

Biological Assessment for the Potential Effects of
Managing the Payette National Forest in
the Deep Creek Section 7 Watershed on
Snake River Spring/Summer and Fall Chinook Salmon,
Snake River Steelhead, and Columbia River Bull Trout
and
Biological Evaluation for
Westslope Cutthroat Trout

Volume 5
Ongoing and New Actions

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I. INTRODUCTION

This Biological Assessment (BA) determines the effects of various Federal actions in the Deep Creek Section 7 watershed on Snake River spring/summer Chinook salmon (*Oncorhynchus tshawytscha*) and their designated critical habitat, Snake River steelhead (*Oncorhynchus mykiss*) and their designated critical habitat, and Columbia River bull trout (*Salvelinus confluentus*). This BA is tiered to previous BAs and supplements for the Section 7 watershed defined as Deep Creek. These BAs are listed at the end of this document under a section of the references cited called "Previous BAs".

Actions in this BA are similar actions as described in 50 CFR 402.12 (g). Actions supersede all those in previous consultations within the boundaries of the Payette National Forest. All acronyms, phrases, references, and associated documents from these BAs are included.

This document also includes a Biological Evaluation (BE) of the effects of federal actions on westslope cutthroat trout (*Oncorhynchus clarki lewisi*). Biological Evaluations for sensitive species are prepared by direction of the Forest Service manual (FSM 2670). The historical distribution of westslope cutthroat trout is based largely on current distribution and accounts from Behnke (1992). The historical distribution of westslope cutthroat trout in the Snake River drainage between the Salmon River and Shoshone Falls is unclear. Although Gilbert and Evermann (1894) reported cutthroat trout in the Wood River, Idaho, Behnke (1992) examined three museum specimens and reported all as redband trout. Jordan and Evermann (1902) mention cutthroat trout in the same paragraphs in which they refer to "fine trout fishing" in Payette and Redfish lakes. It is not clear whether they meant that cutthroat were found in both lakes, but other accounts make it clear that cutthroat did occur in the river basin of the latter. Because redband trout often exhibit a cutthroat like red/orange slash under the jaw, and were termed "cutthroat" in other popular accounts, it is possible the reference in the Payette River was actually for redband trout. Westslope cutthroat trout have persisted throughout much of their known historical range. They have not been confirmed, however, from any samples taken above the mouth of the Salmon River that cannot be attributed to recent introduction (Quigley, et. al., 1996). Therefore, all actions considered in this Biological Assessment will have no impact to westslope cutthroat trout because the species does not exist within the Deep Creek Section 7 watershed.

Descriptive information in this BA covers Deep Creek. The Federal actions are in the entire Deep Creek Section 7 watershed. Hereafter for simplicity, this area is referred to as the watershed, because the hydrologic unit level varies. Some of the descriptive information in Sections I and II of this BA has been condensed from previous volumes or referenced to avoid repetition.

II. GENERAL DESCRIPTION OF SECTION 7 WATERSHED

The Deep Creek watershed is approximately 19,000 acres and ranges from 1500 feet in elevation at its confluence with the Snake River to nearly 7800 feet in elevation at the headwaters. Federal and private lands exist in the watershed that covers about 28 square miles. Deep Creek flows to the northwest from its headwaters just north of Smith Mountain, and drains into the Snake River at T22N, R3W, Section 15, just downstream of Hells Canyon Dam (Figure 1).

The Deep Creek watershed consists of an extremely steep, uplifted mountain ridge system composed mainly of extrusive, igneous rocks of the Seven Devils formation with scattered inclusions of metasedimentary and granitic rock. Soils generally have moderate to high surface erosion potential, and low to moderate productivity. The potential for instability and erosion is fairly high in the oversteepened landforms present in the area.

Vegetation at lower elevations is typically grasslands, shrublands, ponderosa pine and Douglas-fir on south and west aspects, and Douglas-fir and grand fir forests on north and east aspects. Mid and upper elevations are dominated by shrubs and forest communities of Douglas-fir, grand fir, and subalpine fir, with pockets of western larch, lodgepole pine, whitebark pine, and aspen.

The watershed is predominately undeveloped with relatively few road miles: 5.2 miles of classified road of which 2.2 miles are open to use, and 2.7 miles of unclassified road (both Forest Service and private).

A variety of land uses occur on National Forest System (NFS) lands, recreation, forage production, and some timber management. No timber harvest has occurred on Forest lands in the Deep Creek subwatershed since 1993. Hunting occurs on National Forest lands throughout the watershed. Some fishing also occurs in the drainage. Large fires have occurred within the Deep Creek watershed (see current [CD1: \Support Documents\Maps\Large_Fire_map.pdf](#)).

Forest roads 106 and 112 provide access to trailheads into the Deep Creek drainage. Access to two of the mines in the drainage, the Helena and South Peacock mines is also from Forest Road 106. These mines have not been operational since the turn of the century. One other mine, the Red Ledge mine, also occurs in the drainage approximately 2 miles upstream of the mouth of Deep Creek. Water quality in the Deep Creek subwatershed is excellent, with the exception of influences from the Red Ledge Mine. The mine is upstream of steelhead and Chinook habitat, and adit outflow contains high levels of iron, copper, zinc, and manganese. Adit drainage is diluted when it enters Deep Creek but may be having effects on pH and conductivity downstream (Hogen and Burns 2001).

Survey data from the mouth of Deep Creek to the confluence of Oxbow Creek show Deep Creek to be a steep, confined A3 type channel. Most stream channels in the drainage are likely to be high gradient and confined due to the steep topography found over much of the area.

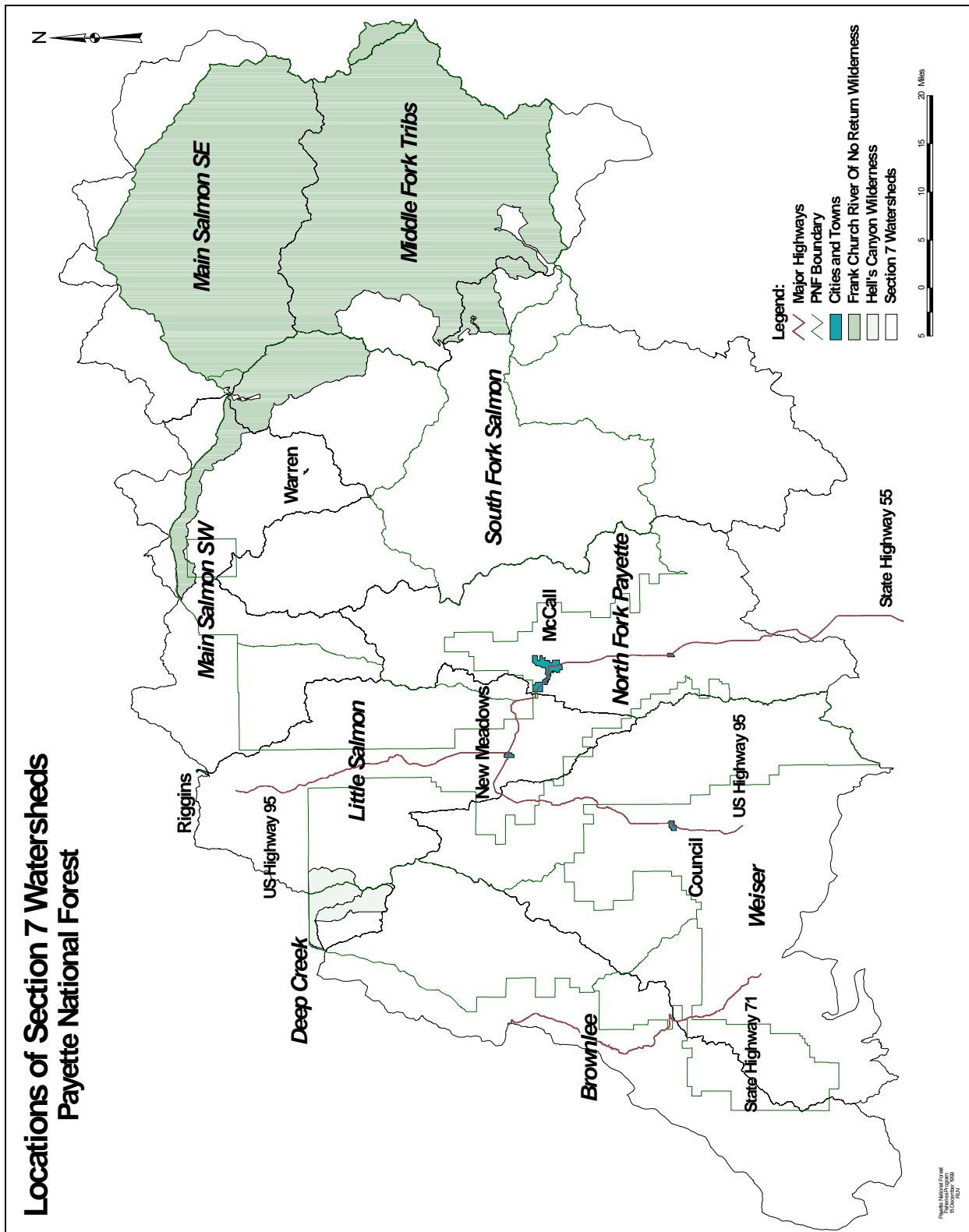


Figure 1.—Section 7 watersheds on the Payette National Forest (see current [CD1: \Support Documents\Maps\sec7watersheds.pdf](#))

A. LISTED SPECIES AND CRITICAL HABITAT, AND SENSITIVE SPECIES

Forest-wide maps indicating the state of our knowledge of actual fish distribution by Forest stream are included in [CD1: \Support Documents\Maps\bull_trout_map.pdf](#), [chinook_map.pdf](#), [cutthroat_map.pdf](#), [steelhead_map.pdf](#).

These maps, which may be incomplete, were produced from primary sources that included: raw data, formal reports analyzing data, formal publications of analyzed data, and file letters documenting observations by trained personnel. Reports and publications containing second hand descriptions of fish distribution were not used. Documentation of anadromous species presence from sources created prior to 1965 when Hells Canyon Dam was completed was not accepted; and various other sources suspected to contain inaccurate descriptions of species distributions were rejected. Inferences with respect to species presence in areas where they were not observed were based on connectivity and populations in adjacent reaches. Survey data used to create these maps are on file at PNF SO.

With the exception of sockeye salmon, the listed species' all occur in the segment of the Snake River that flows through the center of the subbasin, below Hells Canyon Dam. Spring/summer Chinook, steelhead and bull trout have been documented in the lower portion of Deep Creek, but data are not available to assess status or population trends.

Distribution is limited to the lower sections of Deep Creek by steep gradients and a natural barrier approximately 3 miles upstream of the mouth (Zurstadt, 2004). Habitat access is not known to be altered by human activity with the exception of drainage associated with the Red Ledge Mine. Polluted mine drainage is likely creating a chemical barrier at least seasonally, during low flow periods. Drainage from the mine affects water quality in the lower 2 miles of Deep Creek, and this water flows downstream into the Snake River. Spawning and rearing habitat is generally scarce in Deep Creek, and is likely most plentiful near the mouth. Though abundance is not known, anecdotal information from anglers as well as radio-tag information from the Grand Ronde River basin suggests a widespread presence of fluvial bull trout below Hells Canyon dam (Chandler and Richter, 2000). There is no documentation of Deep Creek being used by fall Chinook. Natural fall Chinook salmon spawning now occurs primarily in the Snake River below Hells Canyon Dam and in the lower reaches of the main Salmon River.

1. CHINOOK SALMON

Snake River spring/summer and fall Chinook salmon, listed as threatened by the National Marine Fisheries Service (NMFS, 57FR14653), occur in the Deep Creek Section 7 Watershed. Hereinafter, all references to Chinook salmon are for the listed species.

a. Critical Habitat for Chinook salmon

Critical habitat for Chinook salmon was designated in 1993 (58FR68543) and specifically defined geographic areas, and essential habitat elements. Critical habitat for Chinook salmon includes all river-reaches presently or historically accessible and adjacent riparian zones, except reaches above impassable natural falls. Deep Creek Section 7 Watershed contains habitat elements necessary to support Chinook salmon, and is at least partially accessible to the fish. Deep Creek provides spawning and rearing, as well as migration habitat for Chinook (Table 1).

b. Essential Fish Habitat

Essential fish habitat is defined and analyzed in accordance with applicable requirements of section 305(b) of the Magnuson –Stevens Act (MSA), implementing regulations in 50 CFR part 600.920. Essential fish habitat is coincident with designated critical habitat for Chinook salmon on the Forest.

2. STEELHEAD

Snake River steelhead, listed as threatened by NMFS (62FR43937), occur in the Deep Creek section 7 watershed. Hereinafter, all references to steelhead are for the listed species.

a. Critical Habitat for Steelhead

The final rule designating critical habitat for steelhead was published by NMFS on September 2, 2005, and took effect on January 2, 2006 (70FR52629). Deep Creek provides spawning and juvenile rearing, adult holding and migration habitat (Table 1).

3. BULL TROUT

Columbia River bull trout were listed as threatened by the USFWS (U.S. Fish and Wildlife Service, 63FR31647). Columbia River bull trout occur in the Deep Creek Section 7 Watershed. Hereinafter, all references to bull trout are for the listed species.

a. Critical Habitat for Bull Trout

No critical habitat for bull trout was designated by the USFWS (70FR56211) that is affected by the Payette National Forest.

4. WESTSLOPE CUTTHROAT

Westslope cutthroat trout are designated by the Regional Forester as a sensitive species. Westslope cutthroat trout were petitioned for listing (63FR31691) but were determined by the USFWS to not be warranted in 2000 (65FR20120). Hereinafter, all references to cutthroat trout are for the petitioned species.

a. Critical Habitat for Westslope Cutthroat Trout

Critical habitat is not applicable to westslope cutthroat trout.

Table 1.—Listed and Proposed Fish Species Use of the Analysis Area

Stream	Chinook Salmon	Steelhead	Bull trout
Deep Creek	Historic and Current Spawning and Juvenile Rearing, Adult Holding and Migration Corridor	Historic and Current Spawning and Juvenile Rearing, Adult Holding and Migration Corridor	Present in the watershed, but life cycle use and distribution are unknown

B. SCOPE OF THE ACTIONS

This assessment is limited to ongoing actions of the Payette National Forest within the Deep Creek watershed. These actions include miscellaneous forest products, mistletoe control, fire management, fish habitat and riparian sampling, watershed and fish habitat improvements and maintenance, noxious weed management, road management, trails, recreation and administrative site operation and maintenance, travel plan, and Heaven’s Gate outfitters.

C. LOCATION

Deep Creek, located in west-central Idaho, is a tributary to the Snake River at T22N, R3W, Sec 15, immediately downstream of Hells Canyon Dam. Major tributaries to Deep Creek include Oxbow Creek, Copper Creek, and Lake Creek. Chinook salmon, steelhead, and bull trout have not been documented in any tributaries to Deep Creek.

III. SPECIFIC DESCRIPTION OF THE ANALYSIS AREA (ENVIRONMENTAL BASELINE)

A. THE DEEP CREEK WATERSHED (6TH HU CODE 170601010102)

Deep Creek lies within the Columbia River and Snake River basins, and enters the Snake River just downstream of Hells Canyon dam. The Deep Creek Section 7 watershed is designated as USGS hydrologic unit 170601010102. In this BA, the analysis area is synonymous with the action area.

1. NATURAL PHYSICAL CHARACTERISTICS

Natural physical characteristics in the subwatershed have not changed since the 2001 Deep Creek Ongoing Actions BA and can be viewed in that document on p.4. Not mentioned in the previous BA is a natural barrier, a 20-30 foot bedrock drop-off, that is approximately 1 mi. upstream from the Red Ledge mine. This fall is a barrier at all flows (Zurstadt 2004).

2. HUMAN-CAUSED PHYSICAL CHARACTERISTICS

With the exception of items discussed below, human activities that have or may alter physical characteristics in the subwatershed remain the same as those described in the 2001 Deep Creek Ongoing BA and can be viewed in that document on page. 6.

a. Livestock Grazing

Livestock use in the watershed remains the same as described in the 2001 Deep Creek BA, but is included here to present more recent monitoring data. As in the 2001 BA, two sheep allotments (Deep Creek & Snake River-Indian Creek) occur in the Deep Creek watershed. Current operations call for one band of sheep ranging in size from 950 ewe/lamb pairs or 1200 dry ewes to graze upper Deep Creek each year. A second band uses both the Deep Creek and Snake River/Indian Creek allotments, as well as portions of the Lost Creek, Smith Mountain, Sheep Creek, and Echols Butte allotments (Veach and Burns, 1998, and Federal Action J).

Three monitoring sites are located in the Deep Creek subwatershed. Site 516 was established to monitor direct grazing impacts in the headwaters where sheep graze annually. Implementation (streambank disturbance and utilization) and time trend monitoring (greenline surveys) are conducted at this site (Table 2). Green line ecological status increased from early seral to mid seral and stability status increased from moderate to high between 1996 and 1997, and again rated high when read in 2002 (Table 2). Streambank data collected 2001-2003 found no disturbance due to livestock (Zurstadt 2004). Key forage utilization 2001- 2003 was 0-5% (Table 2).

Table 2.—Grazing monitoring in the headwaters of Deep Creek (site 516) (Zurstadt 2004).

Parameters	96	97	98	99	00	01	02	03
Green Line Ecological Status	Early Seral	Mid Seral	NA ¹	NR	NR	NR	NR	NR
Green Line Stability Rating	Moderate	Good	NR	NR	NR	NR	High	NR
Streambank Disturbance	Pre- ND	Pre- 1% WL ²	Pre- ND	Pre- ND	Pre- ND	Pre- NR	Pre-NR	Pre-0-5%
	Post- 13% LS ³	Post- 4% WL	Post- ND	Post- ND	Post- ND	Post- 3% WL	Post-4-5% natural	Post - 0% LS 4.5-7.5% WL, 6.5-10.5% natural processes, 2.5% trails/human
Key Forage Utilization	ND	ND	<20%	ND	ND	0%	0-5%	0-5%

¹ NA = data were collected by PNF, but not available at time of the report, ND = No data were collected, NR = not read, occurs during interim years of green line monitoring or during years of no use,

² WL = Disturbance caused by wildlife only.

³ LS = Disturbance caused by livestock only.

Sampling site W068 is located at the mouth of Deep Creek and site W065 can be found a short distance upstream from the mouth. Gradient at site W065 was measured at 10 percent in 1993. No barriers to fish passage occur between site W065 and the mouth of Deep Creek. Stream temperature at site W065 has exceeded the State of Idaho salmonid spawning standard. Temperature trend data is limited by lack of data; however, available data appear to have a trend similar to control sites (Zurstadt 2004). Free matrix and surface fines are used to determine substrate conditions. There is no discernible trend in cobble embeddedness, but there appears to be a slight increasing trend in free matrix particles since 1997 (Tables 3 & 4) (Zurstadt 2004).

Table 3.—Grazing monitoring ~200m upstream of the mouth of Deep Creek (site W065) (Zurstadt, 2004).

Parameters	93	94	95	96	97	98	99	00	01	02	03	04
Stream Temperature (Summer Max °C)	ND ¹	16.9	14.5	15.2	NA ²	NA	15.5	16.5	ND	16.8	16.5	16.5
Stream Temperature (7-Day Moving Average, LRMP*)	ND	ND	13.3	14.6	NA	NA	14.8	NA	ND	16.4	16.0	15.7
Cobble Embeddedness Mean	ND	22.6	ND	35.1	49.1	32.0	51.5	52.2	18.8	16.3	20.9	32.1
Free Matrix Mean	43.8	34.7	ND	13.0	4.0	16.9	9.3	12.1	32.6	ND	36.0	34.8
Surface Fines Mean	14.4	7.1	ND	5.3	8.6	5.2	9.7	3.4	5.3	27.7	5.9	9.2

*Seven-day moving average temperatures as defined in LRMP and in Hogen and Wagoner, 1999.

¹ ND = No data were collected.

² NA = An attempt to collect data was made, but data logger failed.

Table 4.—Grazing monitoring data from the mouth of Deep Creek (site W068) (Zurstadt, 2004).

Parameters	96	97	98	99	00	01	02	03	04
Free Matrix Mean	29.5	15.8	18.6	9.5	14.6	35.7	ND	26.4	22.2
Surface Fines Mean	0.3	7.0	2.8	9.1	5.6	17.7	27.7	8.1	9.5

¹ ND = No data were collected.

b. Unauthorized Activities on the National Forest

Unauthorized activities occurring in Deep Creek are similar to those described in the 2001 Deep Creek BA p. 11. Since 2001, motorized use has increased and thus unauthorized motorized use has increased in Deep Creek as well as over the entire Forest (Rob Bryant, personal communication).

c. Past Mitigation as Part of the Environmental Baseline

Since the listing of Chinook salmon, past federal actions have undergone consultation with the NOAA Fisheries Service. With the listing of bull trout, the USFWS also consulted on federal actions. BAs from 1994 – 2001 identified specific mitigations necessary for each federal action. Implementation or non-implementation of mitigations (Appendix 1) is part of the environmental baseline.

3. CUMULATIVE WATERSHED EFFECTS

Baseline matrices in Appendix 2 present the current cumulative condition for watershed condition indicators (WCIs) in the analysis area.

4. WATERSHED RESTORATION OPPORTUNITIES

On the National Forest, no restoration opportunities are known. Roads used for the Deep/Copper timber sale have been decommissioned. The one existing road appears stable and is high in the watershed with no stream crossings. On private land within the watershed, restoration opportunities exist at the Red Ledge mine site. Large piles of tailings adjacent to the stream could be stabilized and revegetated to reduce sediment input. Work has been performed to reduce adit drainage, however, latest surveys (Mitchell and Bennett 1995) documented that drainage is continuing from the adits but may not affect fish habitat within areas accessible to anadromous fish and bull trout, due to the small amount (3-4 gallons/minute). Opportunities exist to perform additional work to further reduce acid drainage from adits.

5. DESCRIPTION AND DISTRIBUTION OF CHINOOK, STEELHEAD AND BULL TROUT

a. Location of Important Spawning and Rearing Areas.

Chinook Salmon.—A natural falls was believed to be a barrier to Chinook salmon passage approximately 400 meters upstream from the mouth of Deep Creek. However, surveys conducted by the Council Ranger District in 1999 did not identify a definite passage barrier in this area. Instead, surveys suggest that a series of partial fish passage barriers (small waterfalls ranging 3 to 5 feet in height) probably severely limit the access for Chinook salmon by river mile 2.5. In addition, a natural 20-30 foot bedrock drop-off, that is approximately 1 mi. upstream from the Red Ledge mine is a barrier at all flows (Zurstadt, 2004). Drainage from the Red Ledge mine has eliminated all aquatic macroinvertebrates downstream of the mine to the mouth of Oxbow Creek during certain periods in the past. It may have limited fish populations in this same reach in the past. Spawning areas are present upstream to river mile 2.5. In September of 1993, M & M Enterprises (contractor) was performing cobble embeddedness measurements at the mouth of Deep Creek and found large eyed eggs in the substrate (Hurley 1994). Although these eggs were not identified to species, they were probably spring/summer Chinook salmon eggs because it is the only species that would produce eggs of that size during the time of the investigation (Dave Burns, fisheries biologist, PNF, personal communication).

Steelhead.—Steelhead are documented within Deep Creek and were observed spawning in Deep Creek approximately 200 meters upstream of the mouth in 1998 by Eric Veach, journey-level West Zone Fishery Biologist. Detailed information specific to steelhead within Deep Creek is not available. Steelhead trout have not been documented in tributaries to Deep Creek. Resident populations of redband rainbow trout were found in Deep Creek (Uberuaga and Burns, 1991).

Bull trout.—Surveys for bull trout in the Deep Creek watershed have been limited. Bull trout are known to occur in the Snake River between the mouth of the Imnaha River and Hells Canyon Dam. Idaho Fish and Game personnel have observed bull trout in Idaho streams entering this reach of the Snake River at the mouth of Sheep, Granite, Deep and Wolf creeks (Buchanan et al., 1997). Idaho Power biologists radio tracked one bull trout that entered Deep Creek and stayed approximately one month (Burns et al., 2005). Surveys for bull trout within the Deep Creek watershed have not been done, so that their existence there is unknown.

b. Condition and Trend of Populations

Adult Chinook salmon were observed spawning in Deep Creek after the construction of Hells Canyon Dam in 1967. Subsequent investigations of Chinook salmon spawning in Deep Creek have not confirmed their presence or absence within Deep Creek. No written documentation of subsequent investigations for Chinook salmon are on file at the Forest Supervisors Office, and the Idaho Department of Fish and Game has not investigated the presence or absence of Chinook salmon in Deep Creek (Don Anderson, personal communication 1996). Steelhead trout were observed spawning in Deep Creek in 1998 (Veach, 1998). No quantifiable steelhead population surveys have been completed for Deep Creek.

The threatened status for Chinook salmon, steelhead and bull trout suggests a serious decline in abundance throughout the Snake River Basin. Introgression from hatchery stocks and impacts of hydropower facilities and commercial harvest of stocks are all considered to have adverse impacts on salmon and steelhead.

6. HABITAT CONDITION, TREND, AND LIMITING FACTORS

On PNF lands in this analysis area, several WCIs are functioning at risk (FR) (Appendix 2). Those that may be limiting factors and/or have changed since the 2001 LSR Ongoing Actions BA are discussed below.

a. Surface Fines

Surface fines have been determined to be functioning appropriately (FA), a change from the functioning at risk call made in the 2001 BA. This change is due to surface fines having been predominantly below 20% at Deep Creek monitoring sites (Appendix 2).

b. Chemical Contaminants and/or Nutrients

Due to the acidic outflow and chronic sediment source from the Red Ledge mine, the chemical contaminants and nutrients WCI is considered to be functioning at risk. Mine sediment and acid are affecting an unknown reach length downstream of the outflow from the mine adit. Polluted drainage from the Red Ledge Mine is likely creating a chemical barrier at least seasonally, during low flow periods, thus the physical barrier WCI is functioning at risk. Embeddedness data indicate this WCI is functioning at risk (Appendix 2). Because increased embeddedness can reduce rearing, overwintering, and macroinvertebrate (fish food) habitat, it may be a limiting factor.

c. Pool Quality

Pool quality was determined to be FR in the 2001 Deep Creek BA. This WCI is now considered to be FA because most pools measured in 1998-1999 habitat surveys were >1m deep.

d. Width to Depth Ratio

Width maximum depth was determined to be functioning at risk in the 2001 Deep Creek BA. Review of 1998-1999 habitat surveys found the width max depth was well below 10 in all reaches surveyed indicating the WCI is functioning appropriately.

Overall, data indicate embeddedness may be a factor limiting fish production by reducing available fish and macroinvertebrate habitat. Sediment and acidic outflow from the Red Ledge mine are affecting water and substrate quality and limiting habitat use over an unknown reach length downstream of the mine.

IV. DESCRIPTIONS OF PROPOSED ACTIONS

Several programmatic Federal actions are proposed in the Deep Creek watershed (Table 5).

Table 5.—Proposed programmatic Federal actions in the Deep Creek watershed.

Programmatic Federal actions
Miscellaneous forest products
Mistletoe control and pre-commercial thinning
Fire management activities
Fish habitat/riparian sampling
Watershed improvements and maintenance
Noxious weed management
Road management
Trails, recreation and administrative site O&M
Travel plan
Livestock grazing
Outfitter and Guides Activities on Federal Lands (Heaven's Gate Outfitters)

A. FEDERAL ACTION: MISCELLANEOUS FOREST PRODUCTS

PURPOSE AND NEED: Public harvest of miscellaneous forest products such as firewood, posts and poles, Christmas trees, small volumes of timber (less than 70 acres of green harvest, or 250 acres of salvage in any analysis area annually), mushrooms and other plants and seeds for use by permitted Forest users until December 31, 2017.

