Fisheries
Specialist Report

Flagtail Fire Recovery Project

Malheur National Forest
Blue Mountain Ranger District

Grant County, Oregon

__/s/ J. Perry Edwards_____ *Date: 1/14/2004*
District Fisheries Biologist

Introduction

This report lists species and status of fish present in the Flagtail Fire Project Area as well as existing conditions for fish and fish habitat. This report builds on conclusions from soils and watershed analyses and determines direct, indirect and cumulative effects on fish habitat and populations.

The major limiting factors listed in the Upper Silvies WA (2001) that are degrading fish habitat quality and thereby fish populations in the Flagtail project area were excessive summer water temperatures, high sediment loads, widened channels, lack of quality pool habitat, and lack of fish habitat connectivity at all stream flows. Responses to recommendations from the Upper Silvies WA to improve these conditions are discussed in direct/indirect effects section where activities associated with this project would modify existing conditions or in cumulative effects if other projects will modify aquatic conditions.

Regulatory Framework

Riparian habitats are areas of land directly affected by water that exhibit either visible vegetation or physical characteristics reflecting an influence from the water. The Malheur National Forest originally designated these areas under the land allocation of Management Area (MA) 3A. The Forest Service's Inland Native Fish Strategy (Inland Native Fish Strategy, 1995) for the Intermountain, Northern, and Pacific Northwest Regions directed the Malheur National Forest to apply Riparian Habitat Conservation Areas (RHCAs). The project area is located at the northern end of the Great Basin with no connection to the ocean and hence contains no anadromous fish and is therefore not under the direction from Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (1995b), which is also known as PACFISH. RHCAs are portions of watersheds where riparian-dependent resources receive primary emphasis, and management activities are subject to specific standards and guidelines. RHCAs are further differentiated by the following categories: Fish-bearing streams, or Category 1; perennial streams, or Category 2; and intermittent channels, or Category 4. Table FI-1 below lists miles of stream channel by Category.

Table FI-1: Miles of Stream Channels by Category

Area	Category 1	Category 2	Category 4
Total Miles in Flagtail Fire Area	6.6	4.2	9.5
Total Miles in Subwatersheds	35.9	29.9	61.3
Percent of Channel in Fire Area	18.4%	14.0%	15.5%

INFISH replaced Regional Forester's Forest Plan Amendment 2 to establish default buffers on RHCAs around all streams, wetlands, water bodies, and landslide prone areas on the Forest (USDA 1995a: A-4 to A-6). The INFISH Decision Notice was further clarified with a *Decision Notice Correction for the Inland Native Fish Strategy* that stated "…it appeared that it might not be clear that the selected alternative **does** replace the interim direction established May 20, 1994 by Region 6 Regional Forester John E. Lowe in the *Decision Notice for the Continuation of Interim Management Direction Establishing Riparian, Ecosystem, and Wildlife Standards for Timber Sales."* The default values for non priority watersheds (those not containing bull trout) were used for this project and Table FI-2 summarizes the buffer widths that would apply throughout the project area. There are about 820 acres of MA 3A in the project area.

Table FI-2: INFISH RHCA Buffer Widths

Type of RHCA	RHCA Width (Feet)
Fish-bearing stream reaches	300
Permanently flowing, non-fish stream reaches	150
Seasonally flowing or intermittent stream reaches	50
Ponds, lakes, or wetlands > 1 acre	150
Ponds, lakes, or wetlands < 1 acre	100
Landslide prone areas	100

Amendment #29 of the Malheur National Forest Plan (1994) established additional Forest-wide fisheries standards for Management Area 3A, non-anadromous riparian areas. These Riparian Management Objectives (RMOs) included habitat elements of sediment/substrate, water quality, channel morphology and riparian vegetation to be managed within their natural ranges of variability. Amendment #29 set specific Desired Future Conditions (DFCs) for these habitat elements. These RMOs are listed on pages A-2 to A-4 in the INFISH Decision Notice (USDA 1995a). A copy of the INFISH Decision Notice is available in the Project File.

There are 13 Forest-wide fisheries standards in the INFISH Decision Notice listed on pages A-6 to A-13 (USDA 1995a) that apply to this project. These include: RF-2(b-f), RF-3(a-c), RF-4, RF-5, FM-1, FM-4, RA-2, RA-3, RA-4, RA-5, and WR-1. The other INFISH standards are outside the scope of this project. Refer to pages A-6 to A-13 in the INFISH Decision Notice (USDA 1995a) for the description of these standards.

There are two INFISH standards that apply to culverts in the burned drainages: RF-4 and RF-5 (USDA 1995a). Standard RF-4 states, "construct new and improve existing, culverts, bridges, and other stream crossings to accommodate a 100 year flood…where those improvements would/do pose a substantial risk to riparian conditions". INFISH standard RF-5 states, "provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams."

Analysis Methods

The analysis area consists of the four subwatersheds, Hog Creek, Jack Creek, Keller Creek and Snow Creek. Information was compiled from the Upper Silvies Watershed Analysis (2001), stream survey reports and data (pre-fire), as well as field surveys conducted after the 2002 Flagtail fire. Region 6 Level II stream and riparian habitat surveys were conducted on the Silvies River, Snow Creek, Jack Creek and tributaries between 1994 and 1996. This information is compared with standards and guidelines from the Malheur National Forest Land and Resource Management Plan (1990) including amendment 29 to determine relative "health" or condition of the riparian areas, streams and the effects to fish and fish habitat. Existing stream channel conditions were compared to expected conditions to provide fish habitat based on geomorphology characteristics of hill slopes, valley bottom width/gradient, substrate parent materials and riparian vegetation communities.

This section builds on conclusions from soils and watershed analyses to determine direct, indirect and cumulative effects on fish habitat and populations. The low gradient landscape both within and downstream of the project area would limit potential for observable cumulative effects to the confluence of the Silvies River and Keller Creek from the north side and Jack Creek at the forest boundary from the east side.

Direct, indirect and cumulative effects of all alternatives are disclosed for Sensitive Species (USDA 2000) and Management Indicator Species. A Biological Evaluation (Appendix G) was prepared for Sensitive Species as directed by the Malheur National Forest Plan (USDA 1990) as amended.

AQUATIC SPECIES

Management Indicator Species, Threatened, Endangered and Sensitive Species

Management Indicator Species (MIS) are species of vertebrates and invertebrates whose population changes are believed to best indicate the effects of land management activities. Through the MIS concept, the total number of species found within a project area is reduced to a subset of species that collectively represent habitats, species and associated management concerns. The MIS are used to assess the maintenance of populations (the ability of a population to sustain itself naturally) and biological diversity (which includes genetic diversity, species diversity, and habitat diversity), and to assess effects on species in public demand.

An endangered species is an animal or plant species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range. A threatened species is an animal or plant species listed under the Endangered Species Act that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. A sensitive species is an animal or plant species identified by the Forest Service Regional Forester for which species viability is a concern either a) because of significant current or predicted downward trend in population numbers or density, or b) because of significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

The Malheur Forest Plan directs analyses to focus on MIS species or Sensitive Species. The only MIS occurring in the project area or downstream is redband trout (*Oncorhynchus mykiss gairdneri*). Both redband trout and Malheur mottled sculpin (*Cottus bendirei*) are on the Region 6 Sensitive Species List (USDA 2000). There are no Threatened or Endangered fish species in project area streams or in the Silvies River Subbasin, which is an inland fishery, so consultation

with National Oceanic and Atmospheric (NOAA) Fisheries or United States Fish and Wildlife Service (USFWS) was not necessary.

Existing Condition

Historical Perspective on Fish Occurrence – The following narrative on fish occurrence and species presence was taken from the Upper Silvies Watershed Analysis (2001). The Flagtail Project Area is a non-anadromous, inland fishery watershed, and it supports Great Basin redband trout and Malheur mottled sculpin, speckled dace (*Rhinichthys osculus*) occur in some streams of the project area while redside shiners (*Richardsonius balteatus*) and suckers (*Catostomus spp.*) may be found in the Upper Silvies River. District stream classifications and inventory database categories recognize all fish species in terms of occupancy and riparian habitat conservation areas (RHCA) designations. However, management attention is more focused on Management Indicator Species (MIS) or listed Threatened, Endangered, and Sensitive (TES) species and their affected habitats.

Redband trout have been confirmed and documented in the Silvies River, Snow Creek, and Jack Creek in the burn area from Region 6 Hankin and Reeves, Level II surveys (1994-1996). The map (Figure 16, Map Section) of fish bearing streams (Category 1) shows where redband trout exist in the project area. Malheur mottled sculpin have been confirmed and documented by Forest Service or Oregon Department of Fish and Wildlife surveys as occupying the Silvies River in the burn area. The presence of Malheur mottled sculpin has been documented as far back as the 1955 Bison genetic studies as well as during ODFW population sampling conducted in 1978-1979, yet most survey notes usually document them as generic sculpin.

Grazing practices and numbers between 1870 and 1930, coupled with the removal of beaver led to the majority of changes in riparian plant communities and channel morphology of the Silvies River (Upper Silvies WA 2001). Livestock grazing removed vegetation, damaged banks causing downcutting and stream channel widening. Logging, railroad and road building also modified the Silvies River, tributaries and associated riparian areas by removing trees and down wood in riparian areas and draw bottoms as well as disturbing valley bottoms to create the transportation systems. This resulted in downcutting and straightening of the stream channels.

GREAT BASIN REDBAND TROUT

Native trout found in the internal basins of Oregon are redband trout derived from the Columbia River system. Redband trout are on the Region 6 Sensitive Species List. Malheur Lake Basin is the largest of the Oregon desert basins and contains the greatest amount of trout habitat. The Silvies River is one of six sub-basins feeding into the lake. Basin fish fauna show little difference from the Columbia River fauna, suggesting a rather broad and geologically recent connection between Malheur Lake and Malheur River; which flows east into the Snake River system.

