FREMONT-WINEMA NATIONAL FORESTS
WATERSHED EFFECTS AND BIOLOGICAL EVALUATION
PROPOSED, ENDANGERED, THREATENED AND SENSITIVE FISH SPECIES

PROJECT: **Toolbox Fire Recovery Project**
DATE: **September 12, 2003**
DISTRICT: **Silver Lake**

INTRODUCTION
A Biological Evaluation (BE) must be completed for all projects authorized, funded or conducted on the Fremont National Forest to determine the possible effects the proposed activity will have on threatened, endangered, and sensitive species (FSM 2672.4). These species are those that are:

A) Listed or proposed to be listed as endangered or threatened by the U.S. Department of the Interior-Fish and Wildlife Service;

B) Listed as sensitive by USDA Forest Service Region 6 (FSM 2670.44).

Species that fit these categories and are known or suspected to utilize habitat within the Fremont National Forest include redband trout (*Oncorhynchus mykiss spp.*), Pit-Klamath brook lamprey (*Lampetra lethophaga*), Goose Lake Lamprey, (*Lampetra tridentata sp.*), Pit sculpin (*Cottus pitensis*), slender sculpin (*Cottus tenuis*), Pit roach (*Lavina symmetricus mitrulus*), Oregon lakes tui chub (*Gila bicolor oregonensis*), Goose Lake tui chub (*Gila bicolor thalassina*), Goose Lake Sucker (*Catostomus occidentalis lacusanserinus*), Klamath largescale sucker (*Catostomus synderi*), shortnose sucker (*Chasmistes brevirostris*), Lost River sucker (*Deltistes luxatus*), and bull trout (*Salvelinus confluentus*).

The potential effects that this project may have on these species are analyzed in this document. Redband trout (sensitive) is the only threatened, endangered, and/or sensitive aquatic species known or suspected to occur in the subwatersheds potentially affected by implementation of the Toolbox Fire Recovery Project. Therefore, it has been determined that implementation of the this project will have **No Effect** on Lost River sucker, shortnose sucker, bull trout, Pit-Klamath brook lamprey, Goose Lake Lamprey, slender sculpin, Pit roach, Oregon Lakes tui chub, Goose Lake tui chub, and Klamath largescale sucker. The remainder of this Biological Evaluation will address the effects on redband trout only.

BACKGROUND
On July 12, 2002 a lightning storm ignited 67 fires on the Fremont National Forest. On the Silver Lake Ranger District, two of these fires, the Toolbox Fire, which started near Toolbox Springs, and the Silver Fire, which started near Silver Creek Marsh campground, became the primary fires within the Toolbox Complex. Suppression activities on a portion of the adjacent Winter Fire also became a component of the Toolbox Complex. In total, the Toolbox Complex included approximately 85,000 acres, including approximately 49,500 acres of National Forest lands, 8,000 acres of Bureau of Land Management administered lands and 27,500 acres of private land.

In the fall of 2002 the Forest Service and the Burned Area Emergency Rehabilitation (BAER) team accomplished emergency rehabilitation work that focused on stabilizing soils and preventing erosion in areas most severely burned and preparing for increased stream flows. Log erosion barriers or rice wattles (in places where logs ere not available or were too rigid) were placed on 13 acres of the burned area to reduce water velocity, break up concentrated flows, and induce hydraulic roughness to the burned watersheds. Road treatments were identified across the fire area because of problems associated with runoff and sediment processing capabilities. Two relief culverts were installed to alleviate overflow and over 15 miles of drainages ditches were cleaned to allow for proper drainage of water during increased water yields.

The Project Area

The Toolbox Fire Recovery project area totals approximately 47,200 acres of Fremont National Forest lands within: T 29 S, R 13-16 E, T 30 S, R 13-16 E, and T 31 S, R 13-15 E, Willamette Meridian. The project area is defined as National Forest lands, within the Toolbox Complex, within:

Silver Creek Watershed –
(The following subwatersheds)

- Middle Silver Creek
- West Fork Silver Creek
- Upper Silver Creek
- Thompson Reservoir
- Benny Creek

Silver Lake Watershed –
(The following subwatersheds)

- Upper Duncan Creek
- East Duncan Creek
- Lower Duncan Creek

The project area is bounded on the east by the north-south trending fault block feature known as Winter Rim. An unburned strip varying between 3 and 7 miles wide occupies a north-south corridor between the Silver Fire (the western portion of the project area) and the Toolbox Fire (the eastern portion of the project area). Within this unburned corridor are locally familiar landmarks such as Thompson Reservoir, East Bay Campground and Hager Mountain. The terrain within the project area is almost universally of gentle slope. About 86 percent of the area has slopes under 15 percent. Only about 3 percent of the area has slopes over 30 percent. Silver Creek and West Fork Silver Creek, both in the Silver Fire portion, flow through canyons that are up to 450 feet deep with localized side slopes of up to 70 percent. Elevations in the area range from approximately 4,450 feet to 7,200 feet (top of Winter Ridge).

Perennial fish bearing steams within the project area include Silver Creek, North Fork Silver Creek, West Fork Silver Creek, and Guyer Creek. Riparian Habitat Conservation Areas (RHCAs) for these streams, as well as for intermittent channels within the project area, have been incorporated into project proposals in accordance with Fremont National Forest Land and Resource Management Plan (LRMP) Standards and Guidelines, as amended by the Inland Native Fish Strategy (INFISH).

The project area is currently characterized by a mosaic of burned forest conditions, ranging from unburned to fire-killed ponderosa pine, lodgepole pine, and mixed conifer stands, interspersed with young fire-damaged plantations. The area is predominantly in Forest Plan management allocations that allow for the production of sawtimber and other wood fiber products, within the context of developing sustainable forest conditions. The Fremont National Forest proposes to cut some of these standing dead trees, to reforest some areas, and to implement riparian improvement and protection projects. Theses actions are needed to facilitate the recovery of the burned area. Ponderosa pine and white fir quickly lose commercial value and their suitability as raw material for sawtimber rapidly deteriorates following fire mortality. It is expected that, by the time this project can be implemented, trees of less than 12 to 14 inches in diameter will have lost their merchantability. The accumulation of fuel loadings that would occur if high-density standing-dead stands were allowed to progress to a heavy down-dead condition would greatly increase the intensity of subsequent fires in the area. These conditions would:

- Reduce the potential for reforestation to successfully result in establishment of sustainable late and old forest conditions. Areas with high intensity burns do not currently have a ponderosa pine seed source adequate for natural regeneration. Areas that were partially burned typically have patches, which burned at a high intensity, that are too large to successfully regenerate naturally.
- Promote insect infestations that could affect adjacent live stands

- Hinder, for the foreseeable future, the eventual use of management tools such as prescribed fire that are needed to promote the recovery of healthy ponderosa pine forest conditions.

Forest Plan Management Areas and Forest Plan Direction

The LRMP, as amended, contains Forest-Wide Standards and Guidelines (S&G's). In addition, S&G's for specific areas (termed "Management Areas" or MA's) are stipulated in the LRMP.

Management Areas and associated Standards and Guidelines are described in Chapter IV of the Forest Land Resource Management Plan. National Forest System Lands affected by the fires within the project area include Management Areas (MAs) 1, 2, 3, 5, 6, 8, 12, 13, 14, and 15. Some MAs are not mutually exclusive and "overlap" on each other. For example, MA 6/Scenic and MA 1/Mule Deer Winter Range can exist on the same acre(s). Therefore the acres shown below, when totaled, slightly exceed the overall acreage of the project area. On the other hand, some MAs are mutually exclusive (such as MA 5 / Timber-Forage production and MA 14 / Old Growth) and cannot "occupy" the same acre(s).

MA 1: Mule Deer Winter Range (approximately 2,209 acres; 5 percent of the project area)

The Forest Plan states, “Food, cover, and human disturbance will be managed on mule deer winter range to provide the habitat needed to meet the Oregon Department of Fish and Wildlife and Klamath Tribes herd management objectives”(LRMP, 132). Emphasis is on improving forage and thermal cover, and, where site capabilities allow, maintaining 40 to 50 percent thermal cover and at least 80 percent of potential habitat effectiveness for mule deer.

Forest Plan guidelines state that habitat improvement (in mule deer winter range) can include prescribed burning and mechanical ground and vegetative disturbance after evaluation of effects on habitat and nontarget species (Fremont National Forest LRMP, 132).
The LRMP lists six activities that should be evaluated for habitat improvement actions within Management Area 1. These include:

1. Seeding of desirable species
2. Fertilization
3. Prescribed burning
4. Mechanical vegetative disturbance
5. Chemical treatment of undesirable plants
6. Water developments.

MA 2: Threatened and Endangered Species Habitat (approximately 1,996 acres; 4 percent of the project area)

This includes both peregrine falcon habitat and bald eagle management area (BEMA). BEMAs are managed to provide an abundance of mature/over mature trees for nesting/roosting platforms, a minimum disturbance from people, and an abundance of food.

MA 3/MA 14: Old-Growth Dependent Species Habitat (approximately 1,191 acres; 2 percent of the project area)

The goal of MA 3 and MA14 is to increase and/or manage stands of old growth on the Forest to maintain minimum viable populations of dependent, native vertebrate species.

MA 5: Timber and Range Production (approximately 34,704 acres; 74 percent of the project area)

These acres are allocated management of commercial production of sawtimber and forage for domestic livestock, within LRMP Standards and Guidelines for all resources. The LRMP establishes an objective in MA 5 of creating a healthy forest condition characterized by a variety of age classes, through control of stocking levels, species mix, and protection from insects, disease, and other damage. In general the Forest is to be managed for healthy range with satisfactory range conditions (LRMP, 75). Satisfactory range condition is described as range in at least fair condition with a stable trend and no basic or other resource damage on the allotment.

The LRMP, as amended by Regional Forester's Eastside Forest Plans Amendment #1 (1994) and Regional Forester's Forest Plan Amendment #2 (1995), establishes objectives current objectives for MA 5. While MA 5 is still to be managed for the commercial production of sawtimber and forage for domestic livestock (within Forest-Wide Standards and Guidelines for all resources), the Regional Forester's amendments have shifted the focus toward retaining and promoting Late/Old structural (LOS) characteristics. MA 5 areas are to be managed with an objective of creating a healthy forest condition through control of stocking levels, species mix, and protection from insects, disease, and other damage while moving forest stands toward structural conditions that are within the historic range of variability (HRV). Historic Range of Variability refers to structural forest conditions that are based on pre-settlement conditions. Moving forest stands toward the historic range of variability is desirable because such conditions provide the most sustainability in long term. Sustainability refers to the ability of forested systems to withstand or resist rapid and widespread structural change due to fire, insects, and disease.