LOCATION: Deep Creek Section 7 Watershed

DATES OF PREVIOUS CONCURRENCE:

- USFWS: October 15, 2001
- NMFS: August 9, 2001

DESCRIPTION: Public harvest of miscellaneous forest products such as firewood, posts and poles, Christmas trees, small volumes of timber (less than 70 acres of green harvest, or 250 acres of salvage in any analysis area annually), mushrooms and other plants and seeds for use by permitted Forest users.

REQUIRED MITIGATION:

Adopt LRMP buffer strip widths for tree harvest with the exception that the District Ranger may designate areas for miscellaneous forest products harvest or collection within RCAs that have been agreed to by both a journey level hydrologist and fisheries biologist and meet the following criteria:

Trees may be harvested or collected if all the following conditions are met:

- where trees do not provide shade to a perennial stream during any part of the day or year,
- where trees do not contribute to potential large woody debris recruitment to adjacent perennial or intermittent stream channels or floodplains,
- where tree removal or tree felling would not impact stream banks, springs, seeps or other wetlands,
- where vehicles would remain on existing open roads,
- where trees would not be felled or brought across any road cutslope,
- where root or tree firmness is high and blow down potential is low,
- where a riparian area exists for effective sediment filtering.

Adopt LRMP buffers for storage and refueling operations with regard to post and pole and small sales.

Restrict campsites for commercial forest product harvesters to areas outside of RCA's unless approved by a fisheries biologist or hydrologist. This restriction would cover all forest product harvest activities listed in the federal action. Large campsites will have site plans completed with necessary mitigation measures. Grey water will be removed from camp and disposed of properly. At locations where camps will encroach on RCAs, a fisheries biologist or hydrologist will assist in laying out the camp to avoid effects to WCIs. Measures used to avoid effects to streams and WCIs may include flagging no-entry zones to maintain a desired distance between camp and streams, maintaining a close dialog with campers as to resource concerns, and regular visits to camp(s) by a fisheries biologist, hydrologist, or contract administrator.

In order to avoid and mitigate effects identified in the environmental baseline, the Forest will conduct additional activities. In addition to previous requirements developed for consultation, the Forest will do the following:

- Forest employees with training and knowledge of riparian function will talk to firewood cutters in the field concerning LWD in riparian areas. Contacts will occur if employee believes that he/she is safe doing so, or is accompanied by another employee and they believe that they are safe. Safety training will be provided. Any observed violations should be called in on the radio with necessary information, at a minimum.
- "Forest officers" who can approve cable yarding of any products identified as part of this action will be limited to line officers or persons authorized to sign permits and contracts.
- A positive emphasis will be used on signing. Signs will emphasize areas open to use of miscellaneous forest products and the reasons certain areas, like RCAs, are generally closed.
- Increased monitoring of firewood harvest will occur.
- If monitoring shows no decrease in incidents of unauthorized firewood harvest over the next two years, the results will be brought to the attention of the level one streamlining team, who will decide whether initiation of consultation is warranted, or whether to make other recommendations to the Forest to avoid adverse effects.
- Equivalent Clearcut Area (ECA) will not be increased to greater than 15% in any 6th level HU.

B. FEDERAL ACTION: MISTLETOE CONTROL AND PRE-COMMERCIAL THINNING

PURPOSE AND NEED: To control mistletoe infestation in timber and to reduce competition among trees in merchantable timber stands until December 31, 2017.

LOCATION: Deep Creek Section 7 Watershed

DATES OF PREVIOUS CONCURRENCE:

- USFWS: October 15, 2001
- NMFS: August 9, 2001

DESCRIPTION: Mistletoe control and pre-commercial thinning occur as follow up activities to previous timber harvest, or in other tree stands where stand density is too great to meet management objectives. Mistletoe control can involve the removal of any size tree infested with mistletoe, but treatment generally focuses on large over story trees. Previously harvested stands are precommercially thinned 15 to 25 years after a timber sale to reduce the stand density. Most stands to be thinned are plantations. Pre-commercial thinning will not occur in RCAs except to improve WCIs, which will be agreed to by a journey-level fisheries biologist and hydrologist. An

annual list of pre-commercial thinning projects within RCAs will be provided to the Level 1 Team for informal review by May 1 each year.

MITIGATION MEASURES:

No fuel will be stored or transferred within RCAs. These activities will be conducted to insure that ECA is not increased over 15 percent in any 6th field HU.

These activities will not occur within RCAs except in RCAs that have been agreed to by both a hydrologist and journey-level fisheries biologist and must meet all the following criteria:

- where trees do not provide essential shade to a perennial stream during any part of the day or year.
- where trees to be thinned are not required to meet WCIs (i.e., to contribute to potential large woody debris recruitment).
- where tree removal or tree felling would not impact stream banks, springs, seeps or other wetlands.
- where vehicles would remain on existing open roads.
- where trees would not be felled or brought across any road cutslope.
- where a riparian area exists for effective sediment filtering.

Or:

- where trees are located away from streams upslope, uphill, from an existing open road.

C. FEDERAL ACTION: FIRE MANAGEMENT ACTIVITIES

PURPOSE AND NEED: This action involves all activities that could occur during management of wildland fires on the Payette National Forest until December 31, 2017. This includes wildfires, wildland fire use fires, and prescribed fires.

- Wilderness management objectives may be met by permitting lightning-caused fires to play, as nearly as possible, their natural ecological role within wilderness, and
- Lightning-caused fires in non-wilderness lands that allow wildland fire use for resource benefit can be permitted; this action has previously been called prescribed natural fire.

The action also includes prescribed fires to restore, and maintain ecosystem health and resilience.

LOCATION: Within the Deep Creek Section 7 Watershed this action will amount to an estimated annual average of 32 ignitions, most of which will receive initial attack, an average of one large fire per year (i.e., larger than 100 acres), some of which may be designated Wildland Use Fires (WFUs), amounting to approximately 5 acres. These estimates are based on historic fire occurrence (see [CD1: \Support Documents\Maps\Large_Fire_map.pdf](#) & [fire_history.pdf](#), and Sanders 1998). The Payette National Forest has suppression responsibility for initial attack on some areas outside of the Forest.

DATES OF PREVIOUS CONCURRENCE: SIMILAR ACTION

- USFWS: October 15, 2001,
- NMFS: August, 9, 2001

DESCRIPTION: The fire management activities within this area include application of appropriate measures to control unwanted “wildfires” as well as activities that strive to meet land management objectives through a combination of management ignited prescribed fire and management of natural ignitions for resource benefit. The later action is referred to as “Wildland

Fire Use". All activities are implemented in accordance with the Forest Service Manual (FSM 5140) and the Wildland and Prescribed Fire Management Policy Implementation Procedures Reference Guide (1998), and the Wildland Fire Use Implementation and Procedures Reference Guide (see CD2: \Support Documents\Fire\wildland_fire_use_guide052505.pdf [in Fire.zip]). These activities include aerial application of water and chemical fire retardants, (including FIRE-TROL [CD2: \Support Documents\Fire\janik_2000.doc, in Fire.zip]), construction of fuel breaks by hand and machinery around fire perimeters, the opening and use of closed roads in areas where tractors are allowed, complete removal of under story and over story vegetation as a part of fire line construction, the establishment and operation of base and spike camps which could involve hundreds or thousands of people, burnout operations between fire lines and the wildfire, application of water drafted from stream courses, construction of temporary dams for drafting water into hoses, establishment of helispots and helibases where Jet-A fuel is transported and stored, bucket dipping (or snorkeling) of water from rivers, large streams, and lakes by helicopter, and transport and use of gasoline and diesel fuel for pumps, saws, and engines, and management ignition of prescribed fires using aerial or hand ignition methods. More detailed descriptions of these activities are included below.

Camps, Helicopter Landing Sites, and other Operational Facilities

Camps, helibases, staging areas, and helispots are areas used to camp or stage personnel and equipment and places to land and park helicopters:

- Camps vary in size and impacts from coyote camps for two people with minimal equipment and comforts to large camps for several hundred personnel camped in one area. Large camps have areas for sleeping, eating, showering, staging supplies and equipment, fueling equipment and for Incident Management Teams to work. Large campsites will have site plans completed with necessary mitigation measures. Grey water will be removed from camp and disposed of properly. Where possible, camps will be located outside RCAs. At locations where camps will encroach on RCAs, resource advisors will be contacted prior to camp setup and assist in laying out the camp to avoid effects to WCIs. Measures resource advisors may use to avoid effects to streams and WCIs include flagging no-entry zones to maintain a desired distance between camp and streams, maintaining a close dialog with camp managers as to resource concerns, educating personnel at morning and evening briefings about why measures to protect streams & fish are in place, and regular visits to camp(s) by both resource advisors and law enforcement personnel assigned to the fire to quickly fixing problems observed.
- Helicopter bases are areas where helicopters can be fueled, loaded, parked, and maintained. One to several helicopters can be stationed at a helibase. Helispots are areas where personnel and equipment can be loaded or unloaded from a helicopter. Helicopters are usually only at helispots long enough to drop or pickup a load. Helicopter bases will have plans completed identifying necessary mitigation measures.
- Staging areas are places where personnel and equipment are placed for rapid deployment on large fires. These areas have sanitation facilities and places to safely park personnel carriers and equipment. Some fueling and light maintenance may be performed on equipment. Food and sleeping facilities are normally not provided at staging areas. Staging areas are short-term and for temporary use only. Where possible, staging areas will be located outside RCAs. At locations where staging areas will be in RCAs, resource advisors will be contacted prior to use and assist in laying out the area to avoid effects to WCIs. Examples of measures resource advisors may use to avoid effects to streams and WCIs can be seen in "camps" above.

Fire Line Construction

Fire lines are constructed to control the spread of the fire:

- Fire line construction involves clearing a path; removing all flammable material and scraping a line clear to mineral soil wide enough to check the spread of fire. The line may

be constructed wider if the conditions warrant. A cup trench may be used across the bottom of the fire to catch rolling debris.

- Most often hand tools and chainsaws are used for line construction though tractors or explosives may be used. Use of explosives would only occur outside RCAs of fishbearing streams. Fuel characteristics, fire behavior, topography, access, and suppression strategy dictate the type and size of fire line constructed.
- In some instances, a wet line using a hose lay with pump and water source or cold trailing the fire's edge may be sufficient. Natural barriers are used whenever possible, including rock outcrops, areas of little or no fuel, and streams, rivers, or lakes.
- Cooling the fire and knocking down the hotspots can include separating burning heavy fuel and using dirt, water, or humidity to cool them down. Some felling and burning of hazard snags or trees, and bucking of down logs may be required using hand tools or a chainsaw.
- Fireline construction may be completed by use of helicopters or fixed-wing aircraft dropping water, foam, or retardant to create a "wet-line" in front of the advancing fire. As directed under "chemical use" below in this action, no retardant or foam is to be dropped in streams or adjacent riparian areas.

Water Drafting

Where available, water is used to suppress fires:

- Water may be transported to the fire in a truck or a portable pump and hose. A draft source is used to refill the truck and draw water for the pump and hose. Helicopters are also used to dip water from lakes and streams and drop it on the fire.
- The pump used varies with the size of the water source, and stream flows are not significantly affected by pump operations. If the water source has inadequate flow for effective pumping, a "porta-tank" may be used or occasionally a sump is created. When available, a culvert crossing is generally used to create this sump by temporarily restricting stream flow. A sump may be constructed by hand using native materials, plywood, and/or plastic. These sites are usually (but not always) located in steep, low-order headwater streams. Intakes will be screened with 3/32" mesh screen to prevent fish entrainment. In all cases:
 - Drafting equipment will be inspected for proper screening when it arrives on Forest prior to deployment on a fire.
 - Any sump created by blocking flow will be performed in coordination with a fisheries biologist to prevent dewatering.
 - Crews will be trained to avoid dewatering of streams.
- Portable pumps are fueled either by an attached tank or by a portable fuel container.
- In the case of a portable pump, a water source is located near the fire and a sump may be developed.
- Helicopter bucket drops of water or retardant may be used. Buckets range in size from 75 gallons to more than 1,000 gallons, depending on the allowable helicopter payload.
- Water is dipped (or snorkeled, which is considered synonymous with dipping) by helicopters from lakes, rivers, streams, or portable tanks that are located as close to the incident as possible unless they are identified as closed; areas shown as closed to dipping will only be used to provide protection for life or property. Snorkeling occurs when the snorkel is appropriately screened and the location avoids spawning fish. A suitable dip (or snorkel) site is located according to specific criteria that include safety considerations for the helicopter, water depth, and water surface area. Dipping (or snorkeling) generally occurs from lakes and large rivers. Sometimes dipping occurs in smaller streams; the size of the stream used is limited by the pool size available.
- The Forest will complete an Invasive Species Action Plan that addresses treatment and protocol for limiting invasive species spread through fire management activities. Helicopter

buckets, snorkels and tanks as well as engine and portable pump drafting equipment and tanks will be treated in accordance with this plan.

Invasive Species

The following steps will be taken to limit spread of invasive species:

- Keep all water handling equipment, including helicopter buckets, clear of mud or plant material. Following each use, rinse foot valves, draft hoses, buckets, etc with fresh clean water (well or city would be best) and allow the equipment to completely dry before putting back in service. This may require having several sets of this equipment at stations or vehicles to switch out with.
- While on assignments, try to limit drafting or dipping to one drainage or water source, or if you have to change water sources, change out the equipment (implement step 1 to the equipment before placing back in service). This way the potential of inadvertently transferring an invasive species from one pond or creek to another is limited.
- Wash underside of vehicles often, especially after fording a stream.

Application of Retardant, Foams, and Surfactants

Chemical fire retardants, foams, and other surfactants may be used to increase the effectiveness of water in checking the spread of fire or to support burnout and/or prescribed fire operations:

- The volume of retardant drops ranges from 400 to 3,000 gallons depending on the size of the aircraft involved. Retardant is usually laid out in a linear fashion near the hottest part of the fire and most often loads are split into multiple drops.
- Retardant generally reaches the fuel in the form of a mist or rain and not as a concentrated mass.
- Retardant is generally applied on areas above the drainage bottoms because of the limited maneuverability of aircraft in drainage bottoms; most retardant drops occur on ridges or side slopes, where the fire is burning hottest.
- Heavy Airtankers, Single Engine Air Tankers (SEAT) and Helicopters may be able to deliver either retardant, foam, or water only depending on the need, environmental restrictions, and their loading capabilities.

Mop-Up

Once the fire is contained and the spread is stopped, mop-up is started. Mop-up involves insuring that the fire is out. This includes cold trailing, a process by which a bare hand is used to feel for heat along the edge of “the black” on larger fires or throughout the entire area of smaller fires, in search of hotspots. When hotspots are found, they are extinguished with hand tools, dirt, and water.

Rehabilitation Activities

After the fire is controlled, rehabilitation of the fire line, roads, camps, and other areas used, will be planned and completed as necessary. Actions associated with rehabilitation will be identified in the Incident Action Plan or Rehabilitation Plan and may include measures such as:

- Construction of water bars and covering the fireline with debris is usually sufficient for hand lines.
- Tractor fire lines, in particular, usually require extensive rehabilitation, and these areas are usually seeded in addition to water bars and debris placement.
- Any required seeding will be done with certified weed-free seed mixes.
- Trees felled in RCAs during suppression actions will be left in place, unless they are a safety hazard around facilities.

Wildland Fire Use and Fire Management Plans

This action has previously been called prescribed natural fire. There are two basic premises of the Wildland Fire Use program:

- Wildland fire will be used to protect, maintain, and enhance resources and, as nearly as possible, be allowed to function in its natural ecological role.
- Use of fire will be based on approved fire management plans and will follow specific prescriptions contained in operational plans.
- Wildland fire use can be applied to any lands identified and permitted by the Forest Plan to meet resource management objectives so long as a Fire Management Plan has been approved for the area in question. This means that lightning-caused fires occurring within areas covered by the above plans would be evaluated and allowed to burn if evaluation criteria are met. For a fire to be designated under the wildland fire use (WFU) program, a fire must meet the following criteria:
- Fire must be lightning-caused. Anthropogenic ignitions will not be considered for WFU designation and will receive an appropriate management response.
- Effects to cultural and natural resources may be mitigated by various management techniques, fuels, weather, or topography, under appropriate circumstances.
- Weather Forecasts and fire behavior (current and expected) must be considered acceptable for a fire to be declared a WFU.
- Risk indicators are acceptable. Risk indicators are defined in the Wildland Fire Use Implementation and Procedures Reference Guide (2005) and include fire danger indexes, time of season, fire size, and potential complexity, safety concerns, threats to boundaries, fuels & fire behavior, objectives, management organization, improvements, natural/cultural/social values, air quality values, logistics, political concerns, tactical operations, and inter-agency coordination.
- Current wildfire activity on the Forest, in the Region, or nationally must be at a level where resources are available to manage the fire or hold it if necessary.
- There are no other compelling reasons to preclude WFU designation (line officer discretion).
- If the WFU event exceeds the planned parameters for risk or is no longer meeting resource objectives, then it may be declared a wildfire, in which case the appropriate management response would be implemented.

The decision to classify a fire under "Wildland Fire Use" or as a "Wildland Fire needing an appropriate suppression response" is complex, requiring consideration of many factors, and involvement of fire, wilderness, and other resource specialists:

- Within a maximum of eight (8) hours of the discovery of a fire, the appropriate line officer will decide whether or not to allow a candidate fire to be managed as a WFU event. The decision is documented in a Stage I Initial Assessment. This assessment is a report on the fire situation that includes information as to where the fire is located, start date/time, current size, fuel conditions in the fire area, weather (current/predicted), fire behavior (current/predicted), and availability of resources to manage the fire under WFU. If the decision is to declare the fire a wildfire, then the appropriate management response will be applied to suppress the fire. If the decision is to manage as a WFU, further planning will be completed in accordance with the Wildland Fire Use Implementation Procedures Reference Guide. The Stage II and Stage III plans as they are referred to, are described in the guide (CD2: \Support Documents\Fire\wildland_fire_use_guide052505.pdf [in Fire.zip]) and would be completed as needed if incident complexity changes.
- Whether an ignition is declared a WFU or not, it is still considered on an equal basis with other fires for allocation of resources, meaning fires that pose greatest threat to life and property will receive highest priority for receiving requested resources regardless of their designation as WFU or Wildfire.

Prescribed Fires



The Payette National Forest is proposing to burn up to 1000 (varies by watershed) acres per year. A five-year plan (CD2: \Support Documents\Fire\plan05.pdf [in Fire.zip]) is updated annually to identify burn locations.

The intent is re-introduce fire, using aerial and ground based ignition during the predetermined weather conditions that will allow a mixed severity fire to take place. Ignition will depend on site conditions. The creation of openings, similar to what natural fire might produce is anticipated. Aerial ignition may take place on the upper slopes and ridge tops to create a backing fire. A prescribed burn of low to moderate intensity will reduce surface and ladder fuels in order to mitigate future stand replacement fires of intensities which exceed the historic norm, and will increase opportunities to manage naturally occurring wildland fires. This treatment will be used to mimic historic vegetative characteristics by reintroducing early stages of succession, altering species composition, and reducing unusually high stand densities.



Individual burn units would range from about 100 to 1000 acres, totaling up to 1000 acres for this project depending on site-specific objectives and the available prescription window for meeting objectives. Burning may also occur of material piled from either harvest of Miscellaneous Forest Products, or Mistletoe Control and Pre-Commercial Thinning actions as described above. Hand-piling in RCAs may occur when agreed to by both a hydrologist and fisheries biologist. Hydrologist and fisheries biologist will designate distance hand piles must be from streams or other waters.

Ignitions are planned to occur during appropriate weather conditions whenever a specific set of fuel moisture, soil moisture, humidity, and weather criteria (prescription elements and management requirements) can be met. No mechanical fire-line construction is planned. Contingencies will be identified should an escaped fire warrant line construction. Natural barriers to fire movement such as moist riparian areas, changing fuel conditions, and topographic breaks will be used to confine the prescribed fires.

Burn units would be ignited aerially either by dispensing plastic spheres from a helicopter, with a heli-torch, and/or with some areas hand-ignited with torches. The spheres contain potassium permanganate (3 grams each) and are injected with glycol (0.75-1.5 cc's, i.e., antifreeze) just prior to release to cause ignition. Ignition typically occurs after about 20 seconds, on the ground. Additional details of this procedure are in the current CD2: \Support Documents\Fire\Rx_fire_aerial_ign_process.doc (in Fire.zip).

There would be no purposeful ignition, except for burning of hand-piles, and no active prevention within RCAs, and fire would be allowed to burn into RCAs. For burning piles the objective would be to consume the pile and limit spread from it.

For prescribed fires, a burn plan will be written that meets FSM 5140 direction. Important considerations include duff moisture, mineral soil exposure, terrain breaks, and fuel reduction objectives.

Mitigation applied to prescribed fires.—(The proposed action includes the following mitigation measures):

- No ignition activity, except for ignition of hand-piles, will occur within 300 feet (slope distance) of fish bearing perennial streams. Fire that “backs” into riparian zones will be allowed to burn, since higher fuel moistures in riparian areas typically limit fire impacts/spread in these zones.
- Ignition will be avoided on Landslide Prone and moderate-high risk /hazard landtypes, and will only occur uphill from these areas.
- Helicopter landing sites and refueling areas will be located outside of the RCAs.

- Burn plans will address required elements as discussed in FSM 5140 and the *Prescribed Fire Planning and Implementation Procedures Reference Guide*.
- A fish biologist will review the burn plan prior to line officer approval.
- No new roads will be built to access prescribed burns, no roads will be re-opened that are presently closed and vegetated.
- Approved spill prevention containment and countermeasure plans (SPCC) will be used for prescribed fire. Plans will include direction for transporting, storing, and use of toxic materials, such as spheres and torch fuels, to minimize risk of accidental spills and/or introduction into live water.
- During actions to prevent the spread of fire use guidelines below for fire suppression.
- The prescribed burn will not increase ECA above 15% in the corresponding 6th level hydrologic units.
- A post-burn visual assessment will be conducted by fire personnel and a fisheries biologist via a walk through of selected stream corridors. This will assess implementation of the burn and associated mitigation listed above (e.g., avoidance tactics) in riparian areas.

Design Criteria (Mitigation Measures part of all fire management actions)

These project design criteria address potential adverse effects such that they can be avoided or minimized to the point of being negligible or discountable. They are guidelines that apply unless protection of life and property require deviation. They are often discussed in the program description and are listed here as a summary.

Guidelines for Fire Management within Drainages Supporting Listed Fish and Critical Habitat.—Rangers ensure all personnel involved in fire suppression have been briefed and are familiar with these guidelines:

- Utilize minimum impact suppression tactics in areas where there is potential to damage listed fishes or critical habitat. Every effort should be made to minimize stream course disturbance, sedimentation, and actions that will result in increased water temperatures.
- Use of tractors:
 - Do not use tractors in the South Fork Salmon River basin (section 7 watershed), Rapid River, or Big Creek, except for the direct protection of human life and property.
 - Minimize tractor use in other areas.
 - Do not use tractors in RCA and landslide prone areas.
- Chemical Use:
 - Do not use chemicals when there is a potential for direct stream contamination.
 - Minimize the application of retardant near live streams. Do not drop retardant or foam directly in streams or adjacent riparian areas.
 - Do not pump directly from streams if chemical products are going to be injected into the system without mitigation in place. If chemicals are needed, pump from a fold-a-tank, pumpkin, blivet or other water containment device, or use a backflow check valve.
 - Do not authorize storage of fuels and other toxicants or refueling within RCAs unless there are no other alternatives. Storage of fuels and other toxicants or refueling sites within RCAs shall be approved by the responsible official and have an approved spill containment plan commensurate with the amount of fuel (Forest Plan standard SWST11).
 - Spill containment equipment will be readily available and utilized when necessary.
 - Petroleum products will be contained in impermeable devices of sufficient size to contain amount of fuel/oil stored. Examples of fuel containers requiring containment are fuel trucks, portable pumps and their fuel, portable generators and their fuel, fuel stored in cans at camps and staging areas.

- Helicopter bucket dipping (or snorkeling) from lakes and streams with juvenile bull trout, salmon, and steelhead is not permitted except as otherwise described in the no dipping map (see current [CD1: \Support Documents\Maps\no_dipping_map.pdf](#)).
 - The Forest will develop a contingency plan identifying procedures to be initiated should a chemical spill or contamination occur.
- Suppression tactics (backburns or burnouts) should minimize fire severity in riparian areas.
- Resource Advisor:
 - A fish biologist will be involved in planning and training for the development of a Wildland Fire Situation Analysis (WFSAs) and/or, working with or as the Resource Advisor.
 - Resource advisors assist to locate camps, staging areas, and base heliport locations which will be identified early during the action. Identification will be approved either during presuppression planning, or on a case-by-case basis. Resource advisors will work to locate camps, staging areas, etc. outside RCAs where no or negligible effects to listed fish species are likely to occur. Should camp, staging areas, etc. be located in RCAs, measures to mitigate effects such as those described under “camps” above will be taken.
 - A Resource Advisor, usually a resource specialist, is assigned to large fires requiring either a Type I or II Incident Management Team. This advisor is a representative of the responsible PNF line officer and will:
 - Provide constant linkage between the suppression objectives of the Incident Management Team and the resource interests of the PNF.
 - Be readily available to the Incident Commander and the Operations Chief.
 - Review Operational Period Plans to assess the potential effects of the planned actions to develop suppression strategies and tactics to minimize the impacts of the fire’s effects and those of the suppression actions on natural and social resources.
 - Provide information about the local areas resource values.
 - Provide updates to the Level 1 team.
 - Contact Level 1 team members if emergency consultation is triggered.
- Suppression Rehabilitation
 - An Emergency Suppression Rehabilitation Team will be assigned to all fires over 100 acres and report to the Resource Advisor.
 - A fisheries biologist, or hydrologist, will always be assigned to the Rehabilitation Team.
 - After suppression, rehabilitation is completed, a Rehabilitation Team will review the suppression and rehabilitation efforts to see if the tactics identified successfully avoided adverse effects to listed fishes and critical habitat.
 - A separate Burn Area Emergency Rehabilitation Team (BAER) may be formed as appropriate, but burn area rehabilitation is not part of the fire suppression action. That team would have to initiate an independent consultation should any BAER actions be recommended that might affect listed species or critical habitat. BAER actions are infrequent on any fires on the Payette National Forest over the past 20 years with fewer than four total actions.
- Briefings
 - Present a brief to the fire overhead team on threatened species present and the legal requirements, before they deploy to the fire.

Program Evaluation, Monitoring, and Reporting

The following monitoring and reporting will be accomplished for fires, including ignitions, project fires, wildland fire use fires, and prescribed fires insofar as they are applicable:

- The Forest Supervisor be responsible for determining consistency of fire suppression activities with this BA. They are encouraged to seek counsel from fisheries biologists regarding the expectations of this BA.
- When the IC determines that the fire suppression activities being implemented are inconsistent with this BA, the Forest Supervisor will be notified. In general, this may lead to the initiation of emergency consultation on the fire (see CD2: \Support Documents\Fire\Emergency Consultation Guidelines.doc [in Fire.zip]), and should occur before resources available to mitigate effects are released from the incident.
- When the burn boss determines that the prescribed fire activities being implemented are inconsistent with this BA, the District Ranger or Forest Supervisor will be notified. In general, this may lead to the initiation of emergency consultation on the fire (see CD2: \Support Documents\Fire\Emergency Consultation Guidelines.doc [in Fire.zip]), and should occur before resources available to mitigate effects are released from the incident.
- Critical information about the incident and expected suppression actions will be shared with the USFWS and the NMFS when listed species are involved; documents submitted to these agencies for emergency consultation will be tracked where emergency consultation is triggered. The Forest will follow guidelines for emergency consultation provided by the Level 1 team (CD2: \Support Documents\Fire\Emergency Consultation Guidelines.doc [in Fire.zip]).
- A monitoring report on this program will be completed, as part of the next Biological Assessment for programmatic fire management and presented to the Level 1 team during consultation. The monitoring report will include:
 - fire location and size for all types of fires.
 - summary of fire intensity, or fire intensity map, if available, and results of prescribed burn monitoring.
 - results of post-fire reviews and monitoring.