It is not known if pure native trout populations exist in the Malheur basin (Behnke 1992). Hatchery introduction has occurred across the basin in years past and native redband face constant hazards in the high desert environment. However, the Flagtail Project Area's climatic extremes of high summer temperatures and low flow conditions frequently produce oxygen depletion in the water. Malheur redband are a genotypic sub-species adapted to these unstable, harsh, environments and because they are more adapted to variable water conditions, they probably have resisted hybridization with hatchery fish. Observations in the Silvies watershed have verified this adaptive nature by finding redband in some very marginal waters with high

temperatures late in the summer. They tend to be small in size and are better suited for the microhabitats being maintained by base flows of less the 0.3 cfs. Hatchery rainbows would not be able to tolerate the harsh water conditions. Populations are likely diminished due to simplification of habitat, sediment input and high summer temperatures compared to natural conditions. Spawning occurs in the spring generally from April through May.

MALHEUR MOTTLED SCULPIN

The Upper Silvies WA (2001) states that the Malheur mottled sculpin (*Cottus bendirei*) was originally collected in Rattlesnake Creek in Harney County with other similar samples found the Lower Silvies River with studies conducted in 1963 and 1971. Malheur mottled sculpin are on the Region 6 Sensitive Species List.

At the local watershed level, this analysis simply recognizes 2 sub-forms of *Cottus bairdi* in the Silvies River. The Scotty Creek samples (1997) just south of the project area and perhaps the rest of the watershed favor *bendirei* while the lower Silvies River samples (1955-1968) favored *hubbsi.* Mottled sculpin require water temperatures below 79°F with high dissolved oxygen and low turbidity. They are found in streams with moderate to rapid current and are associated with rubble, gravel, or rocky bottoms. They seldom are found in silted areas. Malheur mottled sculpin are sensitive to changes in water quality including increases in water temperature and sediment. Populations are likely diminished due to simplification of habitat, sediment input and high summer temperatures compared to natural conditions. Spawning occurs in the spring generally from February through May. They were thought to be serious predators of trout eggs and fry, but results of studies on their food habits have revealed that few trout eggs or fry are actually eaten. Mottled sculpins are much more important as forage for trout.

Habitat and Biological Surveys of Streams in the Fire Area

Stream surveys were conducted on the fish-bearing streams impacted by the Flagtail fire (2002), namely the Silvies River, Snow Creek, Keller Creek and Jack Creek between 1994 and 1996 (see Figure 16, Map Section). These surveys followed the Region 6 Level 2 protocol based on the Hankin Reeves basinwide stream survey methodology. Additional information listed in this report was gathered and analyzed after the Flagtail Fire.

Water temperature is a key factor affecting growth and survival of all aquatic organisms. Spring spawning temperatures are not an issue but excessive rearing temperatures are a problem in the project area. The State of Oregon sets the upper limit of 64^{o} Fahrenheit for salmonids. Native redband are better adapted to variable Eastside temperature fluctuations, but any prolonged exposure to temperatures at or above 77^{o} Fahrenheit is lethal. Passage barriers (culverts) can reduce the ability of fish to move to cold water refugia that can sustain populations of sensitive fish (Furniss et al. 1991). Cool water habitats in the Silvies River should be provided by deep pools, cold water side channel, riffle or pool habitats with ground water inflow, or side tributary channels feeding in colder water to the River. Tributaries to the Silvies River provide cold water from headwaters and spring/seep sources. Increased temperatures also impact fish by reducing the prey base of aquatic insects and reducing the dissolved oxygen. This can lead to disease and mortality.

The following narrative gives results of stream surveys, compares data with MNF LRMP standards, which are consistent with INFISH RMOs, and then describes effects on fish and fish habitat. Table FI-3 summarizes existing conditions and LRMP standards.

Table FI-3: Level 2 Stream Survey Results and LRMP Standards

Stream Name and Survey Reach	Existing LWD♠ Per Mile	LRMP Standard (LWD Per Mile)	Existing Pools/Mi.	LRMP Standard Pools/Mi.	Existing Bank Stability	LRMP Standard Bank Stability
Silvies River R1	5.7	20-70	59	75-132	90	80%
Silvies River R2	0.6	20-70	65	75-132	79	80%
Silvies River R3	0.0	20-70	16	75-132	99	80%
Jack Cr. R3	3.2	20-70	39	151-264	100	80%
Jack Cr. R4	8.7	20-70	55	151-264	99	80%
Snow Cr. R1	5	20-70	78	75-132	96	80%
Snow Cr. R2	15	20-70	86	75-132	97	80%

♠ LWD includes both large and medium woody debris which is effective in smaller streams

Silvies River—The Silvies River is very important for fish due to its large size compared to other streams in the project area and its location in a wide, low gradient valley bottom. It has the greatest potential to provide spawning and rearing habitat for fish. Unfortunately, it is also the most impaired stream in the project area because of the effects of past land management activities conducted without Best Management Practices (BMPs) and the stream channel is highly sensitive to further impacts based on Rosgen stream classification (1996). The stream downcut and gullied in the past, disconnecting the floodplain and lowering the water table. The channel is in an intermediate stage of recovery but not at the final point of evolution. A large portion of the Upper Silvies drainage is open landscape with only meadow vegetation or dry terrace sagebrush and bunch grass ground cover. Sedges and rushes are present along most streambanks. However, some point bars are still not vegetated. Bank cover from riparian shrubs remains marginal in most areas. Channels are fully exposed to solar heating, evapotranspiration, and slow moving base flows, which contributes to higher water temperatures down through the system.

The upper reaches, approximately 6 miles, of the Silvies River are on MNF land; the remainder (downstream) is on private land. A Level 2 stream survey was conducted in 1994. Redband trout, Malheur mottled sculpin and speckled dace were identified during the survey. The Silvies River mainly provides winter rearing and some spawning habitat for redband trout. Malheur mottled sculpin use the Silvies River for summer/winter rearing and spawning habitat. While there are redband trout and Malheur mottled sculpin in the Silvies River during base flows, numbers are reduced from natural levels due to high water temperatures.

Reaches 1 through 3, encompassing 4.1 miles, are within the Flagtail Fire boundary (Figure 16, Map Section). All reaches failed the LRMP standard for pools per mile, but survey information ranged from 52% to 79% pools (by stream area). Superficially, this gives the appearance that the Silvies River has a great abundance of pool habitat. However, pool quality is poor overall. There is some deep pool habitat, but many pools have only slightly greater depth than riffles and the main difference was slower water movement. A large portion of the pool area is part of the tailout with shallow water depths and functions more like a glide or run. The Silvies River is deficient in LWD and failed LRMP standards on all reaches, even when large and coarse wood, which both influence streams of this size, were included in totals. Historically in the stringer meadows on the Silvies River, LWD would have been comprised of aggregates of hardwood shrubs/trees, beaver dams, and some conifers where forested areas abut the meadow or moved from upstream during high flows.

Stream channel classification (Rosgen 1996) was currently B5c and B6c with entrenchment levels characteristic of an F channel type based on Stream channel cross sections completed in 2002. Small substrate in the channel bed and banks is expected due to the parent materials

available in the low gradient valley bottom of the Silvies River. The small substrate (sand) and moderate entrenchment (disconnection from the floodplain) make this stream sensitive to sediment and flow modifications.

Bankfull widths and width to depth ratios increased as the survey progressed upstream; bankfull widths normally get smaller as there is less water above tributaries, higher in the drainage. Average bankfull width went from 7.7 to 9.9 to 15 feet in Reaches 1 through 3, respectively. The lack of LWD and continued disturbance limiting establishment of deep-rooted riparian vegetation (both herbaceous and shrubs) were likely the cause of bankfull width measurements being higher than expected in this stream. Rock weirs created in the 1980s further widened the channel in Reach 3. Post fire surveys noted areas where cattle had caused extensive bank damage and heavy utilization of riparian herbaceous and woody vegetation.

Channels with high bankfull width to depth ratios without shade or undercut banks commonly allow the sun to elevate stream temperatures above that optimum for salmonid summer rearing. High width to depth ratios can also limit winter rearing by allowing streams to freeze. High width to depth ratios in smaller streams can severely limit habitat available for fish at base flows due to inadequate depth as well as high water temperatures.

The small substrate of the channel bed and resultant lack of spaces between gravel or cobble, where juvenile fish spend the winter, reduce the quality of this habitat. Lack of shade, undercut banks and cover reduces fish habitat quality, particularly during base flow periods. Redband trout move into smaller tributary streams during the summer to access cooler water during base flow periods. Low LWD component reduces availability of high quality pools, sorting of gravel to create spawning habitat, and increases channel instability and sediment transport, all of which impact fish habitat and populations.

Temperatures in the Upper Silvies River (at the Bear Valley work center) in 1996 reached 64^{o}F or higher starting June 29 and ending August 31, with 61 days exceeding rearing standards based on an average seven day, maximum high. The maximum reading was 72^{o}F that year. In 2000, water temperatures in the Upper Silvies River exceeded 64^{o}F for 70 days between June 19 and August 28, based on an average seven-day, maximum high. The maximum reading was 75.2^{o}F that year.

Overall, the Silvies River provides poor habitat for redband trout and Malheur mottled sculpin compared to expected conditions for the natural range of variability.

Snow Creek—A Level 2 survey was completed on Snow Creek in 1996 for 2.3 miles to the upper limit of fish distribution (Figure 16, Map Section). Redband trout and speckled dace were identified during the survey. Snow Creek is valuable summer rearing habitat for fish. Summer water temperatures are substantially lower in this stream than in the Silvies River, into which it flows. The small size of the stream limits usefulness for winter rearing as the stream may freeze every year. In fact, biological sampling showed fish distribution and population density changed drastically between summer and winter.