The Regional Forester's amendments contain direction that is intended to allow the culturing of overstocked stands with the objective of retaining and promoting the Late/Old structural (LOS) characteristics in the stand. For the stand treatments contained in the action alternatives, the following direction from the Regional Forester's amendments specifically applies:

- No net loss of LOS components
- Outside of LOS the intent is to maintain and/or enhance LOS components by adhering to the following standards:
- Maintain all live trees greater than or equal to 21" dbh (diameter breast high).
- Manipulate vegetative structure that does not meet late and old structural (LOS) conditions in a manner that moves it toward these conditions as appropriate to meet HRV (Historical Range of Variability).
- Maintain open park-like stand conditions where this condition occurred historically. Manipulate vegetation in a manner to encourage the development and maintenance of large diameter, open canopy structure.
- Maintain connectivity and reduce fragmentation of LOS stands, by maintaining or enhancing the current level of connectivity between LOS stands and old growth habitats.

MA 6: Scenic Viewshed (approximately 1,800 acres; 4 percent of the project area)

The overall objective in MA 6 is to provide an attractive, natural appearing forest visual character. The LRMP contains guidelines for land management prescriptions that are designed to ensure the visual integrity of landscapes in the foreground-viewing zone.

MA 8: Research Natural Areas (approximately 87 acres; less than 1 percent of the project area)

MA 8 is designated to preserve examples of ecosystems for research and education. No fire burned within the RNA that is within the fire perimeter.

MA 12: Utility Corridor (approximately 785 acres; about 2 percent of the project area)

The goal of MA 12 is to provide for and administer necessary special purpose corridors across National Forest System lands to ensure safe, efficient use of the facilities necessitating use of these lands, and minimize impacts upon Forest resources, landscapes, and environment.

MA 13: Developed Recreation (approximately 9 acres; less than 1 percent of the project area)

The goal of MA 13 is to provide convenient recreational opportunities at readily accessible and appropriately designed developed sites. In this project area, this includes Silver Creek Marsh Campground in the Silver Fire portion – in an area of varied vegetative mortality from the fires and Fremont Point Cabin (site) in the Toolbox Fire portion, which was destroyed by the fire.

MA 15: Fish and Wildlife Habitat/Water Quality (approximately 6,355 acres; about 13 percent of the project area)

The aquatic and riparian zones of all drainages and water bodies, and their immediately adjacent uplands will be managed to meet the objectives of (MA 15). MA 15 will be managed to maintain or improve water quality, fish habitat, recreation opportunities, and riparian habitat for dependent wildlife species. The Forest Plan amendment for the Inland Native Fish Strategy (INFISH, 1995) amended the standards and guidelines by creating Riparian Habitat Conservation Areas (RHCAs). All project actions must be in compliance with INFISH.

Riparian dependent resources receive primary emphasis in all RHCAs. INFISH Standards and Guidelines for Timber Management (TM-1) prohibits timber harvest within RHCAs, except as follows:

Where catastrophic events such as fire, flooding, volcanic, wind, or insect damage result in degraded riparian conditions, allow salvage and fuelwood cutting in RHCAs only where present and future large woody debris needs are met and where cutting would not retard or prevent attainment of other Riparian Management Objectives and where adverse effects can be avoided to inland native fish.

Riparian habitat conservation areas, as defined in INFISH, are portions of watersheds where riparian dependent resources receive primary emphasis and management activities are subject to specific standards and guidelines.

The 6,335 acres of MA 15 within the project area, include approximately 1,378 acres of Category 1 (perennial-fish bearing streams); 4,595 acres of Category 3 (ponds, lakes, reservoirs, and wetlands greater than 1 acre) and 382 acres of Category 4 (intermittent streams). All fish bearing streams are within the Silver Fire portion.

Standard RHCA widths are as follows:

(Category 1) Perennial Streams:

- The area on either side of the steam extending from edges of active stream channel to the top of the inner gorge, or the outer edges of the 100-year floodplain, or the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet, including both sides of the stream channel), which ever is greatest.

(Category 3) Ponds, lakes, reservoirs, and wetlands greater than 1 acre:

- The body of water or wetland and the area to the outer edges of the riparian vegetation, or to the extent of the seasonally saturated soil intermittent stream channel or wetland and the area to the outer edges of the riparian vegetation or to a distance equal to the height of one site potential tree, or 150 feet slope distance from the edge of the wetland, which ever is greatest.

(Category 4) Intermittent streams and wetlands less than 1 acres.

- The intermittent stream channel and the area to the top of the inner gorge
- The intermittent stream channel or wetland and the area to the outer edges of the riparian vegetation.
- The area to the edge of the channel, wetland to a distance equal to the height of one-half site potential tree, or 50 feet slope distance, which ever is greatest.

Proposed Action

The proposed action responds to the goals and objectives for the Fremont National Forest as established by the Fremont National Forest Land and Resource Management Plan (1989), as amended. Amendments to the LRMP include, but are not limited to, Regional Foresters Eastside Forest Plan Amendments No. 1 and No. 2 and the Inland Native Fish Strategy (INFISH).

Salvage of Fire Damaged Trees

This includes salvage harvest of approximately 21,500 acres in the Silver Creek, Silver Lake and Summer Lake Watersheds (see Maps 1 and 2). As a general rule of thumb, in ponderosa pine stands trees with less than 20 percent bright green crown would be considered for salvage harvest. In mixed conifer stands, white fir trees less than 21" dbh that show evidence of receiving heat to the bole, such as scorching, blackening or immediately adjacent high intensity fire activity (i.e. a consumed down log next to the tree) would be removed as fire-damaged trees. White fir trees have a much thinner bark than ponderosa pine and are more susceptible to mortality from the effects of fire.

Most of the proposed timber salvage units would be harvested using ground-based logging systems. Access for salvage would include the use of classified, temporary, and unclassified roads. Classified roads are those that have been determined to be needed for long-term motor vehicle access to National Forest lands. Temporary roads are those that are authorized by contact, permit, or other written authorization not intended to be part of the forest road transportation system and not necessary for long-term resource management. Unclassified roads are unplanned roads, abandoned travelways, and off-road vehicle tracks that are not managed as a part of the forest transportation system, including roads once authorized under a permit or contract that were not decommissioned upon the termination of authorization. Decommissioning refers to activity that results in the stabilization and restoration of unneeded roads to a more natural state.

The salvage harvest activities in the proposed action would require the reconstruction of about 9.5 miles of existing classified roads, primarily by adding surfacing; the re-opening of approximately 20 miles of classified roads, primarily as pre-haul maintenance; the temporary use of approximately 14 miles of unclassified road; and the construction of approximately 12 miles of new temporary road. All of the above road development would occur in order to provide connection to the existing classified road system. Temporary roads would be closed and decommissioned after completion of project activities. Approximately 10 to 15 percent of the area to be salvaged would be harvested using helicopter based logging systems, including areas salvaged within Riparian Habitat Conservation Areas (RHCAs).

Other connected actions in association with salvage include treatment of slash, water barring, and erosion control measures such as scattering of slash on skid trails. Salvaged trees would supply raw materials to local or regional industry and wood products to the public.

All activities within RHCAs would be in accordance with Fremont National Forest Land and Resource Management Plan (LRMP) Standards and Guidelines, as amended by the Inland Native Fish Strategy (INFISH). INFISH Standards and Guidelines for Timber Management (TM-1) prohibits timber harvest within RHCAs, except as follows:

> Where catastrophic events such as fire, flooding, volcanic, wind, or insect damage result in degraded riparian conditions, allow salvage and fuelwood cutting in RHCAs only where present and future large woody debris needs are met and where cutting would not retard or prevent attainment of other Riparian Management Objectives and where adverse effects can be avoided to inland native fish.

Using the riparian management objectives as well as the standards and guidelines of INFISH the following would be applied to the salvage within RHCAs:

Commercial Salvage in Riparian Habitat Conservation Areas (not in Roadside Hazard Corridors)

Other than the roadside hazard corridors discussed above there are approximately 416 acres proposed for commercial salvage in RHCAs. This includes 22 acres in Category 1 RHCA, 262 acres in Category 3 and 132 acres in Category 4 (there are no Category 2 RHCAs in the project area). All activities within RHCAs would be in accordance with Fremont National Forest Land and Resource Management Plan

(LRMP) Standards and Guidelines, as amended by the Inland Native Fish Strategy (INFISH). Specifically, the following would be applied to salvage activity within RHCAs:

Category 1 – Fish Bearing Streams: In the outer 100 feet of the RHCA (which are typically 300 feet wide, or wider, in slope distance beyond the edge of the active stream channel, on each side of the stream) salvage harvest of selected trees or clumps. Helicopter yarding would be used. A feathered forest edge would be retained. No salvage would occur other than in the outer 100 feet of RHCA. No mechanized ground-based equipment would be allowed within the entire width of the RHCAs, as a part of the commercial salvage operation, except at existing classified road crossings.

Category 3 – Ponds, lakes, reservoirs, and wetlands greater than 1 acre: In the outer 75 feet of the RHCA (which are typically 150 feet wide slope distance beyond the edge of the wetland, pond, lake or reservoir) salvage harvest of selected trees or clumps would be allowed. Helicopter yarding would be used where topography warrants. "Line-pulling" from ground-based equipment would be used otherwise. A feathered forest edge would be retained. No mechanized ground-based equipment would be allowed within the entire width of the RHCA, except at existing classified road crossings. An exception to this would be considered in the event that isolated areas of harvest could be accessed by using an existing unclassified road as a temporary road or using a designated skid trail across an RHCA. Such exceptions would be reviewed on a case-by-case basis by the Zone Hydrologist.

