Watershed Restoration and Sediment Reduction for FY2000 - FY2002
Headwaters Forest Reserve
Environmental Assessment # AR-00-03

Background

Headwaters Forest Reserve was acquired into public ownership on March 1, 1999. The Reserve contains the headwaters of Salmon Creek, portions of the South Fork Elk River watershed and the entire Little South Fork Elk River watershed. Approximately 3000 acres of the Reserve is old-growth forest that does not contain roads. The remaining 4,400 acres is covered by previously logged forests of various ages. The logged areas contain numerous roads and skid trails which were used to haul the logs to the mills.

Federal legislation authorizing acquisition of the Headwaters Forest Reserve requires BLM to develop a management plan. This legislation states that the goals for the management plan "shall be to conserve and study the land, fish, wildlife, and forests occurring on such land while providing public recreation opportunities and other management needs." The management plan is currently being developed and is expected to be completed during the Fall of 2001. In the meantime, the BLM is managing the Headwaters Forest Reserve in a manner consistent with the goals stated in the authorizing federal legislation and the Interim Management Guidelines established on March 24, 1999.

When forest roads are not maintained they eventually fail or fall apart. When roads fail they can deliver large amounts of sediment and other debris into watercourses. Road surfaces and ditches tend to collect and concentrate water draining from a hillside. Typically, roads fail because culverts or ditches plug during a winter storm and divert water down the road surface which creates gullies or causes the road to slump. Sometimes, water from a winter storm saturates portions of road prisms which then slip out. The soil and other material from these road failures deposited in watercourses can change the nature of these watercourses by increasing the amount of sediment carried. Often, habitat for aquatic animals such as salmon and steelhead are negatively affected by increased sediment in streams.

Watershed scientists have long recognized the threat that abandoned or poorly maintained roads pose to streams and the aquatic animals that live in streams. In northwestern California, numerous streams have been altered by increased sediment loads which has had negative impacts on fish habitat. Over the past 25 years, many techniques have been developed to improve road design and maintenance to help prevent erosion from roads. In addition, specific techniques have been developed to "remove" roads that are no longer needed (Pacific Watershed Associates 2000). The process of road removal is the reverse of road construction. During road construction, heavy equipment pushes soil on a hillslope to make a flat road surface, and culverts are placed in streams and then buried with dirt. Road removal uses heavy equipment to pull dirt back onto the hillside, excavatel dirt out of streams, and remove culverts. The objective of road removal is to restore

hillside and stream channels as close to pre-road conditions as possible. When a road is removed the risk of future erosion is minimized.

It is estimated that at least 50 miles of former logging roads are part of the Reserve, although a full inventory has not yet been completed. Some of these roads have not been maintained for many years and some have been maintained. The BLM has made a partial inventory of the abandoned system of roads and their potential to yield sediment into watercourses (Pacific Watershed Associates 2000). This inventory has focused on Salmon Creek and the headwaters of Little South Fork Elk River. Inventory work for the headwaters of Elk River and the lower portions of Elk River is continuing and should be completed in 2001.

Purpose and Need

Inventories of abandoned roads have found several road segments adjacent to streams which are deteriorating (slumping, diverting water, slipping, etc) which pose immediate threats of large sediment yields into streams (Pacific Watershed Associates 2000). Despite the fact that a management plan for the Headwaters Forest Reserve has not yet been completed, to meet the goals stated in the authorizing legislation to "conserve...the land, fish, and wildlife...", the BLM needs to apply treatments to these abandoned roads to reduce the immediate threat of erosion and prevent further deterioration of streams. These treatments can be completed in a manner which will not preclude future options available to the management plan currently in development. In addition, BLM needs to perform maintenance on the Elk River Trail to reduce sedimentation to South Fork Elk River and Little South Fork Elk River as well as perform necessary emergency repairs to specific unmaintained road segments that are likely to suffer continuing damage during winter storms.

Anadromous fish habitat.

The Elk River and Salmon Creek watersheds once supported abundant runs of native chinook and coho salmon, and steelhead. A number of factors have contributed to declining salmonid stocks, including offshore drift-net fishing, conventional commercial fishing, and ocean conditions. Freshwater habitat degradation is probably a major factor in this decline.

A primary impact of past and present land management activities to anadromous fish habitat in the Elk River and Salmon Creek watersheds has been the introduction of massive sediment loads into the streams and their tributaries as well as other channel modifications. Stream channels have become clogged with sediments, reducing pool frequency and depth, and perhaps contributing to increased frequency of flooding. Large pools are a primary characteristic of high quality aquatic systems. Studies in the Pacific Northwest indicate that the number and frequency of these pools has been reduced by as much as 80%. The primary reasons for loss of pool habitats is filling by sediments, loss of pool-forming structures such as boulders and large wood, and loss of sinuosity by channelization. (Thomas, Raphael, et. al., 1993)

Water quality.

Large sediment loads have contributed to the degradation of water quality parameters such as turbidity. The introduction of large volumes of fine sediments, which are easily suspended, increases turbidity resulting in reduced reproductive success in salmonids. Fine sediments settle into the interstices of spawning gravels and cements gravel substrates so that salmon cannot dig their redds (nests) in which to lay eggs. Salmon eggs are suffocated when spawning gravels are buried by fines, or hatching fry are unable to swim their way out of buried and cemented gravels. Turbidity also affects salmonids directly through increased gill abrasion and limits primary production and benthic invertebrate abundance. Coarse sediment loads fill pools, widen channels, and decrease width to depth ratios which can result in elevated water temperatures.

Geologic instability

The Headwaters Forest Reserve is located in one of the most seismically active regions of North America, the intersection of three oceanic plate boundaries called the Mendocino Triple Junction. High uplift rates of land surfaces near this plate junction are caused by earthquake activity and tectonic forces, and when coupled with the area's high annual rainfall, create very high erosion rates for this part of California. These tectonic forces have also folded and fractured rocks within the entire Coast Range mountains of California, including the rocks within the Reserve, and have made the rocks unstable and very susceptible to erosion and landsliding.

Road networks may be the most important sources of accelerated delivery of sediment to fish-bearing streams. The relationship of road systems to sedimentation has been well documented (Furniss, et. al., 1991; Amaranthus, et.al., 1985; Reid and Dunne, 1984; Beschta, 1978; Megahan and Kidd, 1972; Brown and Krygier, 1971).

Given the high amount of rainfall in this region, the frequency of damaging seismic activity, and a history of road failures, it is possible that a catastrophic erosion event will occur in the Elk River and Salmon Creek watersheds. The BLM has identified a need for action in the protection and restoration of anadromous fisheries habitat in the Headwaters Forest Reserve.

Fire access

Access for fire suppression activities to Headwaters Forest Reserve is available via the Pacific Lumber Company road network which is maintained in a driveable condition to facilitate large vehicles. With one exception, all roads located in the Headwaters Forest Reserve are unmaintained, undrivable and offer no access for fire suppression activities.

Proposed Action

The BLM is proposing four types of treatments to the existing road and trail system in the Headwaters Forest Reserve. The type of treatment proposed for each identified road and trail segment can be found on Map A. The treatments proposed are designed to reduce the risk of erosion into fish-bearing streams while not precluding future options for management which will be determined by development of a management plan for the Headwaters Forest Reserve.

In order to minimize any potential impacts to marbled murrelets, all personnel working on these proposed actions will be briefed on the importance of not leaving garbage on site and that feeding, or leaving food for, animals is prohibited. The BLM will monitor all project sites to ensure these provisions are complied with.

Road Removal: BLM proposes "removing" several road segments that pose danger of catastrophic erosion into Little South Fork Elk River and the headwaters of Salmon Creek. Road "removal" (also called "decommissioning" or "road restoration") entails the following actions: complete removal of culverts and/or "Humboldt crossings" at points where watercourses cross a road prism (stream crossings), removal of fill material from stream crossings, de-compaction (aka "ripping") of road surfaces, and pulling fill material from the outside edge of the road to re-contour the hillslope to pre-road conditions (to the extent possible). All soil moved is placed in stable locations where it will be very unlikely to erode into watercourses. Road removal requires the use of heavy equipment such as excavators, bulldozers, backhoes, and dump trucks. During the course of road removal, the vegetation that has been growing on the roads and road edges is uprooted. This vegetation is then cut into smaller pieces and used to mulch areas of bare soil in order to reduce the chance that rainfall will carry sediment from the bare soil into watercourses.

Road removal is proposed for six road segments adjacent to streams in both the Little South Fork Elk River and Salmon Creek watersheds (Road Segments R1, R2, R3, R4, R5, and R6 on Map A). Detailed treatments for each Road Segment can be found in Appendix A. To minimize potential impacts to the threatened marbled murrelet population in the Reserve, road removal for Road Segment R1 will start after September 15 in either 2000 or 2001 and road removal for Road Segments R2, R3, R4, and R5, will start after August 5 in either 2000 or 2001. Between August 5 and September 15, the workday will start at least two hours after sunrise and cease at least two hours before sunset. Road removal for Road Segment R6 may start as early as July in either 2000 or 2001. To minimize potential impacts to salmon and steelhead, work will cease each year by October 15 (unless dry weather allows for brief extensions) or earlier if wet weather restrictions contained in the Pacific Lumber Company Habitat Conservation Plan (US Fish and Wildlife Service 1999) begin to restrict the use of Felt Springs Road.

Some of the vegetation that has grown next to the roads are invasive species such as pampas grass. Pampas grass tends to invade freshly disturbed areas and thus could spread along the newly removed roads. In order to reduce the levels of pampas grass invasion, established pampas grass plants will be removed by hand labor, prior to seed formation. When pampas grass is encountered during the road removal process it will be up-rooted and removed, or buried, as appropriate.