Average bankfull width was 6.2 feet in Reach 1. The stream had some floodplain available and was moderately sinuous overall (Rosgen B5 channel) with channel and bank substrate composed of sand. There were some segments where the valley bottom widened (Rosgen C5b and a segment of E5 channel) to create small meadows and other short segments where the valley bottom became more narrow and steeper (Rosgen A channel type). This stream failed to meet minimum LRMP standards for large and medium wood frequencies. The survey noted large quantities of silt, even in pool tailouts and riffles and noted many pools lacked depth necessary for good habitat. It also noted areas where ungulate browsing had reduced shade provided by

alder and caused bank trampling. Post fire surveys in 2002 also noted areas where cattle had caused bank damage and heavy utilization of riparian herbaceous vegetation.

Riparian vegetation ranges from sedges and rushes in meadow areas to dense woody shrubs and forbs to conifer overstory with grasses, rushes, sedges, and a small number of shrubs in the riparian area.

In 2000, water temperatures in Snow Creek at Road 24 exceeded 64 for 12 days between July 1 and August 28, based on an average seven-day, maximum high. The maximum reading was 77.8°F that year. However, Snow Creek temperatures were an average of 8 degrees lower than the Upper Silvies River during the same period of peak temperatures.

Overall, Snow Creek provides fair habitat for redband trout compared to expected conditions for the natural range of variability.

Jack Creek—A Level 2 stream survey was conducted in 1996 for 3.1 miles to the upper limit of fish distribution. Almost 1 mile of Reach 4 is within the Flagtail fire area (Figure 16, Map Section). Redband trout and speckled dace were identified in Jack Creek. The headwaters of Jack Creek likely function as summer rearing habitat as stream temperatures warm up downstream. Average bankfull width of Reach 4 in the fire area was 3.2 feet. The small size of the stream limits usefulness for winter rearing as the stream likely freezes for several months every year. The stream channel was moderately sinuous and composed of silt or sand substrate with some floodplain available (Rosgen B6) inside the fire area. Downstream, Jack Creek has braided channel sections (Rosgen D4/6) in a large, wet meadow, just downstream of the fire area until the valley bottom narrows resulting in similar channel characteristics (Rosgen B6/B4) as those inside the fire area. Minimum LRMP standards for large and coarse wood as well as pool frequencies were not met in Jack Creek.

Field crews reported several large pools created by beaver dams in Jack Creek immediately downstream of the fire area. It is not known if these dams are presently active. There is an active headcut, over 7 feet deep in places, in survey Reach 1, downstream of the fire perimeter. Jack Creek may be diverted through an irrigation ditch on private land and flow into Scotty Creek so impacts from the fire could be transported to Scotty Creek on private land.

In 2000, water temperatures in Jack Creek at the Forest Boundary exceeded 64°F for 48 days based on an average seven-day maximum high between June 19 and August 8, when the stream channel became dry at the hydrothermograph. The stream continued to flow upstream in the Flagtail Fire area. Maximum temperature recorded was 78.5°F that year.

Overall, Jack Creek provides fair habitat for redband trout compared to expected conditions for the natural range of variability.

Swamp Creek—This is a perennial, non-fish bearing stream in the Keller Creek subwatershed. There are redband trout approximately ¼ mile downstream of the fire area, where Swamp Creek flows into Hay Creek (Figure 16, Map Section). There is no information on channel conditions in the project area as surveys stopped when fish presence ended. Only ¼ mile of the stream is within the project area.

Hog Creek—No portions of fish bearing, perennial or intermittent stream channels to Hog Creek are located in the fire area. The fire boundary is 0.3-0.5 miles from live water. The small percentage of the subwatershed burned and distance from streams make channel conditions irrelevant in this stream.

Macroinvertebrates

Macroinvertebrate populations in degraded watersheds are more susceptible to effects of fire due to the cumulative effects of past actions (Minshall 2003 in press). Recovery of ecosystems from the impacts of wildfire is likely slower where natural processes are already impaired. Surveys listed in the Upper Silvies WA (2001) noted a majority of stream insect species tolerant of high temperature and sediment loading. This is supporting evidence of the disturbed riparian and stream conditions of project area streams.

Fire Impacts on Stream Elements and Fish

Effects to streams and fish from the fire are limited to direct heating of the water during the fire, and indirect effects such as increase in summer water temperature from removal of shade provided by the conifer overstory prior to the fire, increases in sediment from removing ground vegetation in riparian areas, and increases in large or coarse woody debris as snags fall into streams.

The Soils and Watershed sections describe the effects from the fire or suppression and rehabilitation activities on aquatic processes. The following paragraphs build on those sections to describe the effects on fish and fish habitat.

Snow Creek Subwatershed—The Snow Creek subwatershed includes Snow Creek and a segment of the Silvies River (from the forest boundary upstream to just above the confluence with Snow Creek). A large portion of the subwatershed was burned (Figure 6, Map Section). However, only ½ mile of Snow Creek had high intensity fire along the stream banks, killing all conifer overstory and much of the hardwood vegetation understory. There was much lower mortality of herbaceous vegetation. Consumption of riparian vegetation may reduce bank stability with high stream flows. Downed woody of the riparian area and some in the stream channel was consumed. The majority of the fish-bearing portion of this stream had fire of varying intensities within 25-30 feet of the stream. This caused mortality of conifers that previously provided shade to the stream. These snags may provide woody debris to the riparian area and stream in the future. Direct effects of the fire were likely limited to Snow Creek, which burned with high intensity on a portion of the riparian area and raised stream temperatures to lethal levels. This likely resulted in direct mortality of fish in that segment of stream and potentially downstream to the confluence with the Silvies River. However, neither the BAER team nor other personnel conducting field reconnaissance during and after the fire observed dead fish.

Fire along the Silvies River occurred mainly on the forested hillsides down to the riparian meadows in the valley bottom. Fire did not directly impact the streambanks. Fire came to within 10 feet of the south side of the stream in some locations. This caused mortality of conifers that had provided shade but may provide LWD to the riparian area and stream in the future.

Jack Creek Subwatershed—Fire burned to the outer fringes of the true riparian zone of Jack Creek for less than 500 feet, but did not destroy any vegetation within 20 feet of the streambanks (Figure 6, Map Section). This caused mortality of conifers that had provided shade but may provide LWD to the riparian area and stream in the future.

Keller Creek Subwatershed—Swamp Creek, a perennial non fish-bearing stream had fire come to within 30 feet of the stream, ¼ mile above the confluence with Hay Creek, a fish-bearing stream (Figure 6, Map Section). The majority of fire burned in uplands, near the subwatershed

boundary, which would have minimal impacts to below measurable amounts in the channels in the subwatershed.

Hog Creek Subwatershed—Hog Creek and the headwaters of the Silvies River lie within this subwatershed. Fire burned for approximately 0.2 miles outside of the riparian zone along the Silvies River (Figure 6, Map Section). The majority of fire burned in uplands, near the subwatershed boundary, which would have no effects on the Silvies River.

Fire Suppression

The MNF adheres to Minimum Impact Suppression Tactics (MIST) to minimize impacts or potential for impacts from fire suppression efforts including erosion/sediment, noxious weed introduction or spread, chemical contamination, etc. while maintaining firefighter safety. Resource Advisors were on the ground during fire suppression activities in 2002 and worked with fire planning and logistics to determine appropriate suppression actions that minimized potential for impacts to natural resources as per MIST guidelines. No retardant was used near streams. Resource Advisors also determined rehabilitative measures necessary after fire suppression activities were completed.

Additional post-fire monitoring was conducted in July 2003 after the DEIS was published. The monitoring further documented effects of the fire, suppression and rehabilitation as well as recovery. The hydrologist and fishery biologist did not identify any sources of erosion, sedimentation or chemical contamination impacting fish or fish habitat caused by the fire, suppression or rehabilitation activities. Monitoring of the specific locations of concern listed on page 199 in the Flagtail DEIS revealed no erosion or other hydrologic impacts. No evidence of additional sediment, excessive flows or channel modification was observed in fish-bearing streams in the fire area or downstream in the Silvies River or Jack Creek.

Hazard Tree Management

Hazard trees, both commercial and submerchantable-sized, were felled along roadsides and the interior of the fire during fire suppression and mop-up activities for fire-fighter safety. The portion of the tree in the road prism was cut and moved out of the road prism, but left onsite. The remainder of the tree outside the road prism was not moved.

Commercial-sized hazard trees were felled as part of the Flagtail Roadside Hazard Tree CE. Trees outside of RHCAs or in the outer portions of RHCAs were felled and removed as a commercial product. Trees in the inner portions of RHCAs, within 66 feet of perennial or fish-bearing streams, were felled and the portion of the tree in the road prism removed; the remainder was left onsite.

Hazard tree management activities during and after the fire did not impact fish or fish habitat because trees determined to be a hazard were only a fraction of those in the fire area and many were left onsite after being felled. Trees felled and left onsite remained to capture any sediment moving down the hillslope. Additionally, those trees removed as a commercial product were harvested with equipment on the road to minimize ground disturbance (see Watershed section).

Roads

Forest roads can degrade fish habitat and isolate portions of streams from fish (Furniss et al. 1991). Roads degrade fish habitat by contributing sediment to the stream, increasing stream width to depth ratios through bank damage, decreasing the shade component through hazard tree removal, brushing out for safe sight distance, firewood cutting, and/or by further impacting fish numbers by facilitating angler access. Roads also increase the drainage network, decreasing the time it takes for water to reach stream channels, thereby increasing peak and near peak flows and reducing base flows. Road crossings can impact fish if culverts plug and the road fails which contributes sediment directly to the channel and by creating barriers to passage to some life stage at some flow level. Most fish passage barriers at high flows are created when culverts are too small or too steep which creates high water velocities that prevent fish from moving upstream. Passage barriers at low flows are commonly created when culvert outlets are over 8-inches from the level of the stream or when the culvert provides too little water depth for fish to swim.