D. FEDERAL ACTION: FISH HABITAT AND RIPARIAN SAMPLING

PURPOSE AND NEED: To conduct fish habitat and riparian surveys to gain fuller knowledge of existing conditions and trends until December 31, 2017. This work may be contracted to private firms.

LOCATION: Streams within the Deep Creek Section 7 Watershed.

DATES OF PREVIOUS CONCURRENCE:

- USFWS: October 15, 2001
- NMFS: August 8, 2001.

DESCRIPTION: The Payette National Forest's Land and Resource Management Plan (LRMP, USFS 2003), specifies that monitoring of aquatic species and habitats will occur to evaluate implementation of standards and the effectiveness of these standards in achieving WCIs. Section 4 (c) 2 A of the Endangered Species Act directs the U.S. Fish and Wildlife Service to review the status of species listed under the Act. Other federal agencies are directed under 50 CFR 402.01 (a) to "utilize their authorities to further the purposes of the Act by carrying out conservation programs for listed species". Among the purposes of the Act specified in Section 2 (b) is "to provide a program for the conservation of each endangered and threatened species". Conservation programs, to be successful, must monitor the effectiveness of measures taken to protect listed species and their habitats. To monitor the habitat and population trends of aquatic

species on the Payette National Forest, the actions described below will be carried out annually in many streams on the Forest.

Habitat surveys

Some streams will be surveyed to produce quantitative assessments of fish habitat. Survey methods are similar to those described in Overton et al. (1997) and Burton et al (1992). Habitat surveys involve walking and snorkeling within stream channels, measuring channel and habitat dimensions and qualities, using stadia rods, measuring tapes, or surface fines grids. Methods to measure substrate composition and quality that may be used include determination of cobble embeddedness, percent surface fines, free matrix measures, and core sampling. Measurement of cobble embeddedness involves removing cobble-sized rocks from the stream bottom. The cobbles are returned to the site after measurements are taken. Percent surface fine determination is a visual estimate that involves no disturbance other than that caused by the presence of the crews in the stream channel. Determination of free matrix measures involves randomly placing a sampling hoop and counting the number of non-embedded rocks within the hoop; this action requires disturbing all loose rocks within the hoop. Core sampling requires removing from the stream all substrate within the substrate samples, which may be taken from any part of the habitat. Most core samples will be done with a hollow cores sampler; some freeze sampling may occur.

Aquatic invertebrate sampling

Aquatic invertebrate sampling will occur on some streams. Invertebrates will be sampled with a Hess sampler, Surber sampler, or kick nets.

ASSUMPTIONS:

- Chinook, steelhead, and bull trout rearing and spawning occur in some of the streams to be sampled.
- Crews are able to recognize and avoid Chinook, steelhead, and bull trout redds.

REQUIRED MITIGATION:

- Crews will be trained in redd identification, likely redd locations, and methods to avoid stepping on redds or delivering fine sediment to redds.
- Crews will avoid redds and spawning Chinook, steelhead, and bull trout while walking within or near stream channels to the extent possible and will typically work more than one stream width or greater than one habitat unit upstream of redds. Avoidance will be accomplished by examining pool tail-outs and low gradient riffles for clean gravel and characteristic shapes and flows prior to walking or snorkeling through these areas.
- If redds or spawning Chinook, steelhead, or bull trout are observed at any time, the habitat surveyors will step out of the channel and walk around the habitat unit on the bank at a distance from the active channel and take all precautions to avoid any harassment of individuals.
- If continuing to survey while avoiding Chinook, steelhead, or bull trout is not possible the crew will step out of the active stream channel and walk around the habitat unit at a distance from the stream.
- While conducting free matrix substrate measurements or core samples, and while sampling aquatic invertebrates, redds and areas immediately above redds will not be sampled in order to avoid killing eggs or delivering sediment to redds. The distances involved will be approximately the same as for other measures.

E. FEDERAL ACTION: WATERSHED AND FISH HABITAT IMPROVEMENTS AND MAINTENANCE

PURPOSE AND NEED: To maintain existing watershed improvement projects and to complete new small projects (up to 10 acres each) using the Watershed Improvement Tracking inventory list

and other sources from which to draw projects. To maintain existing fish habitat projects and to complete new small projects (less than one acre each or 20 structures) as funds become available. The Forest will provide a list of project descriptions and maps annually for informal review by US Fish and Wildlife Service Level 1 team members before the projects are implemented. The current planning period runs until December 31, 2017.

LOCATION: Deep Creek Section 7 Watershed

DATES OF PREVIOUS CONCURRENCE:

- USFWS: October 15, 2001
- NMFS: August 9, 2001.

DESCRIPTION:

Watershed Improvements

These projects include such things as gully stabilization, road obliteration, vegetation and structure placement, using gabions, trees, wooden grids, and soil cementing techniques to stabilize slopes. Structures have been, and will be, placed on slopes that are actively eroding to help stabilize and vegetate these slopes. Structures are generally used in combination with other techniques such as the planting of trees and shrubs, and the use of matting materials. This action includes mining reclamation (less than 10 acres) including re-contouring to restore hydrologic function, clean up of existing facilities and other previously mentioned activities. This action includes the clean up of small toxic spills and dumps. This actions does not include when the volume of substance requires the implementation of the Clean Water Act, Resource Conservation Act, Comprehensive Environmental Response Compensation and Liability Act or Oil Pollution Act. Emergency consultation will occur if any of the aforementioned Acts are implemented.

Fish Habitat Improvements

These projects include stream/riparian area improvements, woody debris management, stream bank stabilization and vegetation, fine sediment removal, boulder cluster placement, anchored whole-tree revetments, log weirs, and fish barrier removal. Maintenance of these projects would consist of an inspection, followed by the repair of any deficiencies found. This includes, vegetation of eroded areas, debris removal (from weirs), reshaping or reinforcement of existing structures and the addition of rock or other woody material to stabilize existing structures, especially on stream bank stabilization structures.

Actions Not Covered

Actions not described in this action include channel realignment, handling and relocating fish, and actions that cause adverse displacement or disruption of listed fish.

REQUIRED MITIGATION:

- Instream work will be timed to avoid spawning activity, and eggs or alevins in the substrate.
- Watershed Improvements:
 - The watershed improvement and maintenance program is mitigation for past watershed impacts (i.e, not from ongoing actions). Projects address erosion and sedimentation problems associated with old roads, timber sale areas, old grazing, and old mining projects.
 - These mitigation projects will use the highest level of additional mitigation (water control devices, mulch or erosion control matting, vegetation and grass seed and fertilizer) when the construction site is within the RCA buffers or on slopes greater than 45 percent, or where necessary to minimize effects. A moderate level of erosion control

(mulch, grass seed and fertilizer) will be used on other areas. Generic BMPs (Best Management Practices) that can be used include:

- Silt fence and filter barriers
- Straw-bale sediment barriers
- Erosion control blankets and mats
- Hydromulching
- Mulching
- Waterbars and rolling dips
- Temporary sediment basins
- Straw rolls
- Straw bale dikes
- Slash filter windrows
- Scattered slash
- Brush layering
- Shrub planting

Specific details including instructions and diagrams for some of the BMPs listed above are provided on this CD1: \Support Documents\Miscellaneous\bmp.pdf

- **Fish Habitat Improvements:**

- The fish habitat improvement and maintenance program is mitigation for recognized habitat deficiencies.
- Ground disturbing construction activities within the RCA buffers will be fully mitigated at the “high” level of mitigation as explained above. Mechanized equipment, such as a trackhoe, must be free of any petroleum or hydraulic leaks and must be serviced outside the RCA buffers.
- Use of mechanized equipment within the RCA buffers, including within the stream channel, would only occur after a journey level fisheries biologist has determined that effects to substrate embeddedness, other WCI’s, and individual listed fishes (including their eggs and alevins) would be negligible.

- **Any culvert replacement will conform to the following guidelines:**

- Before work begins a journey level fisheries biologist will confirm that any effects to listed fishes, due to their proximity to the activity, would be negligible.
- Culverts will meet LRMP standards.
- FishXing or similar software may be used to determine culvert specifications required for fish passage.
- Use erosion control at the work site to minimize sediment delivery to the stream prior to any construction.
- Remove fill from around existing culvert and store at a stable location.
- Construct a temporary channel and line it with plastic and/or geotextile, or use some other water conduction facility (e.g., pipe) that must meet fish passage requirements.
- Divert the stream into the temporary water conduction facility.
- Remove existing culvert.
- Install replacement culvert.
- Reconstruct approaches over new culvert.
- Seed and mulch disturbed areas, remove sediment collected by erosion control material as specified by a hydrologist, soil scientist, or fisheries biologist.
- Additional site-specific measures, including modifications to BMPs because of site-specific conditions, may be identified and approved by a fisheries biologist or hydrologist.

Opportunities

- Currently, no opportunities are known on PNF lands. On private lands, an opportunity exists to reduce/eliminate acidic flows and sediment coming from the Red Ledge mine.

F. FEDERAL ACTION: NOXIOUS WEED MANAGEMENT

PURPOSE AND NEED: To control, contain or eliminate noxious weed invasion and infestations on National Forest Systems lands, and maintain vegetative communities and the species dependent on them, in the Deep Creek Section 7 watershed until December 31, 2017. This action does not include weed treatment within the Frank Church River of No Return Wilderness. Noxious weed management and control has been recognized through national policy, forest plan development, broad scale assessments, and site-specific NEPA decisions. Laws that require management of noxious weeds include:

- Federal Noxious Weed Act of 1974, as amended.
- The Forest and Rangeland Renewable Resource Planning Act of 1974.
- The Public Rangelands Improvement Act of 1978.
- The Carlson-Foley Act of 1968.

In Addition, Executive Order 13112, signed by the President of the United States in February 1999, directs federal agencies to conduct activities that will reduce noxious weed populations. The Idaho Noxious Weed Law (Title 22, Chapter 24, Idaho Code) requires landowners to eradicate noxious weeds on their lands, except in special management zones. This requires prevention of their above- ground parts for at least two years. The Forest cooperates with the state but is not bound by most state laws.

LOCATION: This activity would occur throughout the Deep Creek Section 7 watershed. Known noxious weed locations that are mapped into GIS, where management and/or control could occur, are shown in [CD1: \Support Documents\Maps\weeds.pdf](#). This map is continually being updated as known locations are verified.

The Forest would provide a list of site-specific project descriptions and maps annually (separate from this document) for informal review and approval by National Marine Fisheries Service and US Fish and Wildlife Service Level 1 team members before the projects are implemented. Unknown sites found during project implementation may be treated following the guidelines within this BA, and would be mapped and reported annually.

DATES OF PREVIOUS CONCURRENCE:

- USFWS: October 15, 2001
- NMFS: August 18, 2003 (Biological Opinion, NMFS 2003)

DESCRIPTION: This action covers all activities involved with the noxious weed management program. Noxious weed management activities include herbicide application, mechanical controls (hand pulling or digging), biological treatments, and rehabilitation (i.e. seeding, plantings). Herbicide treatment occurs annually from April through September. The noxious weed management activities on the PNF include: awareness/education, prevention/early detection, inventory, an array of weed treatment practices, monitoring, and rehabilitation.

Noxious weed management measures depend on the area being considered and the particular weed situation, management objectives may range from containment to control and eventually to eradication.

Introduced noxious weeds and non-native species are found in many plant community types and at many locations. Weed management efforts may be necessary on rangelands, in timber harvest

areas, along roads and road rights-of-way, along trail routes, at dispersed recreation sites, on developed recreation sites, and at other disturbed sites (i.e. fires, flood events).

Noxious weeds are plant species that have been designated “noxious” by law. In addition to noxious weeds, additional plant species may be identified and treated over the course of the consultation. The word “noxious” simply means deleterious by definition. Examples of noxious weeds and other weedy species that may require control measures within the analysis area are (**bold** indicates priority target species for the PNF):

- | | |
|---------------------------------|--|
| • Hoary Cress (whitetop) | <i>Cardaria draba</i> |
| • Musk Thistle | <i>Cardus nutans</i> |
| • Canada Thistle | <i>Cirsium arvense</i> |
| • Diffuse Knapweed | <i>Centaurea diffusa</i> |
| • Spotted Knapweed | <i>Centaurea maculosa beibersteinii</i> |
| • Yellow Starthistle | <i>Centaurea solstitialis</i> |
| • Rush Skeletonweed | <i>Chondrilla juncea</i> |
| • Field Bindweed | <i>Convolvulus arvensis</i> |
| • Leafy Spurge | <i>Euphorbia esula</i> |
| • Dyers Woad | <i>Isatis tinctoria</i> |
| • Perennial Pepperweed | <i>Lepidium latifolium</i> |
| • Dalmation Toadflax | <i>Linaria genistifolia</i> |
| • Yellow Toadflax | <i>Linaria vulgaris</i> |
| • Purple Loosestrife | <i>Lythrum salicaria</i> |
| • Scotch Thistle | <i>Onopordum acanthium</i> |
| • Tansy Ragwort | <i>Senecia jacobaea</i> |
| • Johnsongrass | <i>Sorghum halepense</i> |
| • Chicory | <i>Cichorium intybus</i> |
| • Hound’s Tongue | <i>Cynoglossum officinale</i> |
| • St. John’s Wort | <i>Hypericum perforatum</i> |
| • Sulfur Cinquefoil | <i>Potentilla recta</i> |
| • Mediterranean Sage | <i>Salvia aethiopsis</i> |
| • Medusahead Rye | <i>Taeiathrum caput-medusae</i> |
| • Common Tansy | <i>Tanacetum vulgare</i> |

The noxious weed program on Forest Service lands is based on weed management objectives and priorities that are influenced by weed infestations and site susceptibility. These criteria provide focus and direction for the noxious weed program and allow for site specific and adaptive decision-making. Table 6 identifies the objective and priority system used on FS lands. The intent of containment is to prevent the spread of the weed to beyond the existing infestation perimeter.

The control objective is to reduce the infestation through time; some level of infestation may be tolerated. The eradication objective is total elimination of all weeds.

Table 6.—Weed treatment prioritization and objectives used for noxious weed control on FS lands.

Operational Objectives	Operational Priorities
<p>Eradicate: The weed is treated to the extent that no viable seed is produced over the entire infestation and all plants (above ground portions) have been eliminated during the current field season.</p> <p>Control: Portions of the infestation or outbreak are treated to the extent that overall infestation area diminishes because no viable seed is produced and/or plants have been eliminated.</p> <p>Contain: Portions of the infestations are treated to the extent that the weed is not expanding beyond the established treatment zones. The main body of the infestations may be left untreated.</p> <p>Reduce: The infestation is treated to the extent that densities and/or rate of spread are reduced to an acceptable level.</p>	<p>Critical: Urgent actions due to a combination of outside funds and/or invasive weeds found in susceptible and relatively intact habitats.</p> <p>High: Important actions associated with outbreaks of invasive weeds along key spread-vectors and/or linked to a combination of treatment strategies.</p> <p>Moderate: moderately important actions associated with invasive weeds in somewhat susceptible but disturbed habitats.</p> <p>Low: Actions associated with non-invasive weeds or in areas of low susceptibility where rapid spread is unlikely. May not need immediate (current year) attention.</p>

Table 7.—Annual Noxious Weed Control Program for the Payette National Forest (includes Wilderness)

Type of Noxious Weed Control Activity	Acres
Mechanical/Manual Control	5 – 25 (about 5 acres per Section 7 watershed)
Biological Control No. Site Releases	0 -5
Chemical Ground Based Application	100 – 1000 (100-500 per Section 7 watershed)
Restoration, Seedings, and Plantings	0 – 200 (about 10 acres per Section 7 watershed)
Cooperative Weed Management Areas (CWMAs) ^a	4

^aThese include the Upper Payette River, Lower Weiser River, Adams, and Frank Church Wilderness CWMAs.

Control Methods

All vegetation treatments conducted for control of noxious weeds are done in accordance with established FS policy, regulations, and product labels. FS policy requires the use of specific design features when in close proximity to sensitive areas to insure vegetation treatments do not have an adverse impact on non-target plants or animals. For example, design features for herbicide application include: use of aquatic-approved herbicide where there is a probability that the herbicide may enter the water; buffers adjacent to live waters; and spot-spraying or manual control only of target species in sensitive areas (see Effects section and “Required Mitigation”, below).

Chemical Control.—Herbicide treatments would be conducted in accordance with FS procedures found in Pesticide-Use Management FSH 2109 (CD1: \Support Documents\law\2109.14, individual chapters) and Noxious Weed Management (FSM 2080; CD1: \Support Documents\law\2080.rtf). The chemicals can be applied by many different methods (see below), and the selected technique depends on a number of variables. Some of these are (1) the treatment objective (removal or reduction); (2) the accessibility, topography, and size of the treatment area; (3) the characteristics of the target species and the desired vegetation; (4) the location of sensitive areas in the immediate vicinity (potential environmental impacts); (5) the anticipated costs and equipment limitations; and (6) the meteorological and vegetative conditions of the treatment area at the time of treatment (see Effects section and “Required Mitigation”, below).

Herbicide applications are scheduled and designed to minimize potential impacts to non-target plants and animals, while remaining consistent with the objectives of the vegetation treatment program. The rates of application (i.e., pounds of active ingredient per acre) depend on the target species, the presence, and condition of non-target vegetation, soil type, depth to the water table, presence of other water sources, riparian areas, special status plants, and the requirements of the herbicide label. The majority of treatments will be in travel corridors.

Herbicides

Herbicides that could potentially be used that are approved by the USFS, have completed risk assessments, and are EPA-registered and approved, include the following: 2,4-D amine (Weedar[®] 64, Amine 4); glyphosate (Rodeo[®]); picloram (Tordon[™]); clopyralid (Transline[™]); metsulfuron methyl (Escort[®]); dicamba (Banvel[®]); and imazapic (Plateau[®]). These herbicides, further described in the following text, would be the primary chemicals used in the Federal Action that include the chemical treatment of weeds. The Forest will continue to evaluate new chemicals and amend this consultation to include them where they meet the following conditions: 1) any chemicals appearing on the Forest Service's list of herbicides approved for use on National Forests; and 2) any new or updated chemicals as they are registered and approved by the EPA and added to the Forest Service's list of herbicides approved for use and accompanied by complete risk assessments.

Selection of a herbicide for site-specific application would depend on its chemical effectiveness on a particular weed species, success in previous similar applications, habitat types, soil types, proximity of the weed infestation to water, and the presence or absence of listed fish species. All herbicide applications would follow label instructions, specifications, and precautions as well as applicable Forest Service policy. Characteristics and properties of herbicides are discussed further below.

Table 8.—Common herbicides used by the Payette National Forest, trade name, and typical application rates.

Common Name	Trade Name	Typical Rates
Clopyralid	Transline [®]	0.1-0.5 lb/ac
Picloram	Tordon [™]	0.25-1.0 lb/ac
Glyphosate	Rodeo [®] , Roundup [®] , Accord [®]	0.5-2.0 lb/ac
Metsulfuron Methyl	Escort [®]	0.5-2.0 oz/ac
2,4-D	Amine 4, Weedar [®] 64	0.5-2.0 lb/ac
Dicamba	Banvel [®]	0.25-4.0 lb/ac
Imazapic	Plateau [®]	0.06-0.75 lb/ac

Carriers, Dyes, and Adjuvants

Carriers are gases, solids, or liquids used to dilute or suspend herbicides during application and allow for proper placement of the herbicide, whether it is to the soil or on foliage. Water is the only carrier that is proposed for use and addressed in this document.

Non-hazardous indicator dye is required to be used with herbicides based on direction from the NMFS BO (NMFS 2007). The presence of dye makes it easier to see where the herbicide has been applied and where or whether it has dripped, spilled, or leaked. Dye makes it easier to detect missed spots and to avoid spraying a plant or area more than once.

Adjuvants are not being proposed for use within this watershed.

Application Methods

Ground based application for treatment of noxious weed infested areas would utilize vehicle-mounted or ATV sprayers (spot-gun) (most common method); spot-spraying with hand-held spray nozzles either mounted on a vehicle (slip tank) or attached to a backpack system (very common method); hand-spreading granular formulations (least common method); and wicking, wiping, dripping, painting, or injecting target weeds (uncommon method). All application methods may be used for each herbicide and herbicide combinations. Specific treatment of individual plants can be accomplished with wicking, wiping, dripping, painting, or injecting target weeds. Most of the herbicides that may be used are liquid formulations that are applied onto the foliage of the target vegetation, although soils also may be a major receptor for these chemicals.

Within 50 feet of streams and wetlands, and where riparian or hydrophilic plants are present, and where surface material is obvious recent deposition of sediment of any diameter(s), only herbicides approved for use adjacent to water bodies (glyphosate - Rodeo®) will be used.

Manual Control.—Hand-operated power tools and hand tools are used in manual vegetation treatment to cut, clear, mow, or prune herbaceous and woody species. In manual treatments, workers would cut plants above ground level; pull, grub, or dig out plant root systems to prevent subsequent sprouting and growth; scalp at ground level or remove competing plants around desired vegetation; or place mulch around desired vegetation to limit the growth of competing vegetation.

Hand tools such as the handsaw, axe, shovel, rake, machete, grubbing hoe, mattock (combination of axe and grubbing hoe), brush hook, and hand clippers are used in manual treatments. Axes, shovels, grubbing hoes, and mattocks can dig up and cut below the surface to remove the main root of plants that have roots that can quickly sprout in response to surface cutting or clearing. Workers also may use power tools such as chain saws, power brush saws, and line trimmers (i.e. weed eaters). A less common method that may be used is mowing of weeds, and typically involves hand/motor-powered mowers or tractor mowers.

The manual method of vegetation treatment is labor intensive and costly when compared to herbicide application. However, it can be extremely species selective and can be used in areas of sensitive habitats. Manual control may occur in a variety of areas and is often used in sensitive areas to avoid adverse effects to non-target species or water quality. All noxious weed disposals would be in accord with proper disposal methods. Noxious weeds that have developed seeds would be bagged and burned.

Biological Control.—Biological control would include the use of insects, pathogens, or some combination of the two. Biological methods of vegetation treatment use living organisms to selectively suppress, inhibit, or control herbaceous and woody vegetation. This method is viewed as one of the more natural processes because it requires the proper management of plant-eating organisms and may be used in combination with other control methods within a general area, such as chemical treatments and mechanical. Biological weed control activities include the release of insect agents which are parasitic and “host specific” to target noxious weeds. This activity includes the collection of beetles/insects, development of colonies for collection, transplanting parasitic beetles/insects, and supplemental stocking of populations.

Insects and pathogens would be used as biological control methods generally in conjunction with other control methods (i.e. herbicides), although at the present these methods can control few plant species. Insects are the main natural plant enemies being used at the present time. Other natural enemies include mites, nematodes, and pathogens. This treatment method would not eradicate the target plant species but merely reduces the target plant densities to more tolerable levels. This method also reduces competition with the desired plant species for space, water, and nutrients. This treatment method would be used on larger sites where the target plant has become established and is strongly competitive (e.g., yellow star thistle) or remote locations.

Particular insects, pathogens, or combinations of these biological control agents may also be introduced into an area of competing or undesired vegetation to selectively feed upon or infect those target plants and eventually reduce the target plant density to the desired level of control. There fore in most situations, a complex of biological control agents is needed to reduce the target plant density to a desirable level. But even with a complex of biological control agents, often 15 to 20 years are needed to bring about an economic control level. In most circumstances, biological control agents would not control weeds. They are only creating stresses on the weeds, which is not the same as control.

Cultural Control.—Cultural control would include preventing weed introduction and/or minimizing rate of spread by requiring the following actions on public lands:

- Clean all ground disturbing equipment prior to moving into and out of weed-infested areas before and after use (applies to both USFS and contract equipment. Forest Plan Standard NPST03: “To prevent invasion/expansion of noxious weeds, the following provisions will be included in all special use authorizations, timber sale contracts, service contracts, or operating plans where land-disturbing activities are associated with the authorized land use: b) Earth-disturbing equipment used on NFS lands - such as cats, graders, and front-loaders – shall be cleaned to remove all visible plant parts, dirt, and material that may carry noxious weed seeds. Cleaning shall occur prior to entry onto the project area and again upon leaving the project area, if the project area has noxious weed infestations).
- Use only certified, noxious weed-free grains, hay, or pellets for feeding domestic animals and wildlife; and inspect all feeding sites during and following use.
- Use only certified noxious weed-free seed, along with hay, straw, mulch, or other vegetation material for site stability and vegetation projects.
- Use only noxious weed-free gravel and fill material from inspected sites.
- Vegetate disturbed areas as soon as practical; use temporary fencing if required assuring new seedling establishment.
- Evaluate current and proposed vegetation management practices (i.e. livestock grazing, prescribed burning, and seeding), and implement practices to restore desired plant communities.

Rehabilitation, Seeding, and Plantings.—Noxious weeds commonly invade areas that have vegetation that can’t compete with aggressive invader species. Consequently, after weeds are controlled on a site it is beneficial to establish desirable native vegetation that would compete with noxious weeds, restrict or prevent additional infestations, and help prevent soil erosion and further soil nutrient loss. These treatments may involve ground or aerial application of seeds.

Adaptive Management

The noxious weed control program is a long-term endeavor to control weeds where/when practical. However, because there are areas of scientific and management uncertainty, management actions would need to be refined over time to meet the basic objective of noxious weed control activities systematically reducing weed abundance, extent and spread throughout the PNF. Annual site-specific monitoring would assess the effectiveness of specific control measures on weed species relative to application rate/method and area. Management actions may require refinement or change over time as data from specific effectiveness monitoring is analyzed.

Landscape level management would be reevaluated if consultation were reinitiated. Information from weed inventories and results from treatments will be mapped spatially and the PNF will use this information to assess the noxious weed program objectives and can use this information to build a current baseline for future consultations.

Monitoring

The PNF would be monitoring the effectiveness of the noxious weed program on both a site-specific treatment level and on a landscape level.

Site-specific treatment level monitoring would involve assessing the effectiveness of the treatment agent or control method on a specific patch of noxious weeds. Follow-up treatments would occur as staffing and funding allow. Monitoring may involve multiple years to determine effectiveness. Monitoring of physical, cultural, and chemical control methods would be conducted on randomly selected sites (approximately one site per Section 7 watershed) within one to two months of treatment through visual observation of target species’ relative abundance/site dominance compared to pre-treatment conditions. Sequential monitoring of these sites would occur in subsequent years.

Landscape level effectiveness monitoring would be accomplished over the consultation period of the BA by tracking noxious weed occurrence through Geographic Information System (GIS) mapping across the PNF. Noxious weed infestations would be inventoried, mapped, and tracked through GIS to monitor the amount of the PNF land base with noxious weeds and how the control program has worked over the consultation period.

Landscape level inventory and monitoring is expected to reveal new populations of noxious weeds, which would be mapped and evaluated for control or eradication. Management of these newly discovered sites would occur under the guidelines as described in the preceding proposed action.

Program Reporting and Evaluation

Project proposals (with methods, objectives of treatment, location, map of treatment area, acreage, proposed dates to be started and completed, sensitive areas, and special mitigation) for noxious weed control activities involving herbicides will be prepared annually by Weed Coordinators and submitted by April 1, for review by PNF biologists. Project proposals would be reviewed for compliance with this BA. The PNF biologists (Level 1) would provide a list of project descriptions and maps annually (or as identified) for informal review and approval by National Marine Fisheries Service and US Fish and Wildlife Service Level 1 team members before the projects are implemented. All projects would be reviewed and approved by the NMFS and USFWS before herbicide application occurs.

Annually, a project summary of treatments would be prepared for land treatments that took place during the past year. The report would document treatments that took place, methods used, location, map, acreage, evaluation of achievement of objectives, brief summary of environmental effects, and evaluation of compliance with the BA. This summary report would be completed by April 1, annually, and will likely be provided in a NMFS consultation document.