Category 4 – Seasonally flowing or intermittent streams: Site selective salvage harvest can occur within this RHCA (which are typically 50 feet wide in slope distance beyond the edge of the active stream channel, on each side of the stream). Between 20 and 80 trees per mile of stream, including all green and sufficient dead trees to provide long-term attainment of Riparian Management Objectives, would be retained. Retained trees would have a minimum dbh of 12 inches and a minimum height of 35 feet. No mechanized ground-based equipment would be allowed within the entire width of RHCA, except at existing classified road crossings. An exception to this would be considered in the event that isolated areas of harvest could be accessed by using an existing unclassified road as a temporary road or using a designated skid trail across an RHCA. Such exceptions would be reviewed on a case-by-case basis by the Zone Hydrologist.

Reforestation

Planting of tree seedlings (following site preparation) would occur on approximately 28,500 acres, including areas that are salvage harvested and other areas, predominately existing plantations, that experienced loss of stocking due to fire. The amount (percent) of area where reforestation would occur reflects the varying degree to which mortality occurred. As a result, a higher percentage of an area that burned at high intensity would be reforested than would an area that only burned lightly. Reforestation would occur in areas that are salvage harvested, in existing plantations or young stands where fire damage has occurred, in mixed conifer stands where there has been a substantial reduction of the ponderosa pine component due to the fires (even if they are adequately stocked with a white fir component), and in portions of RHCAs. Most or all seedlings would be ponderosa pine. In most areas, seedlings would be planted at between 150 and 400 trees per acre. Throughout areas that would be reforested, site preparation consisting of falling dead non-merchantable material and follow-up fuels treatment would occur. Within RHCAs, in order to provide future shade and long term large woody debris recruitment, conifer planting would occur in those forested stands that experienced moderate and high burn intensity. In order to promote the development of deciduous riparian vegetation, no conifer planting would occur within 50 feet of any stream channel. Planting in RHCAs would be at a density that would achieve sustainable LOS stand conditions at 20 to 40 trees/acre.

Fuels Reduction

Reduction of fuels, including those created by the fire, by salvage activity, and by site preparation would occur throughout the project area. A variety of fuel treatment methods would be used throughout the project area, including removing marketable timber through salvage harvest, burning in place (including use of prescribed fire), piling and burning, yarding tops to landings to be burned, or lopping and scattering to speed decay. Additionally, in order to meet desired fuels conditions, approximately 3,200 acres would be "pretreated" (by thinning very small diameter trees) and then prescribed burned. In some instances,

this may require a Forest Plan amendment for mule deer habitat outside of winter range. Pre-treatment and prescribed fire is not proposed as a component of the fuels reduction strategy for areas allocated to mule deer winter range (MA 1).

As per INFISH Standard and Guideline FM-1, fuel treatment strategies will be designed "so as not to prevent attainment of Riparian Management Objectives." When recovery of riparian conditions has occurred, fuels treatment would occur using equipment that minimizes the impacts on the environment.

Watershed Protection and Improvement Projects
Where risks to aquatic and watershed resources, because of the Toolbox Complex Fire, have been identified, projects are proposed to eliminate or reduce these risks (see Maps 5 and 6). The following activities are designed to eliminate or reduce adverse effects to aquatic and riparian areas:

1. Approximately 35 miles of road decommissioning to promote watershed recovery.

2. Approximately 750 acres of aspen stand protection, through either falling dead trees or fencing.

3. Placement of large woody debris or other in-stream structures to meet Riparian Management Objectives in approximately 6 miles of Silver Creek and 4 miles of West Fork Silver Creek.

4. Approximately 10 acres of riparian area deciduous plantings

Other Projects
Additional proposed project activity in response to the stated purpose and need for this project includes:

- Approximately 2,500 acres of plantation thinning in order to promote the long-term development of a sustainable LOS forest conditions.
- Re-routing sections of the Fremont National Recreation Trail, if necessitated by salvage activities.

SPECIES OF CONCERN
Redband Trout – Interior redband trout are non-anadromous rainbow trout that occur in six desert basins throughout southeast Oregon and northeast California. These basins are Malheur, Catlow Valley, Fort Rock, Chewaucan, Goose Lake, and Warner Lakes (Behnke 1992). The redband trout is a USDA Forest Service Region 6 sensitive species.

Redband trout require four basic habitat types to accommodate life history requirements: spawning, rearing, adult and overwintering (Behnke 1992). Kunkel (1976) documented that redband trout in a southeastern Oregon stream spawned in April and May, with the highest spawning intensities occurring in the first part of May. In rainbow trout, eggs typically hatch in 4 to 6 weeks and alevins take about 3 to 7 days to absorb the yolk sac before emergence. Gravels free of sediments are optimum for spawning since sediment can smother eggs by impeding the free flow of oxygenated water and can trap alevins (Willers 1991). According to Bjornn and Reiser (1991), spawning is adversely affected when substrate fines (<6.4mm) exceed 25%.

Intermittent streams are used for spawning and are effective when flow continues through emergence and downstream migration of juveniles into perennial tributaries (Behnke 1992). Within forested systems, large wood provides storage of sediment in the tributaries and contributes to the maintenance of water quality and productive fish habitat (Duncan et al. 1987) by both slowing water velocity upstream and trapping transported sediment. In low gradient systems, sediment is trapped on active floodplains during high flow events. After young trout emerge from the spawning gravel, they often rear in low velocity areas associated with stream margin habitats, high cover areas and interstitial spaces. Adults require habitat for resting and feeding and thus are generally found in areas of abundant cover associated with deep

pools, large organic material, undercut stream banks and overhanging vegetation. Over-winter sites, characterized by low velocity areas with cover, including large woody debris, are important to all age classes (Bjornn and Reiser 1991). Generally, water temperatures in excess of 21°C (70°F) are unfavorable and may cause stress to all age classes (Sigler and Sigler 1991). Temperatures of about 15°C, or 58-60°F, are ideal for optimum growth of rainbow trout. Temperatures exceeding 29.4 degrees C (84.9 degrees F) can be fatal to rainbow trout (Bjornn and Reiser 1991). Behnke (1992) states that redband possess a hereditary basis to persist at higher water temperatures (greater than 21°C (70°F)) than other species of trout, and has captured (fly fishing) live redband in streams with temperatures of 28.3 degrees C (82.9 degrees F).

In 1997 several environmental groups petitioned Fish and Wildlife Service to list redband in the Great Basin. On March 15 2000, U.S. Fish and Wildlife Service found redband not warranted for listing at this time (USDI 2000). Reasons given for not listing included moderate to high numbers of redband as compared to state-wide averages, improving trend in habitat, return of adfluvial populations in Goose Lake and Chewaucan River systems, and strong conservation efforts through various working groups and Watershed Councils.

EXISTING CONDITIONS

The project area is located on the Silver Lake Ranger District of the Fremont National Forests. Local weather is largely influenced by the Cascade Mountains. The higher peaks of the sub-watersheds of the analysis area lie to the east of the Cascade Mountain Range within view of Crater Lake National Park and Mount McLoughlin. This mountain range lifts and blocks the maritime air masses that move eastward from the Pacific Ocean, inducing rain and snow to fall on its slopes. The watershed stands in the shadow of the Cascade Range and receives leftover rain and snow and averages about 15-40 inches each year depending on elevation. The majority of precipitation falls as snow from October through March, with the highest elevations receiving the greatest depths. Winter temperatures typically drop below 0°F. Even during the summer, frost and snow may occur at these elevations. Convective thunderstorms provide rain in the spring and summer, although the summer months are relatively dry. Higher elevation areas have a progressively shorter growing season, being significantly shorter above 6,500 feet elevation where ponderosa pine becomes less common. Rain and snow are captured by juniper and sagebrush along the lower scabland plateaus, by ponderosa pine in the lower to middle elevations, and by white fir, Shasta red fir, mountain hemlock and lodgepole forests in the upper elevations. Some of this intercepted water evaporates, while the remainder soaks into the soil. The best infiltration occurs when needles and leaves cover the soil, slowing surface runoff and allowing the moisture to enter the ground.

The analysis area is comprised of eight 6th field watersheds or sub-watersheds, which are part of two 5th field watersheds—Silver Creek (HUC 1712000502) and Silver Lake (HUC 1712000503). Ninety-three percent of the analysis area has a slope between 0 and 20%, while 7% of the analysis area has a slope greater than 20%. The few areas with steeper slopes occur along canyons of Silver, West Fork Silver, Duncan, and East Duncan and along peaks and ridges such as Foster Butte, etc. The elevation within the project area ranges from approximately 4500 ft to 5800 ft in the Silver Fire area and 5300 ft to 6700 ft in the Toolbox Fire area. The elevation within the eight sub-watersheds ranges from 7680 at Yamsay Mountain to 4315 at Paulina Marsh. Land ownership for each of the subwatersheds is a matrix of Forest Service owned land, UST (United States Timberland), and other private holdings. The Forest Service owns approximately 58% of the project area, UST owns approximately 29%, and 13% is owned by other private holdings.

The wildfires of 2002 burned approximately 110,000 acres on the Fremont National Forest. Eighty thousand acres burned within the Toolbox Fire Recovery project area and will be referred to as the Silver Fire and Toolbox Fire. The severity of both fires varied from unburned to high severity. Eight 6th field HUC subwatersheds that were affected by the fires will be analyzed for this project. They are shown in Table 1. A minor portion of the 6th field HUC 171200050208 (Bridge Creek) burned in the Silver Fire and HUC 171200051003 (Ana River) burned in the Toolbox Fire but these sub-watersheds are not part of the project area and are not analyzed for this project. This analysis will focus on three sub-watersheds: Middle Silver, Thompson Reservoir, and West Fork Silver.

In order to understand the common measurements used in this analysis, a discussion of the terms "mortality" (or level of mortality), "intensity" and severity" is useful. These terms, particularly severity and intensity have often been used in different ways in different arenas. They are even sometimes used interchangeably; they are often confused. For example, the Toolbox Complex BAER Report (for the entire Toolbox Complex) indicated that 74,673 acres burned with low severity, 11,311 acres with moderate severity and 810 acres with high severity. However the maps that accompanied the BAER Report instead displayed "burn intensity" and showed a very small area of high intensity (corresponding to the 810 acres of "high severity"). In all cases, the terms used in the BAER are related to the effect of the fire on the soils, specifically the water absorbency/repellency of the soils (correctly termed "severity"). Burn intensity describes the nature of a fire in terms of its rate of energy release. These are physical descriptions of the fires, rather than ecological effects.