The Upper Silvies WA (2001) recommended reducing roads and road impacts within RHCAs as well as identifying/correcting fish passage barrier problems. Roads in the project area that travel along riparian areas, specifically within 100 feet of streams or that intersect streams tend to impact the aquatic resource more than roads located in uplands. Table FI-4 lists miles of road that likely impact streams due to proximity. Open and closed roads impact hydrology and sedimentation. Closing roads to access may reduce sediment caused by rilling from wheel ruts but closed roads are monitored less frequently and commonly receive less maintenance. Mass failures and landslides are rare in this landscape in the current climate regime. Some rilling and gullying does occur where road drainage is not adequate for the site and where road maintenance has not been kept current. The majority of roads are located on Malheur National Forest land (Figure 9, Map Section).

Stronghold populations of salmonids are associated with higher-elevation forested lands and the proportion declines with increasing road densities (Quigley et al. 1996). The higher the road density, the lower the proportion of subwatersheds that support strong populations of key salmonids. Specifically, the Quigley document shows a strong correlation with road densities of 2 miles/mile^2 or higher and reduction of strong populations of salmonids. Further reductions of strong salmonid populations were identified at densities of 3 and 4 miles/mile^2 or greater. Currently, all subwatersheds have road densities over 3.0 miles/mile^2. The table below lists road densities of subwatersheds in the project area.

Table FI-4: Road Information

	Project Area			Entire Subwatershed (Public & Private)			
Subwatershed (SWS)	**Total Road Miles**	**Road Miles within 100 ft. of Cat. 1-4 Channels**	**Stream Crossings on Roads**	**Total Road Miles**	**Road Miles within 100 ft. of Cat. 1-4 Channels**	**Stream Crossings on Roads**	**Total Road Density Mi/ Mi^2**
Hog*	1.2	0.1	0	55.0	8.3	73	5.8
Jack	23.0	2.9	19	49.3	5.1	50	3.1
Keller	2.4	0.1	1	44.4	6.7	73	3.8
Snow*	25.0	5.9	22	35.1	7.4	36	3.5
Total	51.6	9.1	42	183.8	27.5	232	NA

*Not true subwatersheds; Snow Creek and Hog Creek SWS include the Silvies River

Snow Creek—The crossing with Road 24 is currently a barrier to fish passage at low flows due to an 8-inch jump height. This is likely a partial barrier to upstream migration when fish are seeking out colder water for summer rearing and is documented in the Roads Analysis. Road 2400133 has drainage problems on the lower portion near its connection with Road 24. This causes water to concentrate and saturate the road surface and is a direct sediment source to Snow Creek from the road prism and at an undersized culvert, which is a barrier to fish passage at high flows. Road 2400133 south of the connection with 2400203 has rilling evident for several hundred feet as the road is the low point of the topography and actively funnels water. This is a direct sediment source to Snow Creek. Road 2400203 crosses about 300 feet upstream of the fish bearing portion of Snow Creek. This crossing contributes chronic sediment to Snow Creek and could input even greater amounts of sediment if the culvert became plugged. The road through fill disconnects the wetland above the road and reduces water storage capacity as reported in the Watershed section. Water storage is important for fish because the release of water late in the summer increases base flows and reduces water temperature. Road 2400205, currently closed and recovering, crosses Snow Creek using a 34-foot long log culvert that is in poor condition. The collapse of this structure would be a sediment source and barrier to fish movement or migration.

Jack Creek—Road 2400095 and 2400196 are low standard, native surface, valley bottom roads going through a wet meadow and crossing perennial and intermittent channels that flow into Jack Creek. The roads are compacting soils, modifying subsurface water movement and causing bank damage on the channels. There is a plugged log culvert on Road 2400095, which is causing water to run down the road surface for 100 yards and then into Jack Creek.

The culvert just downstream from the fire area on Forest Road 24 has a 6-inch jump height from the culvert outlet to the water surface during low flow conditions. This is likely a partial barrier to upstream migration when fish are seeking out colder water for summer rearing.

Hog Creek—There are approximately 0.3 miles of road within the Flagtail Burn area in this subwatershed. The roads are located high on the slope in the subwatershed and do not impact stream channels, fish habitat or fish.

Keller Creek— There are few roads within the Flagtail Burn in this subwatershed. Only about 0.3 miles of road are located within RHCAs and no problems have been identified. The rest of roads are located high on the slope in the subwatershed and are not impacting stream channels, fish habitat or fish populations.

Environmental Consequences

Direct and Indirect Effects

Effects Common to All Alternatives

Sediment from hillslopes in the Project Area

The Water Erosion Prediction Program (WEPP) was used to predict sediment transport to streams from various runoff events. Sediment transport decreases with time after ground disturbing activities such as fire (see Soils and Watershed sections). For this analysis Year 2 after the fire (2004) was used to compare all alternatives. Pre-fire sediment rates were 0.01 tons/acre. Post-fire runoff rates, modeled for Year 2, ranged from 0.01-0.4 tons/acre depending on slope and fire severity. Management activities increased rates by 0.04-0.07 tons/acre for

tractor logging (depending on mitigation measures), 0.02 tons/acre for skyline, while helicopter activities did not increase sediment transport rates.

WEPP was used to predict sediment transport for high probability runoff events, which were considered to be less than 5-year events. WEPP modeling (see Soils and Watershed sections) determined that no measurable levels of sediment would reach fish-bearing streams from all alternatives. The project hydrologist and fishery biologist conducted field monitoring in 2003, in which only high probability runoff events occurred, and found no sediment movement on hillslopes in the project area which supports the findings of the WEPP model.

WEPP was also used to predict sediment transport for low probability runoff events, which were determined to be 5-year or greater events. The WEPP model predicted a potential 11 to 15-fold increase in sediment transported from units into fish-bearing streams when analyzing alternatives. While the increase in sediment reaching streams differs by alternative (see Table FI-5, see Soils and Watershed sections), the effects to fish and fish habitat are the same. This is because fish habitat would be modified from the over 1100% increase in baseline sediment transported to streams (as a result of consumption by fire of ground vegetation) compared to pre-fire levels. The additional increases in sedimentation associated with harvest/fuels treatments would not have any further observable effect on fish or fish habitat.

Table FI-5. Sediment Increase Compared to Pre- and Post-Fire Conditions from a Low Probability Runoff Event

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Compared to Pre-fire Baseline*	1100%	1500%	1300%	1100%	1400%
Compared to Post-fire Existing Condition	0%	33%	15%	0%	28%

*Percentages rounded to hundreds

It is difficult to predict the effects on fish and fish habitat of an episodic or pulse event of this magnitude after a fire. Increases in sediment loads to streams can reduce the quality and quantity of fish habitat (Meehan 1991). However, Rieman and Clayton (1997) state that pulse disturbances from fires or floods may be necessary to maintain or create high quality fish habitat. Furthermore, redband trout and Malheur mottled sculpin have evolved with these events and are resilient to these pulse disturbances.

Overall, pool habitat quantity and quality may be reduced and stream channel width to depth ratios increased as well as spawning habitat reduced in quality and quantity in the project area. Channel degradation or "downcutting" could also occur which could disconnect floodplains from Snow Creek or Jack Creek or further disconnect the floodplain in the Silvies River. These changes would result in reductions in populations of redband trout and Malheur mottled sculpin for all alternatives. Conversely, a sediment pulse from a 5 year or greater runoff event may create more pool habitat by backing up against in-channel LWD, build point bars and stream banks and aggrade the stream elevation in the Silvies River causing it to reconnect to the floodplain. These changes would result in improved habitat and increased populations of redband trout and Malheur mottled sculpin for all alternatives.

A runoff large event could also kill fish in streams by degrading water quality with high amounts of sediment. Debris torrents are unlikely in the fire area due to the low gradient landscape. A

large, pulse event could kill all fish in the streams of the project area. However, there are fish outside the fire area that would likely move into Snow Creek, Jack Creek and the portion of the Silvies River in the fire area. Furthermore, pulse sediment events tend to be highly localized, and thus would not likely have the same effect to all streams or even the entire length of one stream (Rieman and Clayton 1997).

In summary, a 5-year or greater runoff event would have the same effects, whether positive or negative, on fish and fish habitat from any alternative because the magnitude of sediment transported to streams as a result of the fire. There would be no effects to fish and fish habitat from sediment in all alternatives from a 5-year or less runoff event.

Alternative 1

Vegetation and Roads

Current post-fire existing conditions would remain. No timber harvest would occur. There are not effects expected for fish or fish habitat in Keller Creek and Hog Creek because the effects of the fire are too small in scale and too far from stream channels. Effects of high and low probability runoff events are listed in the Effects Common to All Alternatives in the Fisheries section and sediment transport discussion in the Watershed section. Other effects of this alternative include continued vegetation succession without harvest or thinning activities resulting in the continued buildup of fuels. Future fuel loading in excess of the historic range of variability would occur on 4765 acres (see Figure 17 in Map section for spatial distribution, see Fuels section of FEIS for further details). Untreated, post-fire fuel loadings would prohibit the use of fire as a management tool in later management actions to move the landscape and RHCAs toward the desired condition for vegetation and plant communities in the project area. This could again lead to fuel loading which caused the high fire severity as it related to vegetation in upland areas in the Flagtail fire area. This could potentially impact fish habitat and populations of redband trout and Malheur mottled sculpin.

This alternative would leave the road system as it is. No road mitigation improvement, relocation or decommissioning projects would occur with this alternative. Roads closed under CFR and opened for fire suppression activities would be closed. All open roads within the riparian areas would continue to be left open. Road densities and road miles within RHCAs would remain at current levels listed in Table FI-4. No impacts such as sediment from road reconstruction or decommission would occur with this alternative. Road maintenance activities such as re-grading roads, cleaning plugged culverts and blocked ditchlines would be a benefit by maximizing dispersion of water and minimizing sediment transport; these activities would continue at regularly scheduled intervals. At current and expected future funding levels, this would not allow accomplishment of all maintenance needed. This alternative would do little to address concerns and recommendations listed in the Upper Silvies WA (2001) regarding current negative impacts of roads on aquatic habitat.