Based on annual treatment evaluations and with the likely development of new control methods and technology, changes in existing or use of new noxious weed treatments may be authorized and warranted. Any changes to the proposed action, as described in the BA, would be analyzed for impacts to listed/proposed species and critical habitat, and consultation would be reinitiated as appropriate.

Partnership and Cooperative Weed Management Areas

The Payette National Forest is a cooperative partner in four Cooperative Weed Management Areas (CWMA). The cooperative partnerships undertaken through these WMAs make individual and cooperative efforts more effective. Partners include Federal, State, County, private organizations, and private landowners. The cooperative WMAs are listed below:

- Adams.
- Frank Church Wilderness.
- Lower Weiser.
- Upper Payette River.

The cooperative WMAs provide an opportunity for coordinating weed control efforts within a specific project area and provide a more efficient method of control, restoration, and monitoring. When a federal agency is a cooperator in CWMA, it does not necessarily mean the Forest is the action agency for non-federal lands. However, it does provide the Forest the opportunity of identifying potential private land ESA concerns and issues and recommending noxious weed control BMPs that would reduce risk to listed species and their habitats. It is recognized that the federal listing of species requires the Forest to ensure that all actions authorized or funded by the Forest are not likely to jeopardize the continued existence of the species or result in the destruction or adverse modification of critical habitat of listed species. Where FRTA easements are granted, the Payette NF conditions the easements with these PDCs. Where CWMA are treating on forest, any cooperators are bound by the same PNF PDCs.

Required Mitigation

- The PNF would follow established USDA Forest Service guidelines (FSM 2080; [CD1: \Support Documents\law\2080.rtf](#))
- The PNF would have a certified herbicide applicator overseeing all spray projects.
- A spill cleanup kit would be available whenever herbicides are transported or stored.
- A spill contingency plan would be developed prior to all herbicide applications. Individuals involved in herbicide handling or application would be instructed on the spill contingency plan and spill control, containment, and cleanup procedures.
- Herbicide applications would only treat the minimum area necessary for the control of noxious weeds.
- Trained personnel would monitor weather conditions at spray sites during application.
- All herbicide labels would be strictly enforced
- No spraying would occur when wind velocity exceeds 8 miles per hour.
- No spraying would occur if precipitation is occurring or is imminent (within 3 hours) (this measure is considered to be effective at reducing herbicide delivery from ditches into streams).
- No carrier other than water would be used.
- No use of 2,4-D ester formulations would be authorized.
- The Weed Coordinator will map and identify buffers, methods of application, and herbicide restrictions that may be required for the project, and will make a pre-project review of all spray projects to provide to the level one team by April 1, annually.
- Equipment would be designed to deliver a median droplet diameter of 200 to 800 microns. This droplet size is large enough to avoid excessive drift while providing adequate coverage of target vegetation.
- Equipment used for transportation, storage, or application of chemicals shall be maintained in a leak proof condition.
- All vehicles carrying herbicides shall have a standard spill kit.
- No herbicide storage, mixing or post-application cleaning would be authorized within RCA (100 feet of any live waters). Mixing and loading operations must take place in an area where an accidental spill would not contaminate a stream or body of water before it could be contained.
- Only very low risk, or “aquatic-approved” chemicals (glyphosate-Rodeo®) could be used within 50 feet of open water, where riparian or hydrophilic plants are present, and/or where surface material is obvious recent deposition of sediment of any diameter(s), and these would be applied with hand spraying or wiping only.
- No more than one application of picloram would be made on a given site in any given year to reduce the potential for picloram accumulation in the soil.
- Manual control (e.g. hand pulling, grubbing, cutting, etc.) is authorized in all areas, and may be used in sensitive areas to avoid adverse effects to non-target species or water quality. All noxious weed disposals would be in accord with proper disposal methods. Noxious weeds that have developed seeds would be bagged and burned.
- Only the amount of herbicides that are planned to be used daily would be transported in vehicles.
- Equip drafting equipment for filling spray tanks with back siphoning prevention devices.
- Non-hazardous indicator dye is required to be used with herbicides based on direction from the NMFS BO (2007). The presence of dye makes it easier to see where the herbicide has been applied and where or whether it has dripped, spilled, or leaked. Dye makes it easier to detect missed spots and to avoid spraying a plant or area more than once.

Spill plan.—The following procedures for mixing, loading, and disposal of herbicides and spill prevention plan will accompany all herbicide spraying operations:

Procedures for Mixing, Loading, and Disposal of Herbicides

Procedures for mixing, loading, and disposing of herbicides will comply with Forest Service Manual (FSM) 2109.14 Chapter 40.

The following summary is taken from the Frank Church River of No Return Noxious Weed Treatments Final Environmental Impact Statement, Intermountain and Northern Regions: Bitterroot, Nez Perce, Payette, and Salmon-Challis National Forests (NMFS 2007).

- All mixing of herbicides will occur at least 100 feet from surface waters or well heads
- All hoses used to add dilution water to spray containers will be equipped with a device to prevent back-siphoning
- Applicators will mix only those quantities of herbicides that can be reasonably used in a day
- During mixing, mixers will wear a hard hat, goggles or face shield, rubber gloves, rubber boots, and protective overalls
- All empty containers will be triple rinsed and disposed of by spraying near the treatment site at rates that do not exceed those on the treatment site
- All unused herbicides will be stored in a locked building in accordance with herbicide storage regulations contained in FSM 2109.14
- All empty and rinsed herbicide containers will be punctured and either burned or disposed of in a sanitary landfill
- Any additional herbicide label requirements will be strictly followed during the mixing, loading, and disposal of herbicides

Herbicide Spill Plan for Weed Control

All actions involving incidents, spills, and accidents will comply with FSM 2109.14 Chapter 60. The following has been modified from the Flathead National Forest Noxious and Invasive Weed Control Environmental Assessment (USFS 2000).

A reportable herbicide spill is one pint of concentrate of herbicide and/or five gallons of mixed herbicide, even if these amounts can be contained and recovered by the weed field crew. Spills that can be contained and recovered will thereafter be applied in the field according to the label requirements for the herbicide. If an herbicide spill occurs, the field crew will radio the Ranger District they are working in, and report the spill. The receptionist on duty will use the form on the attached sheet to gather information. The information will then be forwarded to the appropriate District Safety Officer and to the FS/BLM Interagency Hazardous Materials coordinator for appropriate action. The National Poison Control Center (1-800-222-1222) will be contacted as necessary. If there is a spill, report it on approved forms.

At a minimum, the following equipment and materials will be available with vehicles or pack stock used to transport herbicides.

- A shovel
- Absorbent material or the equivalent
- Plastic garbage bags or buckets
- Rubber gloves
- Safety goggles
- Protective clothing
- Rubber boots
- Applicable Material Safety Data Sheets (MSDS)

G. FEDERAL ACTION: ROAD MANAGEMENT

PURPOSE AND NEED: To conduct management activities on National Forest System roads within the Deep Creek Section 7 watershed on the Payette National Forest until December 31, 2017. These activities are performed by Forest engineering staff, other authorized Forest personnel, contractors, or cooperators who have written agreement with the Forest to perform maintenance.

LOCATION: Deep Creek Section 7 Watershed

DATES OF PREVIOUS CONCURRENCE:

- USFWS: October 15, 2001
- NMFS: August 9, 2001

DESCRIPTION: Road management has several major components, road maintenance, administration of easements, rights of way and permits, and physical closures of various types related to reducing resource impacts. Road maintenance that is part of mining operating plans is the sole road maintenance activity that is not part of this federal action; operating plans require separate consultation where they may affect listed species and/or critical habitat. Road management and the travel plan Federal action are interdependent actions; therefore, they will be discussed collectively in the effects matrix (Appendix 3).

Maintenance can be summarized as routine road surface blading, culvert repair and cleaning, brushing on roadways (top of the cut to the bottom of the fill) and road ditch cleaning. Road maintenance includes replacing existing facilities (e.g. road, culvert, bridge, retaining wall, etc.) and resurfacing roads with pre-existing materials, except as identified under “acts of God.” Road surfaces may be upgraded to reduce erosion and sedimentation so long as cut and fill-slopes are not enlarged or disturbed; for example, a native surface road may be upgraded to pit-run gravel, crushed aggregate or asphalt. The federal action includes replacement of facilities normally maintained by the Forest where they are obliterated (severely damaged, or eroded) for up to 500 feet of full prism by flood, fire or other “acts of God” if a journey level fisheries biologist agrees that the effects are not likely to be adverse. Repairs due to “acts of God” may involve alignment shifting to reduce encroachments of RCAs and flood plains. Within funding constraints, the maintenance level assigned to a road dictates the frequency and extent of maintenance work performed on a particular road, or section of road. Roads assigned a higher maintenance level are traveled more often and therefore receive more maintenance more frequently (for further detail refer to Fall Back Emergency Steps below). Maintenance Levels also provide a way to classify forest roads according to their assigned use, so that the road will perform as planned. A description of the various road maintenance levels is located in CD2: \Support Documents\Roads\7709.58,12.3,ex.01[1].rtf (in file Roads.zip). Routine road maintenance activities, snow plowing, and road dust abatement will be conducted to prevent resource damage. Road plowing will follow standards described in the Land and Resource Management Plan. These standards are designed to reduce the potential for damage to the road from snow plowing activities and thereby reduce sediment delivery to streams.

Maps indicating maintenance levels and responsible agencies are included on the accompanying CD:

Maintenance Levels and Responsibility

- West Zone: [CD1: \Support Documents\Maps\rds_oper_ML.pdf](#)

These maps represent the most current information available, and may change as additional information becomes available.

A more detailed description of road maintenance is that road maintenance is any activity that takes place on an existing classified for unclassified road for the expressed purpose of maintaining the road or road system in a safe and properly functioning condition for the user and level of use identified by the road use objective and maintenance level. This activity would be further defined by the following sub-categories:

- **Rote or Routine Road Maintenance.**—Maintenance is anticipated/planned on a repeated/yearly basis, e.g. surface blading, brushing, culvert & bridge clearing, cleaning & repair, surface clearing, deadfall removal. Slide and slough removal occurs. Ditch clearing

and cleaning occurs. Rock raking, and dust abatement applications occur. Hazard trees are felled.

- **Normal or Frequent Road Maintenance.**—Road resurfacing, gravel placement (new or resurface), pavement patching and sealing (including new bituminous surface treatments (seal coats, and similar measures) occur but not annually. Culvert installations, including replacements, upgrades, extensions and new installations, can occur providing LRMP standards, at a minimum, are met and the listed BMPs are used. Such actions in fishbearing streams will be reviewed by the Level 1 Team prior to implementation. Aggregate crushing and hauling can occur from existing rock pit sources. Minor concrete work, i.e. small headwalls can occur. Riprap slope protection, prism reconstruction, retaining walls for slope stabilization, seeding and mulching can occur. Riprap placement for culvert inlet and outlet protection and bridge repairs can occur if limited to a cumulative linear distance of 100 feet or less at an individual site and after approval by a fisheries biologist, except where there may be potential adverse effects to listed species or designated critical habitat. Snow removal occurs on roadways to facilitate access following inclement weather.
- **Extreme or Very Infrequent Road Maintenance.**—Road re-alignments can occur. Re-alignment is defined as road maintenance because: the road exists and is part of an existing road system, and the local road network accesses a portion of the National Forest maintaining the systems function. In addition, meeting present Forest Plan Standards or Legal requirements, (i.e. Endangered Species Act & Clean Water Act, etc.) is a maintenance function. Road re-alignment could occur if the Ranger through the input of fisheries biologists, hydrologists, and others has determined that listed species or designated critical habitat would benefit by road re-alignment, and a fisheries biologist has determined there would be no adverse affects due to sediment delivery, harassment of adults, or other mechanisms of effect. Temporary bridge placement or permanent bridge replacement in locations where a fisheries biologist has determined listed fishes are not present; when utilizing existing abutments or supports or with minor movement or improvement of abutments, and when effects to listed fishes or designated critical habitat from sediment delivery are negligible (see erosion control mitigations below). Actions may require stream fording after fisheries biologist approval. All design criteria applicable to Forest Service roads would be implemented with extreme or very infrequent road maintenance.

Administration of permits and easements results in conducting similar activities to road maintenance except that the Forest Service jurisdiction is limited to prescribing terms and conditions. Permits contain the most flexibility and can contain all mitigation measures that the Forest Service believes are appropriate. The terms and conditions applied to easements, or rights of way can only contain those measures consistent with the property rights identified in the easement or right of way; the latter may apply to state or county roads, access to private property and similar circumstances.

Administration of permits and easements also includes grooming of snowmobile routes and connections among them; the routes are mostly on existing roads; these agreements are with the counties and the state of Idaho.

Physical road closures are those identified according to the mitigation measures described below. The Forest has a process for making decisions about what roads to close for resource protection and otherwise how to manage roads; that process is identified below.

SITUATIONS REQUIRING SEPARATE CONSULTATION: Separate consultation will be required for Forest road maintenance activities if:

- A specific road maintenance action on roads for which the Payette National Forest has maintenance responsibility (including maintenance by County personnel or road use permittees) does not adhere to Payette National Forest road maintenance standards, does

not adhere to all applicable mitigations listed below, and/or may adversely affect a listed species (which could include stranding or harassing fish) or designated critical habitat;

and/or

- A maintenance activity or assigned maintenance level results in adverse effects to a listed species (which could include stranding or harassing fish) or designated critical habitat regardless of whether maintenance standards are followed.

Road maintenance crews, contractors and cooperators will be provided training by the Payette National Forest, prior to operation, regarding the potential for effects to listed fishes and designated critical habitat, and what maintenance practices are mandatory and appropriate.

REQUIRED MITIGATION: Mitigation, in this case, consists of practices aimed at minimizing sediment production and delivery to streams, maintaining or improving the designed drainage of the road, and avoiding the introduction of dust abatement chemicals that could be delivered to streams.

Regular maintenance keeps roads in good functioning condition and allows for identifying and correcting problems promptly. Recommended maintenance (mitigation) for activities in the Deep Creek Watershed is found in Furniss et al. 1991. These practices will help reduce the adverse effects of road deterioration on habitat.

General Practices

- Do not leave berms along the outside edge of roads, unless an outside berm was specifically designed to be a part of the road and low-energy drainage is provided for. The creation of outside berms during road grading is a common mistake, and frequently turns low-impact roads into high-impact, chronic sediment producers.
- Grade and shape roads to conserve existing surface material. Road grading and shaping should maintain, not destroy, the designed drainage of the road, unless modification is necessary to improve drainage problems that were not anticipated during the design phase.
- Inspect ditches and culverts frequently, as appropriate to the maintenance level, and clean them out when necessary. Do not over-clean them, however, because excessive cleaning of ditches causes unnecessary sedimentation. Use care to not undercut the ditch back slope, or the cut-slope.
- When blading and shaping roads, do not side cast excess material onto the fill. End haul all excess fine material that cannot be bladed into the surface as periodic side casting can prevent fill stabilization and promote erosion. End haul and prohibition of side casting is not required for organic material like trees, needles, branches, and clean sod; however, fine organics like sod and grass should be cast somewhere other than into water. Slides and rock failures including fine material of more than approximately ½ yard at one site should be hauled to disposal sites. Fine materials from slides, ditch maintenance, or blading can be worked into the road. Scattered clean rocks could be raked or bladed off the road except within 300' of perennial or 100' of intermittent streams. Fine material is 1" minus; rocks are 1" plus.
- When treating weeds or brush follow all measures identified in the federal action titled "Noxious Weed Control."
- Apply dust-abatement additives and stabilization chemicals (typically MgCl₂ or CaCl₂ salts) so as to avoid run-off of applied dust abatement solutions to streams. Spill containment equipment will be available during chemical dust abatement application.
- Promptly remove debris that obstructs drainage systems.
- Identify and close those unsurfaced roads that during the wet season can directly contribute sediment to streams.
- Identify, close, and reclaim unneeded classified and unclassified roads. These roads should be put into shape to be stable and drain properly without maintenance. This usually

requires earthwork for removing culverts or "dishing out" crossings that have high potential for diversion, shaping the road for long-term stability (Eubanks 1980; Weaver et al. 1987). Where high-value fisheries are at risk from abandoned roads, more extensive obliteration and reclamation of roads should be considered. Road obliteration and reclamation actions are covered under the *Watershed and Fish Habitat Improvements and Maintenance* action.

- Locate fuel storage areas outside of RCAs and provide facilities to contain the largest possible spill. Leaks of motor oil and hydraulic fluids from heavy equipment should be monitored and controlled to prevent water contamination.

In addition, the following practices will be followed during road maintenance activities:

- Avoid road maintenance activities during times in which listed fish eggs or alevins are in gravels near enough downstream to the disturbance to possibly be affected by the action. A fisheries biologist will determine this time period and whether the action is near enough to the fish to warrant this protection.
- Preventive maintenance should be practiced on all roads, not just actively used ones, as prioritized based on resource impacts and funding.
- Do not side cast road grading material (<1 inch diameter fine inorganic material) along all roads within one-quarter mile of perennial streams and from roads onto fill slopes having a slope greater than 45 percent.
- Do not "undercut" cutslopes when cleaning inside ditches so as to avoid destabilizing the slope and thereby accelerating erosion.
- End-haul all large rocks, slides, and other material that ends up on the road to a designated disposal area as agreed by a journey hydrologist/soils scientist or a journey fisheries biologist.
- Earth disturbing projects, such as emergency culvert replacement, where listed fishes are present, shall have the agreement of the Level 1 team that the effects are not likely to be adverse and agreement of a journey hydrologist/soils scientist, one of whom should be on hand to monitor the project. In addition, any culvert replacement will conform to the following guidelines:
 - Culverts will meet LRMP standards.
 - FishXing or similar software will be used to determine culvert specifications required for fish passage.
 - Place erosion control at the work site prior to any construction so as to reduce sediment delivery to the stream to negligible levels.
 - Remove fill from around existing culvert and store at a stable location.
 - Construct a temporary channel and line it with plastic and/or geotextile, or use some other water conduction facility (e.g., pipe) that must meet fish passage requirements.
 - Divert the stream into the temporary water conduction facility.
 - Remove existing culvert.
 - Install replacement culvert.
 - Reconstruct approaches over new culvert.
 - Seed and mulch disturbed areas, remove sediment collected by erosion control material as specified by a hydrologist, soil scientist, or fisheries biologist.
 - Additional site-specific measures, including modifications to BMPs because of site-specific conditions, may be identified and approved by a fisheries biologist, soil scientist or hydrologist.
- Road maintenance will not be attempted when surface material is saturated with water and erosion problems could result.
- Do not excessively "brush" (cutting vegetation) along roads where the vegetation is stabilizing slopes, or providing shade to a stream or river channel.
- Road maintenance may interrupt the delivery of large woody debris to streams thereby inhibiting the maintenance or attainment of good habitat conditions. Therefore, large woody

debris (LWD > 9 m in length and >50 cm in diameter) present on roads within this watershed's RCAs shall be moved intact to down slope of the road, subject to site-specific considerations. Movement down-slope will be subject to the guidance of a journey level fisheries biologist; that guidance will be provided at annual training sessions for road crews and on a site-by-site basis as necessary.

In order to avoid and mitigate effects identified in the environmental baseline, the Forest will conduct additional activities. In addition to previous requirements developed for consultation, the Forest will:

- In February 2000, the Forest began to examine priorities for road management's actions to incorporate the Chief's agenda and incorporate listed fishes and designated critical habitat into the priority setting process.
- In order to fully evaluate appropriate road management options the Forest will use a new Trails/Roads Analysis Process (TRAP, Current CD2: \Support Documents\Roads\TRAP process [in Roads.zip]). TRAP was developed to be compatible with sub-basin review and watershed analysis. This process is being incorporated into a national Roads Analysis Process (RAP), which will be required in all NEPA projects involving road management after 12 July 2001.
- A journey soils scientist has been incorporated into the road maintenance crew.

Documentation Requirements

The following documentation is required and will be provided to the USFWS or the NMFS if requested:

- All culvert replacement will be documented with respect to location, problem, action, date, fisheries biologist approval, etc.
- Road resurfacing will be documented with respect to resurfacing material, method of application, dates, fisheries biologist approval, etc.

Fall Back or Emergency Steps

Situations such as culvert failures, slides, and road failures are evaluated and prioritized according to the maintenance level of the road and the potential for damage to other resources. Road maintenance problems that may pose a threat to listed fishes or their designated critical habitat will receive the highest priority. Problems on roads of either maintenance levels 1 (closed) or 2 are usually given a lower priority than more heavily used roads of levels 3, 4, or 5. Problems are usually reported to the road operations engineer and a work order is given to the road crew to repair the problem. "Road Situation" forms are available to apprise Engineering staff of road-related problems or potential problems by other Forest personnel.

Road maintenance problems are usually corrected within 1 to 10 days, depending upon the priorities of the road maintenance crew. Problems threatening listed fishes or their designated critical habitat will be addressed immediately. If Forest road crews are unable to respond immediately (e.g., because of equipment problems or location), the work will be contracted and supervised by Forest personnel, including a fisheries biologist, soil scientist, or hydrologist.

A fisheries biologist will review road-related maintenance problems that require more than routine maintenance (see definition above). The Forest will complete a BA and consultation with the NMFS and the USFWS, as appropriate, for major road repairs or maintenance that may pose a threat to listed fishes or their designated critical habitat.

H. FEDERAL ACTION: TRAILS, RECREATION, AND ADMINISTRATIVE SITE OPERATION AND MAINTENANCE

PURPOSE AND NEED: To conduct routine operation and maintenance (O & M) of trails, recreation and administrative facilities on the Payette National Forest until December 31, 2017.

LOCATION: Deep Creek Section 7 Watershed

DATES OF PREVIOUS CONCURRENCE:

- USFWS: October 15, 2001
- NMFS: August 8, 2001

DESCRIPTION: Operation and maintenance of recreation and administrative facilities on the Payette National Forest would include the following activities:

- **Recreation and Administrative facilities (Forest Service work station and recreation sites).**—Operation, maintenance and repair of the administrative facilities will occur that includes hazard tree removal, water system repair, structural repair of fences, structural repair of buildings and barns, painting, and maintaining current septic systems. This action would also include the replacement, maintenance, improvement, and installation of structures at recreation and administrative sites such as outhouses, fences, water tanks, signs, septic systems, parking areas, etc. for the purposes of maintaining site function, to serve site users, and to provide for user’s health & safety and for resource protection, etc.
- **Airstrips.**—Leveling, smoothing, removing surface hazards, protecting surface from erosion, watering, mowing, raking rocks, applying fill dirt, re-seeding, and felling of encroaching trees.
- **Trails.**—Conducting Trail maintenance on National Forest Systems trails to keep them in a condition suitable for use and to minimize resource impacts from the trail location and use will be conducted.. Trail characteristics and use levels vary, with the location and destination of the trail. The Forest Service Trail Maintenance Management System is “a method to plan, schedule, perform, and evaluate the maintenance activities necessary to ensure the safety, protection, proper administration, and appropriate use of the forest trail system” (Forest Service Handbook [FSH] 2309.18). Maintenance on these trails is performed after maintenance needs have been identified from condition and prescription surveys and an Annual Maintenance Plan is developed (within funding constraints). Maintenance is conducted on routine (usually annual or bi-annual schedule) and intensive (for one-time resolution of site-specific problems) levels using the methods outlined in Lund and Burns (1995) (Table 9).

Table 9.—Trail maintenance activities (Forest Service Handbook 2309.18)

Activity	Level of Maintenance	Concern
loose rock removal	routine	tread maintenance
rock & root removal	routine	tread maintenance
slough & berm removal	routine, intense	tread erosion water management
slide maintenance	routine, intense	tread erosion slope stabilization
borrow (fill)	routine, intense	Tread maintenance
drainage maintenance	routine, intense	erosion
maintain waterbars	routine, intense	erosion
maintain culverts	routine, intense	erosion
maintain stream fords	routine, intense	erosion
maintain gully crossings	routine, intense	erosion
maintain drainage dips	routine, intense	erosion
fallen tree removal	routine	trailway
brush cutting	Routine	trailway
slope re-vegetation	intense	trailway, erosion
maintain rock/log retaining wall/barriers	intense	erosion, trailway, structure maintenance
construct rock/lock retaining wall or barrier	intense	erosion, trailway, structure maintenance
bridge maintenance	intense	erosion, structure maintenance

Trail operation and maintenance may include:

- Replacement or moving of trail segments (to improve trail function, for resource protection or other management needs), (less than 500 feet of trail), if potential effects to stream channels are reduced (i.e. by moving trails away from stream channels, wetlands etc.) is being proposed. Repair, removal, and installation of culverts, or bridges, and the replacement of trails, bridges and related facilities that have deteriorated to the point of being unsafe and/or representing a hazard to users, or are obliterated by floods, fires, landslides etc. may occur. Most trail bridges are removed by hand. Generally, this consists of removing unusable materials and replacing them with new materials. Bridge repair and replacement can include stream fording by forest personnel. Equipment such as a crane or helicopter may be used to remove/install both prefabricated metal bridges and wooden structures. Installation of a bridge or culvert to reduce or eliminate effects to listed fish species may also occur. Bridges may be native stringer, laminate, or prefabricated metal. Armoring may occur outside edge of trail with logs or rock to inhibit erosion. Stream fords may also be armored.
 - Construction of puncheon or corduroy structures over bogs, or small streams, or placement of culverts to direct water under trail tread may occur. Culverts will be used in intermittent, perennial, and non fish-bearing streams. Culverts would be plastic, metal, or constructed from available rock. Culverts would be placed by hand. Plastic or metal culverts would be short (a little over trail width), entail minor excavation for placement, and be covered first with rock, then native material. Culvert replacement would also be done by hand and entail removal of cover and fill material, placement of fill material where it would not enter the stream, may include minor excavation for placement of new culvert, and covering culvert first with rock, then native material.
 - Trail operation and maintenance may also include use of motorized equipment (i.e. chainsaws, ATV's, trailcat, bobcat) to transport equipment and materials, or to assist in trail construction. (Only on motorized trails, for non-motorized trails personnel must carry or use pack animals to bring in supplies)
- **Bridge Construction.**—Types of bridges that may be constructed include native stringer, laminate, and prefabricated metal. Laminate and prefabricated metal bridges would be placed on keystone block or pressure-treated wooden abutments. Native stringer bridges may be placed on either treated or pressure-treated wooden abutments. All treated wood used shall be produced and used in compliance with “Best Management Practices for the use of wood in aquatic and other sensitive environments” (Western Wood Preservers Institute, 2006). Although treated wood does contain chemicals that are potentially toxic, studies indicate that there are no measurable impacts on aquatic organisms if the wood is properly treated and installed (Lebow and Tippie, 2001).

Native stringer bridge construction: These bridges are constructed by hand, with hand tools such as chainsaw, shovel, axe, and hammer. Log stringers for these bridges are generally attained near the bridge site, but will not be from RCAs. Other materials such as abutments and decking may be packed or flown in. Generally, construction steps may include hand placement of abutments on each side of stream, placing log ends side by side on abutments with logs spanning the stream, attaching logs to abutments and attaching decking to top of logs, and construction of ramp or step up to bridge from trail.

Laminate bridge construction: These bridges are also constructed by hand, with hand tools such as chainsaw, shovel, axe, and hammer. Materials such as abutments and decking may be packed or flown in. Generally, construction steps include placement of abutments on each side of stream (usually keystone block or pressure-treated wood), placement of planks on edge between abutments (usually 2 x 10s or 2 x 12s) , additional planks of varying lengths are nailed to initial planks (i.e., side to side) with joints offset until desired width is reached. Decking and edge rail are then attached to the top of the laminated planks.

Prefabricated metal construction: These engineered bridges are generally done under contract. These bridges often require both hand and machinery work using tools such as shovel, chainsaw, and helicopter or crane. Generally, construction steps include placement of abutments on each side of the stream (usually keystone block), and placement of bridge using a crane or helicopter.

Some stream fording may occur with each of these types of construction depending on site conditions. Often with laminate construction there is little or no stream fording, as people and materials will cross on boards laid spanning the stream. One or two native stringers can sometimes be placed without entering the stream, and once in place can be used for crossing during the remaining construction.