Road segment R2 is part of a trail system that will be used for guided hikes during the summer months prior to the development of a final management plan for the Reserve. Guided hikes will occur for approximately four hours per day, four days per week. In addition, school or educational groups may use the trail up to an additional two days per week. To protect visitor safety during road removal work, BLM interpretive guides will make radio contact with dump truck drivers to inform them of visitor presence, and the speed limit on dump trucks that may drive through areas with visitors will be ten miles per hour. A removable four foot wide fabric and gravel trail will be placed along most of road segment R2 during road removal to facilitate visitor hiking. If the final management plan for the Reserve finds that this is not an appropriate route for a trail then the fabric and gravel will be pulled and removed.

Sediment Reduction: One road segment (Road Segment S1 on Map A) that is deteriorating and causing sediment to be delivered to Salmon Creek needs to be repaired before more sediment is delivered. Currently, the road has one very large sinkhole that cuts through the entire road prism, some minor water diversions, and three small landslides. Two large landings perched above a tributary to Salmon Creek appear unstable and may fail in the near future. It is possible that this road segment may be needed for some future access and thus removing the road at this time is not possible. Sediment reduction measures for the road entail: construction of dips, excavation of a stream crossing where no culvert was placed yet water is flowing under the road prism, re-shaping the road where two landslides have occurred to route water away from road fill, and pulling large volumes of soil from the outside portions of two landings which sit above a tributary to Salmon Creek. This work will occur during times when no guided hikes will occur. This work will be conducted after August 5 of either 2000 or 2001.

Trail Repair: The Elk River Trail uses abandoned logging roads which have not been maintained in several years and are beginning to pose a risk of large-scale sediment delivery into South Fork Elk River and Little South Fork Elk River (Trail Segments T1 and T2 on map). Most of the road was constructed with an inboard ditch which has filled in and is mostly disconnected from the road surface. Many of the culverts are undersized, damaged, or poorly placed. The objective of trail repair is to prevent erosion of the trail surface and fill material. Repairs to the trail will entail: removal of some culverts, construction of waterbars, construction of rocked swales, installation of temporary bridges, cleaning ditches, shaping the trail, and rock surfacing. This work will require the use of a backhoe, a motor grader, dump trucks, and all-terrain vehicles. This work will be started after July 9, except for the top portion of Trail Segment T2 which is within 0.25 mile of occupied marbled murrelet habitat, where work will be started after August 5 and limited to two hours after sunrise and two hours before sunset until September 15. Work may continue through October of 2000, 2001, and 2002 for all Trail Segments.

Emergency Sediment Reduction: Since all road segments can be at risk of failure and cause sediment delivery to watercourses, BLM regularly monitors the roads in the Headwaters Forest Reserve (see legend on Map A). Roads that are not currently scheduled for removal or specific sediment reduction measures, but are still subject to potential problems (like plugged culverts, water

diversion onto road surfaces, landslides, etc) can be found on the map. If problems occur that could transport sediment into watercourses, BLM will employ heavy equipment (backhoes, excavators, dump trucks) to make emergency reduction repairs to these road segments, as necessary. These actions include: cleaning culverts, removing culverts, constructing waterbars, constructing rock-armored swales, moving landslide material to a stable location, and applying weed-free mulch. It is assumed that emergency sediment reduction work will continue during the winter outside the northern spotted owl and marbled murrelet nesting seasons. Emergency Endangered Species Act consultations will be conducted with National Marine Fisheries Service if any emergency sediment reduction work does occur. Emergency Endangered Species Act consultations will be conducted with the US Fish and Wildlife Service if emergency sediment reduction work occurs within northern spotted owl or marbled murrelet nesting season.

Conformance with Existing Plans

The proposed action will be conducted consistently with the standards and guidelines contained in the Northwest Forest Plan (USDA, USDI 1994) and the Arcata Resource Area Resource Management Plan (USDI 1995).

Description of Alternatives

Alternative A
This alternative would include road removal for only Road Segment R1, trail repair, and emergency sediment reduction.

Alternative B
This alternative would include trail repair and emergency sediment reduction only.

Alternative C
This is the no-action alternative.

Affected Environment

Geology, Geomorphology, and Soils

Yager Formation: Two main rock types occur in the Headwaters Forest Reserve: the Yager Formation and a sequence of younger rocks known as the Wildcat Group. The Yager Formation forms the "bedrock" or "basement rock" of the area and consists of moderately hard to very hard sandstones, with some minor conglomerate (pebbles and cobbles mixed with sandstone), and some thin-bedded shales. The predominant Yager Formation rock type within the Headwaters Forest Reserve is sandstone. These rocks are marine in origin and were deposited in an ocean environment

approximately 55 million years ago. The sandstones and conglomerates of the Yager Formation are well cemented, but where the beds of rock have been highly fractured and folded during faulting and uplift they are prone to landsliding, especially along stream corridors.

In the Headwaters Forest Reserve the harder and more resistant Yager Formation rocks are confined to narrow stream corridor exposures in the uppermost portions of the Little South Fork of Elk River and the upper main stem of Salmon Creek, mostly in the inner gorge areas. Up-slope of these narrow Yager Formation exposures, most tributaries of both watersheds flow over softer rocks of the Wildcat Group.

Wildcat Group: Overlying the harder basement rocks of the Yager Formation are very soft claystones, siltstones, and fine sandstones of the Wildcat Group.

The Wildcat Group is composed of five distinct rock sequences, (called "formations" by geologists), which are exposed throughout the Eel River Valley, Ferndale Hills, and the surrounding Eureka area. These sediments were deposited in a marine and flood plain basin during the last 5 million years, then uplifted and folded by tectonic forces. The formation names, from the lowest (and oldest) to the highest (and youngest), are: Pullen Formation, Eel River Formation, Rio Dell Formation, Scotia Bluffs Sandstone, and the Carlotta Formation. All five of these formations make up the Wildcat Group.

In the Headwaters Forest Reserve the Wildcat Group has been mapped by geologists as "Wildcat Undifferentiated", instead of assigning one of the five individual Wildcat Group formation names. This naming convention was adopted in the past for mapping purposes because of poor access and few rock exposures. Both old and new geologic mapping within the Reserve now suggest that the rocks directly overlying the Yager "basement rocks" belong to the Eel River Formation and the lower portions of Rio Del Formation.

The Wildcat Group rocks exposed in both the Salmon Creek and South Fork Elk River watersheds consist of very soft, gray siltstones, claystones, and fine grained sandstones. Locally there are exposures of medium to coarse friable sands directly overlying the basal Yager Formation. All of these rocks are poorly consolidated, weakly cemented, highly erodible, and prone to hillslope failure. Where the rocks are exposed in stream channels they are easily eroded and broken down into their fine components, (sand, silt, and clay), by the action of flowing water. Stream banks composed of Wildcat Group rocks are also easily eroded and undermined by streamflow, destabilizing adjoining stream banks and hill slopes, causing both large and small streamside landslides.

The soft Wildcat Group rocks are also subject to surface or sheet erosion where rock exposures lack vegetative cover, especially along recently built logging roads, landings, and skid trail networks. During rainstorms, fine sediments from unvegetated roads, landings, and skid road networks are transported to inboard ditches and culverts at stream crossings and relief drains, and are ultimately deposited in streams.

Although the soft composition and highly erosive nature of the Wildcat Group rocks pose a great hazard with regards to sediment delivery to fish bearing streams, these rocks also generate new vegetation at a very high rate. The soft nature of the these marine sediments cause them to break down quickly into soil-sized particles, and the numerous fractures within the rock provide spaces for roots to penetrate. The high clay content of the Wildcat siltstones and mudstones helps hold water for longer periods of time allowing for better regrowth of vegetation and a rapid recovery rate for landslides and erosion sites.

Soils

The Elk River and Salmon creek watersheds contain two main soil series, the Larabee and Hugo soils. The Salmon Creek watershed contains mostly Larabee soils with the remaining portions comprised Hugo series and minor amounts of Melbourne soils. The Elk River watershed, which includes the South Fork Elk River and the Little South Fork Elk River, is covered with 76 percent Larabee and 20 percent Hugo soil series. (US Fish and Wildlife Service 1999)

The Larabee soils develop on soft sedimentary rocks on hilly to very steep terrain and are rated moderately erodible. These soils are gray-brown at the surface and strong brown in the subsurface and range from 40 to 70 inches deep. Textures ranged from loam to a clay loam. (US Fish and Wildlife Service 1999)

Hugo soils are derived from sandstone and shale in hilly to very steep terrain and surface erosion hazard is moderate to high. They are gray-brown at the surface, pale-brown at the subsurface ,with soil depths ranging from 30 inches to 60 inches deep. Textures range from loam to clay loam. (US Fish and Wildlife Service 1999)

Landslide Activity and Potential Erosion Hazards

Landslides, especially small slides along stream banks, are common within Elk River and Salmon Creek watersheds. These landslides are most often associated with erosion of stream banks and the erosion of the toes of over-steepened hill slopes in stream corridors.

Debris torrents are another potential source of sediment associated with landslide activity. These are very liquid and highly mobile mixtures of water, organic debris, and soil which move rapidly down stream courses as catastrophic events, especially in steep stream drainages. Debris torrents can occur naturally, but they also commonly occur on abandoned logging roads especially when stream crossings plug and fail during storms. “Humboldt crossings” and newer culvert sites that have not been maintained for many years are especially prone to this type of catastrophic event.

Both landslides and management related failures typically occur in winter months during periods of intense rainfall and high stream flows, but landslides can also occur during moderate to large earthquakes that strike the north coast frequently.

Management Related Erosion Hazards: Within the Headwaters Forest Reserve there are numerous sites of past fill failures and future fill failures associated with abandoned logging roads and landings, left from past logging activities. Erosion hazard sites addressed in this environmental assessment are considered "high yield sediment sites"- sites that if left untreated have potential to deliver large amounts of sediment to watercourses. (Pacific Watershed Associates 2000). Sites with a high potential for fill failure have been mapped and surveyed since the creation of the Headwaters Forest Reserve. These sediment sources consist of unstable soil and buried organic debris left at abandoned "landings" (log storage sites), stream crossings, and road fills. A majority of these abandoned sites are located just above stream courses and within stream inner-gorge areas, where large amounts of sediment from road fills and stream crossing failures can easily enter stream channels and damage fisheries.