Burn severity was determined by the BAER (Burn Area Emergency Rehabilitation) team and was based on soil condition and degree of hydrophobicity. Burn severity across the project area is dominated (85% of the project area) by low severity burn, approximately 14% was classified as moderate severity, and 1% classified as high severity. The majority of the high severity burned areas are located in West Fork Silver Creek (approximately 196 acres) and Lower Duncan Creek (approximately 402 acres). Very high vegetative mortality was documented along 7.4 miles of fish bearing streams, moderate and high mortality along 9.8 miles, and low mortality along 5.7 miles.

Table 1. Hydrologic Unit Codes.

FIRE NAME	6TH FIELD HUC NAME	6TH FIELD HUC NUMBER	Area (acres)
Toolbox	Benny Creek	171200050204	26,813
Toolbox	East Duncan Creek	171200050302	11,601
Toolbox	Lower Duncan Creek	171200050303	25,012
Silver/Toolbox	Middle Silver Creek	171200050209	38,828
Silver/Toolbox	Thompson Reservoir	171200050205	41,166
Toolbox	Upper Duncan Creek	171200050301	22,146
Silver/Toolbox	Upper Silver Creek	171200050206	16,276
Silver	West Fork Silver Creek	171200050207	24,001

The following table displays the percent of each sub-watershed that was burned and the associated percentage by burn severity.

Table 2. Percent of each Subwatershed Burned and associated burn severity

Subwatersheds	High Severity	Moderate Severity	Low Severity	Percent of Subwatershed Burned
Middle Silver Creek	0.0%	0.2%	4.1%	4%
Thompson Reservoir	0.1%	3.7%	16.2%	20%
West Fork Silver Creek	0.8%	5.8%	33.8%	40%

The following table summarizes the miles of riparian area burned, by vegetative mortality level, along fish bearing streams within the project area.

Table 3. Miles of Riparian Area Burned on National Forest System Lands within the Silver Fire Portion

Stream	Miles in Area	Low Mortality	Moderate and High Mortality	Very High Mortality	Percent of Stream Miles Burned at Moderate to Very High Mortality
Silver Creek	9.3	3.8	3.3	2.2	59
WFK Silver Creek	9.4	1.9	2.5	5.0	80
NFK Silver Creek	2.3	0.0	2.1	0.2	100
Guyer Creek	1.9	0.0	1.9	0.0	100
Totals	**22.9**	**5.7**	**9.8**	**7.4**	

Designated Beneficial Water Uses

The waters associated with this project area are for the beneficial use of fisheries, terrestrial wildlife, livestock and road watering. Downstream uses are similar with the addition of agricultural irrigation. There are no surface water supply sources within the project area. Water quality is currently maintained through the application of Best Management Practices (BMPs) for controlling nonpoint sources of pollution to surface water.

303(d) Listed Waters

Forest Service temperature monitoring data was provided to the Oregon Department of Environmental Quality (DEQ). Streams that did not meet State of Oregon water quality standards were submitted by DEQ to the Environmental Protection Agency (EPA) for inclusion in the EPA 303(d) list. Stream temperatures are out of compliance with the State standards for rearing habitat when any maximum 7-day temperature average exceeds 17.8°C. There are two locations that are on the 303(d) list that are part of the analysis area. Silver Creek from the mouth to Thompson Valley Reservoir (Record ID 665, Segment ID 42A-SILV0) and West Fork Silver Creek from the mouth to Silver Creek Marsh (Record ID 666, Segment ID 42A-SIWF0) were found to have 7-day average daily maximum temperatures that exceed the temperature standard. Silver Creek is monitored with a temperature sensor at an elevation of 4530 and West Fork Silver Creek has two monitoring sites at elevations of 4460 and 4740, respectively.

Table 4. Recorded 7-day Average Daily Maximum Temperature at 303(d) Monitoring Sites.

Stream	Elevation	7-Day Average Daily Maximum Temperature (°C)									
		1992	1993	1994	1995	1996	1997	1998	1999	2000	2002
Silver Creek	4530’		22.8				24.1	23.9		24.4	26.2
West Fork Silver Creek	4460’			27.0	21.2	21.8	21.4	21.1		23.8	
West Fork Silver Creek	4740’	27.0	21.0	27.0	22.6	22.6	22.0	21.6	21.0	27.6	

Stream Temperature

The following table lists the maximum 7-day average temperatures that have been recorded in the streams within the analysis area and inside the Silver Fire boundary. These sites are not official monitoring sites for the 303(d) list.

Table 5.Temperature Monitoring Sites

Site	Elevation	1993	1994	1995	1996	1997	1998	1999	2000	2002
North Fork Silver Creek	5050	12.7	15.4	12.3	12.9	12.5	13.0	12.3	14.3	17.4
West Fork Silver Creek	5050	13.1	16.4	12.8	13.8	13.3	13.2	12.4	15.3	17.8
All temperatures in degrees Celsius										

Sediment Monitoring

Several sites within the project area are long-term sampling sites for fine sediment in channel substrate. These sites were inventories last in 2001, before that in 1996 and sampled again after the fires in May 2003. Typically the fine sediment information is generated with bulk samples of spawning gravel. The sample is acquired through the insertion of a cylinder into the streambed and extracting the gravel from the cylinder. Five samples were taken at each site, at pool tail crests or other areas that provided suitable spawning gravels. The samples were then dried and passed through a series of nested sieves to determine the percent of fines less than 6.4 mm (Table 6). In 2003, one sample at two of the four sites was taken of the percent fines on West Fork Silver Creek.

Table 6. Percent Fines less than 6.4 mm within Project Area.

Stream	Elevation	Percent Fines Less Than 6.4 mm		
		1996	2001	2003
West Fork Silver Creek	4850	41	35	32
West Fork Silver Creek	4740	26	25	NA
West Fork Silver Creek	4460	31	15	30
Silver Creek	4720	36	NA	NA

Road System

Historically, the Fremont National Forest emphasized timber management. A large road system was constructed to gain access to timber and other forest resources. Timber sale revenue paid for the majority of the road construction and maintenance. In the past decade however, timber harvest has declined. This change in forest management has reduced the operating budget and the ability to maintain an extensive road system. The Toolbox Fire Recovery Project proposes quantities of timber haul over the existing road system that far surpass levels that have occurred in the past decade, or more. The existing road system proposed for reconstruction includes Maintenance Level-2 roads consisting of native surfaces. Included in this road system are arterial haul roads with diminished cinder surfaces.

ANALYSIS OF EFFECTS BY ALTERNATIVES

Alternatives have been grouped based on similarity of proposed harvest within RHCA, proposed Soil and Riparian Protection/Restoration projects, and to a lesser degree Road Management characteristics. Data used to describe the current stream channel conditions on the four fish bearing streams was collected in the summer of 2000 and fall of 2002. Stream functionality calls are made based on whether habitat objectives are being met. Habitat is compared to INFISH Riparian Management Objectives (USDA 1995). Other habitat elements such as water temperature, riparian vegetation, bank stability, and fine sediment were established by examination of the scientific literature and/or obtained through monitoring of natural or near natural streams on the Fremont National Forest.

Alternative A

The no action alternative serves as a baseline for comparison of the expected effects of all of the other alternatives. There would be no commercial salvage, no acres of fuels treatment or fuels reduction, no prescribed fire, no active closure or decommissioning of any portion of the road system, no active soil or riparian improvement projects, and no reforestation.

This alternative incorporates some of the recommendations of Beschta et. al., (1995). There would be no “immediate intervention on the post-fire landscape” and species would be allowed to naturally regenerate. There would be no salvage logging under this alternative and therefore no salvage logging in sensitive areas. The logging of sensitive areas is often associated with accelerated erosion and soil compaction (Beschta et. al., 1995).

There would be fewer opportunities to actively reduce sediment yields through improvement of drainage on roads and closure and decommissioning of roads. Within the eight sub-watersheds there are 1,012 miles of road within the eight sub-watersheds that are affected by this project. Within the project area

there are 440 miles of road, of which 271 are located on Forest Service land. Currently the road density within the project area and on Forest Service land is 3.68 miles of road per square mile of land base. The direction in the Forest Plan is to "not exceed 2.5 miles per square mile of open road". Recommendations developed during the USFWS (1998) analysis for watersheds functioning appropriately are road densities below 1.0 mi/mi^2. Road closure and/or decommission within sub-watersheds is the recommended action in which to reduce road densities that exceed this value. Under the no action alternative there would be no miles of new temporary road or any re-opening of unclassified roads. The lack of temporary roads and the lack of re-opening unclassified roads would reduce the temporary increase in road miles, road density, and potential sediment production from the additional miles of road. However, the long-term impact from the high road density would be a chronic problem for the analysis area. The WEPP derived model, Cross Drain Spacing and Sediment Yield Program, yielded a sediment loss due to the road system within the analysis area of 1.4 tons/yr.

The ground disturbing activities associated with commercial salvage logging, road reconstruction and fuels treatment would not take place under this alternative. The minimal ground disturbance associated with planting and a low-severity prescribed burning would also not take place under this alternative.

The riparian improvement projects that are aimed at rehabilitating key areas of the analysis area would not be implemented under this alternative and a passive approach to protection and restoration would be implemented. Under this alternative, several streams would continue to lack large wood material and cover the material provides. Areas within the riparian zones that do not revegetate would be left bare. This type of mineral soil exposure would add to sedimentation problems within the stream system. Aspen enhancement projects would not be implemented and conifer encroachment into meadows and riparian areas would continue to plague the landscape. The drainage improvement at road 2917-413, located within the riparian habitat conservation area, would not be implemented and excessive sedimentation from this recreational access road would continue.

Sediment yield

Under Alternative A, sediment inputs from roads would continue to occur in streams within the Silver Fire portion. Fire-derived sediment increases in Silver Creek, West Fork Silver Creek, North Fork Silver Creek, and Guyer Creek are likely to be small because only 1.3 percent of the Silver Fire area burned at a high severity (USDA Forest Service BAER Report 2002) and 14.5 percent at moderate severity. The majority of fire-derived sediments are expected in the West Fork Silver Creek drainage, which experienced a higher percentage of moderate to very high vegetative mortality burn. Fire derived sediment inputs would be highest in 2003-2005 and should return to near pre-fire levels by 2006 as natural vegetation recovers. Sediment produced by road maintenance would be minor because of existing Forest mitigation measures and BMP's. Sediment delivery predictions from roads were estimated to be 4.1 tons per year under Alternative A for the Silver Fire portion.