REQUIRED MITIGATION:

General

- Ground disturbing activities within LRMP riparian buffer strips will be fully mitigated by applying a “high” level of soil erosion mitigation measures which can include water control devices such as silt fence or straw bales, erosion control matting, seed, mulch, fertilizer and placement of woody debris.
- Both a journey level hydrologist and fisheries biologist must agree to the decision to replacing or relocating more than 500 feet of trail that has the potential to affect stream channels and the new location.
- During bridge construction, mechanized equipment will be restricted to operation on streambanks, and may not enter streams, lakes etc. without approval from a journey level fisheries biologist.
- Seeding will be done with certified weed free native seed mixes.
- Bridge construction or other ground disturbing activities potentially affecting habitat for listed fishes will be completed when effects to listed fishes can be minimized. A journey level fisheries biologist will be consulted to determine appropriate timing.
- Planned trail, recreation and administrative site work will be presented to the level one team annually.
- All treated wood used shall be produced and used in compliance with “Best Management Practices for the use of wood in aquatic and other sensitive environments” (Western Wood Preservers Institute, 2006).

Administrative facilities (*airstrips, Forest Service work stations, and recreation sites*)

- Maintenance and repair or replacement of structures that requires replacement, improvement, or installation of water and/or septic systems would meet applicable State Department of Environmental Quality and District of Health requirements. Only existing facilities and water developments are covered by this action.

Trail

- Conduct fish habitat (riparian and stream channel condition) surveys of streamside trails. Develop and implement recommendations for Annual Trail Maintenance Management Plans.
- Side casting of soil/sediment from trails directly into stream channels or within a deliverable distance will not occur.
- Rolling dips and/or waterbars will be placed as needed in newly constructed and existing trails, and near bridge crossings as needed to minimize water travel lengths and erosion.
- To dissipate surface runoff, place woody debris (>3in. diam.) perpendicular to the downhill end of rolling dips and/or waterbars.
- Route trails away from crossings to minimize length of trail sections perpendicular to streams that may direct sediment toward streams.

- Place rolling dips/waterbars such that water and material potentially moving down trails is directed off the trail and filtered by intervening vegetation.
- Reinstall culverts in fish-bearing streams in a manner that allows fish passage. As necessary, FishXing or similar software may be used to determine culvert specifications required for fish passage. Stream gravels and cobbles will not be 'borrowed' from any RCA. where it would affect WCIs. Culvert installation or replacement will follow guidelines for culvert replacement found in the federal actions [road management](#) and [watershed and fish habitat improvements and maintenance](#).
- Stream fords will be designed to allow passage of all aquatic organisms and lifestages, and not be located in potential fish spawning areas. The Forest identifies stream fords where damage is occurring and evaluates options for mitigating any resource damage that is occurring. Stream fords are prioritized according to type and volume of use, with horse trails and motorized trails receiving the highest priority for mitigation. Potential mitigations include installation of a bridge or culvert, armoring of potential erosion sites, placement of stepping stones and logs, or re-routing of the trail to a less sensitive location. Mitigation method is determined by the natural materials available on-site and the amount and type of use. If a section of trail has numerous resource problems then the section is re-routed and the old tread is rehabilitated

Bridge Construction

- Bridge design and construction will meet LRMP standards and guidelines.
- Minimize sediment entering streams by: using silt-fence, or straw bales between abutments and stream, by avoiding abutment construction, or by using keystone blocks or native rock type material that avoid generating erosion/sedimentation. Minimize stream fording as much as is practical.
- Install bridge abutments well outside of active stream channel. Fisheries biologist or hydrologist will determine the extent of active stream channel.
- If native stringers must be taken from RCAs, they will be removed by hand from separate locations. Generally 3 to 5 trees are needed for native stringer bridges.
- Where practical, construct short approach inclines on ends of bridges to prevent water movement from trail onto bridge.

Motorized Equipment

- Mechanized equipment (i.e., bobcat, trailcat, etc.) may ford streams with the approval of a fisheries biologist. Mechanized equipment, must be free of any petroleum or hydraulic leaks and must be serviced outside the LRMP (or LRMP) buffers.
- Fuel for motorized equipment will be transported in US DOT approved containers.
- Refueling of motorized equipment will occur as far from streams as is practicable, and on ground where a fuel spill would be easily contained. Spill containment equipment will be available.

I. FEDERAL ACTION: TRAVEL PLAN

PURPOSE AND NEED: To permit travel on the Forest until December 31, 2017 by issuing a travel plan and to achieve regulation of human access on the Forest to protect resources and provide for appropriate public travel..

LOCATION: The Payette National Forest portion of the Deep Creek Section 7 Watershed

DATES OF PREVIOUS CONCURRENCE:

- USFWS: October 15, 2001
- NMFS: August 9, 2001

DESCRIPTION: Summer motorized travel would be limited to designated roads, trails, and parking areas. This is a change from activities that were permitted during the 2001 consultation because

of road and trail motorized use was permitted on some areas of the Forest. Refer to table 10. Travel on foot and riding livestock is permitted Forest-wide. Motorized use on trails is limited to those so designated by the Forest (Figure 2) and for 100 feet off the travel-way in order to facilitate camping. Motorized use on roads is also limited to roads so designated (Figure 3) and for 300 feet off the roadway to facilitate camping. The action described in 2001 would be modified by a decision based on an analysis being conducted (CD2: \Support Documents\Travel Plan [in Travel Plan.zip]). The change from the baseline in this action is approximated in this BA by Alternative E (CD2: \Support Documents\Travel Plan [in Travel Plan.zip]). Under this federal action degradation of some watersheds would occur in the long term because of anticipated increases in motorized use on roads and trails over time. Alternatives that lessen the rate of long term degradation are beneficial compared to no change, and are therefore considered to be consistent with Forest Plan standards and guidelines. The federal action is consistent with the Forest Plan because proposed activities (such as closure of areas to cross-country motor vehicle use) would reduce the anticipated rate of degradation compared to doing nothing. The federal action makes no changes to travel by horse or foot, but off-road or off-trail use of motorized vehicles is changed (Table 10).

Table 10.—Changes in motorized use by watershed under Alternative E of the proposed new Travel Plan compared to the baseline conditions.

Pathways & Indicators	Approximate change from baseline conditions in acres open to motorized use (for substrate embeddedness) or miles of roads and trails (for stream bank condition)
Deep Creek	
Substrate Embeddedness	Open acres decrease by 95
Stream bank Condition	No change

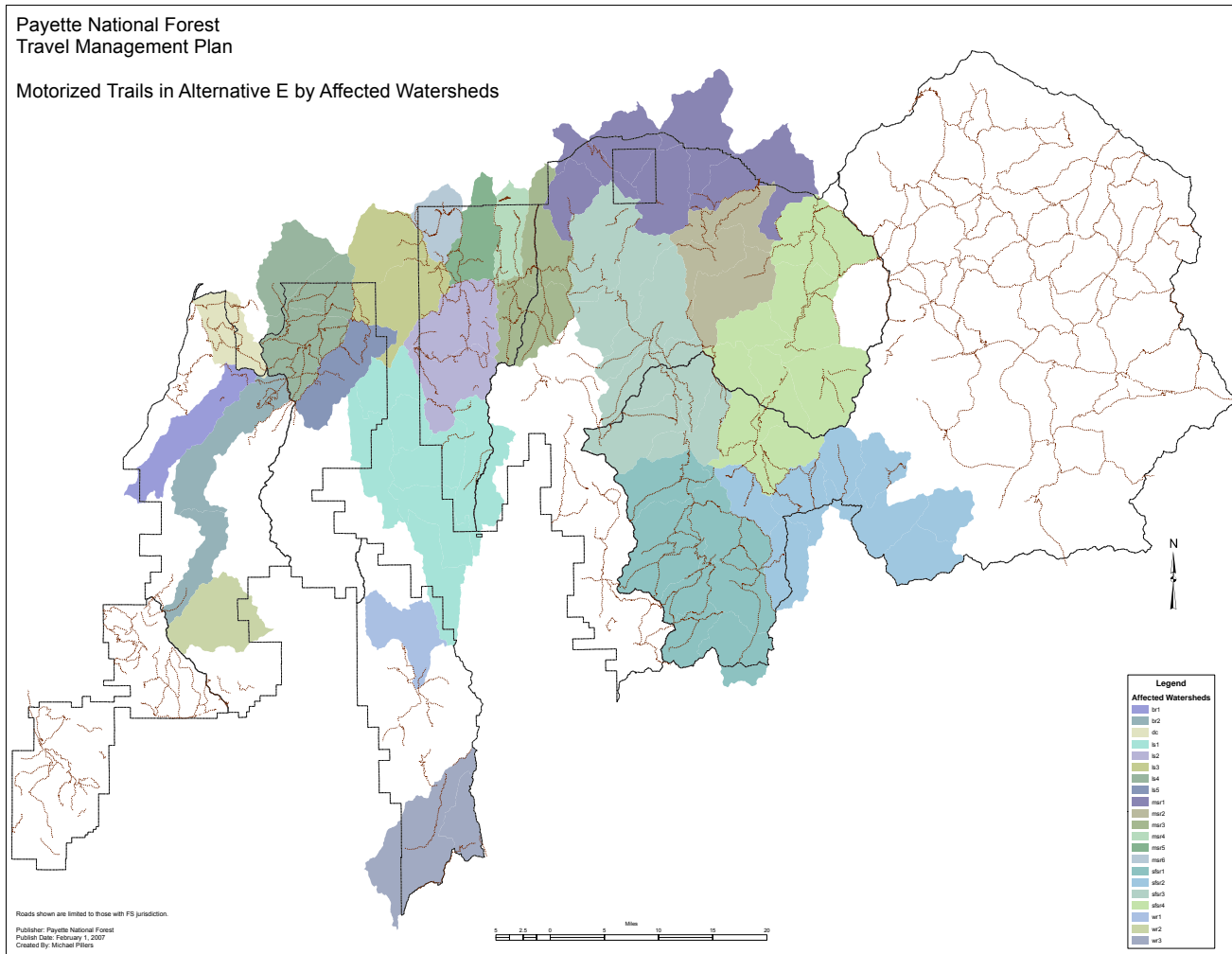


Figure 2.—Trails under Payette National Forest jurisdiction with motorized use.

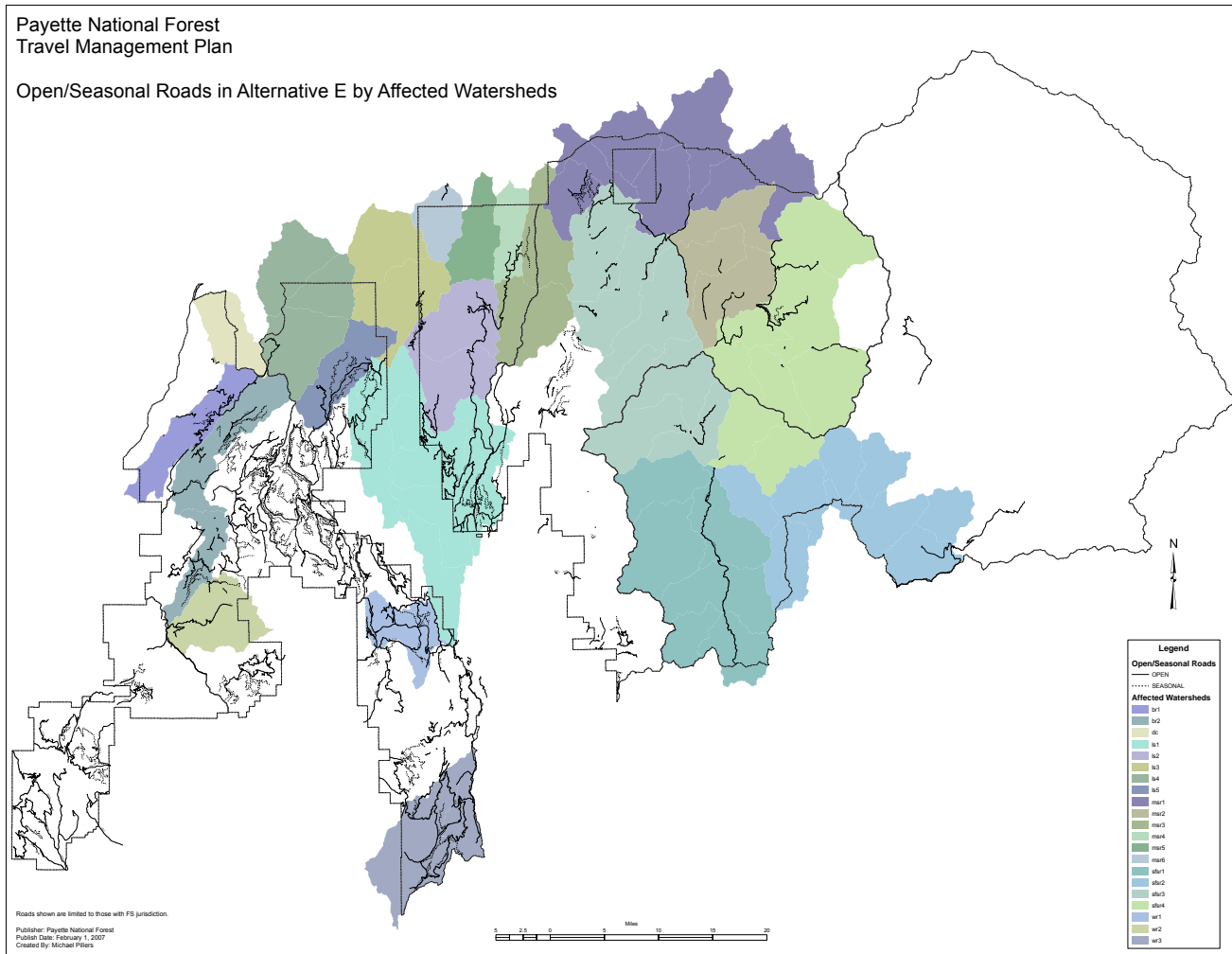


Figure 3.—Roads under Payette National Forest jurisdiction with motorized use.

REQUIRED MITIGATION:

The interdependent actions of “Road Management” and “Trails, Recreation, and Administrative Site Operation and Maintenance” reduce adverse effects of authorizing travel on roads and trails on the Forest; also, see the description of those actions and their effects. The Travel Plan action has specific mitigation measures, and Project Design Features (PDFs) include Best Management Practices (BMPs, Appendix C of Travel Plan on CD2: \Support Documents\Travel Plan [in Travel Plan.zip]), identified design features, and Forest Plan Management Requirements (Table 2-27 of Travel Plan on CD2: \Support Documents\Travel Plan [in Travel Plan.zip]) that must be included to protect listed species. This action has the following features in the Deep Creek Section 7 watershed incorporated in the action as project design features.

Project Design Features

Project design features (PDFs) include Best Management Practices (BMPs) (see Appendix C) standards operating procedures (SOPs), identified design features (below), and Forest Plan Management Requirements (Table 2-27) that must be included to protect Forest resources. PDFs are part of all action alternatives.

- The Payette National Forest would continue to support programs and publications that provide information, education, and training on travel access.
- The Payette National Forest would follow National direction for signing and maps. The Forest Service plans to develop a standard national format for motor vehicle use maps. These maps will be available at local Forest Service offices and, as soon as practicable, on Forest Service web sites. The Forest Service plans to issue additional travel management guidance in its sign standards handbook to ensure consistent messages and use of standard interagency symbols.
- Any roads being converted to trails and new motorized trails would be subject to the following features. (Note: new routes are those on which no designated use has occurred in the past. Reconstructed roads and trails are defined as roads or trails that would be designated on previously unauthorized or closed system roads that would now be open to public travel.)
 - Before a new or previously unauthorized road or trail is constructed, reconstructed, or open for use, a cultural resources survey and evaluation would be completed and concurrence received from the Idaho State Historic Preservation Office so that no impacts would occur to cultural resource sites. Although most routes have been inventoried and cleared for use, a Programmatic Agreement or Memorandum of Agreement may be used to ensure all cultural resource requirements are met.
 - Before a new or previously unauthorized road or trail is constructed, reconstructed, or open for use, a rare plants survey and evaluation would be completed and necessary protection measures enacted so that no unacceptable impacts would occur to rare plants, or impacts would be mitigated.
 - Before a new or reconstructed route is made available for use a Hydrologist or Soil Scientist would complete an ATV Trail Condition Assessment to identify problems and to establish a baseline for future monitoring. The assessment would include a standardized classification system, a GPS location, and documentation in a GIS database.
 - New trails or roads would be designed to meet the minimal trail or road standard as defined by the USDA Forest Service Standard Specifications for Construction of Trails, EM-7720-102; or the FSH 7700 Roads USDA Forest Service Handbook for roads.
 - Reroute trails where water management structures cannot function or be properly maintained, or where trails cross soils and sites poorly suited for motorized use. Reclaim abandoned trail alignment by physical closure, installation of water management structures, de-compacting the abandoned travelway, and pulling of available slash onto the abandoned trail.
 - Construct and maintain water management features (such as waterbars, grade dips, rolling dips, culverts, sheet drains, check dams, ditches or bridges) as determined by a Forest Service hydrologist and /or fisheries biologist. Aquatic organism passage requirements

would be developed based on a new interdisciplinary approach to create stream simulation (CD2: \Support Documents\Roads\stream_crossing_design [in Roads.zip]).

- When rerouting of poorly located trail is not feasible, improve the trail surfaces so they will support use without unacceptable resource impacts. Improvement techniques include replacing or capping unsuitable soils including fills with geotextiles, gravel, corduroy, wood matrix, puncheon, porous pavement panels, or matting.
- Include measures to prevent the spread of noxious weeds such as: uses of weed-free gravel or soil, use of weed-free hay or straw, and prompt re-vegetation of areas of disturbed soil.
- Avoid removing snags and potential snags when constructing or reconstructing roads and trails whenever practical. Hazard trees that are a threat to public safety may be removed.

In addition to the project design features, BMPs are included in the action. Those BMPs (Table 11) are included in order to minimize adverse effects to listed fish species where they occur.

Table 11.—Watershed related BMPs are included in the action in order to minimize adverse effects to listed fish species where they occur. This table is a summary from the measures defined in the Environmental Impact Statement.

BMP Description	Purpose or Objective	Effectiveness and IFPA Compliance
SWCP 11.05 - Wetlands analysis and evaluation.	Maintain wetland functions and avoid adverse soil and water resource impacts associated with the destruction or alteration of wetlands, bogs, and wet meadows.	HIGH. IFPA Rule 030: 08c
SWCP 11.07, 11.11 - Oil spill contingency plan. Petroleum storage, delivery facilities, and management.	Prevent contamination of soil and water resources resulting from leaking delivery systems and storage facilities.	HIGH. IFPA Rules 060: 02a, b, c
SWCP 11.09 - Management by closure to use.	Exclude activities that could result in damages to facilities or degradation of soil and water resources.	HIGH. IFPA Rule 040: cii, di, dii, eiii, eiv
SWCP 11.14 - Management of snow survey sites.	Protect snow courses and related data sites from effects by land management activities.	HIGH. No related IFPA rules.
SWCP 13.04 - Revegetation of surface-disturbed areas.	Protect soil productivity and water quality by minimizing soil erosion.	MODERATE. IFPA Rule 030: 04c, 05a, 05b
SWCP 14.05, 15.05 - Protection of unstable areas. Slope stabilization and prevention of mass failures.	Identify and protect unstable areas so as to avoid triggering mass movements and resultant erosion and sedimentation.	HIGH. IFPA Rule 3.d.ii
SWCP 14.17, 15.3, 15.19 - Stream channel protection. Controlling in-channel excavation. Stream bank protection.	Protect natural stream flows and streamside vegetation by maintaining unobstructed passage of stream flows and by reducing sediments and other stream pollutants from entering.	HIGH. IFPA Rule 030: 05a, 040: 04a thru d
SWCP 15.02 - General guidelines for the location and design of roads and trails.	Locate and design roads and trails with minimal soil and water resource impacts while considering all design criteria.	MODERATE. IFPA Rule 030: 03b, c; 04a 040: 02a thru h
SWCP 15.03 - Road and trail erosion control plan.	Prevent, limit, and mitigate erosion and sedimentation through timely implementation of erosion control practices prior to and during ground-disturbing activities.	MODERATE. IFPA Rule 040: 03c, f, hi.
SWCP 15.06 - Mitigation of surface erosion and stabilization of slopes.	Minimize soil erosion and sedimentation from road cut slopes, fill slopes, and travelways during and after construction.	MODERATE. IFPA Rule 040: 03a thru j.
SWCP 15.07 - Control of permanent road drainage.	Minimize the erosive effects of concentrated water and the degradation of water quality through proper design and construction of road drainage systems and control structures.	MODERATE. IFPA Rule 040: 03 and 04.
SWCP 15.08 - Pioneer road construction.	Minimize sediment production and mass wasting associated with pioneer road construction.	MODERATE. IFPA Rule 040: 02
SWCP 15.09 - Timely erosion control measures for incomplete roads and stream crossings.	To minimize accelerated erosion and sedimentation from disturbed ground created by ongoing incomplete projects.	MODERATE. IFPA Rule 040: 03a, b, f, i
SWCP 15.10, 15.18 - Control of road construction excavation and sidecast. Disposal of right-of-way and roadside debris.	Reduce sedimentation from unconsolidated excavated and sidecast material and construction slash caused by road construction, reconstruction, or maintenance.	HIGH. IFPA Rule 040: 04a
SWCP 15.11 - Servicing and refueling of equipment.	Prevent contamination of water from accidental spills of fuels, lubricants, bitumens, raw sewage, wash water, and other harmful materials.	HIGH. IFPA Rule 060: 02a, b, c
SWCP 15.14 - Diversion of flows around	Minimize downstream sedimentation by ensuring that all	HIGH. IFPA Rule 040:

BMP Description	Purpose or Objective	Effectiveness and IFPA Compliance
construction sites.	stream diversions are carefully planned.	03e
SWCP 15.16 - Bridge and culvert installation (disposition of surplus material).	Minimize sedimentation and turbidity resulting from excavation for in-channel structures.	HIGH. IFPA Rule 040: 03b, d, e
SWCP 15.17 - Regulation of borrow pits, gravel sources, and quarries.	Minimize sediment production from borrow pits, gravel sources, and quarries, and limit channel disturbances in those gravel sources suitable for development in floodplains.	HIGH. IFPA Rule 040: 03g
SWCP 15.21 - Maintenance of roads.	Conduct regular preventive maintenance operations to avoid deterioration of the road surface and minimize disturbance to water quality and fish habitat.	MODERATE. IFPA Rules 040: 04a, b.
SWCP 15.23 - Traffic control during wet periods.	Reduce the potential for road surface disturbance during wet weather and reduce sedimentation probability.	MODERATE. IFPA Rule 040: 03.i
SWCP 15.24 - Snow removal controls.	Minimize impacts of snowmelt on road surfaces and embankments and reduce the probability of sediment production resulting from snow removal operations.	MODERATE. IFPA Rule 040: 05a, b
SWCP 15.27 - Trail maintenance and rehabilitation.	Minimize soil erosion and water quality problems resulting from trail erosion.	HIGH. No related rules

Division of Environmental Quality (DEQ)

Idaho Department of Health and Welfare DEQ is responsible for the overall coordination and implementation of the state's nonpoint source programs. Implementation of the Nonpoint Source Management Program is accomplished through interagency coordination with local, state, and federal natural resource agencies. The nonpoint source programs are implemented with assistance from public advisory committees, which provide continuous feedback on the direction and acceptability of the nonpoint source control strategy.

The nonpoint source control strategy is based on the feedback loop concept. BMPs are the backbone of this control program. A process for site-specific application of BMPs is developed under each nonpoint source program, and monitoring is used to evaluate the effectiveness of the BMPs. Changes to BMPs are recommended when they do not support the beneficial uses; monitoring continues to ensure that the revised practices are adequate (The 1992 Idaho Water Quality Status Report, Idaho Department of Health and Welfare, DEQ, December 1992). The nonpoint source program places emphasis on the following actions:

- Building on the strength of existing nonpoint programs, such as agriculture and forestry;
- Focusing evaluation and monitoring techniques on beneficial use assessments and BMP effectiveness;
- Creating public awareness and support through information, education, and citizen participation;
- Institutionalizing the feedback loop components in state and federal agency programs using the Clean Water Act requirements; and
- Integrating the nonpoint source control program with implementation of the Antidegradation Policy.

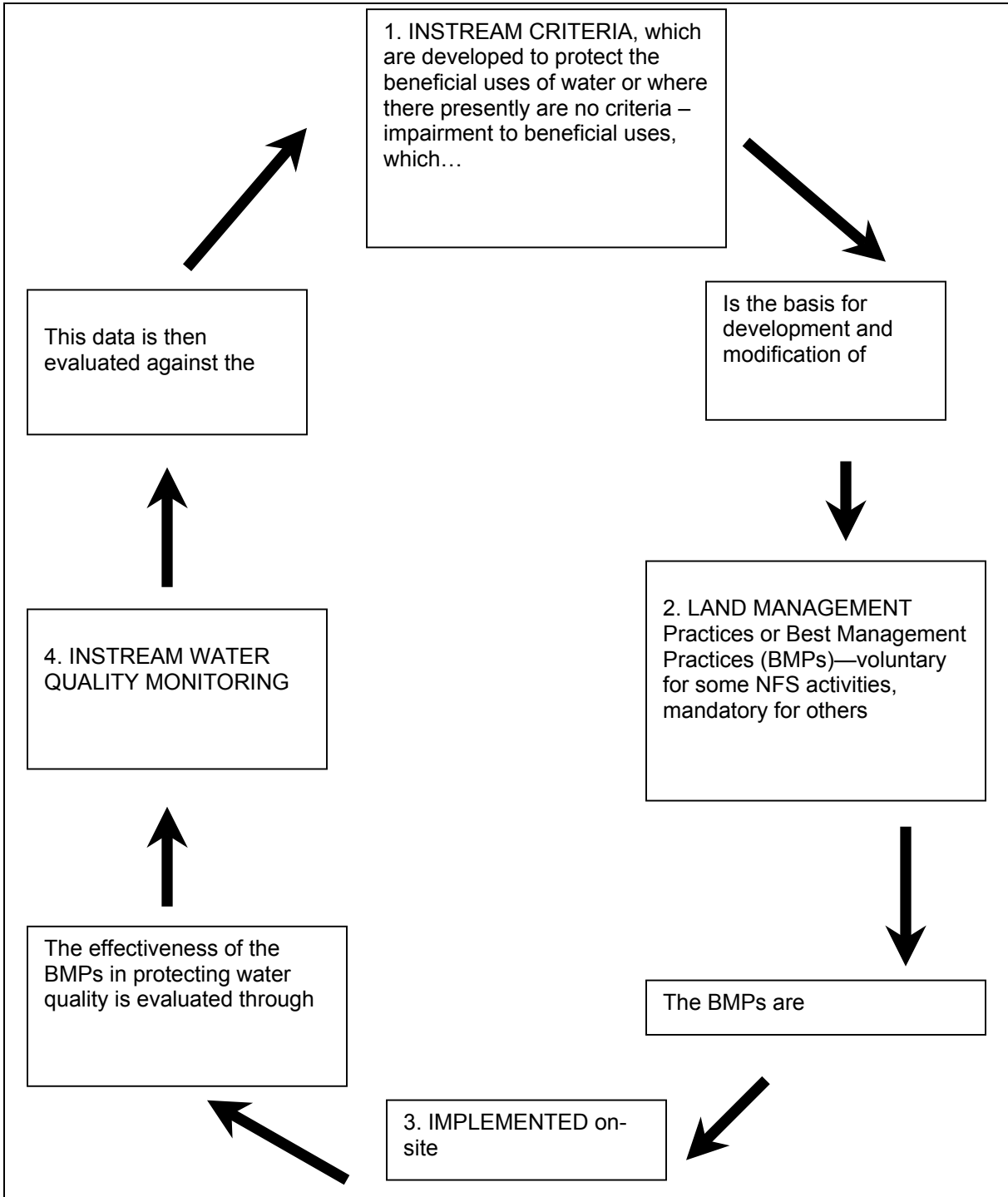


Figure 4.—Feedback loop for BMPs associated with the Travel Plan.