Other erosion sources within the Headwaters Forest Reserve involve tractor skid road networks which capture and concentrate surface water flow during rainstorms. Concentration of surface runoff can cause rills and gullies on hillslopes within the skid road networks and deliver fine sediment to streams. Skid roads located that cross headwater stream areas can easily divert stream flow away from natural drainage courses and onto hillslopes, resulting in large gullies which ultimately carry fine sediment to streams. Concentrated surface water from these skid road networks may also flow to unstable sites on abandoned logging roads and landings, where the additional water may overload stream crossing sites and cause crossing failure, or saturate and destabilize fill sites along roads and cause slope failure.

Erosion Summary: Based on past geologic reports and recent field inventories of potential management related erosion sites, future erosion and sediment delivery to streams within the Headwaters Forest Reserve can be expected to be highest for rocks of the Wildcat Group. Not only do these rocks cover most of the Reserve, they are also the dominant rock type in the affected area and are the most easily eroded and the most susceptible to fill failures within the reserve.

Almost all of the past logging and road building activities within the reserve have taken place on rocks of the Wildcat Group. Old roads and landings along the inner gorge area of the South Fork of Elk River, and roads and landings located just up-slope of the inner gorge in the Salmon Creek drainage pose the highest risks in the near future. The most serious management related erosion hazards are abandoned stream crossings which have a high potential to plug and fail and large landing and road fills composed of loose soil and debris perched over stream channels. These management related erosion hazards have a high potential to deliver large amounts of sediment directly into streams resulting in damage to fish habitat.

Wildlife and Terrestrial Threatened and Endangered Species

The general project area (the Reserve) is inhabited by a variety of terrestrial wildlife species. Three species of wildlife known to occur on or near the Reserve are listed as threatened or endangered. They are the bald eagle, northern spotted owl, and marbled murrelet. The papillose tail-dropper slug is a "Category 2" Survey and Manage species in the Northwest Forest Plan (USDA, USDI 1994) that has been detected in the project area during mollusk surveys.

Species composition and abundance in the Reserve have probably changed greatly since the arrival of European settlers, especially for species dependent on late-successional habitats, species with limited abilities for dispersal, species with low tolerance for human presence, and species that have been heavily exploited as food or fur.

Habitats in the Reserve are young, mid-successional, and late-successional redwood dominated forests. Hardwood forests and riparian strips also occur in the area. Approximately 40 percent of the area (about 3,000 acres) remain in late-successional forest, though approximately 560 acres of that have been partially harvested. Timber harvest and related activities are the primary reason for the young and mid-successional forest stands. Clearcut logging has taken place next to and on all sides of the older stands. Late-successional stands are fragmented, but appear to supply intact habitats for many species with limited mobility (e.g. salamanders, snails and slugs). Other species that are highly mobile and may have large home ranges (e.g. northern spotted owls, marbled murrelets, bald eagles, ospreys and medium to large mammals) may have only part of their habitat requirements met in the Reserve.

The immediate vicinity of the road removal, sediment reduction actions, trail repairs and emergency sediment reductions (the project) are along the prisms (bottom of the fills to tops of the cuts) of roads, which are in various lower successional stages of plant succession (shrubs and small trees).

Northern Spotted Owl: The Reserve occurs within the California Coastal bio-geographic sub-province within the range of the northern spotted owl (NSO). NSO habitat mapping and analysis for the Reserve is derived from vegetation classification and mapping of the Headwaters Forest Reserve (Jimerson and Jones 1999).

Four NSO sites occur on the Reserve (HU171, HU444, HU570 and HU637) according to the California Department of Fish and Game Department database. The database indicates that HU641 and HU171 were detected as pairs, only, and that HU171 and HU637 were nesting pairs at some time in the past. Surveys in 1999 indicate that HU171 and HU570 pairs were present but not nesting.

The activity center of HU570 is within 0.25 mi. of trail segment T3 and the activity center of HU171 is a little over 0.25 mi. from road segment R2.

Marbled Murrelet: Accounts of the taxonomy, biology and other characteristics of the marbled murrelet (MAMU) are found in USDI (1992b) and Marshall (1988). Suitable nesting habitat for the MAMU is considered to be mature to over-mature coniferous stands, or those younger stands with interspersed large trees which may provide nesting substrates. Generally, the habitat characteristics associated with MAMU nesting are large trees with large lateral branches, extensive mistletoe infections, witches brooms, deformities and a mature understory that extends into the canopy. Such characteristics usually do not develop until trees are 200 to 250 years of age. Also, the majority of MAMU observations have been below 2,000 feet elevation, with some detections between 2,000 and 3,000 feet (Patton et al. 1992).

The Reserve contains suitable marbled murrelet nesting habitat in all of the intact old-growth stands present. MAMUs in all intact old-growth stands on the Reserve have exhibited occupying behavior, which would indicate that nesting is occurring at these sites. The area of the proposed action is designated critical habitat area CA-03-a for the marbled murrelet.

No MAMU habitat occurs within the road prisms of any of the project segments. However, potentially occupied nesting habitat for MAMUs occurs within 0.25 miles of the following road segments: T1, 0 ac.; T2, 53 ac.; T3, 0 ac., R1, 445 ac.; R2, 304 ac.;R3, 96 ac.;R4, 80 ac.;R5, 165 ac.; R6, 0 ac; and S1, 94 ac.

Bald Eagle: The bald eagle breeds in the northern one-quarter of California, including several territories in Humboldt County. The preponderance of nest sites in the state are near reservoirs (71%) and lakes (17%), with a few (12%) located along rivers (Jurek 1998). The bald eagle winters at sites throughout the state, concentrating on artificial water impoundments.

The species is a locally regular, uncommon winter visitor: and locally rare breeder (Harris 1991). Specific winter habitat for this species is generally large trees with open crowns near large creeks, rivers, or lakes which have an available supply of fish (Lehman 1980).

Nesting bald eagles have not been documented on the Reserve, either on the former Pacific Lumber Company or Elk River Timber Company lands (USDI and CDF 1999). In excess of 120 wildlife biologist-hours have been expended in the spring of 1999 observing wildlife in the Reserve. No bald eagle observations were made during this time. No nesting activity is known or suspected to be occurring on or nearby the Reserve. The Pacific Lumber Company has conducted bald eagle surveys in the general vicinity of the Reserve in 1999. These surveys are required by the Pacific Lumber Company Habitat Conservation Plan **(**US Fish and Wildlife Service 1999**)** and are conducted within 0.5 mile of timber harvest plans on class I streams in suitable habitat. No bald eagles were detected near the Reserve during these surveys (Chinnici pers. comm.).

Amphibians: The Ensatina, California slender salamander, black salamander and clouded salamander were species found within the road prisms during the search for Del Norte Salamanders. All S and R road segments were surveyed to protocol for the Del Norte Salamander with none being detected. The southern torrent salamander has been detected in intact old-growth habitats in the Reserve but not within the specific project area.

Survey and Manage Animals: All S and R road segments were surveyed to protocol for "Category 2" Survey and Manage mollusks. One individual of the papillose tail-dropper slug (*Prophysaon dubium*) was the only species detected and it was found at one culvert drainage crossing on road segment R2. This species is found from the Washington Cascade Mountains down to Humboldt County in California. The species is usually found in hardwood debris and leaf litter in moist late-successional conifer stands.

Fish, Water Quality, and Aquatic Threatened and Endangered Species

The Headwaters Forest Reserve includes the headwaters of Salmon Creek and South Fork Elk River, both of which contain populations of coho and chinook salmon (both species are listed as threatened under the federal Endangered Species Act), steelhead (a proposed for listing under the federal Endangered Species Act), coastal cutthroat trout, resident rainbow trout, sculpin, and threespine stickleback.

Much of the portion of Salmon Creek located within the Reserve is dominated by old-growth redwood forest riparian area, abundant large woody debris, and deep pools. Data from Pacific Lumber Company, as well as observations from BLM personnel, show the streambed of Salmon Creek within the Reserve to contain a high level of fine sediment (or silt). Data from Pacific Lumber Company show that summer water temperatures in Salmon Creek remain cool, never exceeding 60 degrees. It is thought that downstream migration barriers prevent salmon from spawning in the Reserve although further study on this topic is needed. Steelhead and perhaps coastal cutthroat trout spawn within the Reserve and juvenile steelhead and trout use the upper reaches of Salmon Creek for juvenile rearing.

Much of the riparian forest along South Fork Elk River is dominated by red alder and willows. South Fork Elk River contains abundant pools, a moderate amount of large woody debris (found mostly in aggregations), and abundant spawning gravels in the lower reaches. Data from Pacific Lumber Company, as well as observations from BLM personnel, show the streambed contains a high level of fine sediment or silt. Observations have shown that turbidity levels remain high during most of the rainy season which indicates that the stream transports abundant fine sediments, although further study on this topic is needed. Coho salmon, chinook salmon, steelhead, and coastal cutthroat trout spawn in this river. The main tributary within the Reserve is Little South Fork Elk River which contain an impassible barrier for anadromous fish approximately 0.25 miles from its confluence with South Fork Elk River. Data collected by BLM in 1999 shows that summer water temperatures remain below 65 degrees.