Road density/location

Under Alternative A, existing road densities and miles of open roads within Category 1 and Category 4 RHCAs would remain unchanged as no road closures or decommissions would occur. Current road maintenance activities would continue. Therefore, road conditions on the landscape would continue to exert stress on drainages within the project and their native trout populations by delivering fine sediment to instream habitats and by increasing the drainage network.

RHCA Harvest

No harvest in Riparian Habitat Conservation Areas would occur under this alternative. No commercial salvage would occur with RHCAs within roadside hazard corridors.

Aquatic Habitat Condition

Wildfire has eliminated the protective vegetation on upland slopes and along stream channels and can alter surface soil layers, increasing water yield and surface erosion. In the case of the Silver Fire portion of the Toolbox Complex, 84.2 percent of the area experienced low severity fire, 14.5 percent was moderate, and 1.3 percent high (USDA Forest Service 2002-BAER Report). Approximately 800 acres in

the entire Toolbox Fire Complex exhibited hydrophobic conditions. Storm events up to 50 years were modeled using the Watershed Erosion Prediction Project (WEPP) model. There were only slight increases in water yield predicted under any storm event.

Numerous roads within the analysis area have been identified as having minimal cross drainage with the sediment routed to the streams in several locations. Under Alternative A, minimal maintenance of the road system would occur, no decommissioning would take place and reconstruction activities, including drainage improvements would likely not take place. Fine sediment levels would increase in affected stream channels.

Silver Creek and West Fork Silver Creek have exhibited late summer water temperatures that exceed State of Oregon standards. Other perennial streams within the analysis area (North Fork Silver Creek and Guyer Creek) fall within the acceptable limits for water temperature. Portions of all perennial streams were burned and mortality of shade producing shrubs and trees did occur. The loss of shade, while minimal overall, will increase solar radiation and some increase in stream temperature will occur. Given the limited extent and magnitude of overstory loss adjacent to perennial streams, changes in stream temperature will be negligible. All alternatives will have identical effects to stream temperature, which is immeasurable increases in the short-term, followed by decreases in the long-term as overstory and streamside vegetation within the RHCA's is regenerated.

Fire can also affect nutrient availability and subsequent nutrient loading of streams. Nutrients from the forest floor can be redistributed by leaching of the ash layer and soil, and transported to the stream by surface erosion, soil mass movement, or solution transport (Swanson 1991). Increased nutrient loading (primarily nitrate-nitrogen and phosphorous) to streams is usually seen following burns where fire induced changes in soils results in increased flows. The cause of this increase is believed to be from increased flows that displace volatized material or organic detritus from upslope areas adjacent to the channel. No measurable increase in water yield and minimal increases of fine sediment are predicted from the Silver Fire within the Toolbox Complex. Fire induced loading to all potentially affected streams is expected to be minimal.

Large woody debris is lacking throughout several reaches of the streams in the analysis area. Within the burned area, recruitment of large wood to the channel over several decades is anticipated as burned overstory trees die and fall in the floodplain and active stream channel. Overall, within the burned area all streams will see an increase in large woody debris under Alternative A.

Cumulative Effects

Minor short-term changes in stream channel conditions would be expected with the implementation of Alternative A. Short-term changes include: increased fine sediment from roads and to a lesser extent from hillslopes burned in the fire, any large wood in RHCAs that was cut down during suppression efforts are aiding in pool formation and providing stream channel stability. In the long-term, numerous snags greater than 12 inches dbh would be recruited to stream channels. Increased large woody debris would substantially increase both the quantity and quality of pools within intermittent and perennial stream channels. Fine sediment would continue to be a problem due to extensive road systems.

Alternatives C and E

Alternative C places an emphasis on providing wood products while contributing to the long-term development of LOS. Alternative C would result in a road density of 1.76 mi/mi^2, 14,441 acres of commercial salvage and fuels treatment and reduction, 16 miles of temporary road development, re-opening of 21.4 miles of unclassified roads and reforestation of 34,000 acres that experienced loss of stocking due to fire and includes soil and riparian restoration projects.

Alternative E emphasizes economic efficiency with regard to commercial salvage and limits the reduction of road density. The implementation of Alternative E would result in a road density of 2.57 mi/mi^2, 11,490 acres of commercial salvage and fuels treatment, 15.8 miles of temporary road development, re-opening 13.3 miles of unclassified roads and reforestation of 34,000 acres that experienced loss of stocking due to fire and does not include soil and riparian restoration projects.

Sediment yield
Alternatives C and E are predicted to deliver (respectively) 3.7 and 3.8 tons of sediment per year to streams in the Silver Fire portion. This delivery is sediment produced by roads within the project area. The amount of sediment yield due to harvest activities is expected to be minimal, as documented within the Geology, Geomorphology and Soils section of the EIS for the project. Sediment inputs from roads are likely to occur over a 2-4 year period with the largest pulses of sediment occurring during storms, runoff, and high flow periods in 2003-04 and to a lesser degree in 2005-06.

Significant increases in sediment yield, that exceed the streams natural ability to carry the sediment load, resulting in sediment depositions, wider, shallower and less stable channels, bank erosion and bed scour, are not expected with Alternatives C and E due to riparian protection measures and adherence to Forest BMP's.

Road density/location
Road miles in the Silver Fire portion within 300 feet of fish bearing stream channels currently total 3.05 miles; and 16.38 miles within 300 feet of intermittent streams. Maintaining a buffer between the road and stream channel provides a filter that minimizes the introduction of fine sediment into the stream channel. Studies have shown a buffer distance of roughly one site-potential tree would effectively remove sediment in most situations. The number of road miles within 300 feet of perennial and intermittent stream channels were identified from GIS road and stream layers for the project area.

Under Alternatives C and E, open road densities in the Silver and Toolbox Geographic Areas would decrease from the current level of 3.68 mi/mi2 to 1.76 mi/mi2 and 2.57 mi/mi2, respectively. Alternative C and E would be considered to be **functioning appropriately but at risk** for road densities within the proposed project area. In addition, open road miles within 300 feet of fish bearing streams would decrease from 3.05 miles to 1.15 miles for Alternative C and 1.84 miles for Alternative E while open road miles within 300 feet of intermittent streams would decrease from 16.38 miles to 12.27 miles for Alternative C and 13.07 miles for Alternative E. Sediment inputs from roads into stream channels is expected to be minor given the low number of road miles within 300 feet of stream channels and the implementation of riparian protection measures and BMP's.

RHCA Harvest
Other than roadside hazard corridor harvest (which is included in all action alternatives), in the Silver Fire portion, 22 acres of Category 1 RHCA harvest are proposed in Alternative C; 4 acres are proposed in Alternative E. Harvest in roadside hazard corridor, within RHCAs, would add 15 acres of Category 1 RHCA harvest in both alternatives.

In these two alternatives, harvest units within Category 1 RHCA are either reserved for helicopter yarding (with exceptions that would allow "line-pulling" from equipment outside the RHCA) and placed in the outer 100 foot of a typical 300-foot RHCA; or in the case of roadside hazard corridors are equipment-restricted.

With Alternatives C and E, harvest would occur within Categories 1, 3, and 4 RHCAs. Under the alternative designs some harvest would occur as near as 200 feet from fish bearing streams. Studies show that non-channelized sediment flow rarely travels more than 300 feet and that riparian buffers of 200-300 feet are generally effective at protecting streams from sediment from non-channelized flow (Ketcheson and Megahan 1990, Burroughs and King, 1989). Therefore, the potential for sedimentation into these streams would be greater with harvest occurring within 200 feet of fish bearing streams as opposed to 300 feet.

Harvest would also occur within the entire 50-foot RHCA width along intermittent streams (though no mechanized ground based equipment would be permitted within the entire RHCA width), thus increasing the potential for sediment transport to downstream fish bearing streams. In addition, the harvest would decrease future large wood recruitment to riparian areas, though between 20 and 80 trees per mile of stream would be retained, including all green trees and sufficient dead trees to provide long-term attainment of INFISH Riparian Management Objectives. Large down woody material in riparian areas provides several functions including trapping of sediment transported by rill or sheet erosion,

microclimates for the establishment of deciduous and coniferous tree species, and protection and stabilization of streambanks and riparian areas during high flow events.

Riparian vegetation & bank stability
Silver Creek, West Fork Silver Creek (except Reach 5), North Fork Silver Creek, and Guyer Creek are all **functioning appropriately** for riparian vegetation and bank stability. Reach 5 of West Fork Silver Creek is **functioning appropriately but at risk** due to a high abundance of grass and the lack of willow in the older age classes and its slightly low bank stability values.

When streams are lined with riparian vegetation such as sedges, willows, and dogwood, streambanks are typically highly stable, resulting in a stream channel that is less susceptible to alteration during high flow events. Under Alternatives C and E, no significant increases in water yield or sedimentation are predicted. Riparian vegetation and bank stability will improve as natural vegetation recovers over time in areas that experienced moderate and high burn intensities.

Large woody debris
Silver Creek, in all reaches in the project area, is **functioning appropriately but at risk** for meeting INFISH standards for large wood. However, only Reaches 5 and 6 are considered to have this rating using ICBEMP numbers for natural and near natural streams while Reaches 7 and 8 are considered to be **functioning appropriately**. West Fork Silver Creek is **functioning appropriately** for meeting INFISH standards and natural and near natural conditions as described in ICBEMP. Only Reach 6 of West Fork Silver Creek is considered to be **functioning appropriately but at risk**. North Fork Silver Creek and Guyer Creek are both **functioning appropriately** for large wood.

Under Alternatives C and E, some harvest would occur within RHCAs (in the area between 200 feet and 300 feet from the stream along fish bearing streams). As fire affected trees within the RHCAs die they will provide an important source of wood to the affected stream channels, riparian areas, and adjacent slopes. Large woody debris within affected stream reaches is expected to continue trending toward attainment of desired future condition objectives. The amount of large wood entering fish bearing streams in the Silver Fire portion is expected to increase by an estimated 50 pieces over the next 20 years, which will be sufficient to move to a functional condition. Implementation of the aquatic habitat restoration projects (9.6 miles of large woody debris placement in the Silver Fire portion) would improve the number of pieces of large woody debris in fish bearing streams and therefore improve aquatic habitat conditions for redband trout and other aquatic species.