J. FEDERAL ACTION: LIVESTOCK GRAZING

1. Deep Creek and Snake River/Indian Creek allotments.

PURPOSE AND NEED: Permitting grazing of domestic sheep in the Deep Creek watershed until December 31, 2017.

LOCATION: These activities are dispersed throughout the watershed, but are generally concentrated near ridge tops, following the Annual Operating Provisions.

DATES OF PREVIOUS CONCURRENCE:

- USFWS: October 15, 2001
- NMFS: August 9, 2001

DESCRIPTION: The federal action consists of grazing one band of 1200 ewe/lamb pairs on the Snake River/Indian Creek Allotment from May 16 to October 15. Depending on current rotation either one band of 950 ewe/lamb pairs graze the Deep Creek Allotment from mid-August through the end of August, or 1200 dry ewes graze the allotment from approximately September 2 through October 15. The Deep Creek Allotment is grazed as a pasture in the Smith Mountain Allotment rotation. Portions of Smith Mountain outside of Deep Creek are analyzed in appropriate BAs. Steelhead and Chinook salmon have not been documented in the upper reaches of Deep Creek where the sheep graze. It is unknown where bull trout reside within the watershed but we do not know to what extent.

LRMP rangeland resource standards to protect aquatic resources include:

- TEST25 - Mitigate, through avoidance, the adverse effects of livestock access or activities that may result in trampling of redds or disturbance of spawning or reproductive staging of ESA listed fish species
- RAST02 -Limit livestock trailing, bedding, watering, and other handling to those areas and times that maintain or allow for restoration of beneficial uses and native and desired non-native fish habitat.
- RAST03 - New water developments, corrals, and other handling or loading facilities shall not be located within RCAs, unless it can be demonstrated that these facilities maintain or allow for restoration of beneficial uses and native and desired non-native fish habitat.
- RAST04 - Livestock salting will be prohibited in RCAs. Sheep will be salted only at bed grounds. Salt will be placed in containers and moved with the sheep.
- RAST05 – Only one night/one time use of bed grounds is allowed.
- RAST07 - Only annual once-over sheep grazing will be allowed, with the exception of designated sheep driveways, travel routes, or where specifically authorized.

REQUIRED MITIGATION

General Measures

- Adjusting grazing practices as necessary to maintain or improve inland and anadromous fish resources and fish habitat.
- Assure that existing facilities within RCAs do not prevent or retard attainment of WCIs.
- Limit livestock trailing, bedding, watering, salting, loading, and other handling to those areas and times that will not prevent or retard attainment of WCIs.
- Salt is not to be placed in meadows or bottoms, where livestock congregate and should be placed no less than 0.25 miles from water.

Sheep Allotment Mitigations

These measures are specified for all sheep grazing allotments to maintain or improve aquatic resources. Site-specific mitigations and management are located in the Annual Operating Instructions.

- Once over grazing equivalent to 30% allowable use in riparian and upland areas.
- One time watering per location.
- Permitted grazing can be modified based on range utilization and monitoring studies. Regular field inspection by range personnel of forage utilization, affects where the sheep are, and how long they remain in an area.
- Grazing around all high mountain lakes is prohibited.
- No re-grazing or trailing over an area that has been grazed.

Livestock will be removed from the allotment if bank stability in Copper Creek or Deep Creek drops below present levels. If any conflicts are identified, NOAA and USFWS will be notified of the conflict, and resolution will be proposed.

K. FEDERAL ACTION: OUTFITTER AND GUIDE ACTIVITIES (HEAVEN’S GATE OUTFITTERS)

PURPOSE AND NEED: Issuance of special use permit to allow Heaven’s Gate Outfitter and Guide to operate in the Rapid River subwatershed until December 31, 2017. This consultation covers the permits through December 31, 2017, even though the life of the permit may extend beyond that. If a permit has expired or if permits expire before December 31, 2017, this consultation covers reissuance of the permits until December 31, 2017.

LOCATION: Deep Creek Section 7 watershed

DATES OF PREVIOUS CONCURRENCE:

- USFWS: None in this section 7 watershed
- NMFS: None in this section 7 watershed

DESCRIPTION: Heaven’s Gate outfits and guides fall and winter hunting trips. Priority use period is from September 1 through March 1. The outfitter has six camps, five of which: the Mullin Springs, Copper Creek, Lake Fork Creek, Shingle Creek, and West Fork camps are located in the Rapid River drainage, and one, the Six-Lake Basin Camp lies in the Deep Creek drainage, which is covered in this analysis. Some camps may lie within RCAs. Heaven’s Gate Outfitters would be authorized for approximately 400 service days of use with a maximum number of 28 stock animals.

REQUIRED MITIGATION:

Past requirements in the Rapid River drainage where most camps occur included adopting default LRMP standards for Riparian Conservation Areas (RCAs). Often, this is impractical as level areas for camps are within RCAs. Past inspections have found minor problems, moving a corral that was too close to a small tributary, and creating an off-site water trough for horses to remedy a small area of bank trampling (Gary Elliot, personal communication).

Additional Mitigation

- annually inspect permitted campsite(s).
- check camps to see that
 - they are meeting LRMP standards
 - if they are causing detrimental sediment delivery, or adversely impacting riparian vegetation
 - if there are potential adverse effects to fish or fish habitat at the site(s).
- camps may be in RCAs; but should monitoring find a camp may negatively affect fish or fish habitat, changes will be made in coordination with a fisheries biologist to eliminate the problem or reduce effects to a negligible level.
- determine whether permit conditions are being met.
- if there are potential adverse effects, consultation will be reinitiated.
- if Guides or Outfitters fail to follow the mitigations, the Level 1 team will be notified.

- the Forest will annually educate outfitters and guides about ways to avoid adverse effects to listed fishes.

V. ANALYSIS OF POTENTIAL EFFECTS

A. GENERAL EFFECTS OF MANAGEMENT DISTURBANCES

1. DIRECT AND INDIRECT EFFECTS OF LOGGING FROM SMALL SALES, GREEN AND SALVAGE

Potential effects to fish and their habitats are principally related to increased sedimentation from land disturbance and alteration of riparian communities. When sediment production exceeds a stream's ability to transport it, the amount of fine sediments increase on and within stream substrates. Salmonid populations are typically negatively correlated with the amount of fine sediment in stream substrate (Chapman and McLeod, 1987). Spawning area quality is affected because egg deposition and survival are reduced when sediment fills the interstitial spaces between gravels, preventing the flow of oxygen and the flushing of metabolic wastes. Emerging fry and aquatic insects can also be trapped and smothered by sediment deposition in the gravels. Rearing areas are diminished as sediment fills pools and other areas. Sedimentation of deep pools and coarse substrate used for rearing and overwintering limits the space available for fish. Bell (1986) cited a study in which salmonids did not move in streams where the suspended sediment concentration exceeded 4,000 mg/L because of a landslide. Newly emerged fry appear to be more susceptible to even moderate turbidity than older fish. Turbidity in the 25-50 NTU range (equivalent to 125-275 mg/L of bentonite clay) reduced growth and caused more young salmon and steelhead to emigrate from laboratory streams than did clear water (Sigler, et al. 1984).

Stream channel habitat components are highly dependent upon the configuration of the bed and banks of the stream channel. Perpetuating the physical, vegetative, and biological processes that maintain stream channel configuration is a necessity. Human-induced disturbance and geoclimatic factors often produce different stream/riparian characteristics than would geoclimatic factors alone. The result can be a stream that no longer performs its physical functions of floodplain access, water table maintenance, and sediment transport. The aquatic habitat variables associated with the physical functioning of a stream (pool/riffle ratio, pool size, undercut, woody debris) may not be adequate to support viable fish populations (Bull 1979; Heede 1980).

Use of roads is an integral part of all logging operations. Roads can affect streams directly by accelerating erosion and sediment loading, altering channel morphology, and by changing the runoff characteristics of watersheds. These processes interact to cause secondary changes in channel morphology (Furniss et al. 1991). All of these changes can affect fish habitat. The bare, compacted soils on roads exposed to rainfall and runoff are a potential source of surface erosion. Roads and ditches form pathways for sediment transport to stream channels (Chamberlin et al 1991). Roads are constructed, reconstructed, and maintained in the watershed for general traffic use and in conjunction with timber harvest and other activities.

Riparian areas are a component of functioning aquatic ecosystems. Protection of these areas is often accomplished by delineating riparian areas and restricting or prohibiting management activities within these zones (Forest Ecosystem Management Assessment Team, 1993). This approach allows for the maintenance of current and future sources of large, woody material, intact riparian vegetation communities, and functional ecological processes of temperature (water, air, and soil) regulation and buffer strip functioning.

Logging and salvage within buffer strips reduce their ability to contribute large wood to streams (Bryant 1980; Bisson et al. 1987) and can have other effects. Logging might occur due to noncompliance as described for the environmental baseline, or under special provisions for miscellaneous products. Increased water temperature can often be traced to removal of shade-producing vegetation along streams and smaller tributaries that supply cold water to fish-bearing streams (Beschta et al. 1987). A distinct microclimate is maintained along stream channels, created by cold air drainage and the presence of turbulent surface waters (Chen 1991). In the Oregon Coast Range and western Cascade Mountains, riparian buffers of 100 feet or more have been reported to provide as much shade as undisturbed late succession/old growth forests (Steinblums 1977). Many effects of riparian vegetation on streams decrease with increasing distance from the stream bank (McDade et al. 1990) and are

influenced by the degree of channel constraint and floodplain development (Sedell et al. 1987). The effectiveness of buffer strips along constrained channels to deliver large wood is low at distances greater than approximately one tree height away from the channel. Wind throw, an important contributor of large woody material to streams, is driven by riparian topography. Streams with steep V-shaped topography have the ability to deliver leaf and other particulate organic matter to streams, the amount of which declines at distances greater than approximately one-half tree height away from the channel (Forest Ecosystem Assessment Team, 1993).

Within riparian and/or landslide prone areas, buffers, called RCAs, are identified to protect streams from non-channelized sediment inputs, act as source of wood, and provide other necessary ecosystem functions (USFS 2003). These RCAs have been shown to be wide enough to prevent non-channelized sediment from reaching fish-bearing streams. These RCAs minimize the likelihood of non-channelized flow reaching any stream and becoming channelized flow. Broderson (1973), Belt et al. (1992), Ketcheson and Megahan (1990), Burroughs and King (1989), and Swift (1986) generally concluded that 200-300 foot riparian filter strips are effective at protecting streams from sediment from non-channelized flow. All RCAs are required to be mapped on the ground and specific standards and guidelines applied.

Standard RCA widths are:

- **Perennial streams.**—300-foot slope distance from ordinary high water mark, or flood-prone width, or two site-potential tree heights, whichever is greatest.
- **Intermittent streams.**—150-foot slope distance from the ordinary high water mark, or flood-prone width or one site-potential tree height, whichever is greatest.
- **Ponds, lakes, reservoir, and wetlands.**—150-foot slope distance from the ordinary high water mark, or outer edge of seasonally saturated soils, outer edge of riparian vegetation, or one site-potential tree height, whichever is greatest.

Landslide prone areas are excluded from harvest during the final unit layout.

2. DIRECT AND INDIRECT EFFECTS OF FIRE MANAGEMENT

There are three major components of the federal action that may have very different effects; those are:

1. Fire suppression, where the effects of the wildfire itself are not effects of the federal action.
2. Wildland fire use fires, where the decision is to take no federal action and the effects of the fire are a natural event.
3. Prescribed fire, where the effects of the fire are effects of the decision to burn under prescribed conditions.

Fire suppression effects are quite different from wildfire and prescribed burning because we consider only the management effects of suppression and not the fire itself. Effects of fire suppression and prescribed fire would be similar to observed effects of other prescribed burns and effects from wildfires that have been observed and studied. Those studies are described in the following section. These effects have been essentially natural, with no persistent adverse changes to fish habitat. Most observed prescribed burns have been spring burns, done during cool, moist conditions. Wildfires generally occur under warmer, drier conditions and burn with greater intensity than prescribed fires. The influence of fire on hydrology and water quality can be viewed as a continuum, with effects of prescribed burning at one extreme and wildfire at the other (Baker 1989). Even the effects of wildfire on fish habitat have been found to be essentially natural with no persistent effects. Intense wildfires, like those occurring after years of suppression, can alter fish habitat and the ecology of streams (Rieman et al. 1995; Minshall et al. 1989).

Fire Suppression

Studies of the effects to fish habitat from wildfire suppression show that they are not necessarily adverse when Payette National Forest fire suppression guidelines are applied. These studies confound the effects of the fire with the effects of the suppression action, so the effects of the

suppression itself are expected to be far less than the total effects documented. The following discussion of monitoring results is for the confounded studies, after which we will describe other effects of fire suppression.

Monitoring by Idaho State University in the Rapid River and Big Creek watersheds on the Payette National Forest has shown that wildfires have essentially natural effects (Minshall et al. 1994). Overall, the physical and chemical habitat of study streams in the Big Creek and South Fork Salmon River watersheds has not been altered by either the Golden Fire of 1988 or the Chicken Fire of 1994 (Bowman and Minshall 1999).

Distinct changes in the benthic habitat characteristics did not occur in Big Creek tributaries influenced by wildfires that occurred in 1988 or 1991 (Royer et al. 1995). Major changes were not observed in the channel or substrate characteristics in Big Creek tributaries burned by the 1988 Golden Fire. Only minor year-to-year variation was observed in physical and chemical parameters. (Royer and Minshall 1996).

The heavy spring runoff in 1996 did not appear to scour burned streams in Big Creek to any great extent compared to control streams. (Royer et al. 1997). No substantial changes in water chemistry or measurements of physical habitat characteristics have been observed over nine years of study on Big Creek tributaries influenced by wildfire (Bowman et al 1998, Bowman and Minshall 1999). The streams continue to show no discernable change related to burning by wildfire, and the studies support the hypothesis that fire would have no measurable long-term effects.

Minimal influence from the 1994 Chicken Fire was observed in South Fork Salmon River tributaries (Royer and Minshall 1996). Monitoring in South Fork Salmon River tributaries after wildfires that occurred in 1994 indicated that there were no immediate effects on the catchments studied and only small areas of intense wildfire impact in the catchments. Riparian areas were relatively undamaged and stream channels appeared stable (Royer and Minshall 1996). The Chicken Fire has not created unstable habitat conditions in Fritzer Creek. The physical and chemical habitat of streams studied in the South Fork Salmon River watershed has not been altered by the Chicken Fire (Bowman and Minshall 1999).

Sediment monitoring in the South Fork Salmon River and Chamberlain Creek showed that fine sediment in spawning areas did not show unnatural increases after the 1994 wildfires, or the floods that occurred in 1997 (data on file, Payette National Forest, Supervisor's Office, McCall, Idaho). The 1994 fires, coupled with other potentially destabilizing natural events including floods, hill slope failures, and extreme spring flows have not resulted in obvious deposition of fine sediments (Nelson et al. 1999).

The upper reaches of Chamberlain Creek were within the 1994 Chicken Fire Complex. Fine sediments were slightly elevated in 1996, but have generally declined since 1989. In the upper South Fork watershed, in spite of two large wildfires, high snow packs, and spring runoffs for three consecutive years, and widespread hill slope failures, streambed conditions have fluctuated but did not change significantly (Nelson et al. 1999). Similar results were found in the Secesh River watershed, where the entire Lake Creek area was within the Chicken Fire perimeter, but the trend in spawning conditions for anadromous fish appear to be improving, with decreasing amounts of fine sediment.

Post-fire BAER (Burned Area Emergency Rehabilitation) surveys conducted on the Payette National Forest after the 1994 wildfires found natural vegetation recovering by the following summer. Sprouting of vegetation was noted later in the fall of 1994, after the fire had passed through some areas. Burned trees, even in riparian areas are important sources of large woody debris. Large woody debris recruitment to streams was evident where moderate burn severities occurred after the 1994 wildfires (BAER reports, 1994).

It was estimated that only 5% of small streams within the Chicken Fire perimeter were affected by near total loss of riparian vegetation (Chicken BAER 1994). Burn intensities in riparian zones of the

Chicken Fire varied from low to moderate-hot. Vegetation in these areas was already beginning to resprout by September 1994, and was expected to fully recover within two years (Chicken BAER 1994). By the following summer, there was an excellent natural vegetation recovery response (Dave Kennell, Forest Hydrologist, personal communication). Abundant forbs and shrubs were evident.

The BAER report for the Corral Fire concluded that there would be no persistent effects to anadromous fish. A lack of burning was observed in riparian areas. Natural recovery patterns are expected to be sufficient to preclude long-term degradation of fish resources. Riparian vegetation was generally not much affected or only dried by the fire.

Lightning caused fires that were allowed to burn in the Selway-Bitterroot Wilderness were observed from 1979 to 1987. Despite the steep topography, very little soil movement was observed (Saveland and Bunting, no date).

Observations by fishery biologists and monitoring by Idaho State University and the Payette National Forest indicate that fish habitat is generally not adversely affected by wildfire, and any habitat changes are short-term. Even in other areas, the consequences of large fires are not as catastrophic as often anticipated (Rieman et al. 1995). The magnitude of effect varies widely because, on average, there are about 150 incidents/year on the Forest (most of which are initial attack) compared to a larger acreage burned on a more sporadic basis. Again, it is pointed out that monitoring of fire effects confound the effects of suppression and the effects of fire, such that the independent effects of the suppression action are expected to be far less than the documented combined effects.

Use of tractors, heavy equipment, and chainsaws can alter fish habitat to an extent similar to logging or other similar land disturbing activities. Chamberlain et al. (1991) summarized these types of effects to include changes in sedimentation and stream channel morphology. Potential effects from these sources should be reduced by adoption of guidelines requiring the use of minimum impact fire suppression techniques. The risk and reduction cannot be quantified. Although research in Yellowstone National Park (Schullery and Varley 1994; Gresswell 1993; Mahoney et al. 1993; Young and Bozek 1996) and central Idaho wilderness do not discriminate among sources of change to fish and habitat from fire versus suppression, the combined effects were well within the range of natural variation. Minimum impact suppression techniques were applied to many of the fires studied. This research shows that fish habitat and populations remain unchanged or only changed marginally under such circumstances and effects are negligible.

Norris et al. (1991) summarized the toxicity of various fire retardants. These chemicals are toxic to salmonids in some concentrations. A detailed description of the potential effects of retardants can be found in previous emergency consultation for the South Fork Salmon River (Faurot and Burns, 2005a). Adoption of the guidelines will decrease the risk of effects from fire retardant. The risk and reduction cannot be quantified for various reasons documented in detail by Faurot and Burns (2005a), including such factors as the magnitude of material reaching fish, ameliorating water chemistry and quantity, and avoidance by fish. So long as the guideline to avoid applying retardant to streams is implemented effects are anticipated to be negligible.

Fuel can be toxic to salmonids (McKee and Wolf 1963), with the hydraulic fate of the fuel playing a large role in the resultant effects (Saha and Konar 1986). Risks associated with fuel are reduced by the guidelines requiring certain handling procedures. The risk and reduction cannot be quantified. In the past, there have been no instances where the guidelines resulted in observed effects to listed salmonids; therefore we conclude that the effects are negligible.

Location of fire camps and crews close to occupied fish habitat can directly affect salmon habitat or their behavior. David Burns (Forest Fish Biologist, personal communication) has observed that salmon move away from people. People can trample redds and fish mortality can result (Roberts and White 1992). Risk of these impacts is directly proportional to the number of people and their proximity to the salmon and habitat. The risk of these types of effects is reduced by the adoption of these guidelines. The risk and reduction cannot be quantified, but are expected to be negligible because of avoidance.

Prescribed Burns

Disturbance must be recognized as an integral component of any long-term freshwater habitat restoration strategy (Reeves et al. 1995). Historically, fires were a natural and an important part of the disturbance regime for aquatic systems. Changes are often observed from wildfires after a large-scale hydrologic event (e.g., heavy rains and flooding), and are the result of the two natural events together. In the Oregon Coast Range, the frequency, size, and distribution of wildfires and landslides has been responsible for developing a range of channel conditions within and among watersheds (Reeves et al. 1995). Reeves et al. (1995) found that immediate impacts from intense wildfires followed by intense winter rainstorms include direct fish mortality, elimination of access to spawning and rearing sites, and temporary reduction or elimination of food sources. However, long term effects may be positive, related to landslides and debris flows that introduce large wood and sediment into channels and affect storage of these materials. The configurations of channel networks, the delivery, transport and storage of sediment and wood and the decomposition of woody debris interact to create, maintain, and distribute fish habitat. It is important to maintain and restore complex habitats across a network of streams and watersheds (Rieman and Clayton 1997).

Fish species present are not expected to be adversely affected by any disturbances to habitat resulting from the prescribed burning. Anadromous salmonid populations in the Pacific Northwest are well adapted to dynamic environments because of their high fecundity, mobility of juveniles, and straying adaptations (Reeves et al. 1995). Species such as bull trout and redband trout (steelhead) appear to be well adapted to pulsed disturbances such as those created by fire (Rieman and Clayton 1997). Rieman and Clayton (1997) recommend priority management activities that emphasize prescribed fire where depressed and small or isolated populations of sensitive species persist in landscapes at high risk of uncharacteristic wildfire. Successfully reestablishing more natural patterns and processes could lead to long-term restoration of more complex, productive aquatic habitats.

Prescribed fires are expected to have much lesser degree of effects than wildfires that burned in the Boise River basin in 1992 and 1994. Those fires were large, intense events that would probably have been rare historically (Rieman et al. 1995). Although these wildfires profoundly altered fish populations and habitat, the short-term recovery of bull trout and redband trout populations has been dramatic (Rieman et al. 1995). Broadly distributed habitats suitable for these fish during and after the fire provided for colonization. In an evolutionary sense, bull trout likely experienced disturbance patterns that included mixed or high intensity fires.

Outcome of future prescribed burning projects would be expected to be similar to that of past prescribed burns. Effects have been essentially natural, with no adverse changes to fish habitat. Most prescribed burns observed have been spring burns, done during cool, moist conditions. Observations of spring prescribed burning on the Payette National Forest has shown natural effects in riparian areas, or no observable evidence that fire had burned into riparian areas more than *de minimus* amounts (John Lund [retired], Mary Faurot and Dave Burns, Payette National Forest fisheries biologists, personal communications). Similar observations were made for spring prescribed burns on the Nez Perce National Forest (Gary Seloske, Nez Perce National Forest fishery biologist, personal communication).

Data were collected on pre- and post-burn under-story conifer mortality and fuel loading on two prescribed burns in the South Fork Salmon River watershed. On most study plots, the mortality of trees 7" dbh and smaller was 0-33%. Two plots (out of twelve) experienced 100% mortality of this under-story (the desired result). Five of the twelve plots did not burn at all, because, even though a prescribed fire "unit" is delineated, the fire does not burn every acre in the unit. Fuel loading (total downed woody fuel) was reduced by 12% and 15% on two plots, and was not reduced at all on a third plot (CD2: \Support Documents\Fire\Rx_Fire_Monitoring.pdf [in Fire.zip]).

Observations in the most concentrated area of tree mortality in the riparian corridor of the 1999 Rapid River fall prescribed burn revealed mortality in far less than 10% of mature riparian trees, with mortality as low as 1% for the entire riparian burn area. Observations of the 1999 under-burn in riparian areas

dominated by grand fir in the Rapid River area documented mortality of mature trees as very low to low. Observations of riparian areas within the 1994 Rapid River burn show that the effects are invisible in the grand fir riparian areas. Observations of the 1990 burn show that effects of prescribed fire uphill of riparian areas are now invisible (this CD2: \Support Documents\Fire\RapidRiverMay2004\RapidRiverMay2004 [in Fire.zip]). Study plots established in the late 1980s on the Camp Creek burn area to monitor post-fire soil movement found essentially no movement of soil (J. Lund, Krassel District Fish Biologist, personal communication).

Some effects of prescribed burning have also been described elsewhere. A fall prescribed fire, which covered 43% of a previously undisturbed ponderosa pine watershed in east-central Arizona, did not increase annual or seasonal stream flow significantly over a 6-year study period (Gottfried and DeBano 1989). Fire consumed little of the forest floor, although surface fuels were generally consumed. Baker (1989) found that prescribed burns in the Southwest usually have minimal hydrologic impact on watersheds because the surface vegetation, litter, and forest floor are only partially burned. If properly executed, prescribed burns will not significantly affect the integrated overland flow and stream flow regime of a watershed.

Impacts to riparian areas from prescribed burning are not expected to be so severe that stream temperatures would be affected. The majority of the acreage (about 80-90%) to be burned would be a low intensity under-burn. Over-story mortality of 2% and up to 15% is expected in burned areas. Observations of other prescribed burns indicate the percentages of over-story mortality would be even less in riparian areas. These low levels of canopy removal are not expected to cause increases in stream temperatures. Controlled burning that occurred in riparian areas would stimulate regeneration of some riparian species that may have become decadent due to fire exclusion, contributing to stream shading.

One intended effect of prescribed burning is to reduce the likelihood of large stand-replacing wildfire. Previous prescribed burns reduced the amount and continuity of fuel available for large stand-replacing fires (Suzanne Acton, Former New Meadows District fuels specialist, personal communication, 2003). Large, stand-replacing fires might theoretically adversely affect the quality of habitat for the listed fish species, but this has not been shown by monitoring on the PNF (Minshall et al 1994; Bowman and Minshall 1999). Data collected on the PNF show no fine sediment deposition increase from either prescribed burns or wildfire (Nelson et al. 1999, 1996a, 1996b, 1997, 1998; Nelson and Burns 1999). Fish habitat is generally not adversely affected by wildfire, and changes to habitat that result from wildfire are considered natural. Field review of past Rapid River prescribed burns in 2000, 2001, and 2003 found that fire had burned in a mosaic pattern at varying intensities and severities in upland areas. Where burning had occurred in riparian areas it had also been in a mosaic pattern, had been of low intensity and severity as new under-story growth could be seen, had killed very few trees, and had virtually no impact on vegetation directly adjacent to streams (Dale Olson, PNF fisheries biologist, personal communication, 2003).

The National Marine Fisheries Service recognizes that the introduction of prescribed fire could have potential long-term benefits in restoring habitat functions in RHCA's (Biological Opinion for LRMPs, Chinook salmon, 1995). The Biological Opinion for LRMPs, steelhead (NOAA/NMFS 1995b) added items under "Fire Management" to be implemented to reduce or avoid adverse effects to steelhead and listed salmon. These include maximizing the use of planned ignitions and natural prescribed fire to meet vegetation management objectives."

Effects of any holding action, action to reduce the spread, of prescribed fire are expected to be the same as described for fire suppression above. The same mitigation measures would apply for fire suppression, or holding actions on prescribed fire.

Effects of Mitigation Measures

Effects to stream temperature are mitigated in all actions to negligible levels where guidelines are followed. Stream temperature is largely controlled by shading. The density of the riparian canopy is a critical factor in determining heat input to a reach (Amaranthus et al. 1989). Stream temperatures

increased by as much as 10 °C in headwater streams after high intensity wildfires in basins burned during the Silver Complex fire in southern Oregon (Amaranthus et al 1989). Stream shade went from 90% pre-fire to 30% post fire. Wildfire that burned moderately altered the thermal stability of South Fork Salmon River streams compared to reference streams studied by Royer and Minshall (1997), but not to a degree that is likely to be ecologically significant. Return to pre-fire thermal regimes is expected as surrounding riparian vegetation recovers. Even in intensely burned areas, resprouting and increased canopy cover of riparian vegetation may occur over a few years following a fire (Rieman et al. 1995; BAER reports 1994). Severe wildfires that consume all the vegetation in small catchments are expected to have a greater impact on stream temperatures than those found in the study of South Fork streams (Royer and Minshall 1997); therefore, limitations on ignitions for back burns, burnouts, and planned ignitions should be effective mitigation.