Vegetation and Rare and Endangered Plants

Vegetation: The communities surrounding the Proposed Action consist of early, mid, and late mature Redwood (*Sequoia sempervirens*) dominated forest. Douglas-fir (*Pseudotsuga menziesii*), western-hemlock (*Tsuga heterophylla*), and grand-fir (*Abies grandis*) are common associate tree species. Salal (*Gaultheria shallon*), sword fern (*Pteridium aquilinum*), and deer fern (*Blechnum spicant*) and evergreen huckleberry (*Vaccinium ovatum*) are common understory species. Wet roadside ditches are commonly inhabited by Sitka willow (*Salix sitchensis*), red alder (*Alnus rubra*), wax myrtle (*Myrica californica*), salmon berry (*Rubus spectabilis*), thimbleberry (*Rubus parviflorus*), red flowering wax currant (*Ribes sanguineum*), and horsetails (*Equisetum* spp.).

Threatened and Endangered Plants: There are no Threatened or Endangered Plants in the Headwaters Forest Reserve. However, there is some site potential for Howell's montia (*Montia*

howelii) presumed extinct in California since 1933, but rediscovered in Humboldt County in 1999. Surveys for this species have not located any Howell's montia on the proposed road segments. Incidental surveys will continue indefinitely for the potential reappearance of this species in the Headwaters Forest Reserve.

Survey and Manage Species under Component 2 of the Northwest Forest Plan (USDA,USDI 1994) are known to occur in the Reserve, such as pink flowering clintonia (*Clintonia andrewsiana*) and fetid adder's tongue (*Scoliopus bigelovii*), however, none have been detected along any of the road prism segments identified in the proposed action. It should also be noted, that these species are likely to be dropped from the survey and manage species list under the current USDI and USDA Draft Environmental Impact Statement amending the Survey and Manage standards and guidelines because they have been determined to be both too common and not late-seral or old-growth associated species (USDA, USDI 1999).

Invasive, Non-native Plants: The project area contains a significant population of pampas grass. Pampas grass is commonly found in disturbed areas such as road sides, landings and old clear cuts. It's reproductive potential is very high as its flowering stalks produce several hundred thousand wind born seeds. A single plant can reproduce into a very dense stand in just a few years effectively displacing recolonization by native species. Pampas grass is shade intolerant and tends to die out once it becomes completely shaded by the growing conifer canopy. There is some thought that Pampas grass alters the soil chemistry inhibiting growth of native understory plants. Pampas grass has sharp leaf edges and besides providing a safety hazard, is aesthetically displeasing.

Recreation and Visual Resources

The interim management guidelines published March 24, 1999 (Federal Register, March 24, 1999 Volume 64, number 56) restrict public use of the entire Reserve to day hiking only. Overnight camping, motorized and non-motorized vehicle use, horseback riding and firearms use are not allowed. The Elk River Trail, located at the northern portion of the reserve, was opened to public use beginning March 1, 1999 and remains the only trail open to the visiting public. It was once used as a logging road and extends for 5.5 miles to the edge of the old-growth forest. The first half of the trail is relatively level, while the second half is very steep in several locations. Continual foot traffic when the trail is wet has created muddy conditions on the level parts of the trail and increased fine sediment transport into several tributaries on the steep trail segments.

Information obtained from trail registers and on-site contacts indicates that for the past year, use along this trail is estimated at 3,300 visitor days. Approximately 75% are from Humboldt County, 15% from the San Francisco Bay Area, and only 1% from outside California. Nearly 25% of those who filled out the trail register said they hiked the entire 11 mile round trip.

A very small percentage of hikers continue past the end of the trail and continue cross-country into the old-growth forest. Several others, instead of crossing the first bridge, continue hiking along the stream corridor along an old logging road for approximately one mile.

At the southern end of the Reserve, there is currently no authorized recreation use from Felt Springs Road. Public access will be available through BLM guided hikes at Salmon Pass along the Salmon Creek Trail beginning in the later part of May, 2000. The number of hikers will be limited to less than 25 people per day. One day out of the week there will be no public use. A 10-vehicle parking area will be provided (outside the Reserve boundary) at Salmon Pass only, on land that was previously disturbed. No ground disturbing activities will occur at this parking area. Gravel will be laid down on the existing terrain, and a kiosk, signs and portable restroom installed. The Salmon Creek Trail is a two mile long abandoned logging road. The second half of the trail affords close-up views of the old-growth forest. It will be open from May 15 through November 15 with wet weather restrictions. No other trails or abandoned logging roads are currently being used by the public in the southern portion of the Reserve.

Backcountry wilderness values may exist within portions of the Reserve, however, no inventory has been conducted to date. During the development of the long-range management plan, the area will be inventoried for wilderness characteristics and a determination made regarding its suitability as a Wilderness Study Area.

Visual Resources

The BLM Visual Resource Management (VRM) System consists of management classes that set standards for maintaining an area's visual resources. The Reserve has not yet been inventoried for visual resources, but will be during the development of the long-range management plan. For the purposes of this EA, it is assumed the project area is within either VRM Classes 2 or 3, depending on the location of the particular management action being conducted. Under Class 2, management activities that change the basic elements (form, line, color, texture) should not be evident in the characteristic landscape. Contrasts are seen, but must not attract attention. With Class 3, management activities that change the basic elements can be evident, but should remain subordinate to the existing landscape.

Cultural Resources and Native American Concerns

Knowledge of cultural resources within the Headwaters Forest Reserve is limited. Previous archaeological inventories were tied to timber harvests by logging companies and were conducted by foresters under the California State Department of Forestry Archaeological Technician Program.

A pre-field review and literature search show that the Headwaters Forest Reserve contains significant historic resources (the Falk townsite, Elk River Mill and Lumber Company, Bucksport and Elk River Railroad Company, military trails, and Indian trails), and possibly several major prehistoric Wiyot Indian villages and cultural landscapes. However, no complete inventory has been done nor have any thorough archaeological site records been completed although a portion of the Falk townsite and millsite has been recorded and assigned a California Archaeological Inventory Primary number (P-12-000026(H) based on a brief site record. The Forestry archaeological technicians also noted various historic features including railroad segments and trestles and bottle/can dumps.

At this time, most of the road segments of the proposed road removal, road repair, and trail maintenance project as follows have been field examined by the Arcata Field Office Archaeologist: S-1, most of the E segments, R-1, R-2, R-3, R-4, and T-1. The bridge, on the E Road Segment (see map), below S-1 over Salmon Creek in Section 18, T4N, R1E, HM is historic and will be recorded as a Historic property and must be protected. No archaeological or cultural resources were associated with or located within S-1, R-1, R-2, R-3, or R-4 although it remains to locate and record a historic/prehistoric trail system that crosses in the vicinity one of the E segments and east of R-1. The T-1 segment contains historic townsite ruins, remnants of an historic railroad system, the trail itself which is historic and possibly prehistoric, and outlying associated historic properties. These cultural properties have yet to be completely recorded. The T-2 segment has not been surveyed by archaeologists yet but may contain further historic properties related to early logging and timber industry and possibly several homesteads.

The Government Land Office Plats (GLO's) from 1868 show Indian trails, several Indian villages, and military trails plus several homesteads within the area. The trails connected the coastal and Humboldt Bay areas to inland areas. These prehistoric exchange and historic military and supply routes for gold mines of the Klamath, Trinity, and Shasta regions follow the rivers and ridges within the Reserve.

Prehistoric sites may be expected on ridges, along waterways, particularly flats adjacent to confluences, south facing benches, open areas, chert rock outcrops. Historic sites are expected to occur along the rivers and creeks, along ridgetops, at major springs and prairies, and at large flats or old logging areas within previously cutover Redwood groves.

Complete archaeological and historic inventories will be necessary to establish the cultural significance of historic and prehistoric sites within the Reserve; trails need to be followed on the ground and recorded as linear features. A Cultural Resources Management Plan needs to be developed based on Inventory findings and all significant sites need to be nominated to the National Register of Historic Places under Section 106, Section 110 of the National Historic Preservation Act, FLPMA, and other federal statutes and regulations. The Action, as proposed and limited to specific road segments, will not affect any historic properties presently known but may have an adverse effect on properties that may be located along T-1 or have otherwise yet to be discovered. No Native American concerns have been identified. Several tribal representatives will be involved in the more complete archaeological surveys of the area.

It is suggested, therefore, that during all ground disturbing work, in the event that any cultural materials are encountered, all work will be halted in the vicinity until a qualified archaeologist evaluates the find. Cultural materials may be but are not limited to glass, wood, or metal objects, stone or bone tools, ornaments, milled lumber, train rails or trestles.

Impacts of the Proposed Action

Geology, Geomorphology, and Soils

The proposed rehabilitation activity will not significantly accelerate or alter natural geomorphic erosion processes. Some sheet erosion and rilling can be expected on newly exposed soil and rock outcrops after excavation and slope reshaping by equipment, especially in Wildcat Group rocks. This temporary surface erosion will occur on rehabilitated sites in the first two years, but will be minimized by mulching exposed surfaces with natural organic matter. Mulching with materials such as dead limbs, slash, and leaf litter and rice straw will minimize surface erosion and sediment delivery to water courses.

Some additional soil compaction will occur on road treads and landings during excavation activities. This will be corrected by ripping compacted road surfaces with mechanized equipment during road out-sloping, re-contouring and road obliteration.

Some soil and hillslope disturbance immediately adjacent to roads outside of the specific erosion hazard sites will occur during entry with heavy equipment. Excavation of some areas of landslide debris, vegetation, and collapsed cutbank material on roads will be required to access potential erosion hazards sites. Some small areas of cut banks and hillslope may collapse onto the road prism during excavation, resulting the loss of soil and vegetation in small areas immediately upslope of the road. These areas are estimated to be quite small. If this occurs, slope material will be removed to stable storage areas and mulched, and exposed hillslope surfaces mulched with both dead natural vegetation and rice straw.

Wildlife and Terrestrial Threatened and Endangered Species

Modification or elimination of wildlife habitats or interruption of life processes through disturbance are the two general categories of adverse impacts that can occur to organisms.