Roads in the project area that travel near streams or cross streams commonly impact fish and fish habitat more than roads located in uplands. Table FI-4 lists miles of road that likely impact streams due to proximity (100 feet or less). Mass failures and landslides are rare in the current climate regime. Some roadbed saturation leading to rilling and gullying does occur where road drainage is not adequate for the site.

Stronghold populations of salmonids are associated with higher-elevation forested lands and the proportion declines with increasing road densities (Quigley et al. 1996). The higher the road density, the lower the proportion of subwatersheds that support strong populations of key

salmonids. Specifically, the Quigley document shows a strong correlation with road densities of 2 miles/mile^2 or higher and reduction of strong populations of salmonids. Further reductions of strong salmonid populations were identified at densities of 3 miles/mile^2 and 4 miles/mile^2 or greater.

Road densities would remain at or above 3 miles/mile^2 in all subwatersheds and miles within 100 feet of Category 1-4 channels would remain high (Table FI-4). Roads with drainage problems listed in the Existing Condition would continue to be chronic sediment sources, or press disturbances, to project area streams and would continue to maintain degraded fish habitat and reduced fish populations.

In summary, increased fuel loading could lead to high severity fire in the future. Stream sedimentation caused by roads would continue to be a problem so stream attributes such as pool riffle ratios, pool to pool spacing and lack of quality deep pool habitat would remain out of balance from those expected for the analysis area streams thereby continuing to impact fish populations. This would likely maintain degraded conditions of fish habitat and reduced populations of redband trout and Malheur mottled sculpin.

Alternative 2

Harvest & Fuels Treatments

One purpose and need of the proposed action is to promote healthy and appropriate upland vegetation characteristic of historical plant communities. Harvest, fuel reduction, and reforestation efforts would move the vegetation and fuel loading toward historical levels. This would allow fire in the landscape to maintain vegetation while minimizing potential to negatively impact fish and fish habitat in project area streams.

Forest management activities can affect water yield, sediment and channel structure thereby modifying fish habitat and populations (Chamberlin et al 1991). Increases in sediment yield beyond a stream's ability to transport the material can decrease the amount and quality of instream habitat available to fish. Increases in water yield can also modify fish habitat by destabilizing banks and modifying channel dimensions. Harvest would only include dead and dying trees and therefore not affect water yield or peak flows (see Watershed section for details). Harvest and fuels treatments are not expected to create or transport sediment outside of the harvest unit or cause erosion problems due to limited sediment transport capabilities in the landscape associated with high-probability runoff events. The effects of a low-probability runoff event would be the same as the existing condition due to the majority of sediment coming from effects of the fire (see Effects Common to All Alternatives in the Fisheries section and sediment transport discussion in the Watershed section). Subsoiling skid trails and landings would decompact soils, improving site productivity for vegetation, improving infiltration rates, and reducing potential for sediment transport or erosion. Mitigation measures and BMPs listed in Chapter 2 are highly effective to reduce the potential for drainage network increase, which is the primary erosion/sedimentation process in this landscape (see the Soils and Watershed sections for further details). The use of INFISH buffers on Category 1-4 stream channels as well as creation of buffers and designated skid trail crossings on ephemeral draws would protect streams and fish.

Harvest and fuels treatments would reduce fuel loading from excess of the historic range of variability on 4245 acres; fuel loading would remain in excess of the historic range of variability on 520 acres (see Figure 18 in Map section for spatial distribution, see Fuels section of FEIS for further details). Areas with fuel loading in excess of the historic range of variability reduce the

ability to use prescribed burning as a management tool in uplands and riparian areas in future management actions to move toward desired conditions and could lead to high severity wildfire. This could potentially impact fish habitat and populations of redband trout and Malheur mottled sculpin.

All hazard trees in RHCAs or those less than 8-inches DBH outside RHCAs would be available to trap sediment moving on hillslopes until/unless removed for use in RHCA CE projects. Hazard trees in the visual corridor of County Road 63 could be used for RHCA CE projects and would be reduced to levels commensurate with LRMP standards for visuals. Adequate amounts of downed trees would be retained to ensure sediment is not transported to fish-bearing streams. There would be no effects to fish or fish habitat.

Roads

Road management activities would include relocation, maintenance, and decommission of existing roads (Figure 10, Map Section). This alternative includes construction and subsequent decommission of 3.9 miles of temporary road (Figure 10, Map Section).

Road maintenance activities (approximately 60 miles total) are not expected to impact fish or fish habitat with the use of BMPs and mitigation measures and would have long-term benefits by improving drainage, reducing road failure potential at stream crossings and reducing chronic sediment input to streams.

Road construction (0.3 miles) associated with relocation is not expected to cause impacts to fish or fish habitat but is a benefit by removing (decommissioning) roads impacting Snow Creek and putting them higher in the landscape while keeping the road system connected. This is in accordance with direction from INFISH guideline RF-3 (b) to avoid adverse effects on inland native fish by prioritizing road relocation out of RHCAs. Construction and decommission of temporary roads is not expected to have any effect on fish or fish habitat due to their location outside RHCAs (most on or near ridgetops) on low gradient slopes.

The use of roads for log haul or other activities is not expected to impact fish or fish habitat due to mitigation measures and road improvement activities listed below. The Malheur National Forest has a policy (with direction from INFISH RF-2) to regulate traffic during wet periods to minimize erosion and sediment delivery. This includes log haul as well as any other vehicle traffic. Road maintenance/reconstruction activities would be implemented to bring roads up to appropriate standards to minimize sedimentation and maximize water dispersion before hauling would occur. Log haul traffic would be directed to improved roads (see Figure 24 for locations) and maintenance activities would be completed after haul to keep the road in an appropriate condition to minimize sediment and meet riparian management objectives. Mitigation measures such as dust abatement (mainly for safety concerns), hauling on dry or frozen ground, and ceasing haul activities during muddy conditions are highly effect to minimize sediment input to streams.

An essential part of the proposed action alternative is to decommission roads impacting riparian areas and streams in valley bottoms and to relocate transportation systems higher on the landscape where impacts would be minimized. Activities in this alternative respond to recommendations in the Upper Silvies WA (2001) to reduce roads and road impacts within RHCAs and identify/correct fish passage barrier problems. Some existing roads would be decommissioned after use for harvest/haul as part of this project (Figure 10, Map Section, Table FI-6). Some sediment may be transported to streams at the time of project implementation. There is the potential to impact individual fish when road management activities occur, particularly culvert replacement or removals. Greater impacts to individual fish during

implementation and benefits to fish habitat and populations after implementation would be obtained by removing road/stream crossings or roads within 100 feet of streams, where roads are more likely to impact riparian areas and streams (see Watershed section).

Diesel, helicopter fuel, gas, hydraulic fluid, and oil lubricant are the main chemicals that would be found within the project area. All of these items have the potential to impact fish if allowed to enter project area streams. Only road management activities such as maintenance, reconstruction, decommission and culvert replacement would occur within RHCAs where chemical contamination of fish habitat is possible. Most of the work would employ the use of machinery and trucks to dig or pick up, as well as, move in or remove rock and soil material. Chemical contamination is possible but is not expected because Malheur National Forest safety measures, considered highly effective, would be followed relative to the use, storage, and handling of petroleum products.

Road densities would remain elevated but would drop below 3 miles/mile^2 in Snow and Jack Creek subwatersheds. Roads within 100 feet of Category 1-4 channels would be reduced by over 4 miles total (see Table FI-5). This is a 47% reduction from the existing condition within the project area. These roads contribute the majority of sediment from the existing transportation system to streams. Stream sedimentation caused by roads would be reduced, potentially increasing pool riffle ratios, while decreasing pool to pool spacing and width to depth ratios compared to current conditions. This would result in stream parameters moving toward attainment of LRMP standards and INFISH RMOs in the project area.

Table FI-6: Alt 2 ATM Conditions Post-Implementation

	Project Area				Entire Subwatershed (Public & Private)			
Subwatershed (SWS)	**Decommission Miles**	**Total Road Miles**	**Road Miles within 100 ft. of Cat. 1-4 Channels**	**Stream Crossings on Roads**	**Total Road Miles**	**Road Miles within 100 ft. of Cat. 1-4 Channels**	**Stream Crossings on Roads**	**Total Road Density Mi/ Mi^2**
Hog*	0.1	1.1	0.1	0	54.9	8.3	73	5.8
Jack	7.1	16.3	1.4	11	42.3	3.6	41	2.7
Keller	0	2.4	0.1	1	44.4	6.7	73	3.8
Snow*	5.8	19.7	3.2	12	29.5	4.6	25	2.9
Total	13.0	39.5	4.8	24	171.1	23.2	212	NA

*Not true subwatersheds; Snow Creek and Hog Creek SWS include portions of the Silvies River

The impacts from sediment during implementation and the potential to impact individual fish listed above would be far outweighed by short and long-term benefits of removing chronic sediment sources, or press disturbances, improving shade and lowering risk of road/stream crossing failures thereby improving fish habitat and populations of redband and Malheur mottled sculpin in the project area.

Snow Creek Subwatershed—The drainage/saturation problems on the lower portion of Road 2400133 would be improved by rocking the surface and placement of additional relief drainage structures, replacement of a culvert at a crossing with Snow Creek, and decommission of one segment of road near Snow Creek. The replacement of the culvert on Road 2400133 would also improve fish habitat connectivity.

Road 2400133 south of the connection with 2400203 would be decommissioned and woody debris would be placed on the surface to stop rilling, which is contributing sediment to Snow

Creek. The 34-foot long log culvert on Road 2400205 at Snow Creek would be removed during low flow conditions when this road is decommissioned. The stream banks and floodplain would be rehabilitated to mimic those upstream and downstream. Road 2400203 at the crossing with Snow Creek would be decommissioned to reduce chronic sediment from the road and the potential for sedimentation caused by road failure if the culvert became plugged with sediment and debris. The stream banks and floodplain would be rehabilitated to mimic those upstream and downstream. The decommission of a portion of Road 2400203 from its present location along Snow Creek and relocation to outside of the RHCA connecting with Road 2400078 would reduce sediment impacts to Snow Creek.