Pools
The numbers of pools in all potentially affected stream reaches meet objectives and are considered to be **functioning appropriately**. However, the number of large pools, those greater than 2.6 feet in depth, were found to be deficient in all surveyed stream reaches, with the exception of Reaches 4, 5, and 6 of West Fork Silver Creek, and are considered to be **functioning appropriately but at risk** for Silver and West Fork Silver Creeks. North Fork Silver Creek and Guyer Creek are considered to be **functioning at unacceptable risk** for large pools. Factors believed to be affecting formation of large, deep pools are the low numbers of large woody debris and the filling of pools from upstream sediment sources.

Under Alternatives C and E, RHCAs have been established on all streams with some harvest occurring in the outer edges and with specific guidelines (see RHCA Harvest above). No change is expected in the number of pools or large pools, as a result of salvage, with either of these alternatives. Implementation of the aquatic habitat restoration projects would improve the number of large pools in fish bearing streams and therefore improve aquatic habitat conditions for redband trout and other aquatic species.

Spawning gravel fines/substrate composition
The major cause of sedimentation to streams is from roads in most watersheds. No new specified road construction will occur with this project. Project area wide, approximately 16.0 miles (Alternative C) and 13.3 miles (Alternative E) of temporary road would be constructed using the Forest Road Best Management Practices (BMPs). No temporary road would be constructed within RHCAs. Given the physical separation of temporary road construction from spawning areas (greater than 300 feet in all

cases) and the BMPs in place, the amount of fine sediment in spawning gravels is not expected to change as a result of temporary road construction. Under Alternatives C and E, improvements (cross drainage, rolling dips etc.) would be made to the roads within the project area, which is expected to slightly decrease the amount of fine sediment in spawning gravels.

Salvage activities proposed under Alternatives C and E are not expected to add significantly to fine sediment entering fish bearing streams. In addition, salvage in Category 1 RHCAs would be via helicopter to minimize soil disturbance and compaction. If any project-generated sediment were to reach fish bearing streams, it is expected that it would be short-term in nature, and at an immeasurable, negligible level. The use of timber BMPs, close adherence to the Soil Productivity Guide, and protective measures in RHCAs would prevent most sediment from reaching stream channels. Road related activities (road maintenance and construction of temporary road) would also have minimal effect as long as road BMPs are followed.

Rosgen channel types

Silver Creek, West Fork Silver Creek (except Reach 5), North Fork Silver Creek, and Guyer Creek are all **functioning appropriately** for predicted Rosgen Channel Types. Although Reach 5 of West Fork Silver Creek has stream channels that are similar to the stream type expected, segments of the reach have bankfull width-to-depth ratios that are slightly greater than expected, therefore the reach is considered to be **functioning appropriately but at risk**. Wildfire, followed by commercial salvage and associated road building, can increase water yield and accelerated erosion. These changes can have a dramatic effect to channels downstream depending on the magnitude of the change and the condition and type of stream channels affected. Under Alternatives C and E, little increase in water yield or sediment yield is predicted and therefore no changes in channel types are expected to occur.

Stream temperature and shade

Under Alternatives C and E, water temperature will continue to exceed state water quality standards in Silver Creek and West Fork Silver Creek and temperatures may increase with the loss of overstory vegetation from fire-induced mortality. Water temperatures for North Fork Silver Creek and Guyer Creek are expected to remain unchanged.

Cumulative effects of Alternatives C and E

In assessing cumulative effects on water quality, past and reasonably foreseeable future activities, both within the project area and within adjacent areas, including fire suppression activity are factors to be considered. Past activities in the affected subwatersheds, including grazing, timber harvest, road construction, and recreational activities are assumed to have negatively affected erosion rates, peak and base flows, channel shape and pattern and water quality, as has been documented in nearby watersheds (Upper Chewaucan & Upper Sycan Rivers). Erosion rates from road construction and timber harvest have likely increased over what would be predicted within an undisturbed watershed. Changes in peak flow are believed to be not measurable due to the presence of overstocked stands within the watershed that have mitigated past harvest activities. Drainage efficiency needs to be reduced through aggressive road treatments that hydrologically disconnect roads within the affected subwatersheds. Livestock grazing at the turn of the century likely decreased or altered streamside vegetation by removing woody shrubs and channel stabilizing sedges. Because of these changes, width-to-depth ratios increased on affected stream channels compromising instream habitat conditions and increasing late summer water temperatures.

Reasonably foreseeable activities include timber harvest outside of the fire area, pre-commercial thinning of overstocked green stands within the fire perimeter, and conifer planting in burned areas to improve upland vegetation conditions in the affected subwatersheds, road maintenance, road drainage improvements, road decommissioning, trail reconstruction, stream channel restoration, and a wide range of recreational uses. All of these activities will be designed to maintain or improve the resiliency of the watershed by improving vegetation conditions, reducing sedimentation, restoring base flows, improving in-channel habitat conditions and increasing the health and vigor of stream-side vegetation where and when possible.

Alternatives C and E would not affect large woody debris recruitment. Intermittent perennial stream channel conditions within all potentially affected stream reaches will see improvements in large wood, number of pools and number of deep pools. In headwater areas above the fire instream habitat is expected to remain static or improve over time.

Alternative D, G, and H

Alternative D emphasizes the maintenance of water quality through the limitation of several activities. Alternative D would result in a road density of 1.68 mi/mi^2, 6,367 acres of commercial salvage and fuels treatment, no new temporary road development, re-opening 5.7 miles of unclassified roads and reforestation of 34,000 acres that experienced loss of stocking due to fire and includes soil and riparian restoration projects.

Alternative G places an emphasis on using active management to achieve post-fire recovery, particularly in response to the purpose and need to develop a long-term sustainable forest that is maintainable by re-introduction of fire, while providing recovery of some merchantable. It focuses on fuels reduction and long-term fire suppression effectiveness, partially through a limit to the reduction of road density. The implementation of Alternative G would result in a road density of 2.57 mi/mi^2, 14,419 acres of commercial salvage and fuels treatment, 21.4 miles of temporary road development, re-opening 16.0 miles of unclassified roads and reforestation of 34,000 acres that experienced loss of stocking due to fire and does include soil and riparian restoration projects.

Alternative H focuses on wildlife habitats and on contributing to the long-term development of LOS while providing recovery of some merchantable. It was developed through the modification of Alternative C in response to several key issues. The implementation of Alternative H would result in a road density of 1.72 mi/mi^2, 13,031 acres of commercial salvage and fuels treatment, 14.9 miles of temporary road development, re-opening 19.7 miles of unclassified roads and reforestation of 34,000 acres that experienced loss of stocking due to fire and does include soil and riparian restoration projects.

Sediment yield

Alternatives D, G, and H are predicted to deliver (respectively) 3.7, 3.8, and 3.7 tons of sediment per year to streams in the Silver Fire portion. This delivery is sediment produced by roads within the project area. The amount of sediment yield because of harvest activities is expected to be minimal, as documented within the Geology, Geomorphology and Soils section of the project EIS. Sediment inputs from roads are likely to occur over a 2-4 year period with the largest pulses of sediment occurring during storms, runoff, and high flow periods in 2003-04 and to a lesser degree in 2005-06.

Significant increases in sediment yield, that exceed the streams natural ability to carry the sediment load, resulting in sediment depositions, wider, shallower and less stable channels, bank erosion and bed scour, are not expected with Alternatives D, G, and H due to riparian protection measures and adherence to Forest BMP's.

Road density/location

Road miles within 300 feet of fish bearing stream channels currently total 3.05 miles; and 16.38 miles within 300 feet of intermittent streams. Maintaining a buffer between the road and stream channel provides a filter that minimizes the introduction of fine sediment into the stream channel. Studies have shown a buffer distance of roughly one site-potential tree would effectively remove sediment in most situations. The number of road miles within 300 feet of perennial and intermittent stream channels were identified from GIS road and stream layers for the project area.

Under Alternatives D, G, and H, open road densities in the Silver and Toolbox Geographic Areas would decrease from the current level of 3.68 mi/mi^2 to 1.76 mi/mi^2, 2.57 mi/mi^2, and 1.72 mi/mi^2, respectively. Alternatives D and H would be considered to be **functioning appropriately** for road densities within the proposed project area while Alternative G would be **functioning appropriately but at risk for road densities**. In addition, open road miles within 300 feet of fish bearing streams would decrease from 3.05 miles to 1.15 miles for Alternatives D, G, and H while open road miles within 300 feet of intermittent streams would decrease from 16.38 miles to 11.93 miles for all three alternatives. Sediment inputs from

roads into stream channels is expected to be minor given the low number of road miles within 300 feet of stream channels and the implementation of riparian protection measures and BMP's.

RHCA Harvest
Other than roadside hazard corridors (which are included in all action alternatives), in the Silver Fire portion, no Category 1 RHCA harvest is proposed in Alternatives D, G and H. Harvest in roadside hazard corridor, within RHCAs, would add 15 acres of Category 1 RHCA harvest to each of the alternatives.

With Alternative G harvest would occur within Categories 3 and 4 RHCAs. Harvest would occur within the entire 50-foot RHCA width along intermittent streams (though no mechanized ground based equipment would be permitted within the entire RHCA width), thus increasing the potential for sediment transport to downstream fish bearing streams. In addition, the harvest would decrease future large wood recruitment to riparian areas, though between 20 and 80 trees per mile of stream would be retained, including all green trees and sufficient dead trees to provide long-term attainment of INFISH Riparian Management Objectives. Large down woody material in riparian areas provides several functions including trapping of sediment transported by rill or sheet erosion, microclimates for the establishment of deciduous and coniferous tree species, and protection and stabilization of streambanks and riparian areas during high flow events.

Under Alternatives D and H, limited harvest within roadside hazard corridors within RHCAs would still occur (as it would with all action alternatives). Any harvest within RHCAs increases the potential for sediment transport to downstream fish bearing streams. In addition, the harvest would decrease future large wood recruitment to riparian areas, though between 20 and 80 trees per mile of stream would be retained, including all green trees and sufficient dead trees to provide long-term attainment of INFISH Riparian Management Objectives.

Riparian vegetation & bank stability
Same effects as Alternatives C and E.