Northern Spotted Owl: Disruption of NSO breeding activity may occur when mechanized equipment is used within 0.25 mile of a nest site during the breeding season. This type of disturbance can cause abandonment of breeding effort, disruption of nesting activities such as tending to the young, or result in premature dispersal of juvenile birds.

All NSO sites on the Reserve are greater than 0.25 mi. from project actions except for HU570 which occurs near the junction of T1, T2 and T3 trails. Work on trails would be conducted sometime between July 6 and the onset of the rainy season of the year of implementation. This is late enough in the NSO reproductive season that disturbance from mechanized equipment is not likely to adversely impact owl reproductive success.

The sediment reduction, and emergency sediment reduction actions are not expected to impact NSOs as a result of disturbance because they are greater than 0.25 mi. from the activity centers and will be conducted outside of the NSO reproductive season.

The project actions, which will involve the disturbance of vegetation, would occur within the 1.3 mile territories of three NSO sites. Vegetation disturbance caused by the proposed action would be restricted to the road prisms, which are areas vegetated with shrubs, small trees and pampas grass that do not make up the constituent elements of NSO habitat. Therefore, the vegetation disturbance caused by the proposed action would not impact NSO habitat.

Marbled Murrelet: No direct injury or death of marbled murrelets resulting from trees being felled on them or being knocked out of trees would occur because the proposed action does not involve the felling of any large trees.

Predation on marbled murrelets by the common raven and Steller's jay has been documented by Singer et al. (1991). Increased human activity and the possible increase in garbage and litter is thought to have the potential to attract an increase in jays and ravens on the Reserve and thus indirectly adversely impact murrelet populations by an increase in mortality of adults, chicks and eggs. By having project inspectors actively discouraging animal feeding and leaving of garbage, attraction of corvids to the project area can be kept to a minimum. Project activities would occur at the end of the MAMU reproductive cycle further decreasing the potential for corvids that may appear to have a negative impact on MAMUs. For the above stated reasons, corvid impacts on MAMUs in the project area are expected to be minor.

Disruption of MAMU breeding activity may occur when mechanized equipment is used within the proximity of a nest site during the breeding season. This type of disturbance can cause abandonment of breeding effort or disruption or abandonment of feeding visits.

Measuring the impacts of disturbance on nesting birds is not an easy task and documentation of the reactions of nesting marbled murrelets to disturbance is especially daunting in light of the difficulty in locating and accessing MAMU nests. Information on the reaction of marbled murrelets to different types of incidental disturbance has largely been a by-product of other types of investigations. Long and Ralph (1998), have compiled information from the literature as well as from interviews with researchers and it is from this work that inferences may be drawn about the potential for disturbance to marbled murrelets as a result of the heavy equipment operation in the Reserve.

As described in Long and Ralph (1998), a most invasive type of disturbance, investigators in nest trees at the nest or in nearby trees, elicited relatively minor reactions from marbled murrelet chicks. Comments such as "Chick became alert", "Came to an erect posture", "Looked about cautiously side-to-side", and "Hunched down in nest", were typical of researchers' characterizations of bird reactions (Simmons 1980, Hamer pers. comm., Jones pers. comm. as cited in Long and Ralph 1998). Adult reactions were generally more dramatic. Adults would abort feeding attempts when confronted with a human at their nest, but in at least one instance, went on to successfully fledge their young after the investigator had gone (Hamer, pers. comm. as cited in Long and Ralph 1998). In fact in

several instances nests where researchers disturbed birds on a frequent basis (tree climbed 20 times and bird weighed during nestling growth [Nelson and Hamer 1995 in Ralph et al. 1995]) the young successfully fledged (Nelson and Hamer 1995 in Ralph et al. 1995, Hamer and Nelson 1998, Long and Ralph 1998).

Potential disturbance from restoration workers and heavy equipment on the Reserve would be less intense than that of the actions described above and bird reactions would be expected to be somewhat different too. Marbled murrelet reactions to hikers using trails immediately next to or nearby several nesting sites were noted by Singer et al. (1995); Singer (pers. comm. as cited in Long and Ralph 1998); and Hamer (pers. comm. as cited in Long and Ralph 1998). In three nests on branches overhanging major hiking trails used by approximately 25,000 visitors per year, Singer et al. (1991), stated that "incubating birds only rarely showed behavior suggesting agitation from human presence or noise". In Singer et al. (1995), he states that incubating murrelets showed "no visible reaction to loud talking (or) yelling...near the nest tree". Hamer (pers. comm. as cited in Long and Ralph 1998) used time-lapse video cameras to document the successful fledging of young from two marbled murrelet nests, one next to and one 90 meters from a hiking trail that had an average use of 30 hikers per day. In contrast, Hamer and Nelson (1998) noted several instances, at one nest, of adults delaying or aborting feeding exchanges and incubation exchanges due to disturbance caused by people on the ground near the nest tree. Hamer and Nelson (1998) determined that the one pair that they observed appeared to react more strongly to visual cues than to sounds. And though some food exchanges between adults and young may occur during the day (Chinnici pers. comm.; and Jones 1999), Hamer (pers. comm.) expressed that it was his opinion that any MAMU adverse reactions in response to humans on the ground would be reduced dramatically by restriction of human visitation to an area during the crepuscular hours (dawn and dusk) when MAMU activities are greatest.

Though reactions of MAMUs to disturbance may be variable, continuous use of noisy heavy equipment could be expected to adversely impact MAMUs for a distance of up to 0.25 mi.

Repairs on trails T1 and T3 would have no impacts on MAMUs. The activity would not occur within 0.25 mi. of any MAMU nesting habitat.

Road R1 would be removed between September 15 the onset of the rainy season and would eliminate the opportunity for heavy equipment or human disturbance during the marbled murrelet nesting season. Therefore, this action would be expected to have no impacts on marbled murrelets.

Repairs on trail T2, removal of roads R2, R3, R4, R5, and repairs of road S1 would result in disturbance related adverse impacts to MAMUs on 792 acres of occupied nesting habitat. Adverse impacts would be lessened by delaying activity to after August 5 and restricting activity periods from two hours after sunrise to two hours before sunset.

Bald Eagle: No components of the proposed action are expected to increase the potential for direct adverse impacts on the bald eagle. No power lines, guy lines or items or structures will be suspended in the air to create physical hazards for the birds. No bald eagle presence has been established on or

near the reserve so there should be no disturbance or disruption of bald eagle breeding activity due to mechanized equipment used in conjunction with development of the proposed projects.

Amphibians: Short term direct adverse impacts within road prism would occur due to heavy equipment causing direct mortality to salamanders. Short term indirect impacts from soil disturbance may result in increased sedimentation for a short period of time. Long term beneficial impacts would be derived from improvement of water quality and defragmentation of habitats.

Survey and Manage Animals: One specimen of the papilose tail-dropper slug was found at one stream crossing on road segment R2 in a disturbed habitat. A few individuals may experience direct mortality and short term removal of ground cover habitat. Long term beneficial impacts would result from substrate stabilization through slide and fill repair and regrowth of optimal forest micro-habitats.

Management objectives for the papilose tail-dropper are listed in the *Management Recommendations for Survey and Manage Terrestrial Mollusks* (Burke et.al 1999). Objectives state that protection of existing occupied habitats should be a priority until ecological needs of the species are better known. Some degree of habitat manipulation should be left as a management option, but only in cases where past activities have negatively altered habitats. The proposed action is an action to repair past habitat damage and allow for the restoration of natural systems and processes. Short term adverse impacts appear to be outweighed by the long term beneficial impacts to the species.

Fish, Water Quality, and Aquatic Threatened and Endangered Species:

Road removal and sediment reduction: Even with extensive mulching, these activities will leave some areas of bare ground which will be susceptible to contributing fine sediments into watercourses, including some reaches of Salmon Creek where steelhead and cutthroat trout are likely to spawn. These impacts are likely to be minor and increases in turbidity will probably not be detectable considering the existing area of bare ground from existing roads and clearcuts. No changes in summer or winter water temperatures are expected to occur. In addition, these impacts will last from one to two winters when native vegetation will re-grow on these areas and prevent transport of fine sediment. In the long term, road removal and repair will prevent thousands of cubic yards of sediment from entering watercourses from road failures. This will have a highly beneficial effect on anadromous fish habitat and could aid in the long term recovery of these federally listed species.

Trail Repair: Repair of the Elk River trail will reduce the amount of fine sediment reaching South Fork Elk River that is originating from the trail. In addition, improving trail drainage will reduce the probability that large volumes of sediment from the trail will slide into South Fork Elk River or Little South Fork Elk River. Reducing the amount of sediment entering these drainages will be beneficial to all fish species.

Emergency road repairs: Such repairs will likely happen during the rainy season, will likely cover a small section of road, and should be of short duration. Working with heavy equipment on a wet road will probably result in some increased level of fine sediment transport into watercourses for a short period of time. Since these emergency repairs will only be made to reduce sediment yield into watercourses, such repairs will be beneficial to fish because they will prevent large volumes of sediment from reaching streams where fish reside.

Vegetation and Rare and Endangered Plants

Threatened and Endangered Species: There will be no impacts to Threatened or Endangered Species under the Proposed Action. There will be no impacts to Survey and Manage Species under the Proposed Action.

Invasive, Non-native Species: Removal of the road segments, sediment reduction, trail repair, and emergency sediment reduction will reduce the prevalence of invasive, non-native species such as pampas grass. Encountered species will be removed and buried or transported away from the Reserve for disposal/and or burning.

Recreation/Visual Resources

The Salmon Creek Trail would undergo extensive changes beginning in August as heavy equipment is used to perform the aforementioned work. It is anticipated that all work along the first 1 ½ miles of the trail would occur during the days when guided walks are not being conducted. There would be no impact, therefore, on the scheduling and timing of the guided hikes. After the work is completed, however, this portion of the trail would also be used as an access road and used by heavy equipment to haul excess earthen material from work sites along the last ½ mile of trail and farther back along the abandoned logging road. Heavy equipment use would cause a minor, temporary impact on visitors, as they would have to move to the edge of the trail as vehicles drove by. Their recreational experience would be temporarily interrupted from the increased short-time noise levels and the inherent conflicts that arise when vehicles encounter pedestrians along the same trail. Hiking along an improved access road that would be void of vegetation instead of what exists now (the old abandoned logging road that continues to slowly revegetate naturally) would have a minor negative impact on the visitor's expectations of seeing or hiking in an unaltered, natural landscape.