Temporary roads would be built high in the subwatershed outside of RHCAs, would remain for 1-2 years until harvest activities were completed, and would then be decommissioned. No impacts to fish or fish habitat would occur with these activities because of their distance from streams, the low gradient landscape and mitigation measures.

Jack Creek Subwatershed —Road 2400095 and 2400196 would be decommissioned under this alternative. There would be no observable impacts from decommission activities associated with blocking access at the beginning and end of roads. The removal of one partially plugged log culvert during low flow or dry conditions may input some sediment to Jack Creek at the time of implementation. Placement in the stream channel of sedges and other herbaceous vegetation disturbed during removal of the log culvert and banks will minimize sediment impacts to Jack Creek from this tributary. Benefits of decommissioning the roads and removal of the log culvert would include reduction of compaction, erosion and sediment input to Jack Creek.

Keller Creek Subwatershed—Temporary roads would be built along the subwatershed boundary between Keller Creek and Snow Creek, would remain for 1-2 years until harvest activities were completed and then be decommissioned. Only a small portion of this subwatershed is in the project area. No impacts to fish or fish habitat would occur with these activities because mitigation measures, low gradient landscape and distance from streams.

Hog Creek Subwatershed—Roads in the project area are high on the slope in the subwatershed and therefore unlikely to impact fish or fish habitat because of distances to stream channels. Only a small portion of this subwatershed is in the project area. No impacts to fish or fish habitat would occur with these activities because mitigation measures, low gradient landscape and distance from streams.

Combined Effects of Road, Harvest and Fuels Treatments

Potential impacts would be mitigated through implementation of BMPs, use of INFISH buffers and mitigation measures on ephemeral draws, all of which are highly effective. In summary, there would be no effects expected on fish habitat, individuals or populations of redband trout or Malheur mottled sculpin from sediment from harvest/fuels management compared to post-fire existing conditions. Temporary road construction/decommission would not have any effect on streams or fish due to low impact design, location outside RHCAs (most on or near ridge tops) and the low gradient topography. Road maintenance activities would not impact fish or modify habitat with implementation of BMPs and mitigation measures, which are highly effective. Road decommission and culvert replacement activities have the greatest potential for short-term localized impacts to individual fish from sediment during implementation. Chemical contamination from road management activities is possible but unlikely due to mitigation measures. Benefits to fish habitat and populations of redband trout and Malheur mottled sculpin

would occur after year 2 with the removal of passage barriers and the reduction of chronic sediment input to project area streams.

Alternative 3

Harvest and Fuels Treatments

Immediate sediment effects to fish and fish habitat from fire, harvest and fuels treatments are the same for all alternatives (see Effects Common to All Alternatives at the beginning of the Environmental Consequences section for fisheries). Harvest and fuels treatments would reduce fuel loading from excess of the historic range of variability on 2342 acres; fuel loading would remain in excess of the historic range of variability on 2423 acres (see Figure 19 in Map section for spatial distribution, see Fuels section of FEIS for further details). Areas with fuel loading in excess of the historic range of variability reduce the ability to use prescribed burning as a management tool in uplands and riparian areas in future management actions to move toward desired conditions and could lead to high severity wildfire. This could potentially impact fish habitat and populations of redband trout and Malheur mottled sculpin.

All hazard trees in RHCAs or those less than 8-inches DBH outside RHCAs would be available to trap sediment moving on hillslopes until/unless removed for use in RHCA CE projects. Hazard trees in the visual corridor of County Road 63 could be used for RHCA CE projects and would be reduced to levels commensurate with LRMP standards for visuals. Adequate amounts of downed trees would be retained to ensure sediment is not transported to fish-bearing streams. There would be no effects to fish or fish habitat.

Roads

Activities in this alternative respond to recommendations in the Upper Silvies WA (2001) to reduce roads and road impacts within RHCAs and identify/correct fish passage barrier problems. Road management activities are the same as in Alternative 2 except 2.9 miles of temporary road would be built (Figure 11, Map Section, Table FI-6). Since temporary road construction or decommission would not impact fish or fish habitat, the direct and indirect effects of road activities are expected to be the same as alternative 2.

Combined Effects of Road, Harvest and Fuels Treatments

No effects to individual fish, fish habitat or populations of redband trout or Malheur mottled sculpin are expected from harvest or fuels treatment activities with implementation of BMPs, INFISH buffers and mitigation measures on ephemeral draws, all of which are highly effective. However, lower harvest levels would result in future fuel loading in excess of the historic range of variability on 2423 acres and therefore greater potential for high severity wildfire which could reduce quality and quantity of fish habitat and thereby reduce populations of redband trout and Malheur mottled sculpin.

Direct and indirect effects are the same as those listed in Alternative 2 because road management activities would have the same potential impacts to individual fish during implementation and benefits to fish habitat and populations of redband trout and Malheur mottled sculpin into the future with the reduction in chronic sedimentation.

Alternative 4

Harvest and Fuels Treatments

No commercial harvest would occur under alternative 4. Only fuels treatments would be completed under this alternative. Some units that would have used skyline or helicopter logging systems under alternative 2 or 3 would have submerchantable materials felled, then hand piled and burned. Some units that used tractor logging systems under alternative 2 or 3 would have submerchantable materials felled, grapple piled and burned. The use of INFISH RHCAs on Category 1-4 stream channels, considered highly effective, would protect streams and fish. Fuels treatments are not expected to have effects to fish or fish habitat. Fuels treatments are not expected to create or transport sediment outside of the harvest unit or cause erosion problems due to limited sediment transport capabilities in the landscape associated with high-probability runoff events. The effects of a low-probability runoff event would be the same as the existing condition due to the majority of sediment coming from effects of the fire (see Effects Common to All Alternatives in the Fisheries section and sediment transport discussion in the Watershed section).

Fuels treatments would reduce fuel loading from excess of the historic range of variability on 405 acres; fuel loading would remain in excess of the historic range of variability on 4360 acres (see Figure 20 in Map section for spatial distribution, see Fuels section of FEIS for further details). Areas with fuel loading in excess of the historic range of variability reduce the ability to use prescribed burning as a management tool in uplands and riparian areas in future management actions to move toward desired conditions and could lead to high severity wildfire. This could potentially impact fish habitat and populations of redband trout and Malheur mottled sculpin.

All hazard trees would be available to trap sediment moving on hillslopes until/unless removed for use in RHCA CE projects. Hazard trees in the visual corridor of County Road 63 could be used for RHCA CE projects and would be reduced to levels commensurate with LRMP standards for visuals. Adequate amounts of downed trees would be retained to ensure sediment is not transported to fish-bearing streams. There would be no effects to fish or fish habitat.

Roads

The use of roads for activities associated with this alternative is not expected to impact fish or fish habitat due to mitigation measures listed in Chapter 2 and road improvement activities listed in Alternative 2.

An essential part of this action alternative is to decommission roads in valley bottoms impacting riparian areas and streams. Activities in this alternative respond to recommendations in the Upper Silvies WA (2001) to reduce roads and road impacts within RHCAs. Some existing roads would be decommissioned after use for access for fuels treatment as part of this project. Some sediment may be transported to streams at the time of project implementation. There is the potential to impact individual fish when road management activities occur, particularly culvert replacement or removals. Greater impacts to individual fish and benefits to fish populations would be obtained by removing road/stream crossings or roads within 100 feet of streams where roads are more likely to impact riparian areas and streams (see Watershed section).

Road management activities would be similar to the other action alternatives except that no relocation, reconstruction or temporary road construction/decommission would occur (Figure 12 Map Section and Table FI-7). Another difference from the other action alternatives is that road maintenance activities, which would be a benefit by maximizing dispersion of water and minimizing sediment transport, would only continue at regularly scheduled intervals. At current and expected future funding levels, this would not allow accomplishment of all maintenance needed and result in sediment continuing to impact fish habitat in project area streams.

Decommission activities on Roads 2400133 and 2400205 associated with road relocation in the riparian areas of Snow Creek would not occur with this alternative. Reduced decommission activities and no reconstruction actions would reduce potential impacts from sediment to individuals during implementation. It would also reduce benefits at year 2 and after to fish habitat and populations from reduction of sediment contribution and addition to late season flows.

Road densities would remain elevated but would drop below 3 miles/mile^2 in Jack Creek and would drop to 3 miles/mile^2 in Snow Creek subwatershed. This alternative would reduce roads within 100 feet of Category 1-4 channels by 3.5 miles total (see Table FI-6). This is a 37% reduction from the existing condition within the project area. Roads in close proximity to streams or channels contribute the majority of sediment from the transportation system to streams. Road activities to correct drainage problems listed in the Existing Condition are listed in Alternative 2 by subwatershed with the exception of a segment of Road 2400133 would not be reconstructed (and the culvert not replaced) and segments of Roads 2400133 and 2400134 which would not be decommissioned with this alternative. Stream sedimentation caused by roads would be reduced, potentially increasing pool riffle ratios, while decreasing pool to pool spacing and width to depth ratios compared to current conditions. This would result in stream parameters moving toward attainment of LRMP standards or INFISH RMOs in the project area.

Table FI-7: Alt 4 ATM After Implementation

	Project Area				Entire Subwatershed (Public & Private)			
Subwatershed (SWS)	**Decommission Miles**	**Total Road Miles**	**Road Miles within 100 ft. of Cat. 1-4 Channels**	**Stream Crossings on Roads**	**Total Road Miles**	**Road Miles within 100 ft. of Cat. 1-4 Channels**	**Stream Crossings on Roads**	**Total Road Density Mi/ Mi^2**
Hog*	0.1	1.1	0.1	0	54.9	8.3	73	5.8
Jack	7.1	16.3	1.4	11	42.3	3.6	41	2.7
Keller	0	2.4	0.1	1	44.4	6.7	73	3.8
Snow*	4.7	20.5	4.0	13	30.4	5.4	26	3.0
Total	11.9	40.3	5.6	25	172	24.0	213	NA

*Not true subwatersheds; Snow Creek and Hog Creek SWS include portions of the Silvies River

Chemical contamination is possible but is not expected because Malheur National Forest safety measures, considered highly effective, would be followed relative to the use, storage, and handling of petroleum products.