Fish being sucked up into pumps or impinged on improperly screened pump foot-valves, retardant or fuel spills entering streams and causing fish mortality, LWD removed from streams during fireline construction, sedimentation from un-rehabilitated fireline, redd trampling during stream fording, and disturbance of spawning Chinook salmon or bull trout are examples of how this action can potentially affect fishes and/or habitat. The [federal action discussion](#), provides direction such as properly screening pumps, not dropping retardant in RCAs or streams, containing fuel, proper handling or use of chemicals, not removing RCA trees unless they present a hazard, rehabilitating disturbed areas (e.g., fireline, helispots, camps), to address potential effects.

Properly screening pumps (i.e, with 3/32" mesh screen) will prevent fish from being impinged or entrained. Not dropping retardant in streams, following direction for containment of fuels, and use of other chemicals (foams) will keep contaminants from entering streams and causing fish mortality. Not removing trees felled within RCAs will reduce soil disturbance and potential sediment moving to streams as well as provide stream cover and diversity, shade, sediment filtering, allochthonous material, and other benefits depending on where the trees lie. Rehabilitation of disturbed areas such as fireline, camps, staging areas, and helibases will serve to stabilize those areas and limit sediment entering streams. In addition, direction to see that fire personnel are briefed and familiar with fire management guidelines in this BA, and oversight and continued education/briefing of fire personnel on fires by resource advisors will be implemented. This action is expected to have negligible effects due to implementation of mitigation measures and guidelines, continued education of fire personnel, and use of resource advisors.

3. DIRECT AND INDIRECT EFFECTS OF NOXIOUS WEED TREATMENT

Chemical Control

As part of the aquatic analysis for herbicide application, a risk quotient was developed for each herbicide product that may be used to treat noxious weeds on the PNF (Tables 12 and 13). The risk quotient was calculated from a no adverse effect level, or safety factor, divided by an "Expected Environmental Concentration" (EEC). The EEC, expressed in parts per million (ppm), was derived from a direct application of the active ingredient to an acre pond (one-foot deep) using the maximum rate specified on the label (Urban and Cook 1986). The EEC is an extreme level that is unlikely to occur during implementation and should be viewed as a worst-case situation. The risk quotient provides a reference from which a possible worst-case situation can be viewed. If the risk quotient is greater than 10, the level of concern is categorized as "Low". If the risk quotient is between one and 10, the level of concern is Moderate. If the risk quotient is less than one, the level of concern is High. Levels of Concern were used to develop mitigative prescriptions for stream buffers (see "Required Mitigation" in Federal Action). Spray card monitoring on the stream banks have shown that buffers have been effective in preventing sprayed herbicides from reaching streams (Pete Grinde, Payette NF Weed Coordinator, McCall, ID, personal communication).

Roadside spraying introduces the risk of contaminating ditches, which could in turn deliver herbicide into streams. The following mitigation measures should reduce, but probably will not eliminate, this risk:

- No spraying would occur when wind velocity exceeds 8 miles per hour; no spraying would occur if precipitation is occurring or is imminent (within 3 hours);
- Only very low risk, “aquatic-approved” chemicals (e.g. glyphosate-Rodeo®) could be used within 50 feet of open water, where hydrophilic or riparian plants are present, and/or where surface material is obvious recent deposition of sediment of any diameter(s).

Table 12.—Worksheet for assessing risk quotient values and levels of concern associated with herbicide applications for aquatic species. EPA risk definitions and safety factors are assumed to be current, and were used in the NOAA draft BO for the Effects of Treatment of Noxious Weeds under the Frank Church River of No Return Wilderness Management Plan (NMFS 2007 CD1: \Support Documents\BAs\LOCs\noaaweed_bo_07.pdf)

Methodology for Determining Level of Concern	Example using 2,4-D
Maximum application rate (known constant based on label rates)	3 lb ai/ac (pounds active ingredient per acre)
EEC - Estimated Environmental Concentration (from Urban and Cook table cited based on direct application to a pond 1 acre-foot in volume) measured in ppb (parts per billion), and converted to ppm (parts per million)	at 3 lb ai/ac, in 1 acre-foot water, the EEC = 1103 ppb or 1.103 ppm
Toxicity - the 96-hour LC ₅₀ (a standard test) for a specific aquatic species. The LC ₅₀ is the concentration of a toxicant that causes mortality in 50% of the test organisms under a specific set of conditions.	LC ₅₀ = 250 mg/L (milligrams per liter), or = 250 ppm (testing conducted with rainbow trout)
Safety Factor - A divisor applied to the toxicity value to establish a concentration below which risk is acceptable (as determined by EPA). For endangered aquatic species, EPA uses 1/20 of the LC ₅₀ value.	1/20 of the LC ₅₀ = 12.5 ppm (250 ppm x 1/20 = 12.5 ppm)
The EPA has determined that there is a presumption of unacceptable risk to endangered aquatic species if the EEC > 1/20 LC ₅₀ . Conversely, if the EEC < 1/20 LC ₅₀ , the application rate used to calculate the EEC should not result in an unacceptable risk to endangered aquatic species.	For the 2,4-D amine, where: EEC = 1.103 ppm at 3 lb ai/ac maximum application rate 1/20 the LC ₅₀ = 12.5 ppm EEC is < 1/20 of the LC ₅₀
Because of some of the concerns associated with this level of concern (risk) analysis (see Table in the text) and because the EPA does not define a magnitude of risk of endangered species, especially when the EEC < 1/20 LC ₅₀ , a gradual “level of concern” scale was developed based on how close the EEC value is to the 1/20 LC ₅₀ . The 1/20 LC ₅₀ value is divided by the EEC value and the quotient represents the level of concern for a given herbicide. The level of concern scale is as follows: If the 1/20 LC ₅₀ ÷ EEC is a quotient of >10, the level of concern is low. If the 1/20 LC ₅₀ ÷ EEC is a quotient of >1 but <10, the level of concern is moderate. If the 1/20 LC ₅₀ ÷ EEC is a quotient of <1, the level of concern is high.	For 2,4-D amine: 1/20 the LC ₅₀ = 12.5 ppm EEC = 1.103 ppm 12.5 ppm ÷ 1.103 ppm = 11 Since the quotient is >10, the level of concern is low.

Table 13.—Risk quotient values and aquatic level of concern assessment for chemical products used by the PNF (information from NMFS [2007, [CD1: \Support Documents\BAs\LOCs\noa_a_weeds_bo_07.pdf](#)] except as indicated).

Active ingredient and soil half life (range) in days	Product name and EPA Registration Number	Typical Application Rate (lb/ai/acre ^a)	Label-Maximum Application Rate (lb/ai/acre)	EEC (ppm)	Toxicity 96-hr. LC ₅₀ (mg/L)	Safety Factor 1/20 LC ₅₀ (ppm)	Species Tested	Highly Volatile ^b	Quotient Value (1/20 LC ₅₀ /EEC) and Level of Concern
Clopyralid	Transline® 62719-259	0.5	0.5	0.184	103	5.2	Rainbow trout	No	28 Low
Glyphosate 47 (21-60)	Rodeo® 524-323	1.0	3.75	1.379	>1000	50	Rainbow trout	No	36 Low
Metsulfuron methyl 120 (14-180)	Escort®	1.5 oz (0.094 lb/ac)	2.0 oz	0.046	>150	7.5	Rainbow trout	No	163 Low
Picloram 90 (20-277)	Tordon™ 22K 62719-6	0.5	1 ^c	0.368	5.5-19.3	0.965	Rainbow trout	No	2 Moderate
2,4-D 10(2-16) amine	Weedar® 64 264-2AA	1.0	3	1.103	250	12.5	Rainbow trout	No	11 Low
Dicamba	Banvel®	0.25-4.0	4.0	1.47	>1000	50	Rainbow trout	No	34 Low
Imazapic	Plateau®	0.06-0.2	0.75	0.276	>100	5.0	Rainbow trout	No	18 Low

^a The application rates are those commonly used on the PNF.

^b Mostly inferred from NMFS (2007) which states that “[n]o highly volatile herbicides are approved for use within the FC-RONRW”; these herbicides were all approved.

^c Maximum rate per acre of picloram is 1 lb; rates may be higher for smaller portions of the acre, but the total use on the acre cannot exceed 1 lb ai/ac/year.

The basic toxicology of the herbicides to be used is presented in Table 14. This information is summarized primarily from NMFS (2007, [CD1: \Support Documents\BAs\LOCs\noa_a_weeds_bo_07.pdf](#)), except that the bioaccumulation information was summarized from the FC-RONRW noxious weed treatment final BA (USFS 2003, [CD1: \Support Documents\BAs\Other\FCRONRW_Final_Weeds_BA.pdf](#)).

Table 14.—Toxicology profile of commonly used herbicides on the PNF.

Toxicology	Transline™	Rodeo®	Escort®	Tordon™	Weedar®	Banvel®	Plateau®
	Clopyralid	Glyphosate	Metsulfuron-methyl	Picloram	2,4-D Amine 4	Dicamba	Imazapic
Rainbow Trout (LC ₅₀ , mg/L)	103	140	>150	19.3	250	28	>100 ^a
Level of Concern for Aquatic Species	Low	Low	Low	Moderate	Low	Low	Low
<i>Daphnia</i> (LC ₅₀ , mg/L)	232 - 350	780 - 930	>12.5 ^b	68.3	184 ^c	<11	>100
Bioaccumulates ^d	No	No	No	No	No	No	No
Persistent in Soil ^e	Moderately	No	Moderately	Moderately	Moderately	No	Yes
Mobile in Soil ^f	Yes	No	No	Yes	Moderately	Yes	Yes

^a Not reported for rainbow trout, but NMFS (2007) suggests this value may be appropriate for most fish species.

^b Ahrens (1994, [CD1: \Support Documents\Toxicity\escort.pdf](#)).

^c USFS (2006, [CD1: \Support Documents\Toxicity\093006_24d.pdf](#))

^d Taken verbatim from USFS (2003).

^e Derived from “Soil Half Life” in Table 4 of NMFS (2007).

^f Derived from “Pesticide Movement Rating” in Table 4 of NMFS (2007).

Effects of chemical control were evaluated using indicators from the effects matrices (Appendix 3) as follows:

Local population indicators.—Sub-lethal effects to listed fish and their food sources are probable, therefore adverse effects are expected from this action. Herbicide runoff, volatilization, and drift are the primary mechanisms of off-target movement of chemicals. Off-target movement can result in unintended injury to nontarget species, and contamination of surface waters. Volatilization would be minimized with the use of nonvolatile herbicide formulations (2,4-D amines are much less volatile than 2,4-D esters for example) and avoiding application of herbicides during hot days. Herbicide drift would be minimized with the use of nozzles with large orifices that produce large spray droplets, using drift control agents, and spraying during calm conditions. Ground application minimizes drift because spray nozzles can be in close proximity to target species and to the ground. Restrictions on the use of non-persistent herbicides in close proximity to water, where riparian or hydrophilic plants are present, and where surface material is obvious recent deposition (Table 15, below), would reduce risks associated with herbicides moving into surface waters or leaching into ground water.

Table 15.—Buffers, maximum wind speed, application methods, and herbicide restriction associated with aquatic habitats, riparian areas, and wetland resources on the PNF.

Buffer	Maximum Wind Speed	Herbicide Application Method	Herbicides Authorized
>50 feet from open water	8 mph	All proposed methods (Ground spraying, hand spraying, wicking, wiping)	Picloram, Clopyralid, Metsulfuron methyl, 2,4,D amine, Dicamba, Imazapic, Glyphosate
<50 feet from open water, where riparian or hydrophilic plants are present, and/or where surface material is obvious recent deposition of sediment of any diameter(s)	8 mph	All proposed methods (Ground spraying, hand spraying, wicking, wiping)	Glyphosate (Rodeo®) ("aquatic approved" herbicides) only

Given the exposure, toxicity, and indirect effect information described following this section for proposed chemicals, sub-lethal effects to listed fish and their food sources are probable, therefore adverse effects are expected from this action. The risk of toxic effects from the proposed action depends primarily on the likelihood that herbicides enter water, the toxicity of the herbicide formulation, and the duration and concentration of herbicides once they reach the water. The risks vary considerably among treatment areas, ranging from virtually no risk in upland areas that lack stream channels and have well-developed soils, to low -moderate risks in areas adjacent to streams, on alluvial deposits composed largely of gravels and sand, and where large amounts of herbicides are applied.

Some potential risks of the action are unknown where information concerning sublethal effects and effects of inert ingredients in the herbicide formulations is lacking or incomplete. Sublethal effects associated with the herbicides used in the proposed action include reductions in reproductive success, weight loss, physiological effects (endocrine system, blood chemistry, liver function, etc.), and reductions in growth, prey capture ability, and swimming ability, all of which are associated with *reduced survival. Information available on sublethal effects of all herbicides proposed for use is incomplete for some chemicals and completely lacking for others. Few herbicide formulations have been thoroughly tested for sublethal effects on salmon or steelhead. There are no field studies available that evaluated potential effects of the herbicides used in the proposed action on aquatic productivity or invertebrate prey species found in Idaho streams. Consequently, the extent and likelihood of harmful sublethal effects from the proposed action from sublethal exposures and changes to the invertebrate prey base are unknown, but cannot be discounted.

If herbicides enter water in an appreciable amount, they could adversely affect listed salmon and steelhead through lethal or sublethal effects of exposure to the herbicide or other additives in the product formulation, alteration of the food web, or loss of riparian vegetation from contact with herbicides. The action includes numerous features and safeguards that minimize the likelihood of appreciable water contamination, such as relatively small and scattered treatment areas, ground-

based application, low amounts of chemical application, and application methods that reduce the likelihood of water contamination through wind drift or runoff, and restriction of herbicides used near water to those that have relatively low toxicity to aquatic organisms. Available water quality monitoring by the USFS for past weed treatments are limited, but suggest that safeguards similar to those in the proposed action are likely limiting the occurrence of water contamination and the concentrations of chemicals when water contamination occurs (Berg 2004). Buffers are a key safeguard and are evaluated for each herbicide as follows:

- **Tordon™ (picloram):** all proposed application methods may be used; but only more than 50 feet from open water, where hydrophilic or riparian plants are not present, and where no surface material is obvious recent deposition of sediment of any diameter(s)
- **Transline™ (clopyralid):** all proposed application methods may be used; but only more than 50 feet from open water, where hydrophilic or riparian plants are not present, and where no surface material is obvious recent deposition of sediment of any diameter(s)
- **Escort® (metsulfuron methyl):** all proposed application methods may be used; but only more than 50 feet from open water, where hydrophilic or riparian plants are not present, and where no surface material is obvious recent deposition of sediment of any diameter, where hydrophilic or riparian plants are not present, and where no surface material is obvious recent deposition of sediment of any diameter(s)
- **Weedar® (2,4-D amine):** all proposed application methods may be used; but only more than 50 feet from open water, where hydrophilic or riparian plants are not present, and where no surface material is obvious recent deposition of sediment of any diameter(s)
- **Banvel® (dicamba):** all proposed application methods may be used; but only more than 50 feet from open water, where hydrophilic or riparian plants are not present, and where no surface material is obvious recent deposition of sediment of any diameter(s)
- **Plateau® (imazapic):** all proposed application methods may be used; but only more than 50 feet from open water, where hydrophilic or riparian plants are not present, and where no surface material is obvious recent deposition of sediment of any diameter(s)
- **Rodeo® (glyphosate):** all proposed application methods may be used; this chemical is approved by the EPA for aquatic use and may be used up to the waters edge, where hydrophilic or riparian plants are present, and where surface material is obvious recent deposition of sediment of any diameter(s)

Buffers should reduce the risk of adverse effects to listed aquatic species, their prey, and non-target riparian vegetation from spray drift or herbicide runoff. Buffer zones have been used previously to minimize (not eliminate) potential effects of herbicides to aquatic resources. In the North Fork Payette River watershed, buffer zones of 50 to 100 feet were used to protect from spraying designed to control weeds and undesirable conifers ([CD1: \Support Documents\NEPA\BEs\North Fork Payette River\NFPR be1.pdf](#)). Spray card monitoring on the stream banks has shown that buffers have been effective in preventing sprayed herbicides from reaching streams (Pete Grinde, Payette NF Weed Coordinator, McCall, ID, personal communication).

Risks were evaluated for an accidental direct spraying of a pond (Tables above). Streams are the most likely habitat types to be treated under the proposed action and due to the moving water and resultant dispersal of any contaminate combined with project design criteria that minimize potential exposure, the pond evaluation is considered an overestimate of any likely conditions on the ground. According to risk calculations for realistic (typical) exposures, risks to aquatic species are low to moderate for all herbicides proposed for use (Tables above). Use of appropriate buffers along bodies of water and avoidance of spraying on windy days minimizes risk. Risks from accidental direct spraying of a water body of an herbicide mixture into a water body exist, but the probability of either event occurring is low.

Fuel and herbicide transportation, storage, and emergency spill plans would be developed and implemented to reduce the risk of an accidental spill which may occur from the use of large amounts of fuel and/or herbicides. A catastrophic spill of fuels or herbicides reaching waters with listed species

would have potential for significant adverse effects; however, the probability for such an event to occur is negligible.

Characteristics of Proposed Herbicides.—This section, which discusses in detail the chemical, biological, and ecological properties of the herbicides to be used was taken directly from NMFS (2007, CD1: \Support Documents\BAs\LOCs\noaaweedbo_07.pdf), though the format has been changed slightly. We have not provided, and likely not have, the individual citations in this section, except for the SERA risk assessment documents (produced by Syracuse Environmental Research Associates, Inc. for USFS) on CD1 in folder ..\Support Documents\Toxicity:

Picloram

Exposure.—Picloram is highly soluble in water, readily leaches through soil, and is resistant to biotic and abiotic degradation processes with a field half-life of 20 to 300 days. Ismail and Kalithasan (1997) found that picloram moves rapidly out of the top 2 inches of soil with a half-life of about 4 to 10 days. Somewhat longer half-lives of 13 to 23 days have been reported by Krzyszowska et al. (1994) who also noted that picloram is degraded more rapidly under anaerobic than aerobic conditions and also degrades more rapidly at lower application rates. Generalized estimates of peak levels of picloram in water ranged from 0.012 mg/L in sandy soil to 0.025 mg/L in clay soil, when applied at an application rate of 0.45 kg acid equivalents (a.e.) per acre, and modeled as transport directly into a pond (SERA 2003a). Water concentrations expected from the proposed action would likely be far less than the concentrations modeled in SERA (2003a).

SERA (2003a) identified a peak estimated rate of contamination of ambient water associated with the normal application of picloram at 0.05 (0.01 to 0.2) mg a.e./L at an application rate of 1 lb a.e./ac. Typical application rates for picloram in the proposed action range from 0.125-0.5 lb a.e./ac, with a maximum label rate of 1 lb a.e./ac. At the maximum application rate of 1 lb a.e./L, the expected levels of picloram in ambient water, using the worst-case scenario in the BA and generalized modeling in SERA (2003a), picloram concentrations would likely be well below levels causing death in rainbow trout. Considering the fact that chemicals from the proposed action that reach a stream would be more dilute in running water in comparison to a pond, and that application of picloram would not occur within 50 feet of any stream, it is unlikely that picloram will reach water in an amount causing outright mortality in the majority of locations where the herbicide will be used. The most likely scenario where picloram will enter the stream is where weeds are treated on floodplains with a high water table and highly permeable soils.

Toxicity.—The proposed action includes the use of Tordon 22K, which contains picloram as the active ingredient, and also contains the inert ingredients potassium hydroxide, ethoxylated cetyl ether, alkyl phenol glycol ether, and emulsified silicone oil. Toxic assays of the product formulation are not available. Rainbow trout exposed to picloram in 96-hour exposures have an LC₅₀ from about 0.8 mg/L to about 20 mg/L, while chronic studies using reproductive or developmental parameters for trout report no-effect levels of 0.55 mg/L and adverse effects levels of 0.88 mg/L (SERA 2003a). Presmolt stages of coho salmon exposed to sublethal concentrations of picloram in freshwater were found to have a 70% higher mortality rate in the smolt stage when the fish were later exposed to seawater (Lorz et al. 1979).

Most of the potential sublethal effects for picloram have not been investigated in regard to toxicological endpoints that are important to the overall health and fitness of salmonids (e.g., growth, life history, mortality, reproduction, adaptability to environment, migration, disease, predation, population viability). Sublethal effects concentrations reported in the literature vary. Woodward (1979) found that picloram concentrations greater than 0.61 mg/L decreased growth of cutthroat trout and a similar finding was reported by Mayes (1984). Maximum exposure concentrations not affecting survival and growth of cutthroat trout ranged from 290 to 48 µg/L in Woodward's (1979) study. Picloram concentrations modeled as the worst-case scenario in the BA would approach or exceed the thresholds identified by Woodward (1979)

where salmonid growth and survival may be affected. Tests with the early life-stages of rainbow trout showed that picloram concentrations of 0.9 mg/L reduced the length and weight of rainbow trout larvae, and concentrations of 2 mg/L reduced survival of the larval fish (Mayes et al. 1987). Woodward (1976), in a study of lake trout, found that picloram reduced fry survival, weight, and length at concentrations of 0.04 mg/L, and that the rate of yolk sac absorption and growth of lake trout fry was reduced in flow-through tests at concentrations as low as 0.35 mg/L. These effects were observed at herbicide concentrations that may be encountered from the proposed action. Yearling coho salmon exposed to 5 mg/L of picloram for 6 days suffered “extensive degenerative changes” in the liver and wrinkling of cells in the gills (EPA 1979).

Indirect Effects on Aquatic Organisms.—Although picloram is toxic to salmonids, it is not as toxic to *Daphnia* or algae at the same concentrations. In *Daphnia* the reported acute (48-hour) LC₅₀ value is 68.3 (63 to 75) mg/L. Chronic studies using reproductive or developmental parameters in *Daphnia* report a no-effect level of 11.8 mg/L and an adverse effect level of 18.1 mg/L (SERA 2003a).

The toxicity of picloram to aquatic plants varies substantially among different species. Based on the available toxicity bioassays, the most sensitive species is *Navicula pelliculosa*, a freshwater diatom, with an EC₅₀ (i.e., the concentration causing 50% inhibition of a process for growth) of 0.94 mg a.e./L and a No-Observable-Effect Concentration (NOEC) of 0.23 mg a.e./L. The least sensitive aquatic plants appear to be from the genus *Chlorella* (another group of freshwater algae), with EC₅₀ values greater than 160 mg a.e./L. Macrophytes appear to have a sensitivity that is in the upper range of that seen in algae, with a reported EC₅₀ of 164 mg a.e./L in duckweed (SERA 2003a).

Given the information reported above, the proposed action is unlikely to cause adverse effects to zooplankton and algae; however, the potential for adverse effects to aquatic invertebrates other than *Daphnia* is unknown.

Effects on Non-Target Plants.—While most grasses are resistant to picloram, it is highly toxic to many broad-leafed plants. Picloram is persistent in the environment, and may exist at levels toxic to plants for more than a year after application at normal rates. In normal applications, non-target plants may be exposed to chemical concentrations many times the levels that have been associated with toxic effects. Spray drift has been shown to kill crops a short distance away from the area being treated. Under the proposed action, picloram will not be used within 50 feet of water, or within 100 feet of water if winds exceed 5 mph. These precautionary measures greatly reduce the likelihood that the action will result in any significant loss of non-target riparian vegetation. Picloram’s mobility allows it to pass from the soil to nearby, non-target plants. It can also move from target plants, through roots, down into the soil, and into nearby non-target plants. Since picloram will not be used within 50 feet of live water, riparian shrubs, forbs, and saplings will not be exposed to picloram. Large riparian trees with roots that extend beyond the 50-foot streamside zone may be injured by picloram; however, beyond occasional injury to mature trees, no appreciable changes in riparian trees are likely to occur.

2,4-D (amine salt only)

Exposure.—The herbicide 2,4-D is available in a variety of chemical forms with different toxicities to fish. The products identified in the proposed action contain the amine salt form, which has the lowest toxicity among the various 2,4-D formulations. The worst-case exposure scenario modeled for 2,4-D in the BA estimated maximum concentrations to be from 2.2 to 2.7 mg/L. The herbicide 2,4-D is highly soluble in water, but it rapidly degenerates in most soils, and is rapidly taken up in plants. 2,4-D ranges from being mobile to highly mobile in sand, silt, loam, clay loam, and sandy loam (USFS 1995a). Consequently, 2,4-D may readily contaminate surface waters when rains occur shortly after application, but is unlikely to be a ground-water contaminant due to the rapid degradation of 2,4-D in most soils and rapid uptake by plants. Most reported 2,4-D ground-water contamination has been associated with spills or

other large sources of 2,4-D release. 2,4-D may remain active for 1 to 6 weeks in the soil and will degrade to half of its original concentration in several days (USFS 1995a). Soils high in organic matter will bind 2,4-D the most readily. 2,4-D is degraded in soil by microorganisms and degradation is more rapid under warm, moist conditions.

Transport of 2,4-D into rivers by storm runoff is likely to occur from rain events within or shortly following the spray season, based on documented studies. Out of 32 stream samples collected downstream from helicopter application of 2,4-D, 2,4-D was found in all samples collected and in highest concentrations following a rainstorm the day after the spraying (Rashin and Graber 1993). In a national study of surface water quality, 2,4-D was found in 19 of 20 basins sampled throughout the United States (USGS 1998).

Toxicity.—Weedar 64 and Amine 4 are the 2,4-D formulations proposed for use. Both products contain roughly 53% inert ingredients that are not identified on the label. Toxicity assays are reported for the active ingredients only; consequently, the actual toxicity to fish is unknown for exposure to Weedar 64 or Amine 4. In rainbow trout, tests of the 2,4-D dodecyl/tetradodecyl amine salt on several life stages yielded LC₅₀s of 3.2 mg/L for fingerlings, 1.4 mg/L for swim-up fry, 7.7 mg/L for yolk-sac fry, and 47 mg/L for eggs (USFWS 1980). For Chinook salmon in the fingerling stage, tests of the dodecyl/tetradodecyl amine salt yielded a 96-hour LC₅₀ of 4.8 mg/L and at the yolk-sac stage, a 96-hour LC₅₀ yielded 2.9 mg/L (USGS 2001). Based on the exposure modeling in the BA and reported lethal assays, 2,4-D contamination from the proposed action could reach or exceed the lowest LC₅₀ under the worst case scenario, while remaining at slightly one-half or less of the lowest concentration reported for sublethal effects.

Most of the potential sublethal effects from exposure to 2,4-D have not been investigated for endpoints important to the overall health and fitness of salmonids. Exposure to 2,4-D has been reported to cause changes in schooling behavior, red blood cells, reduced growth, impaired ability to capture prey, and physiological stress (NIH 2002; Gomez 1998; Cox 1999). Exposure to the 2,4-D amine salt at a concentration of 5 mg/L reduces the ability of rainbow trout to capture food (Cox 1999). 2,4-D can combine with other pesticides and have a synergistic effect, resulting in increased toxicity. For example, combining 2,4-D with picloram damages the cells of catfish (*Ictalurus spp.*) gills, although neither individual pesticide has been found to cause this damage (Cox 1999). Little et al. (1990) examined behavior of rainbow trout exposed for 96 hours to sublethal concentration of 2,4-D amine and observed inhibited spontaneous swimming activity and swimming stamina.

Indirect Effects on Aquatic Organisms.—The SERA (1998) report suggests that amine and acid formulations have relatively low toxicity to aquatic invertebrates and aquatic plants, although the effects are highly variable. Insect larvae are most susceptible to adverse effects, while zooplankton are the least susceptible (Sarkar 1991). Acute toxicity tests exposing the cladoceran, *Simocephalus vetulus*, to the sodium salt of 2,4-D show complete mortality following 96 hours of exposure to concentrations ranging from 0.5 to 5.0 mM (Kaniewska-Prus 1975). Using a molecular weight of 221 for 2,4-D acid, these levels correspond to 0.1105 to 1.105 grams a.e./L. The EPA (1989) reported for the dimethylamine salt, a LC₅₀ for grass shrimp of 0.2 mg/L. SERA (1998) concluded that some species of aquatic algae are sensitive to concentrations of approximately 1 mg/L 2,4-D; however, low levels of the compound may stimulate algal growth in some species. Ester formulations have much greater toxicity, but are not proposed for use in this action.