The last ½ mile of Salmon Creek Trail would eventually be rehabilitated as part of the road removal process and made into a four foot wide path. Recreation use would be impacted while heavy equipment was being used in this location. This impact would be mitigated by directing hikers along an alternative route overlooking the restoration work. This would create an excellent opportunity for BLM's interpretive specialists to explain why watershed rehabilitation is an important program and how the restoration work is accomplished.

Impacts on Elk River Trail users would be minor and temporary in nature. Hikers may have to step to the side of the trail as heavy equipment passes by, and short-term bypasses would allow hikers to continue traveling along the trail. The end result would improve trail conditions and improve the overall recreational experience because hikers would no longer be slipping in mud, nor would they feel it necessary to meander along the trail trying to avoid wet areas. The scenic quality would be improved because old culverts would be removed, the thousands of foot prints seen by hikers as they travel through wet areas would no longer be visible, and the overall route would look more like a trail instead of a road.

The other road segments proposed for restoration would have no impact on interim recreation use because visitors would not be hiking on them. The restoration work would not preclude future options for various types of recreational opportunities, including mountain biking, backpacking or horseback riding because these routes could be rebuilt relatively easily using hand crews or a small trail machine to accommodate these uses.

There would be a short term (up to five years) impact on scenic quality along the roads that undergo complete removal and restoration because many of the small trees and brush that currently screen portions of the cutbanks would be removed. This would be mitigated slightly by placing stumps and logs that are sprouting redwood seedlings along the barren slopes. In the long term, the landscape scenery along these restored roads would be improved substantially. Scenic quality along the Elk River Trail would be improved by removing old culverts, reducing the amount of mud on the trail and reshaping the trail so it looks more like a hiking trail instead of a road. The Salmon Creek Trail would be improved for heavy equipment access to other restoration work sites for the next several years, so the scenic quality with respect to maintaining a natural appearing landscape would be reduced. In the long term, however, it is anticipated that this trail would also be rehabilitated back to a four foot wide path, improving the scenic quality over what exists there now

Cultural Resources and Native American Concerns

There will be no impacts to cultural or Native American resources from the proposed action for S-1, R-1, R-2, R-3, R-4. Repair of the E Road Segments will cause no negative impacts as long as care is exercised in the vicinity of the historic bridge on the E Road Segment on the north edge of Road Segment S-1. All trail maintenance of T-1 will have positive effects in preserving the historic remnants located there and will aid in their preservation by slowing down the erosion process. Depending on what cultural resources may be located along T-2, the impacts of the proposed action will most likely be beneficial.

Impacts of the Alternatives

Impacts of Alternative A

Geology and Geomorphology and Soils: The proposed rehabilitation activity in this alternative will not significantly accelerate or alter natural geomorphic erosion processes. The major positive effects of Alternative A will be to greatly reduce the amount of sediment entering streams by removing unstable fills and stream crossings on the R1 road segment (Map A). Lack of immediate treatment for the remaining road segments described in the original proposed action, (road segments R1, R2, R3. R3, R5, R6, S1), could have a major negative effect on the streams within the reserve, with major sediment introduction from fill and crossing failures likely during winter storm events.

Minor impacts of Alternative A would be small amounts of sediment which would enter streams at specific rehab sites, specifically from rilling and sheet erosion of newly exposed soil and rock surfaces. This would be minimized by extensive use of mulching with rice straw and natural occurring materials, such as slash and limbs from within the rehab site. Some loss of soil in small areas adjacent to roads may occur during the opening of abandoned roads while initially accessing these emergency rehab sites with heavy equipment. At stream crossing sites, small amounts of remaining original crossing fill, material that cannot be excavated with equipment or removed by hand labor, would enter stream courses during the first year after site treatment.

Wildlife and Terrestrial Threatened and Endangered Species:

Northern Spotted Owl
Impacts are expected to the same as those of the proposed action.

Marbled Murrelet
Repairs on trails T1 and T3 would have no impacts on MAMUs. The activity would not occur within 0.25 mi. of any MAMU nesting habitat. This impact is the same as the proposed action.

Road R1 would be removed between September 15 the onset of the rainy season and would eliminate the opportunity for heavy equipment or human disturbance during the marbled murrelet nesting season. Therefore, this action would be expected to have no impacts on marbled murrelets. This impact would be the same as the proposed action.

Repairs on trail T2 and repairs of road S1 would result in disturbance related adverse impacts to MAMUs on 147 acres of occupied nesting habitat. This would be 645 acres less impacted than in the proposed action. Adverse impacts would be lessened by delaying activity to after August 5 and restricting activity periods from two hours after sunrise to two hours before sunset.

Bald Eagle
There would be no impacts, the same as the proposed action.

Amphibians
Short term impacts would be the same as the proposed action, only on less acreage. Beneficial impacts would be lessened as well.

Survey and Manage Animals
This alternative would result in no impacts on the known site of the papilose tail-dropper slug.

Fish, Water Quality, and Threatened and Endangered Aquatic Species: Even with extensive mulching, removal of Road Segment R-1 and sediment reduction on Road Segment S-1 will leave some areas of bare ground which will be susceptible to contributing fine sediments into watercourses although, under this alternative it is less likely that any fine sediments would reach a fish-bearing stream, as compared to the Proposed Action. These impacts are likely to be minor and probably not detectable considering the existing level of bare ground from existing roads. In addition, these impacts will last from one to two winters when native vegetation will re-grow on these areas and prevent transport of fine sediment. In the long term, road removal and repair will prevent thousands of cubic yards of sediment from entering Little South Fork Elk River. This will have a highly beneficial effect on downstream anadromous fish habitat and could aid in the long term recovery of these federally listed species.

The impacts of trail maintenance and emergency road repairs would be the same as described for the Proposed Action.

Threatened and Endangered Plants: No impacts.

Survey and Manage Plants: No impacts.

Invasive, Non-native Species: Removal of segment R1 (adjacent to the Little South Fork Elk River), trail repair, and emergency sediment reduction will reduce the prevalence of invasive, non-native species such as pampas grass. Encountered species will be removed and buried or transported away from the Reserve for disposal/and or burning.

Recreation/Visual Resources: This alternative would have less impact on recreation use and visual resources than the Proposed Action because no work would be done on the Salmon Creek Trail or the network of logging roads that are accessed from this trail. Hikers would not have to avoid dump trucks as they passed by, nor would they be hiking on this newly upgraded access route. Scenic quality would be maintained as vegetation keeps growing along the edges of the trail. The opportunity for visitors to observe road restoration work in progress, however, would not be available under this alternative. This would reduce environmental education opportunities for those who are interested in learning about watershed rehabilitation. Impacts on recreation use and visual resources along the Elk Creek Trail would be the same as the Proposed Action.

Cultural Resources and Native American Concerns: The impacts of this alternative are the same as the proposed action.

Impacts of Alternative B

Geology, Soils, and Erosion: This alternative will not significantly accelerate or alter natural geomorphic erosion processes. Impacts would include small amounts of sediment entering streams the from rilling and sheet erosion of newly exposed soil and rock surfaces at specific trail rehab sites during the first year after site treatment. At stream crossing sites, small amounts of remaining crossing fill that cannot be excavated with equipment or removed by hand labor would enter stream courses during the first year after rehab work. Some loss of soil in small areas adjacent to roads may occur during the opening of abandoned roads while initially accessing these emergency rehab sites with heavy equipment. If this occurs, slope material will be removed to stable storage areas and mulched, and exposed hillslope surfaces mulched with both dead natural vegetation and rice straw. Total amounts of temporary sediment introduction would be less that Alternative A, as only the trail segment and emergency sediment reduction segments would be treated (Map A).

Wildlife and Terrestrial Threatened and Endangered Species:

Northern Spotted Owl
Impacts are expected to the same as those of the proposed action.

Marbled Murrelet
Repairs on trails T1 and T3 would have no impacts on MAMUs. The activity would not occur within 0.25 mi. of any MAMU nesting habitat. This impact is the same as the proposed action.

Repairs on trail T2 would result in disturbance related adverse impacts to MAMUs on 53 acres of occupied nesting habitat. This would be 739 acres less impacted than in the proposed action. Adverse impacts would be lessened by delaying activity to after August 5 and restricting activity periods from two hours after sunrise to two hours before sunset.

Bald Eagle
There would be no impacts, the same as the proposed action.

Amphibians
Short term impacts would be the same as the proposed action, only on less acreage. Beneficial impacts would be lessened as well.

Survey and Manage Animals
This alternative would result in no impacts on the known site of the papilose tail-dropper slug.

Fish, Water Quality, and Threatened and Endangered Aquatic Species: The impacts of trail maintenance and emergency road repairs would be the same as described under the Proposed Action.

Threatened and Endangered Plants: No impacts.

Survey and Manage Plants: No impacts.

Invasive, Non-native Species: Trail Repair and Emergency sediment reduction will reduce the prevalence of invasive, non-native species such as pampas grass. Encountered species will be removed and buried or transported away from the Reserve for disposal/and or burning.

Recreation/Visual Resources: This alternative is different from Alternative A in that Road Segment R1 road would not be removed Since no recreation use is planned along this particular road, the impacts on recreation use would be the same as Alternative A. The negative visual impact would be greater than Alternative A but less than the Proposed Action. By not removing Road Segment R1, the landscape's scenic qualities will continue to be degraded in this portion of the reserve. Impacts on recreation use and visual resources along the Elk Creek Trail would be the same as the Proposed Action and Alternative A.