The potential to impact individual fish from road management activities would be far outweighed by benefits to fish habitat and populations of removing chronic sediment sources, improving shade and lowering risk of road/stream crossing failures thereby improving fish habitat and populations of redband trout and Malheur mottled sculpin in the project area.

Combined Effects of Road and Fuels Treatments

There are no effects expected on fish habitat or populations from increases in water yield and sediment compared to existing conditions from the fuels management activities with implementation of BMPs and INFISH RHCAs, all of which are highly effective. However, there would be future fuel loading in excess of the historic range of variation on 4360 with only fuels treatments (no harvest) and therefore greater potential for high severity wildfire, which could

reduce quality and quantity of fish habitat and thereby reduce populations of redband trout and Malheur mottled sculpin.

Road management activities have the greatest potential for localized impacts to individuals from sediment during implementation and benefits to fish habitat and populations of redband trout and Malheur mottled sculpin after implementation with the reduction of chronic sedimentation. Alternative 4 would reduce roads within 100 feet of Category 1-4 streams by 37% and remove 17 road/stream crossings. This would benefit fish and fish habitat with a reduction of chronic sedimentation of streams.

Alternative 5

Harvest and Fuels Treatments

Immediate sediment effects to fish and fish habitat from fire, harvest and fuels treatments are the same for all alternatives (see Effects Common to All Alternatives at the beginning of the Environmental Consequences section for fisheries). Harvest and fuels treatments would reduce fuel loading from excess of the historic range of variability on 2707 acres; fuel loading would remain in excess of the historic range of variability on 2058 acres (see Figure 21 in Map section for spatial distribution, see Fuels section of FEIS for further details). Areas with fuel loading in excess of the historic range of variability reduce the ability to use prescribed burning as a management tool in uplands and riparian areas in future management actions to move toward desired conditions and could lead to high severity wildfire. This could potentially impact fish habitat and populations of redband trout and Malheur mottled sculpin.

All hazard trees in RHCAs or those less than 8-inches DBH outside RHCAs would be available to trap sediment moving on hillslopes until/unless removed for use in RHCA CE projects. Hazard trees in the visual corridor of County Road 63 could be used for RHCA CE projects and would be reduced to levels commensurate with LRMP standards for visuals. Adequate amounts of downed trees would be retained to ensure sediment is not transported to fish-bearing streams. There would be no effects to fish or fish habitat.

Roads

Activities in this alternative respond to recommendations in the Upper Silvies WA (2001) to reduce roads and road impacts within RHCAs and identify/correct fish passage barrier problems. Road management activities are the same as in alternative 2 except 3.3 miles of temporary road would be built (Figure 13, Map Section, Table FI-6). Since temporary road construction or decommission would not impact fish or fish habitat, the direct and indirect effects of road activities are expected to be the same as alternative 2.

Combined Effects of Road, Harvest and Fuels Treatments

No effects to individual fish, fish habitat or populations of redband trout or Malheur mottled sculpin are expected from harvest or fuels treatment activities with implementation of BMPs, INFISH buffers and mitigation measures on ephemeral draws, all of which are highly effective. However, lower harvest levels would result in future fuel loading in excess of the historic range of variability on 2058 acres and therefore greater potential for high severity wildfire which could reduce quality and quantity of fish habitat and thereby reduce populations of redband trout and Malheur mottled sculpin.

Direct and indirect effects are the same as those listed in Alternative 2 because road management activities would have the same potential impacts to individual fish during implementation and

benefits to fish habitat and populations of redband trout and Malheur mottled sculpin into the future with the reduction in chronic sedimentation.

Cumulative Effects

The past, present and foreseeable future actions listed in the Flagtail FEIS Appendix J were analyzed in conjunction with direct and indirect effects of project activities to determine cumulative effects on fish and fish habitat in project area streams and downstream in the Silvies River and Jack Creek. Effects of the fire and past actions were described in the existing condition portion of the Fisheries Section.

Alternative 1

Legacy impacts from roads, harvest and grazing activities conducted without BMPs on private and public land have reduced fish habitat quality and complexity in project area streams and downstream in the Silvies River and Jack Creek. Riparian vegetation has been reduced and width to depth ratios are high resulting in excessive summer rearing temperatures. This has reduced fish populations of redband trout in the Silvies River, Jack Creek and Snow Creek and Malheur mottled sculpin in the Silvies River compared to natural conditions.

On private land downstream of the project area, road-building, logging of fire-killed trees and thinning of live trees occurred between fall 2002 and spring 2003. Harvest and fuel treatment activities are expected reduce future fuel loading and the potential for wildfire starting on private land that could impact fish and fish habitat both in and downstream of the Flagtail Fire area. The extent of road-building activities on private land or the effects are unknown but are not expected to impact the Flagtail Fire area upstream.

Sediment transported through the existing road and associated drainage system would continue sediment delivery to streams which would maintain degraded conditions of stream channels and fish populations.

All hazard trees remaining in the project area would be available to trap sediment moving on hillslopes until/unless removed for use in RHCA CE projects. Adequate amounts of downed trees would be retained to ensure sediment is not transported to fish-bearing streams. Minimum standards for instream LWD (MNF LRMP Amendment 29) would be met before removing trees from RHCAs. There would be no effects to fish or fish habitat. Hazard tree activities planned in the Hog Subwatershed upstream of the fire area are expected to have a positive effect on fish habitat because hazard trees in RHCAs would be used to meet instream LWD standards (MNF LRMP Amendment 29) in Hog Creek. Hazard trees in RHCAs in excess of those needed for instream LWD may be removed.

Large and coarse woody levels are expected to rise as a result of natural recruitment as snags (fire-killed trees) fall in the fire area. Coarse wood placement completed under a CE in 2003 on 1.5 miles of the Silvies River and several ephemeral draws in the project area and more planned for 2004 will increase down wood levels in streams and draws immediately upon implementation. This will meet minimum LRMP standards and INFISH RMOS for LWD frequencies in fish-bearing streams when fully implemented. Coarse wood placed downstream of the outlets of culverts on Road 24 at Jack Creek and Snow Creek (planned for 2004) will reduce jump height and therefore improve habitat connectivity at low flows. Other activities completed under CEs in 2003 and ongoing in 2004 include streamside riparian hardwood planting (in Snow Creek, Jack Creek and the Silvies River) and conifer planting in upland portions of RHCAs which will provide wood to streams and channels in the future (5-7 years for

shrubs and 20+ years for conifers) as single pieces or aggregates. Woody material will capture sediment in all channels including low probability, high runoff events. In Category 1 streams woody material would sort gravels improving spawning substrate, create and maintain pools and improve channel width to depth ratios to better maintain stream temperatures in project area streams and downstream in the Silvies River system.

Water temperatures during base flows would be elevated compared to pre-fire levels because conifers killed by the fire previously provided shade. Water temperatures would then decrease potentially to lower than pre-fire conditions as riparian shrubs from natural recruitment and those planted under CEs provide shade to better maintain stream temperatures within 7-10 years. Shrubs would begin to improve channel width to depth ratios by root strength within 3-5 years in project area streams and downstream in the Silvies River system. Riparian hardwoods also provide habitat and food for macroinvertebrates after 4-5 years that could then be food for fish.

No grazing on pastures in the fire area for a minimum of 2 growing seasons would reduce cumulative effects of wild and domestic ungulate browsing and grazing pressure to allow hardwoods to re-establish and herbaceous vegetation to recover in riparian areas. The effects would be similar and additive to hardwood planting and protection. Some uncontrolled cattle grazing occurred in summer/fall 2003 but no measurable effects to riparian habitat or stream channels were observed. Re-initiation of grazing by domestic livestock within Forest Plan and Interagency Interdisciplinary Team (IIT) standards would not retard attainment of Riparian Management Objectives (RMOs) in project area streams.

A fuels reduction project may occur inside RHCAs where dead, submerchantable trees under 8-inch DBH would be felled, then handpiled and burned outside of riparian areas. This would have no impact to hydrology and sediment but would potentially reduce severity of future wildfires inside RHCAs thus reducing mortality to riparian vegetation and negative effects to streams and fish populations.

Overall, natural addition of large woody debris, shrub regeneration, actions associated with CEs and deferral of grazing are expected to improve aquatic conditions compared to the existing condition thereby improving fish populations. Bankfull and wetted width to depth ratios should decrease in all streams with the largest reduction in the Silvies River. Redband (in all streams) and Malheur mottled sculpin (in the Silvies River) populations should improve and expand with better summer/winter rearing and spawning habitat due to lower sediment loads, more/higher quality pools and lower summer water temperatures.

Alternative 2

Legacy impacts from roads, harvest and grazing activities conducted without BMPs on private and public land have reduced fish habitat quality and complexity in project area streams and downstream in the Silvies River and Jack Creek. Riparian vegetation has been reduced and width to depth ratios are high resulting in excessive summer rearing temperatures. This has reduced fish populations of redband trout in all fish bearing streams and Malheur Mottled sculpin in the Silvies River compared to natural conditions.

Cumulative effects would be beneficial and similar to the No Action alternative due to actions completed under CEs in 2003 and 2004 including riparian hardwood planting, upland conifer planting in RHCAs, and coarse wood placement in streams and ephemeral draws. This will meet minimum LRMP standards and INFISH RMOS for LWD frequencies in fish-bearing streams in the project area. Hazard tree activities upstream of the fire area in the Hog Subwatershed are expected to have a positive effect on fish habitat because hazard trees in RHCAs would be used

to meet instream LWD standards (MNF LRMP Amendment 29) in Hog Creek. Trees in excess of those needed for instream LWD may be removed.