Large woody debris
Silver Creek, in all reaches in the project area, is **functioning appropriately but at risk** for meeting INFISH standards for large wood. However, only Reaches 5 and 6 are considered to have this rating using ICBEMP numbers for natural and near natural streams while Reaches 7 and 8 are considered to be **functioning appropriately**. West Fork Silver Creek is **functioning appropriately** for meeting INFISH standards and natural and near natural conditions as described in ICBEMP. Only Reach 6 of West Fork Silver Creek is considered to be **functioning appropriately but at risk**. North Fork Silver Creek and Guyer Creek are both **functioning appropriately** for large wood.

Under Alternatives D, G, and H, harvest would not occur within Category 1 RHCAs, but would occur in (Alternative G) Category 3 and 4 RHCAs. All action alternatives include limited roadside hazard corridor RHCA harvest. As fire affected trees within the RHCAs die they will provide an important source of wood to the affected stream channels, riparian areas, and adjacent slopes. Large woody debris within affected stream reaches is expected to continue trending toward attainment of desired future condition objectives. The amount of large wood entering fish bearing streams in the Silver Fire portion is expected to increase by an estimated 50 pieces over the next 20 years, which will be sufficient to move to a functional condition. Implementation of the aquatic habitat restoration projects (9.6 miles of large woody debris placement in the Silver Fire portion) would improve the number of pieces of large woody debris in fish bearing streams and therefore improve aquatic habitat conditions for redband trout and other aquatic species.

Pools
The numbers of pools in all potentially affected stream reaches meet objectives and are considered to be **functioning appropriately**. However, the number of large pools, those greater than 2.6 feet in depth, were found to be deficient in all surveyed stream reaches, with the exception of Reaches 4, 5, and 6 of West Fork Silver Creek, and are considered to be **functioning appropriately but at risk** for Silver and

West Fork Silver Creeks. North Fork Silver Creek and Guyer Creek are considered to be **functioning at unacceptable risk** for large pools. Factors believed to be affecting formation of large, deep pools are the low numbers of large woody debris and the filling of pools from upstream sediment sources.

Under Alternatives D, G, and H, RHCAs have been established on all streams with some harvest occurring in the outer edges of Category 3 (Alternative G) and within Category 4 RHCAs (Alternative G) and in roadside hazard corridors (all action alternatives), within specific guidelines (see RHCA Harvest above). No change is expected in the number of pools or large pools, as a result of salvage, with these alternatives. Implementation of the aquatic habitat restoration projects would improve the number of large pools in fish bearing streams and therefore improve aquatic habitat conditions for redband trout and other aquatic species.

Spawning gravel fines/substrate composition

The major cause of sedimentation to streams is from roads in most watersheds. No new specified road construction will occur with this project. Project area wide, approximately 16.0 miles (Alternative G) and 14.9 miles (Alternative H) of temporary road would be constructed using the Forest Road Best Management Practices (BMPs). Alternative D has no temporary road construction. No temporary road would be constructed within RHCAs. Given the physical separation of temporary road construction from spawning areas (greater than 300 feet in all cases) and the BMPs in place, the amount of fine sediment in spawning gravels is not expected to change as a result of temporary road construction. Under Alternatives D, G and H, improvements (cross drainage, rolling dips etc.) would be made to the roads within the project area, which is expected to slightly decrease the amount of fine sediment in spawning gravels.

Salvage activities proposed under Alternatives D, G, and H are not expected to add significantly to fine sediment entering fish bearing streams. In addition, no salvage would occur in Category 1 RHCAs. If any project-generated sediment were to reach fish bearing streams, it is expected that it would be short-term in nature, and at an immeasurable, negligible level. The use of timber BMPs, close adherence to the Soil Productivity Guide, and protective measures in RHCAs would prevent most sediment from reaching stream channels. Road related activities (road maintenance and construction of temporary road) would also have minimal effect as long as road BMPs are followed.

Rosgen channel types

Silver Creek, West Fork Silver Creek (except Reach 5), North Fork Silver Creek, and Guyer Creek are all **functioning appropriately** for predicted Rosgen Channel Types. Although Reach 5 of West Fork Silver Creek has stream channels that are similar to the stream type expected, segments of the reach have bankfull width-to-depth ratios that are slightly greater than expected, therefore the reach is considered to be **functioning appropriately but at risk**. Wildfire, followed by commercial salvage and associated road building, can increase water yield and accelerated erosion. These changes can have a dramatic effect to channels downstream depending on the magnitude of the change and the condition and type of stream channels affected. Under Alternatives D, G and H, little increase in water yield or sediment yield is predicted and therefore no changes in channel types are expected to occur.

Stream temperature and shade

Silver Creek, West Fork Silver Creek (except Reach 5), North Fork Silver Creek, and Guyer Creek are all **functioning appropriately** for predicted Rosgen Channel Types. Although Reach 5 of West Fork Silver Creek has stream channels that are similar to the stream type expected, segments of the reach have bankfull width-to-depth ratios that are slightly greater than expected, therefore the reach is considered to be **functioning appropriately but at risk**. Wildfire, followed by commercial salvage and associated road building, can increase water yield and accelerated erosion. These changes can have a dramatic effect to channels downstream depending on the magnitude of the change and the condition and type of stream channels affected. Under Alternatives D, G and H, little increase in water yield or sediment yield is predicted and therefore no changes in channel types are expected to occur.

Cumulative Effects

In assessing cumulative effects on water quality, past and reasonably foreseeable future activities, both within the project area and within adjacent areas, including fire suppression activity are factors to be considered. Past activities in the affected subwatersheds, including grazing, timber harvest, road construction, and recreational activities are assumed to have negatively affected erosion rates, peak and base flows, channel shape and pattern and water quality, as has been documented in nearby watersheds (USDA 1998, USDA 1996). Erosion rates from road construction and timber harvest have likely increased over what would be predicted within an undisturbed watershed. Changes in peak flow are believed to be not measurable due to the presence of overstocked stands within the watershed that have mitigated past harvest activities. Drainage efficiency needs to be reduced through aggressive road treatments that hydrologically disconnect roads within the affected subwatersheds. Livestock grazing at the turn of the century likely decreased or altered streamside vegetation by removing woody shrubs and channel stabilizing sedges. As a result of these changes, width-to-depth ratios increased on affected stream channels compromising instream habitat conditions and increasing late summer water temperatures.

Reasonably foreseeable activities include timber harvest outside of the fire area, pre-commercial thinning of overstocked green stands within the fire perimeter, and conifer planting in burned areas to improve upland vegetation conditions in the affected subwatersheds, road maintenance, road drainage improvements, road decommissioning, trail reconstruction, stream channel restoration, and a wide range of recreational uses. All of these activities will be designed to maintain or improve the resiliency of the watershed by improving vegetation conditions, reducing sedimentation, restoring base flows, improving in-channel habitat conditions and increasing the health and vigor of stream-side vegetation where and when possible. Improvements in watershed and stream channel conditions will increase the abundance of sensitive fish species within the affected subwatersheds.

In Silver Creek, West Fork Silver Creek, North Fork Silver Creek, and Guyer Creek, fine sediments in spawning substrates are high as a result of past and ongoing activities. These alternatives include a variety of activities that are expected to affect sediment levels in either the short-term or the long-term, including salvage harvest activities, reforestation, road management (especially decommissioning), and instream placement of large wood.

The short-term sediment inputs produced by Alternatives D, G, and H (which include no harvest within the RHCA's of fish bearing streams other than roadside hazard corridors) although not considered to be significant, are likely to combine with pre-existing sediment sources to produce short-term impacts to redband trout spawning and rearing habitat in all streams. Based on the tons per year estimates, cumulative effects of sedimentation may cause short-term reductions in pool volumes, reduced quality of spawning areas, and sedimentation of shallow margin areas used for rearing. The Biological Evaluation concludes that this activity may impact individuals or habitat, but would not likely contribute to a trend towards federal listing or loss of viability to the population or species. The road management activities included in all action alternatives and the natural riparian vegetation recovery that will have occurred by 2004 are the primary factors that should contribute to a long-term reduction of sedimentation into redband trout habitat.

The cumulative effects of Alternatives D, G, and H on water temperatures in Silver, West Fork Silver, North Fork Silver, and Guyer Creeks would be insignificant because these alternatives are unlikely to increase water temperature to a measurable degree. The only event that would potentially increase water temperatures is the loss of riparian vegetation and overstory conifers because of the fire.

Alternatives D, G, and H would not affect large woody debris recruitment. In-channel habitat conditions within all potentially affected stream reaches will see improvements in large wood, number of pools, and number of large pools. In headwater areas above the fire instream habitat conditions are expected to remain static or improve over time.

MITIGATION MEASURES

The potential effects of the proposed activities on PETS species and habitats will be mitigated by:

Roadside Hazard RHCA Units (All Alternatives)

- Individual tree marking will occur in roadside hazard units within Riparian Habitat Conservation Areas, where necessary.
- Minimize line-pulling distances to limit soil disturbance and avenues of sediment transport to stream channels.
- No mechanized ground based skidding equipment allowed within the first 150 feet on Category 1 RHCAs and within 50 feet of stream channel on Category 3 & 4 RHCAs. Harvest activity will be permitted within the entire width of RHCAs by operating on existing roads.
- In order to decrease the hazard of culvert plugging, minimize the amount of slash and debris remaining on the ground immediately upstream of any culvert. Whole tree yard trees where possible and scatter any slash away from culvert openings

Soils (All Alternatives)

The guidelines in the soil productivity guide (USDA, 2000) shall be followed for the protection of soil during any activity.

Best Management Practices/Fremont N.F. Supplement (All Alternatives)

Best management practices (BMPs) are the primary mechanisms to enable the Achievement of water quality standards (Environmental Protection Agency, 1987). BMPs have been selected and tailored for site-specific conditions. The BMPs are a supplement to the General Water Quality Best Management Practices, Pacific Northwest Region, 1988. The Practices apply to road management activities implemented through timber sale contracts, public works contracts, and forest accounts. BMPs can be found in Appendix C – Mitigation Details.

The interdisciplinary team (soil/water/fish) specialists are responsible for including the BMPs in the Environmental Assessment (EA) or Environmental Impact Statement (EIS) for purposes of implementation on the ground. The interdisciplinary team should review the marking guide and contract documents to ensure inclusion of the BMPs.

Mitigation measures shown in the BMPs shall be incorporated into the timber sale marking guide and the timber sale contract, as appropriate. Completion of environmental analyses and project implementation is the responsibility of the District Ranger. The Silviculturist should ensure inclusion of the BMPs in the marking guide and the Timber Management Assistant (TMA) in the timber sale contract. The Sale Administrator is responsible for following through with implementation of the BMPs and EA as incorporated into the timber sale contract. It is the responsibility of the pre-construction engineer to ensure inclusion of BMPs into the road survey and design package. The Engineering Representative (ER) is responsible for following through with implementation on the ground.