Cultural Resources and Native American Concerns: The impacts of this alternative would be the same as the proposed action.

Impacts of Alternative C

Geology, Geomorphology, and Soils: This alternative will not significantly accelerate or alter natural geomorphic erosion processes with the reserve. No minor temporary sediment introduction related to site treatment activities would enter stream courses. Lack of immediate treatment for all the road and trail segments, R1, R2, R3. R3, R5, R6, S1, T1, T2, and T3 described in the original proposed action, could have a major negative effect on streams within the reserve, with major sediment introduction from fill and crossing failures likely during winter storm events.

Wildlife and Terrestrial Threatened and Endangered Species: There would be no impacts on all species and groups analyzed, except long term beneficial impacts on amphibians would be forgone.

Fish, Water Quality, and Threatened and Endangered Aquatic Species: The no-action alternative would result in a high risk of large-scale erosion into Salmon Creek, Little South Fork Elk River, and South Fork Elk River from road failure. Depending on the timing, amount, and duration of erosion, these impacts may be significant or not. Turbidity would likely increase over time as rills and gullies that have begun to form on many road surfaces that are included for treatment in the Proposed Action continue to enlarge. No effect on water temperature is anticipated.

Threatened and Endangered Plants: No Impacts.

Survey and Manage Plants: No impacts.

Invasive, Non-native Plants: Invasive, non-native species, such as pampas grass, will continue to thrive in these proposed project areas until the surrounding canopy reaches 100% closure and shades out the weeds which could take decades.

Recreation/Visual Resources: Impacts on recreation use and visual resources of the Salmon Creek Trail would be the same as described under Alternative A. Along the Elk Creek Trail, if nothing is done to improve the drainage situation by removing water from the trail, negative impacts on the visitor's hiking experience would continue to accelerate. People would continue to slip in the mud during wet weather periods, meander around puddles and create bypasses around certain stretches. The potential for blowouts along several trail segments could require a closure to all public use until repair work is completed. The one positive impact of not repairing this trail would be that hikers would not have to avoid the heavy equipment being used to conduct the work as outlined in the Proposed Action. Visual resources would continue to deteriorate, particular during wet weather periods as the number of foot prints through the muddy areas increase. Old culverts would still be visible and the trail would continue to look like a road. Impacts on recreation use of the other remaining roads would be negligible because very few visitors use these routes. There would be negative visual resource impacts in the long term by not restoring any of the road systems back to a natural appearing landscape.

Cultural Resources and Native American Concerns: If no remedial road and trail work is done, there will be some negative impacts as the historic resources along T-1 will continue to erode out and be displaced.

Cumulative Impacts

Under the Proposed Action, positive cumulative impacts to fisheries, riparian areas, soils, and erosion are likely since the primary objective of the Proposed Action is to reduce the risk of large-scale erosion into streams. Alternative A has less of a positive cumulative impact since less road removal will occur. Alternative B has even less positive cumulative impact since no road removal would occur under this alternative. Alternative C would likely yield some level of negative cumulative impacts to fisheries, riparian areas, soils, and erosion since the risk of large-scale erosion into streams would increase over time.

The road removal portion of the Proposed Action would result in long term beneficial cumulative impacts for marbled murrelets, amphibians, and terrestrial mollusks. Permanent removal of the roads would result in less disturbance in the future and in a decrease in erosion and sedimentation. A long term decrease in habitat fragmentation would also result which would benefit the species listed above. No long term adverse cumulative impacts would be expected. Alternative A would have the same long term beneficial cumulative impacts on marbled murrelets, amphibians, and terrestrial mollusks, however, the magnitude would be much less than the proposed action. No long term adverse cumulative impacts would be expected. Alternative B and Alternative C would not be expected to result in long term adverse or beneficial cumulative impacts to terrestrial animals.

Under the Proposed Action, there will be some positive cumulative impacts to the cultural resources located along T-1 through improved protection. This will enhance the resources to the public's benefit and help prevent their destruction over the long term. Under Alternative C, there will be some negative cumulative impacts to the cultural resources located along T-1 as their deterioration will increase over time until they are lost.

No cumulative impacts are expected to recreation, vegetation, Survey and Manage species, and threatened or endangered plants. Under Alternatives B and C, no eradication of non-native invasive plants would occur and, in some area, may be able to spread which would cause negative cumulative impacts to the native biota.

Mitigations

Threatened and Endangered Fish:
Operations Criteria for road repair and decommissioning are contained in Appendix B.

Invasive, Non-native Vegetation:
In order to comply with Executive Order 13112, all vehicles and heavy equipment (paying special attention to the body and undercarriage) shall be inspected for any attached invasive, non-native weed seeds or other plant parts capable of reproduction or spread, and be removed before entering BLM roadways or land.

Removed road segments, repaired sediment sources, or other trail repair that leaves freshly disturbed ground (even with the protective mulch layer) shall be monitored monthly or on a regular basis such that new invasive, non-native species can be immediately removed before they are able to grow to reproductive maturity. Every effort will be taken to ensure that rehabilitated areas are maintained in a weed-free condition.

Contacts

National Marine Fisheries Service, Arcata
US Fish and Wildlife Service, Arcata
California Department of Fish and Game, Eureka
Pacific Coast Fish, Wildlife, and Wetlands Restoration Association

References

Amaranthus, M.P., and R.M. Rice, N.R. Barr, R.R. Zeimer, 1985. Logging and forest roads related to increased debris slides in Southwestern Oregon. Journal of Forestry, v.83, no. 4, pp 229-233.

Beschta, R.L., 1978. Long-term patterns of sediment production following road construction and logging in the Oregon Coast Range. Wat. Resourc. Res. 14: 1011-1016.

Chinnici, Sal. Wildlife Biologist. Pacific Lumber Company, Scotia, CA [Personal Communication]

Brown, G.W. and J.T. Krygier, 1971. Clearcut logging and sediment production in the Oregon Coast Range. Wat. Resourc. Res. 7: 1189-1198.

Bureau of Land Management, Interim Management Policy and Guidelines for Lands Under Wilderness Review, BLM Manual 8850-1, 1987.

Burke, T.E., Applegarth, J.S., Weasma, T.R. 1999. Mamagement Recommendations for Survey and Mannage Terrestrial Mollusks. Version 2.0. Nancy Duncan Editor. U.S. Bureau of Land Management. Portland, OR.

Dengler, L., G. Carver, R. McPherson, 1992. Sources of north coast seismicity. California Geology, v. 45, no. 2, pp 40-53.

FEMAT, 1993. Forest Ecosystem Management: an ecological, economic and social assessment, report of the Forest Ecosystem Management Assessment Team.

Furniss, M.J., T.D. Roelofs, C.S. Yee, 1991. Road construction and maintenance. American Fisheries Society Special Publication 19, pp. 297-324.

Haller, C.R., Pliocene Biostratigraphy of California, 1980, in The Miocene Stratigraphy of California revisited, Kleinpell, R. M, et. al, AAPG Studies in Geology, No.11. The American Association of Petroleum Geologists, Tulsa, Oklahoma

Hamer, T.E. 1999. Research Biologist. Hamer Environmental, Mt. Vernon, EA 98274. [Personal Communication].

Hamer, T.E. 1999. Research Biologist. Hamer Environmental, Mt. Vernon, EA 98274. [Personal Communication] *in* Long, L.L., and C. J. Ralph. 1998. Regulation and observations of human disturbance near nesting marbled murrelets. U.S.D.A. Forest Service, Pacific Southwest Research Station, Redwood Sciences Laboratory, Arcata, CA . 35 pp.

Hamer, T.E. and S.K. Nelson. 1998. Effects of disturbance on nesting marbled murrelets: summary of preliminary results. Prepared for U.S. Fish and Wildlife Service Office of Technical Support, Duncan Plaza - 4th Floor, 333 S.W. 1st Ave. Portland, OR 97208-3623 24 pp.

Hamer, T.E. and S.K. Nelson. 1995. Characteristics of marbled murrelet nest trees and nesting stands. In: C.J. Ralph, G.L. Hunt, M.G. Raphael, and J.F. Piatt (Tech. Eds.). Ecology and conservation of the marbled murrelet. Gen. Tech. Rept. PSW-GTR-152. Albany, CA: Pacific Southwest Exp. Sta., Forest Service, U.S. Dept. Of Agriculture, 420 pp.

Hamer, T.E. and E.B. Cummins. 1990. Forest habitat relationships of marbled murrelets in northwestern Washington. Report on file. Washington Dept. of Wildlife, Nongame program, Olympia, WA. 51 pp.

Harris, S.W. 1991. Northwestern California Birds. Humboldt State Univ. Press, Arcata, CA. 257 pp.

Jimerson, T.M. and J.K Jones. 1999. Vegetation classification and mapping of the Headwaters Forest Reserve. Prepared for USDI Bureau of Land Management, Arcata, CA. 33 pp.

Jones, P. H. 1999. Marbled murrelet daytime chick feeding behaviours suggest revisiting protocols. Abstract of oral presentation, Twenty-sixth Annual Meeting, Pacific Seabird Group, Blaine, WA. 86 pp.

Kilbourne, Richard and Morrison, S.D., 1985, Geology and geomorphic features related to landsliding, Fields Landing 7.5-minute quadrangle, Humboldt County, California: Department of conservation, Division of Mines an Geology, OFR 85-4, SF, scale 1:24,000

Kilbourne, Richard, 1985, Geology and geomorphic features related to landsliding, McWhinney Creek, 7.5 minute quadrangle, Humboldt County, California: Department of Conservation, Division of Mines an Geology, OFR 85-3 S. F., scale 1:24,000

Lehman, R.N., D.E. Craigie, P.L. Collins, R.S. Griffen. 1980. An analysis of habitat requirements and site selection criteria for nesting bald eagles in California. Wilderness Research Institute, Arcata, CA.

