crossing site, and, more importantly, reduced fragmentation of existing populations. Over the long-term, this would result in healthier populations, and would allow populations to respond more positively to environmental changes that may occur. Bull trout will be likely to be adversely affected in the short term, and westslope cutthroat individuals and habitat may be impacted.

4.3 Resources not directly affected

Vegetation

Effects of the alternatives

The proposed action and no action alternatives are essentially neutral in effects to the vegetative resources. This project analysis represents Phase One of a strategy documented in the 1999 report, “Upper Lolo Creek Report: Ecosystem Analysis at the Watershed Scale”, which defers actions on vegetative opportunities to a subsequent analysis under Phase Two. By design, proposed watershed restoration activities, including road storage and/or decommissioning are focused on areas where vegetative activities are not foreseen for the next 20 years. Additional road storage and/or decommissioning are deferred to Phase Two in conjunction with vegetative opportunities.

A change in management strategy of “restore” in the short-term and “conserve” in the long-term has been identified through landscape scale analysis (1999 EAWS) and supported by the “WQRP and TMDLs for the Upper Lolo Creek TMDL Planning Area” (MTDEQ, April 2003). Projects will concentrate on measures to reduce sediment from roads, since roads are the source of an estimated 99.2% of the management generated sediment. Though timber harvesting and prescribed burning are needed to move ecosystems toward desired conditions and contribute to watershed restoration, water yield and sediment will be the most limiting factor in project design. In the phase two analysis proposed in the Upper Lolo Creek Report: Ecosystem Analysis at the Watershed Scale, it is suggested that timber harvest and prescribed burning will be proposed to reduce fuels and introduce fire back into the ecosystem (refer to Appendix A of the 1999 EAWS report, or opportunities listed under vegetation section of Chapter 3). The phase two proposals are located in areas other than those under consideration here, under phase one, and will provide opportunities for additional watershed restoration activities.

Wildlife

Geographic scope

For wildlife effects analysis, the geographic scope depends on the species and issue. The project area (approximately 45,700 acres) is larger than the home ranges for most of the species covered in this report. Subsequently, habitat conditions for most species are assessed for the project area. A larger area is used for population information for fisher and wolverine because of data reporting methods.

Alternative A, no action

The no action alternative would not have any immediate or long term impact on endangered, sensitive, or management indicator terrestrial wildlife species. Current management of the watershed area would continue.

Alternative B, proposed action

This project has no adverse impacts on any TES (threatened or endangered species) or MIS (management indicator species) terrestrial wildlife species (see associated determinations table). Although the project boundary occurs within a Lynx Analysis Unit, lynx habitat would not be adversely affected by the road work or decommissioning activities. According to the 2002 Programmatic Biological Assessment for Activities that are Not Likely to Adversely Affect Listed Terrestrial Species, the activities proposed under this project are Not Likely to Adversely Affect Lynx (Region One Level One Team, Lynx Screen Table D2). The documentation for this screening process will be included in the project record.

The project is in the Bitterroot grizzly bear recovery area which is identified as not currently occupied by grizzly bears. The project would have no effect on grizzly bears and activities conducted under this project follow guidance in the grizzly bear recovery plan in regard to reducing road densities.

There are no known bald eagle nests within a 2.5 mile radius of the project area. For this reason, there would be no effect on nesting bald eagles. The area may be used by bald eagles as foraging habitat. Activities proposed under this project are in line with guidance

for foraging habitat management given in the Montana Bald Eagle Management Plan (1994)

The road decommissioning and improvement activities would not adversely affect wolf prey species (deer, elk). No known wolf dens exist in the project area. For this reason, the proposed actions would have no effect on wolves. The programmatic not likely to adversely affect screen referred to earlier was used as a guide to make this determination.

There are no impacts on any other sensitive or management indicator species. As stated previously, species such as elk, wolverine and fisher may benefit from the additional security habitat created under the proposed action.

The project complies with the Standards, Guidelines and Objectives stated in the Lolo National Forest Plan (1986).

Table 4-9. Effect of proposed action on wildlife

Species	Preferred habitat	Project area status	Effect of project on habitat	Determination	Comments
Bald eagle (threatened)	Lakes, streams for foraging Large snags/trees near water for nesting	No nesting habitat	None	No effect	Not suitable nesting habitat
Grizzly bear (threatened)	Variable	Not present Project within Bitterroot Recovery Area	Reduction in road density and access	No effect	Project would benefit grizzlies in the future
Canada lynx (threatened)	Wet site coniferous forests between roughly 4,500 to 8,000'	Possible occurrence at low densities	Reduction in road density and access Some disturbance during activities	Not likely to adversely affect	Project occurs within lynx analysis units Programmatic NLAA
Gray wolf (threatened)	Variable	No known packs Individuals may pass through	None	No effect	Project would not negatively effect ungulates No impact on wolf prey base
Black-backed woodpecker (sensitive)	Burned or coniferous forests with high insect infestations (i.e., bark beetles)	May have low-level presence No large burns provide habitat	None	No impact	No salvage of burned or insect- infested trees
Flammulated owl (sensitive)	Large diameter ponderosa pine	Possible at lower elevations	None	No impact	No timber harvest or forest modification
Goshawk (sensitive)	West of continental divide Stands w/ mean diameter of 21", crown closures of at least 40% and elevations below 6,200' Nesting habitat variable but typically mature stands with dense canopies and fairly open understories	Possible	None	No impact	No timber harvest or forest modification
Loon *(sensitive)*	Undisturbed lakes	Not present	None	No impact	No suitable lakes
Peregrine falcon *(sensitive)*	Variable foraging Typically a cliff nester	No breeding pairs Individuals may pass through	None	No impact	No suitable nesting habitat
Northern bog lemming *(sensitive)*	Frequent sphagnum-labrador tea-black bogs but also found among deep, moist spruce woods, wet, subalpine meadows, and alpine tundra (Mead et al, 1992)	No bogs or wet meadows in area of work	None	No impact	No suitable habitat No work would occur in wet meadows