Some uncontrolled cattle grazing occurred in summer/fall 2003 but no measurable effects to riparian habitat or stream channels were observed. The Forest policy for deferral of grazing for a minimum of 2 years after a fire and grazing within IIT standards after re-initiation would not retard attainment of RMOs.

On private land downstream of the project area, road-building, logging of fire-killed trees and thinning of live trees occurred between fall 2002 and spring 2003. Harvest and fuel treatment activities are expected reduce future fuel loading and the potential for wildfire starting on private land that could impact fish and fish habitat both in and downstream of the Flagtail Fire area. The extent of road-building activities on private land or the effects are unknown but are not expected to impact the Flagtail Fire area upstream.

The road management activities associated with the action alternatives are expected to have benefits by reducing sediment that would improve habitat complexity and fish populations more than the No Action alternative, likely improving conditions beyond the pre-fire baseline. This responds to recommendations in the Upper Silvies WA (2001) to improve aquatic conditions. The impacts of sediment during implementation of road management activities are expected to have a no observable effect to fish habitat or populations.

Bankfull and wetted width to depth ratios should decrease in all streams with the largest reduction in the Silvies River. Redband (in all streams) and Malheur mottled sculpin (in the Silvies River) populations should improve and expand with better summer and winter rearing as well as spawning habitat due to lower sediment loads, more pools and lower summer water temperatures.

Alternative 3

Cumulative Effects would be the same as those listed for Alternative 2. This is because the cumulative effects of road management activities and harvest/fuels treatments when combined with the effects of actions completed under CEs are the same for both alternatives.

Alternative 4

Legacy impacts from roads, harvest and grazing activities conducted without BMPs on private and public land have reduced fish habitat quality and complexity in project area streams and downstream in the Silvies River and Jack Creek. Riparian vegetation has been reduced and width to depth ratios are high resulting in excessive summer rearing temperatures. This has reduced fish populations of redband trout in all fish bearing streams and Malheur Mottled sculpin in the Silvies River compared to natural conditions.

On private land downstream of the project area, road-building, logging of fire-killed trees and thinning of live trees occurred between fall 2002 and spring 2003. Harvest and fuel treatment activities are expected reduce future fuel loading and the potential for wildfire starting on private land that could impact fish and fish habitat both in and downstream of the Flagtail Fire area. The extent of road-building activities on private land or the effects are unknown but are not expected to impact the Flagtail Fire area upstream.

Cumulative effects for Alternative 4 would be most similar but less beneficial in the long-term compared to those for Alternatives 2 and 3 due to road management activities which were

designed to address recommendations from the Upper Silvies WA (2001) to improve aquatic habitat. The main differences with this alternative would be fewer road decommission or improvement activities would be implemented to improve aquatic habitat and heavier fuel loading would remain after management actions that would allow greater potential for high severity wildfire in the future.

Actions associated with CEs including riparian hardwood planting, upland conifer planting in RHCAs, coarse wood placement in streams and ephemeral draws are expected to improve aquatic conditions compared to the existing condition thereby improving fish populations and meeting LRMP standards and RMOs as stated in Alternative 1. Hazard tree activities in the Hog Subwatershed are expected to have a positive effect on fish habitat as hazard trees in RHCAs will be used to meet instream LWD standards (MNF LRMP Amendment 29) in Hog Creek. Trees in excess of those needed for instream LWD may be removed. Some uncontrolled cattle grazing occurred in summer/fall 2003 but no measurable effects to riparian habitat or stream channels were observed. In addition, the Forest policy for deferral of grazing for a minimum of 2 years after a fire and grazing within IIT standards after re-initiation would not retard attainment of Riparian Management Objectives.

Bankfull and wetted width to depth ratios should decrease in all streams with the largest reduction in the Silvies River. Redband trout (in all fish bearing streams) and Malheur mottled sculpin (in the Silvies River) populations should improve and expand with better summer and winter rearing as well as spawning habitat due to lower sediment loads, more pools and lower summer water temperatures.

Alternative 5

Cumulative Effects would be the same as those listed for Alternatives 2 and 3. This is because the cumulative effects of road management activities and harvest/fuels treatments when combined with the effects of actions completed under CEs are the same for these alternatives.

Comparison of Alternatives

The following table lists indicators relevant to fish and fish habitat to compare the existing condition (Alternative 1) and conditions resulting from implementation of the action alternatives (Alternatives 2, 3, 4 and 5). In short, the lower the number in each column, the better stream conditions would be for fish and fish habitat in the project area and downstream in the Silvies River and Jack Creek.

Table FI-8. Comparison of Alternatives for Fisheries Values

	Road/Stream Crossings	Miles of Road within 100 Feet of Category 1-4 Channels	Total Road Miles	Acres Exceeding HRV Fuel Levels
Alternative 1	42	9.1	51.6	4765
Alternative 2	24	4.8	39.5	520
Alternative 3	24	4.8	39.5	2423
Alternative 4	25	5.6	40.3	4360
Alternative 5	24	4.8	39.5	2058

Determination of Effects on Sensitive Species

Redband trout and Malheur mottled sculpin are designated as the management indicator species for fisheries analyses in the Malheur Forest Plan (USDA 1990), and as a Sensitive Species by the Regional Forester (USDA 2000). Potential determinations for Sensitive Species are as follows:

NI	No Impact
MIIH	May Impact Individuals or Habitat, but Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species
WIFV	Will Impact Individuals or Habitat with a Consequence that the Action May Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species
BI	Beneficial Impact

The following is a summary of effects determinations for alternatives documented in the Biological Evaluation of the Flagtail project. Table FI-7 lists determinations for all alternatives.

Alternative 1, No Action:

Fuel loading will increase in the project area as snags fall and new vegetation grows. This could lead to high severity wildfire that has the potential to impact fish and fish habitat in the project area. The activities with the highest potential for affecting sediment input to streams are road management activities. Under this alternative, there would be no road management activities other than ongoing routine road maintenance. This can be considered no change from the existing condition. However, this alternative would do nothing to reduce impacts of the existing road system and degraded stream conditions as they relate to fish habitat. It would be expected that sedimentation from existing roads would remain constant or increase over time, unless other projects are implemented to address these impacts. This alternative "**May Impact Individuals or Habitat**" for redband trout and Malheur mottled sculpin now and in the future. These impacts would not cover a large enough area to reduce population viability and therefore would not result in a "**WIFV**" determination for redband trout or Malheur mottled sculpin habitat and populations.

Alternatives 2, 3, 4 and 5:

Fuel loading would be reduced as a result activities associated with the action alternatives and a fuel treatment project in RHCAs implemented under a CE. This could lead to reduced impacts (severity) of future wildfire that has the potential to impact fish and fish habitat in the project area. The activities with the highest potential for affecting sediment input to streams are road management activities. Under the action alternatives, there would be road management activities which include construction/relocation of system roads (Alternatives 2, 3 and 5), construction of temp roads (Alternatives 2, 3 and 5), maintenance (including creation of additional relief drainage structures), reconstruction (culvert replacement on Snow Creek in Alternatives 2, 3 and 5) and decommission of existing system roads. The only impacts on fish or fish habitat would be those from during implementation and up to 1 year after reconstruction or decommission activities within 100 feet (mapped GIS) of streams. The impacts would be limited to the immediate vicinity of the activity and "**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. However, the long-term reduced impacts to aquatic indicators would result in a "**Beneficial Impact**" for redband trout and Malheur mottled sculpin habitat and populations.

Table FI-7: Sensitive species biological evaluation summary

Aquatic Species	Effects Determination Alternative 1 No Action	Effects Determination* Alternative 2 Proposed Action	Effects Determination* Alternative 3 Proposed Action	Effects Determination* Alternative 4 Proposed Action
Interior Redband Trout	**MIIH**	**MIIH (BI)**	**MIIH (BI)**	**MIIH (BI)**
Malheur Mottled Sculpin	**MIIH**	**MIIH (BI)**	**MIIH (BI)**	**MIIH (BI)**

*Effects in Parentheses are Long Term Effects (greater than 2 years) if different from Short Term Effects (1-2 years)

Consistency With Direction and Regulations

The alternatives are consistent with Forest Plan direction. None of the potential combined effects are expected to adversely affect INFISH RMOs or redband trout population viability. Application of INFISH direction would maintain or improve fish habitat conditions in the Project Area. Riparian and stream channel conditions, or RMOs) are expected to improve with road management activities and actions completed under separate CEs which include riparian hardwood planting, upland conifer planting in RHCAs, as well as Malheur National Forest direction to defer grazing for two or more years following a fire. Resumption of grazing is not expected to retard attainment of RMOs as long as Forest Plan (in uplands) and Interagency Interdisciplinary Team, or IIT, (in riparian areas) standards are met.

Consultation with NOAA or USFWS is not necessary for fisheries because the area is part of an inland fishery and contains no ESA fish species. The Magnuson-Stevens Fishery Conservation and Management Act as amended (1996) does not apply to the project area because it is an inland fishery.

Recreational fishing opportunities are limited in the Flagtail burn area by water quality and habitat degradation. The proposed action and action alternatives include aquatic conservation and restoration actions that would improve the quantity, function, sustainable productivity, and distribution of recreational fisheries as directed under Executive Order 12962, Recreational Fisheries.

Irreversible and Irretrievable Commitments of Resources

No irreversible effects are expected. Reduced fish population viability for redband trout could be an irretrievable commitment of resources, but the possibility is not expected. INFISH established explicit goals and objectives for inland fish habitat condition and function. By following INFISH standards and guidelines as well as design and mitigation measures specific to this project, it is believed that irretrievable commitment of this resource can be avoided. The goal is to achieve a high level of habitat diversity and complexity through a combination of habitat features.

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