In both timber sale contracts and public works contracts, mitigations found in the following BMPs should be included in the contract provisions and special project specifications. It is the responsibility of the pre-construction engineer to ensure inclusion of BMPs in the public works package. The Contracting Officer's Representative (COR) is responsible for following through with implementation on the ground.

DETERMINATION OF EFFECTS

Proposed, Endangered, and/or Threatened (PET) Fish Species

The Toolbox Fire Recovery Project and associated activities will have **no effect** on any PET fish species and/or their habitat based on no PET fish species existing within the Silver Creek and Silver Lake watersheds. The project will **not result in adverse modification of designated critical habitat**, as none exists in these watersheds.

Sensitive Fish Species

The proposed project **may impact individual redband trout or habitat, but will not likely contribute to a trend toward federal listing or reduced viability for the population or species** (MIIH) for all alternatives (see following table). Redband trout populations in some or all potentially affected stream channels are limited as a result of high levels of fine sediment in spawning gravels, a lack of high quality

pool habitat, lack of large woody debris, and water temperatures that may exceed State of Oregon water quality standards. Mitigations identified in this report, reconstruction and or elimination of problem roads or road segments, establishment of adequate RHCA's, close adherence to the Forest Soil Productivity standards, timber sale BMP's, and road BMP's will minimize any potential effects. Implementation of the watershed restoration activities proposed in all action alternatives will help to accelerate recovery of occupied redband trout habitat. At a watershed scale, upgrading of existing roads, decommissioning of unneeded roads, strict adherence to grazing standards and guidelines, and improvements in upland vegetation (a progression towards the Historic Range of Variability) should be considered to improve and/or re-establish functional watershed processes.

No measurable change in stream flow resulting from the fire and subsequent salvage logging are predicted. All action alternatives emphasize removal of dead trees, which would have no additional effect on canopy cover. Road drainage under all action alternatives would be improved and BMPs would be applied to all temporary roads constructed. Road improvements would reduce hydrological effects related to roads. Road obliteration will reduce road related hydrological and sediment impacts once they become re-vegetated. However, since only a small percentage of these road obliterations were within 300 feet of active channels, fine sediment is expected to remain high.

Soils in the project area are currently below Regional standards for compaction. Minimal sediment transport from the soil profile is also predicted from the burned area and logging would not be expected to significantly increase transport rates. Since sediment loss from the project area is expected to be minimal, nutrients that bind themselves to sediment (phosphorus and calcium) are apt to be minor. In addition, since minimal disturbance would occur within RHCAs with any alternative, most sediment transported down slope would be filtered out before it reaches the channel. Significant changes in water quality due to sedimentation or nutrient loading would not be expected to occur. Late summer stream temperatures would continue to be in excess of state standards.

In-channel habitat conditions Silver, West Fork Silver, North Fork Silver, and Guyer Creeks would see improvements in large wood, number of pools and number of deep pools. In headwater areas above the fire instream habitat is expected to remain static or improve over time. Grazing standards are designed to improve the health and vigor or riparian vegetation, reduce bank trampling and allow low gradient streams to narrow and deepen over time. Grazing plans would be modified, if needed, in order to insure compliance.

Several habitat objectives for redband trout are being met in Silver, West Fork Silver, North Fork Silver, and Guyer Creeks. However, high levels of fine sediment in spawning substrates and water temperatures that exceed state standards put the these streams at risk as a redband trout reserve. This is especially true in Silver Creek and to a lesser degree in West Fork Silver Creek, where water temperatures approach lethal limits and fine sediment is inputs because of a moderate drainage network density. Road improvements contained in the action alternatives would help reduce these cumulative effects.

Any changes in water quality, resulting from the burn and subsequent activities, within Silver, West Fork Silver, North Fork Silver, and Guyer Creeks could have some effect on downstream populations of redband trout. These impacts are believed to be discountable, insignificant and not measurable downstream of the Diversion Dam on the northern fire boundary.

Although the redband trout present in the affected sub-watersheds has specific habitat requirements, it is assumed that trending toward the natural or near-natural habitat conditions described by ICBEMP (USDA & USDI 1997), will lead to properly functioning streams and desired future conditions. A positive trending towards these conditions will ensure species viability and sustainability.

Table 7. Sensitive Species Biological Evaluation Summary for the Toolbox Fire Recover Project

Species	Alt. A	Alt. C	Alt. D	Alt. E	Alt. G	Alt. H
Redband Trout	MIIH	MIIH	MIIH	MIIH	MIIH	MIIH

CONSISTENCY WITH THE INLAND NATIVE FISH STRATEGY (INFISH)

The timber salvage portion of this project will not retard or prevent attainment of Riparian Management Objectives (RMOs) or adversely affect native fish (TM-1 of INFISH).

Neither of the affected sub-watersheds is an INFISH priority watershed. Proposed road reconstruction and instream restoration will serve to accelerate attainment of RMOs and are fully consistent with the goals and applicable INFISH Standards and Guidelines, particularly, RF-2 and FW-1 of INFISH.

Implementation of any of the action alternatives for the Toolbox Fire Recovery Project is not expected to adversely affect inland native fish nor will it prevent attainment of RMOs as described in INFISH.

All of the alternatives were found to be consistent with the applicable Forest-wide fisheries and watershed standards addressed in the Regulatory Framework section. None of the alternatives would hinder the attainment of INFISH Riparian Management Objectives (RMO's) for pool frequency, large woody debris, water temperature, and width to depth ratio, or cause significant harm to native fish and their habitats in the long-term.

The short-term effects on pool volume from sediment increases that are expected with the action alternatives would not be significant enough to produce a non-attainment of the pool frequency RMO. In the long-term, the pool frequency RMO would be maintained or improved as natural riparian vegetative recovery occurs and project related sediment gets transported out of the affected pools and larger scale sediment reductions occur from improvements occurring in Silver Creek and West Fork Silver Creek, in all action alternatives. Natural recruitment of large woody debris would occur in all streams over the long-term. The water temperature RMO would be maintained, as measurable increases in stream temperature are unlikely to occur in any perennial stream. The width to depth ratio RMO would be maintained because the short-term sediment and peak/base flow increases would not occur on a large enough scale to cause significant channel widening.

Several of the RMOs (large woody debris, water temperature, large pools) are currently below objectives. Improvement in road drainage within the fire perimeter, as included in all action alternatives, would reduce sediment inputs to stream channels. Large wood within the burn area would increase as trees die and are recruited to the stream channel and/or placed in the channel as part of the aquatic habitat restoration that is included in all action alternatives. Increased large woody debris would provide instream structure to aid in pool formation and complexity. Plantings of deciduous tree species within affected riparian areas will improve water temperature over the long-term.

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LITERATURE CITED/CONSULTED

Behnke, R. J. 1992. Native trout of western North America. American Fisheries Society Monograph 6. American Fisheries Society, Bethseda, Maryland.

Beschta, R.L., et.al. 1995. Wildfire and Salvage Logging: Recommendations for Ecologically Sound Post-Fire Salvage Logging and Other Post-Fire Treatments on Federal Lands in the West. Oregon State University, Corvallis, Oregon. 14 pp.

Bjornn, T.C., and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. American Fisheries Society Special Publication. 19:83-138.

Burroughs E. R., Jr. and J. G. King. 1989. Reduction of Soil Erosion on Forest Roads. General Technical Report INT-264. Intermountain Research Station. 21 p.

Duncan, S.H., R.E. Bilby, J.W. Ward, and J.T. Heffner. 1987. Transport of Road Surface Sediment Through Ephemeral Stream Channels. Water Resources Bulletin, Vol. 23, No.1, p. 113-118. Oregon State University Press, Corvallis, OR.

Fremont National Forest. 1989. Land and resource management plan. Fremont National Forest, Lakeview, Oregon.

Fremont National Forest. 2000. Soil Productivity Guide for Ground Disturbing Activities. Fremont National Forest, Lakeview, Oregon. 11 pp.

Fremont National Forest. 2000. Stream Habitat Inventories for Silver, West Fork Silver, North Fork Silver, and Guyer Creeks. Unpublished Data on file at Silver Lake Ranger District.

Ketcheson, G.L and W.F. Megahan. 1995. Sediment Productions and Downslope Sediment Transport From Forest Roads in Granitic Watersheds. USDA Forest Service, Rocky Mountain Research Station, INT-RP-486.

Kunkel, C.M. 1976. Biology and production of the redband trout (*Salmo sp*.) in four southeastern Oregon streams. Masters Thesis. Oregon State University.

Sigler, W.S. and J.W. Sigler. 1987. Fishes of the Great Basin, A Natural History. University of Nevada Press. 425 pp.

Swanson, D.N. 1991. Natural Processes. Influences of Forest and Rangeland Management on Salmonid Fishers and Their Habitats. American Fisheries Society Special Publication 19:139-179. American Fisheries Society, Bethesda, MD.

USDA Forest Service. 1995. Inland Native Fish Strategy Environmental Assessment (INFISH). USDA Forest Service, Intermountain, Northern, and Pacific Northwest Regions, Coeur d'Alene, Idaho.

USDA Forest Service. 2002. Burned Area Emergency Rehabilitation report for the Toolbox Fire Complex. Internal Report. USDA Forest Service, Fremont National Forest, Lakeview, OR.

USDA Forest Service and USDI Bureau of Land Management. 1997. Evaluation of the EIS Alternatives by the Science Interaction Team: Volume II. USDA Forest Service and USDI Bureau of Land Management. Gen. Tech. Rep. PNW-GTR-406. Portland, Oregon: USDA Forest Service, Pacific Northwest Forest and Range Experiment Station: pp. 1024-1040.

USDI Fish and Wildlife Service. 1998. A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale. U.S. Fish and Wildlife Service, Portland , Oregon.

USDI Fish and Wildlife Service. 2000. Status Review for Great Basin Redband Trout. U.S. Department of the Interior, Fish and Wildlife Service, Region1, Portland, Oregon. January 2000.

Willers, B. 1991. Trout biology. A natural history of trout and salmon. Lyons and Burford Publishers. New York, New York.