Species	Preferred habitat	Project area status	Effect of project on habitat	Determination	Comments
Townsend's big-eared bat *(sensitive)*	Roosts in caves and mines Foraging habitat variable	No caves or mines in area Presence unlikely	None	No impact	No suitable roosting habitat
Boreal toad *(sensitive)*	Variable including wetlands, forests, woodlands, sagebrush, meadows and floodplains Overwinter in caverns or rodent burrows	Presence likely	None	No impact	No suitable habitat No work would occur in riparian areas (aside from existing roads)
Northern leopard frog *(sensitive)*	Typically in or adjacent to permanent, slow moving or standing water bodies with considerable vegetation	Presence likely	None	No impact	No suitable habitat in immediate project area No work would occur in riparian areas (aside from existing roads)
Coeur d'Alene salamander *(sensitive)*	Talus rock near seeps, streamsides and waterfalls at elevations LT 5000'	No springs, streams or waterfalls in project area	None	No impact	Springs, seeps and streams would not be impacted.
Fisher *(sensitive)*	Variable; generally moist coniferous or mixed coniferous/deciduous forests with complex understories and abundant down woody material	Possible	Reduction in road density and access. Some disturbance during activities	May impact individuals No impact on population	No timber harvest or forest modification Overall gain in security
Wolverine *(sensitive)*	Highly variable with extremely large home ranges	Possible – No special features that make this area significant	Reduction in road density and access. Some disturbance during activities	May impact individuals No impact on population	No timber harvest or forest modification Overall gain in security
Elk *(MIS)*	Variable	Significant summer range No winter range	Reduction in road density and access Some disturbance during activities	May impact individuals No impact on population	No timber harvest or forest modification Overall gain in security
Pileated woodpecker *(MIS)*	Foraging – variable forest habitat Nests in snags usually GT 20" dbh, typically Ponderosa pine or larch	Possible	None	No impact	No timber harvest or forest modification

Plants

It has been determined that the proposed project, with mitigation for botanical resources, may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for *Orogenia fusiformis* or other Regional Forester's sensitive plant species. This determination is based on:

Presence of potential habitat in the project area;

- Largely negative occurrence results (with the exception of road 33114) during intuitive surveys, with the low possibility that sensitive plant occurrences may have been overlooked;
- Modification of treatment for road 33114 to protect the *Orogenia fusiformis* there and in the adjacent potential habitat; and
- Additional local occurrences of *Orogenia fusiformis* outside the project activity areas that may contribute to the overall persistence of the species within the watershed.

Recommendations

In order to mitigate for botanical resources, FS RD 33114 would receive a modified level 3 treatment. This modification will avoid impact to the existing *Orogenia fusiformis*, while leaving most of the road open as potential habitat for further colonization. The details of the modification are outlined in the botany report in the project file located at the Missoula Ranger District.

Chapter 5 - List of Participants

Forest Service

Individual	Title
Ivy Kostick	ID team leader, Forester
Maggie Pittman	District Ranger
Don Stadler	NEPA coordinator
Carol Brekke Goffe	Writer/editor
Bob Nolan	Transportation planner
Ronna Simon	Hydrologist/soil specialist
Brian Riggers	Fisheries biologist
Sacha Pealer	Botanist
Scott Tomson	Wildlife biologist
Steve Slaughter	Silviculturist
Charles “Milo” McCleod	Heritage resources
Shane Hendrickson	Fisheries biologist
Skip Rosquist	Forest hydrologist
Tracie Sylte	Hydrologist
Lynda Pike	Writer/editor

Public

Individual	Group
John Zelazny	Lolo Watershed Group
Marnie Kriley	Wildlands CPR
Matthew Koehler	Native Forest Network
Jeff Juel	The Ecology Center
Jake Kreilick	National Forest Protection Alliance
Mark VanderMeer	Watershed consulting
Vicki Moore	n/a
Howard Morrow	Missoula Snowgoers
Shane Sullivan	Missoula Snowgoers
Sungnome Madrone	Redwood Community Action Agency
Bill Grasser	Forest Consensus Council
Chuck Seeley	Forestry consultant