Long, L.L., and C. J. Ralph. 1998. Regulation and observations of human disturbance near nesting marbled murrelets. USDA Forest Service, Pacific Southwest Research Station, Redwood Sciences Laboratory, Arcata, CA . 35 pp.

Marshall, C.B. 1988. Status of the marbled murrelet in North America; with special emphasis on populations in California, Oregon, and Washington. Audubon Society of Portland. 42 pp.

Megahan, W.F., and W.J. Kidd, 1972. Effects of logging and logging roads on erosion and sediment deposition from steep terrain. Journal of Forestry. 70(3): 136-141.

Morrison, S.D., And Andrei Sarna-Wojcicki, 1981, Time Equivalent Bay and Outer Shelf Faunas of the Neogene Humboldt Basin, Northern California, in Biostratigraphic Datum Planes of the Pacific Neogene, Proceedings of the IGCP-114, International Workshop of the Pacific Neogene, Biostratigraphy, Sixth Annual Working Group Meeting, November 25-29, Osaka, Japan

Nelson, S.K. and T.E. Hamer. 1995. Nesting biology and behavior of the marbled murrelet. pp. 57-68 *in* Ralph et al. (eds.)Ecology and conservation of the marbled murrelet. Gen. Tech. Rep. PSW-152. U.S.D.A., Forest Service, Pacific Southwest Research Station, Albany, CA.

Ogle, Burdette A., 1951, Geology of the Eel River valley area, Humboldt County, California: Univ. of California, PhD thesis, 392 p.,4 pls., 4 figs.s

Ogle, Burdette A., 1953, Geology of Eel River valley area, Humboldt County, California: California Div. Mines Bull. 164, 128 pages, 6 plates, 14 figs.

Pacific Watershed Associates. 2000. Summary report - Phase 1, Headwaters Watershed Assessment and Restoration Planning, Humboldt County, California. Prepared for PCFWWRA and US Bureau of Land Management. March, 2000 Draft. 42 pp.

Paton, P.W.C., C.J. Ralph, and R.A. Erickson. 1992. Use of inland sites in northwestern California by Marble Murrelets. Pages 109-116 in Carter, H.R. and M.L. Morrison (eds.). Status and conservation of the marbled murrelet in North America. Proceedings of the Western Foundation Vertebrate Zoology 5(1).

Reid, L.M. and T. Dunne, 1984. Sediment production from forest road surfaces. Wat. Resourc. Res. 20(11): 1753-1761.

Sarna-Wojcicki, A. M., J.R. Wagner, M..E. Perkins, K.R. Lajoie, S.D. Morrison, Introduction to the tectonic an stratigraphic setting Humboldt County, northwestern California, National Association of Geology Teachers Conference, Far Western Section, Field Guide, Oct 8-10, 1982,

Sarna-Wojcicki, A.M.., S. D. Morrison, C. E.. Meyer, and J.W. Hillhouse, 1987, Correlation of upper Cenozoic tephra layers between sediments of the western United States and eastern Pacific Ocean and comparison with biostratigraphic and magneto-stratigraphic data, Geological Society of America Bulletin, Vol 98. p 207-223

Singer, S.W. Santa Cruz Mountains Murrelet Group, P.O. Box 7422, Santa Cruz, CA 95061. [Personal Communication] *in* Long, L.L., and C. J. Ralph. 1998. Regulation and observations of human disturbance near nesting marbled murrelets. USDA Forest Service, Pacific Southwest Research Station, Redwood Sciences Laboratory, Arcata, CA . 35 pp.

Singer, S.W., D.L. Suddjian, and S.A. Singer. 1995. Fledging of marbled murrelets from two tree nests in California. *in* Nelson, S.K. and S.G. Sealy, eds. Biology of marbled murrelets: inland and at sea--a symposium of the Pqcific Seabird Group 1993. Northwestern Naturalist 76 (1):54-62.

Singer, S.W., N.L. Naslund, S.A. Singer, C.J.Ralph. 1991. Discovery and observation of two tree nests of the marbled murrelet. Condor 93(2): 330-339.

Simmons, T. R. 1980. Discovery of a ground-nesting marbled murrelet. Condor 82(1): 1-9.

Spreiter, T., 1992. Redwood National Park Watershed Restoration Manual. Redwood National Park Watershed Restoration Program, Orick, CA.

Thomas, J.W., M.G. Raphael, R.B. Anthony, E.D. Forsman, A.G. Gunderson, R.S. Holthausen, B.G. Marcot, G.H. Reeves, J.R. Sedell, and D.M. Solis, 1993. Viability assessments and management considerations for species associated with late successional and old-growth forests of the Pacific Northwest-The report of the Scientific Analysis Team. USDA, Forest Service, Portland Oregon, 530 pp.

USDA, Forest Service and USDI, Bureau of Land Management. 1994. Record of decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the northern spotted owl, standards and guidelines for management of habitat for late-successional and old-growth related species within the range of the northern spotted owl.

USDA Forest Service and USDI Bureau of Land Management. 1999. Draft Supplemental Environmnetal Impact Statement for ammendment to the Survey and Manage, Protection Buffer, and other mitigating measures standards and guidelines. Portland, OR 492 pp.

USDI, Bureau of Land Management. 1995. Arcata Planning Area Proposed Resource Management Plan Ammendment and Environmental Assessment.

USDI Fish and Wildlife Service. 1992. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Washington, Oregon, and California Populations of the Marbled Murrelet, final rule Federal Register Vol. 57, No.

USDI Fish and Wildlife Service and California Department of Forestry and Fire Protection. 1999. Final Environmental Impact Statement/Environmental Impact Report and Habitat Conservation Plan/Sustained Yield Plan for the Headwaters Forest Project.

APPENDIX A
ROAD REMOVAL PRESCRIPTION MAPS

APPENDIX B
OPERATIONS CRITERIA

Part 1: Road Repair

Applicable Standards and Guidelines:

RF-2e. Minimize disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow.

RF-2f. Restrict sidecasting as necessary to prevent the introduction of sediment into streams.

RF-3a. Reconstruct roads and associated drainage features that pose substantial erosion risk.

RF-3b. Prioritize road reconstruction based on current and potential impact to riparian resources and the ecological value of the riparian resources affected.

RF-4. New culverts, bridges, and other stream crossings shall be constructed, and existing culverts, bridges, and other stream crossings determined to pose a substantial risk to riparian conditions will be improved, to accommodate at least the 100-year flood, including associated bedload and debris. Priority for upgrading will be based on the potential impact and ecological value of the riparian resources affected. Crossings will be constructed and maintained to prevent diversion of streamflow out of the channel and down the road in the event of a crossing failure.

RF-5. Minimize sediment delivery to streams from roads. Outsloping of the roadway surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is unfeasible or unsafe. Route road drainage away from potentially unstable channels, fills, and hillslopes.

RF-6. Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams.

Additional Criteria (as directed by RF-2.d)

A. All non-emergency road repairs will occur only when road conditions are not wet and when the chance of precipitation is minimal.

B. Bridge replacements will be conducted only during times of low streamflow but prior to upstream migration of adult anadromous salmonids. Replacement activities will avoid, to the maximum extent feasible, removal of any riparian vegetation. Temporary low water crossings will be designed, and inspected daily, to insure fish passage.

C. Operations will use all feasible techniques to minimize sediment from entering a drainage system. Materials used for bridge repair, replacement, or temporary crossings will minimize the possibility of introduction of fine sediments or toxins into the drainage

system. A BLM project inspector, or designee, will be onsite to insure proper procedures are followed.

D. Heavy equipment will be inspected daily by the BLM project inspector, or designee, to check for leaks . Equipment that may leak lubricants or fuels into a drainage will not be used until leaks are repaired. Fuel trucks (if used) and/or re-fueling will be done outside of Riparian Reserves and stream crossings. A spill plan will be available to onsite personnel.

E. For bridge and stream crossing replacement, disturbance to Riparian Reserves will be minimized. Any disturbed ground must receive appropriate erosion control treatment (mulching, seeding, planting, etc.) prior to the beginning of the wet season.

F. Water drafting will be conducted only at sites approved by BLM staff. Intake hoses will be screened to prevent entrainment of fish. If possible, water drafting will occur in non-fish-bearing streams. Vehicle approaches will be inspected by BLM personnel or designees to insure damage to riparian areas is minimized.

Part 2: Road Decommissioning

Applicable Standards and Guidelines:

RF-2a. Eliminate road and landing locations in Riparian Reserves.

RF-2e. Minimize disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow.

RF-2f. Restrict sidecasting as necessary to prevent the introduction of sediment into streams.

RF-4. New culverts, bridges, and other stream crossings shall be constructed, and existing culverts, bridges, and other stream crossings determined to pose a substantial risk to riparian conditions will be improved, to accommodate at least the 100-year flood, including associated bedload and debris. Priority for upgrading will be based on the potential impact and ecological value of the riparian resources affected. Crossings will be constructed and maintained to prevent diversion of streamflow out of the channel and down the road in the event of a crossing failure.

RF-6. Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams.

Additional Criteria (as directed by RF-2.d)

A. Heavy equipment operations will use all feasible techniques to prevent any sediment from entering a drainage system during road restoration/rehabilitation work. Only operators with experience in road restoration will be employed for these projects. A BLM project inspector, or designee, will be onsite to insure proper procedures are followed.

B. Heavy equipment will be inspected daily by the BLM project inspector, or designee, to check for leaks. Equipment that leaks lubricants or fuels will not be used until leaks are repaired. Fuel trucks (if used) and/or re-fueling will be done outside of Riparian Reserves and stream crossings.

C. As often as feasible, any removed vegetation will be scattered on top of the treated road surface which will prevent most rainfall from directly impacting soil and promote rapid growth of future vegetation contoured surfaces are which exposed to rainfall.