Glyphosate (Rodeo formulation only)

Exposure.—Glyphosate strongly binds to most soils, but dissolves easily in water. Glyphosate remains unchanged in the soil for varying lengths of time, depending on soil texture and organic matter content. The half-life of glyphosate can range from 3 to 130 days (USFS 1995b). Soil microorganisms break down glyphosate and the potential for leaching is low due to the soil adsorption. However, glyphosate can move into surface water when the soil

particles to which it is bound are washed into streams or rivers (EPA 1993). Studies examined glyphosate residues in surface water after forest application in British Columbia with and without no-spray streamside zones. With a no-spray streamside zone, very low concentrations were sometimes found in water and sediment after the first heavy rain (USFS 1995b). Although glyphosate is chemically stable in pure aqueous solutions, it is degraded relatively fast by microbial activity, and water levels are further reduced by the binding of glyphosate to suspended soil particulates in water and dispersal (SERA 2003b).

After an aerial application of Roundup at a rate of 1.8 lb a.i./ac in British Columbia streams that were intentionally oversprayed, maximum concentrations of glyphosate reached 0.16 mg/L and rapidly dissipated to less than 0.04 mg/L after 10 minutes. After a storm event, peak concentrations in stream water were less than 0.15 mg/L, rapidly dissipating to less than 0.02 mg/L before the end of the storm event (Feng et al. 1990, Kreuzweiger et al. 1989). At the same application rate, another Canadian study noted maximum stream concentrations of 0.109 to 0.144 mg/L, occurring 7 to 28 hours after aerial application. Similar results were noted in a study conducted in Oregon (Newton et al. 1984). Maximum water levels in streams reached 0.27 mg/L following repeated helicopter applications directly across a small stream at an application rate of 2.9 lbs/ac. Peak concentrations of glyphosate under the proposed action are likely to be lower than these examples of helicopter spraying, since the herbicides will be applied by hand. As reviewed by Neary and Michael (1996), some applications have resulted in much lower concentrations in streams, in the range of 0.003 to 0.007 mg/L per lb applied (Neary and Michael 1996, Table 11, p. 253). The highest residues were associated with sediments, indicating that they were the major sink for glyphosate. Residues were noted throughout a 171-day monitoring period. Suspended sediment is not a major mechanism for glyphosate transport in rivers, but glyphosate sprayed in road ditches or other drainage structures could readily be transported as suspended sediment and cause acute exposures following rain events.

Toxicity.—Glyphosate is available in a variety of formulations with different toxicities to fish. The primary hazards to fish appear to be from acute exposures to the more toxic formulations, where the toxicity is likely caused by surfactants rather than the active ingredient. Only the Rodeo formulation, which lacks surfactants, is proposed for use. At the typical application rate of 2 lbs a.e./ac, the hazard quotients for the more toxic formulations at the upper ranges of plausible exposure indicate that the LC₅₀ values for these species will be not reached or exceeded under worst-case conditions (SERA 2003b). Reported tests of glyphosate (technical grade or formulations without surfactants) toxicity to fish for 24 to 96 hour LC₅₀ values range from approximately 10 mg/L at a pH of 6, to >200 mg/L at a pH of 10 (Smith and Oehme 1992; EPA 1993). Technical glyphosate acid (parent compound) is “practically nontoxic” to fish. The 96-hour LC₅₀ for technical grade glyphosate in rainbow trout ranges from 1.3 mg/L (USGS 2002), to a range of 86 to 140 mg/L reported in SERA (2003b). The results of a rainbow trout yolk-sac 96-hour LC₅₀ static bioassay ranged from 3.4 to 5.3 mg/L (USGS 2002).

The use of less toxic formulations result in acute hazard quotients that do not approach a level of concern (LOC) for any species. Nonetheless, the hazard quotient of 0.08 for sensitive species at an application rate of 2 lbs/acre is based on an LC₅₀ value rather than a sublethal assay or NOEC. Thus, the use of glyphosate near bodies of water where sensitive species of fish may be found (i.e., salmonids) should be conducted with substantial care to avoid contamination of surface water. Concern for potential effects on salmonids is augmented by the potential effects of low concentrations of glyphosate on algal populations (SERA 2003b).

Information on sublethal effects of glyphosate is available for many of the endpoints important to the overall health and fitness of salmonids and, of those reported, glyphosate appears to carry a low risk for sublethal effects (SERA 2003b).

Indirect Effects on Aquatic Organisms.—Glyphosate is highly toxic to all types of terrestrial plants and is used to kill floating and emergent aquatic vegetation. Glyphosate does not

appear to have similar toxicity to algae. Glyphosate is considered by EPA to be “slightly toxic” to aquatic invertebrates (SERA 2003b). LC₅₀ values of 780 and 930 mg/L have been reported for *Daphnia*. Hildebrand et al. (1980) found that Roundup treatments at concentrations up to 220 kg/ha did not significantly affect the survival of *Daphnia* or its food base of diatoms under laboratory conditions. In addition, Simenstad et al. (1996) found no significant differences between benthic communities of algae and invertebrates on untreated mudflats and mudflats treated with Rodeo. It appears that under most conditions, rapid dissipation from aquatic environments of even the most toxic glyphosate formulations prevents build-up of herbicide concentrations that would be lethal to most aquatic species (Tu et al. 2001).

Clopyralid

Exposure.—Clopyralid’s half-life in the environment averages 1 to 2 months and ranges up to 1 year. It is degraded almost entirely by microbial metabolism in soils and aquatic sediments. Clopyralid is not degraded by sunlight or hydrolysis. Similar to picloram, clopyralid is highly soluble in water, does not bind to soil particles, is not readily decomposed in some soils, and may leach into ground water. Clopyralid is extremely stable in anaerobic sediments, with no significant decay noted over a one year period (Hawes and Erhardt-Zabik 1995; Tu et al. 2001). Because clopyralid does not bind readily with sediments, it is likely to disperse in flowing waters, and remain at progressively lower concentrations as it moves downstream. The clopyralid half-life ranges from 8 to 40 days (Tu et al. 2001). Clopyralid is stable in water over a pH range of 5 to 9 (Woodburn 1987) and the rate of hydrolysis in water is extremely slow, with a half-life of 261 days (Concha and Shepler 1994).

Because Clopyralid does not bind tightly to soil it has a high potential for leaching. While clopyralid will leach under conditions that favor leaching, such as sandy soil, a sparse microbial population, and high rainfall, the potential for leaching or runoff is functionally reduced by the relatively rapid microbial degradation of clopyralid in soil (e.g. Baloch-Haq et al. 1993; Bergstrom et al. 1991; Bovey and Richardson 1991). A number of field lysimeter studies and the long-term field study by Rice et al. (1997) indicate that leaching and subsequent contamination of ground water are likely to be minimal. This conclusion is also consistent with a short-term monitoring study of clopyralid in surface water after aerial application (Leitch and Fagg 1985).

SERA (2003c) estimated peak rates of contamination of ambient water associated with the normal application of clopyralid to be 0.02 (0.005 to 0.07) mg a.e./L at an application rate of 1 lb a.e./ac. For longer-term exposures, average estimated rate of contamination of ambient water associated with the normal application of clopyralid is 0.007 (0.001 to 0.013) mg a.e./L at an application rate of 1 lb a.e./ac.

Toxicity.—Little information is reported for toxic effects of Clopyralid. Clopyralid is available in two forms (acid and amine salt) which have different toxicities to fish. Transline, which is the product identified in the proposed action, uses the monoethanolamine salt of clopyralid, which appears to have very low toxicity, compared to the acid formulation present in some other products. Toxicity of the acid formulation of clopyralid for a 96-hour LC₅₀ is reported in SERA (2003c) to be 103 mg a.e./L, using an unspecified life stage of rainbow trout. Similarly, Tu et al. (2001) reported LC₅₀s for steelhead of 104 mg/L. For the monoamine salt form used in the proposed action, SERA (2003c) reported a 96-hour LC₅₀ of 700 mg a.e./L. No longer-term toxicity studies are available on the toxicity of clopyralid to fish eggs or fry (SERA 2003c). No information is available on sublethal effects.

The material safety data sheet for Transline indicates the product contains roughly 60% inert ingredients that include polyglycol 26-2, which is a surfactant that belongs to a class of chemicals sometimes referred to as alkylphenol ethoxylates. Alkylphenol ethoxylates are generally much more toxic to fish than clopyralid, with estrogenic and growth effects in trout observed at concentrations on the order of 1 to 10 ppb (µg/L) (Bakke 2003).

Indirect Effects on Aquatic Organisms.—Toxic effects on aquatic invertebrates are reported only for *Daphnia*, which has an LC₅₀ of 350 mg a.e./L for the monoamine salt and 232 mg a.e./L for the acid LC₅₀ (SERA 2003c). If other invertebrates respond similarly to *Daphnia*, then lethal effects on aquatic invertebrates are unlikely.

Aquatic plants are more sensitive to clopyralid than fish or aquatic invertebrates (SERA 2003c). From information reported in SERA (2003c) it appears that there could be potential losses in primary productivity from algae killed by clopyralid, based on an EC₅₀ for algae of 6.9 mg/L. However, concentrations lethal to algae are unlikely to occur unless clopyralid is directly added to water, or if a rainfall washes the chemical into a stream shortly after it is applied.

Imazapic

Exposure.—A study by Ta (1994) identified a soil half-time of 113 days. Tu et al. (2001) reported a similar average soil half-life of 120 days, and is primarily degraded by soil microbial metabolism. Imazapic is moderately persistent in soils, and has not been found to move laterally with surface water (generally moving only 6 to 12 inches laterally but can leach to depths of 18 inches in sandy soils). Although the extent to which imazapic is degraded by sunlight is believed to be minimal when applied to terrestrial plants, it is rapidly degraded by sunlight in aqueous solutions (half-life of 1 to 2 days). Imazapic is water soluble and is not degraded hydrolytically in aqueous solutions (Tu et al. 2001). A study by Ta (1994) identified a soil half-time of 113 days. Tu et al. (2001) reported a similar average soil half-life of 120 days, and is primarily degraded by soil microbial metabolism. Imazapic is moderately persistent in soils, and has not been found to move laterally with surface water (generally moving only 6 to 12 inches laterally but can leach to depths of 18 inches in sandy soils). Although the extent to which imazapic is degraded by sunlight is believed to be minimal when applied to terrestrial plants, it is rapidly degraded by sunlight in aqueous solutions (half-life of 1 to 2 days). Imazapic is water soluble and is not degraded hydrolytically in aqueous solutions (Tu et al. 2001).

Simulations of imazapic were conducted for both clay, loam, and sand at annual rainfall rates from 5 to 250 inches and the typical application rate of 0.0624 lb a.e./ac (SERA 2004a). Based on the modeling, under arid conditions (i.e., annual rainfall of about 10 inches or less), no runoff is expected and degradation, not dispersion, accounts for the decrease of imazapic concentrations in soil. At higher rainfall rates, plausible offsite movement of imazapic may result in runoff losses that range from about 1% to 45% of the application rate, depending primarily on the amount of rainfall rather than differences in soil type. In very arid environments substantial contamination of water is unlikely. In areas with increasing levels of rainfall, exposures to aquatic organisms are more likely to occur. Thus, the anticipated concentrations in ambient water encompass a very broad range, 0.00003 to 0.0114 mg/L, depending primarily on differences in rainfall rates (SERA 2004a).

SERA (2004a) estimated peak concentrations of imazapic in contamination water to be 0.0005 mg/L (0.00005 to 0.01) mg a.e./L per 1 lb a.e./ac, for an annual rainfall of 50 inches. For longer-term exposures, average estimated rate of contamination of ambient water associated with the normal application of imazapic is 0.00002 mg a.e./L (0.00001 to 0.00003 mg a.e./L) at an application rate of 1 lb a.e./ac.

Toxicity.—Imazapic is available in acid and ammonium salt forms. Platueau, which is proposed for use, is formulated with the ammonium salt, which is less toxic than acid formulations. Fish appear to be relatively insensitive to imazapic exposures, with LC₅₀ values >100 mg/L for both acute toxicity and reproductive effects. In acute toxicity studies, all tested species (channel catfish, bluegill, sunfish, trout, and sheepshead minnow) evidenced 96-hour LC₅₀ values of >100 mg/L. The low toxicity of imazapic to fish is probably related to a very low rate of uptake of this compound by fish. In a 28-day flow-through assay, the bioconcentration of imazapic was measured at 0.11 L/kg (Barker and Skorsynski 1998) indicating that the concentration of imazapic in the water was greater than the concentration of the compound in

fish. Barker and Skorsynski (1998) observed no effects on reproductive parameters in a 32-day egg and fry study using fathead minnow.

No studies are reported in the SERA assessment (2004a) for sublethal effects of imazapic to listed fish. Barker and Skorsynski (1998) observed no effects on reproductive parameters in a 32-day egg and fry study using fathead minnow. Even though imazapic itself appears to be only moderately toxic to fish, based on the LC₅₀, Plateau contains roughly 76% inert ingredients that are not identified by the manufacturer. With many herbicides, the inert ingredients may be more toxic to fish and other aquatic organisms than the active ingredient. While toxicity tests are reported for imazapic, there is no apparent information regarding the toxicity to salmon and trout for the product formulation in Plateau, which includes imazapic and unspecified inert ingredients. Consequently, the toxic effects of salmon or trout exposure to Plateau are unknown.

Indirect Effects on Aquatic Organisms.—Relatively little information is available indicating the effects of imazapic on aquatic organisms in the natural environment. No adverse effects to *Daphnia* or mysid shrimp were observed at nominal concentrations of imazapic of up to 100 mg/L in 96-hour studies (SERA 2004a); however, the report did not specify if the analysis included any sublethal endpoints. Effects of imazapic on aquatic plants are highly variable. *Lemna gibba*, a freshwater macrophyte, is the most sensitive aquatic plant reported in the literature, with an EC25 value based on decreased frond counts of 0.00423 mg/L. Algae were less sensitive than macrophytes (reported LC₅₀ values > 0.045 mg/L), and responses included both growth inhibition and growth stimulation (SERA 2004a).

Dicamba

Exposure.—In soil, dicamba is very mobile because it binds poorly to most soils. Dicamba is also readily soluble in water, so its transport is influenced by precipitation. At low rainfall rates, dicamba dissipation had a half time of approximately 20 days. At high rainfall rates using modeled runs, virtually all the dicamba was washed from the soil. As detailed in SERA (1995), the environmental fate of dicamba has been extensively studied. In general, dicamba is very mobile in most soil types, with the only reported exception being peat, to which dicamba is strongly adsorbed (Grover and Smith 1974). For many soil types, the extent of soil adsorption is positively correlated with and can be predicted from the organic matter content and exchangeable acidity of the soil (Johnson and Sims 1993). In a monitoring study by Scifres and Allen (1973), dicamba levels in the top 6 inches of soil dissipated at a rate of approximately 22% per day over the first two weeks following application, with a soil half-life of 3.3 days. After 14 days no dicamba was detected, with the limit of detection of 0.01 µg/g, in the top 6 inches of soils. Residues at all depths were less than 0.1 µg/g. The rates of dissipation in clay and loam were essentially identical.

Available monitoring data indicate that ambient water may be contaminated with dicamba after standard applications of the product. The range of average to maximum dicamba levels in water, reported in a monitoring study by Waite et al. (1992), are from 0.1 to 0.4 µg/L. SERA (1995) characterized the water concentration of dicamba in a severe spill as approximately 10 mg/L, which could result in some fish mortality.

SERA (1995) concluded that ambient concentrations of dicamba in water will vary considerably, depending on various site-specific conditions. The maximum level reported in ambient surface water is 37 µg/L, 5 hours after direct aerial spraying of a stream with dicamba at a rate of 1 lb/acre (Norris and Montgomery 1975). Because the proposed action will not be applying dicamba by this method maximum concentrations of dicamba are likely to be lower. Monitored levels of dicamba in water, caused by rights-of-way management were reported by (Muir and Grift 1987) to be 0.12 to 5.48 µg/L

Toxicity.—The product proposed for use (Banvel) is formulated with the dimethylamine salt, with roughly 60% inert ingredients that include an unspecified amount of ethylene glycol.

Ethylene glycol has much lower toxicity to fish than dicamba. Available information on the toxicity of Banvel to fish is limited to assays using only the active ingredient; consequently, the toxicity of Banvel to listed fish is unknown. There is wide variation in the reported acute toxicity of dicamba to fish, with 24-hour LC₅₀ values ranging from 28 mg/L to more than 500 mg/L. Most laboratory assays in SERA (1995) reported LC₅₀ values >100 mg/L. In bluegill sunfish, the standard 96-hour LC₅₀ is 600 mg/L, but when the herbicide was adsorbed onto vermiculite, the LC₅₀ dropped to around 20 mg/L (USFS 1984). In a study by Lorz et al. (1979), yearling coho mortality was observed at 0.25 mg/L during a seawater challenge test which simulates their migration from rivers to the ocean. An LC₅₀ of 28 mg/L in trout was reported by Johnson and Finley (1980). Little is known about effects on fish other than acute toxicity.

Indirect Effects on Aquatic Organisms.—The range of toxicity values of dicamba to aquatic invertebrates suggests wide variation among species. Consequently, available assays provide little insight about the toxicity of dicamba to invertebrate species consumed by listed salmon and steelhead. Seed shrimp, glass shrimp, and fiddler crabs are killed by concentrations over 100 mg/L, while *Daphnia* and amphipods are killed by concentrations in the range of 3.9 to 11 mg/L (Cox 1994). The low end of this range is several orders of magnitude higher than water concentrations observed by Waite et al. (1992), but within the range of concentrations SERA (1995) described for a moderate to severe spill.

Sublethal effects on aquatic invertebrates are unknown. The only endpoints that have been examined are acute lethal responses for aquatic animals (LC₅₀ values) and growth inhibition in unicellular algae (EC₅₀ values). Algae species are much more sensitive to dicamba than fish (SERA 1995).

Metsulfuron–methyl

Exposure.—Metsulfuron-methyl is generally active in the soil. It is usually absorbed from the soil by plants. The adsorption of metsulfuron-methyl to soil varies with the amount of organic matter present in the soil, and with soil texture and pH. Adsorption to clay is low. The half-life of metsulfuron-methyl can range from 120 to 180 days (in silt loam soil). There are major areas of uncertainty and variability in assessing potential levels of exposure in soil. In general, metsulfuron-methyl absorption to a variety of different soil types will increase as the pH decreases (i.e., the soil becomes more acidic). The persistence of metsulfuron-methyl in soil is highly variable, and reported soil half-lives range from a few days to several months, depending on factors like temperature, rainfall, pH, organic matter, and soil depth. Off-site movement of metsulfuron-methyl is governed by the binding of metsulfuron-methyl to soil, the persistence in soil, as well as site-specific topographical, climatic, and hydrological conditions.

Metsulfuron-methyl will degrade faster under acidic conditions, and in soils with higher moisture content and higher temperature (Exttoxnet 1996). Soil microorganisms break down metsulfuron-methyl to lower molecular weight compounds under anaerobic conditions. Metsulfuron-methyl in the soil is broken down to nontoxic and non-herbicidal products by soil microorganisms and chemical hydrolysis. Metsulfuron-methyl dissolves easily in water. There is a potential for metsulfuron-methyl to contaminate ground waters at very low concentrations. Metsulfuron-methyl readily leaches through silt loam and sand soils.

Metsulfuron-methyl environmental fate and transport simulations reported in SERA (2004b) were conducted for clay and sand at annual rainfall rates ranging from 5 to 250 inches and the typical application rate of 0.02 lb ai/ac. In sand or clay under arid conditions (i.e., annual rainfall of about 10 inches or less), there is no percolation or runoff and the rate of decrease of metsulfuron-methyl concentrations in soil is attributable solely to degradation rather than dispersion. At higher rainfall rates, plausible concentrations in soil range as high as 0.007 mg/L and, under a variety of conditions, concentrations of 0.0005 mg/L and greater may be anticipated in the root zone for appreciable periods of time. Metsulfuron-methyl exposure to aquatic species is affected by the same factors that influence terrestrial plants, except the directions of the impact are reversed. In very arid environments (i.e., where the greatest

persistence in soil is expected) substantial contaminations of water is unlikely. In areas with increasing levels of rainfall, toxicologically significant exposure to aquatic plants is more likely to occur. As summarized in SERA (2004b), peak water levels of about 0.003 to 0.006 mg/L can be anticipated under worst case conditions at rainfall rates of 25 to 50 inches per year after a single application.

Toxicity.—Metsulfuron-methyl is non-lethal to fish at the peak concentrations likely to be encountered by listed salmon and steelhead and peak concentrations are many orders of magnitude lower than the concentrations where various sublethal effects were observed in rainbow trout. Metsulfuron-methyl does not bioaccumulate in fish. The lowest concentration at which mortality was observed in any species of fish is 100 mg/L for rainbow trout; however, in the same study, no mortality was observed in fish exposed to 1000 mg/L (Hall 1984). SERA (2004b) concluded that mortality is not likely to occur in fish exposed to metsulfuron-methyl concentrations less than or equal to 1000 mg/L.

Debilitating sublethal effects (erratic swimming, rapid breathing, and lying on the bottom of the test container) were observed by Muska and Hall (1982) after exposure to 150 mg/L for 24 hours. In tests with rainbow trout, no significant long-term effects (90-day exposure) were observed by Kreamer (1996) on hatch rate, last day of hatching, first day of swim-up, larval survival, and larval growth at concentrations up to 4.7 mg/L. Concentrations greater than 8 mg/L resulted in small but significant decreases in hatching and survival of fry.

The metsulfuron-methyl product used in the proposed action is Escort, which contains 40% inert ingredients that include Sodium naphthalene sulfonate-formaldehyde condensate; a mixture of a sulfate of alkyl carboxylate and sulfonated alkyl naphthalene, sodium salt; polyvinyl pyrrolidone, trisodium phosphate, and sucrose (NCAP 2006). There is insufficient information on the toxicity of naphthalene-based surfactants and polyvinyl pyrrolidone to fish to determine the impact on fish. All of these ingredients are commonly used in household cleaning products or as food additives. Polyvinyl pyrrolidone is marketed as a disinfectant for fish aquaria and treatment of certain fish infections; consequently, the product is not likely to be toxic to listed trout at environmental concentrations encountered in the proposed action. Because the amount of each of the various inert chemicals in Escort and the toxicity of some of the inert ingredients are unknown, there is no assurance that the proposed action will avoid toxic effects to listed fish if fish are exposed to the product in any appreciable amount.

Indirect Effects on Aquatic Organisms.—Toxicity studies on aquatic invertebrates are reported only for *Daphnia*, which for acute exposure, a 48-hour NOEC for immobility of 420 mg/L is used. For chronic exposures, the NOEC of 17 mg/L for growth inhibition is used, although higher chronic NOECs, ranging from 100 to 150 mg/L, have been reported for survival, reproduction and immobility (SERA 2004b). The only effect reported by Hutton (1989) in a 21-day *Daphnia* study was a decrease in growth at concentrations as low as 5.1 mg/L, but decreased growth at concentrations less than 30 mg/L was not statistically significant. In aquatic invertebrates, decreased growth appears to be the most sensitive endpoint. Wei et al. (1999) report that neither metsulfuron-methyl nor its degradation products are acutely toxic to *Daphnia* at concentrations that approach the solubility of the compounds in water at pH 7. Although the results of *Daphnia* studies suggest that metsulfuron-methyl is relatively non-toxic to invertebrates, toxic effects concentrations for different invertebrate species often vary widely, as seen in several herbicides reviewed in this Opinion. Consequently, given the limited data available on invertebrate effects, there is insufficient information to draw any conclusion about the toxicity of metsulfuron-methyl on invertebrates consumed as prey by listed salmon and steelhead.

There are substantial differences in sensitivity to effects of metsulfuron-methyl among algal species, but all EC₅₀ values reported in SERA (2004b) are above 0.01 mg/L, and some values are substantially higher. Toxicity in algae increases with lower pH, most probably because of decreased ionization leading to more rapid uptake. At a concentration of 0.003 mg/L,

metsulfuron-methyl was associated with a 6 to 16% inhibition (not statistically significant) in algal growth rates for three species but stimulation of growth was observed in *Selenastrum capricornutum* and the aquatic macrophyte, duckweed (SERA 2004b). Wei et al. (1998; 1999) assayed the toxicity of metsulfuron-methyl degradation products in *Chlorella pyrenoidosa* and found that the acute toxicity of the degradation products was about two to three times less than that of metsulfuron-methyl itself in a 96-hour assay. One field study cited in SERA (2004b) on the effects of metsulfuron-methyl in algal species found that concentrations of metsulfuron-methyl as high as 1 mg/L are associated with only slight and transient effects on plankton communities in a forest lake.

All watershed condition indicators.—Removal of solid stands of vegetation by chemical treatment may result in short-term, insignificant increases in surface erosion that would diminish as vegetation reoccupies the treated site. The speed of site vegetation and the plant composition of the new vegetation would depend on the persistence and selectivity of the herbicide used. Chemical control of noxious weeds is expected to result in negligible adverse effects to sediment yield. Risk for effects to non-target vegetation are lowest with wicking, backpack or hand operated sprayers.

Channel condition, water quality, and habitat condition Indicators.—Spraying of “long-lived” persistent herbicides (e.g. Tordon™) would not be authorized within 50 feet of any live waters. This would reduce risks associated with residual herbicides that persist in the soil and continue to affect newly emerging plants or sprouting perennial shoots. Restrictions on the use of non-persistent herbicides in close proximity to water would reduce risks associated with herbicides moving into surface waters or leaching into ground water. Only aquatic-approved herbicides (glyphosate - Rodeo®) would be authorized for use within 50 feet of live waters or where hydrophilic or riparian plants are present, or where surface material is obvious recent deposition of sediment of any diameter(s). Ground based herbicide application would result in reduction of noxious weeds within riparian areas and along stream banks. Negligible effects to stream bank stability are expected. A reduction of noxious weeds in riparian areas and along stream banks could benefit native plant species and result in improved stream bank stability and riparian condition. Negligible and unmeasurable effects that are attributed to chemical control are expected to occur to water temperature, large woody debris, streambank condition, sediment, and related features. Chemical control is expected to have adverse effects to water contamination, but risk will be reduced because of the buffers which would be used along riparian areas and due to the use of special guidelines for ground based herbicide application within riparian areas and along live waters. These include:

- The Weed Coordinator will map and identify buffers, methods of application, and herbicide restrictions that may be required for the project,
- No herbicide storage, mixing or post-application cleaning would be authorized within RCAs (100 feet of any live waters). Mixing and loading operations must take place in an area where an accidental spill would not contaminate a stream or body of water before it could be contained.
- No spraying of herbicides other than glyphosate (Rodeo®) would be authorized within 50 feet of any live waters, where hydrophilic or riparian plants are present, and where surface material is obvious recent deposition of sediment of any diameter(s)
- Only very low risk, or “aquatic-approved” chemicals (glyphosate-Rodeo®) could be used within 50 feet of open water, where hydrophilic or riparian plants are present, and where surface material is obvious recent deposition of sediment of any diameter(s).

Implementation of hazardous materials (fuel and herbicide) transportation, storage, and emergency spill plans would result in a low risk for hazardous material contamination (fuels and herbicides) of ground water and surface water.

Manual Control

In manual treatments workers primarily would cut plants off above ground level; pull, grub, or dig out plant root systems. The scope of this is very low for the amount of acreage treated annually. However, noxious weed control benefits are very high for treating sensitive areas (i.e. riparian areas, special

status plant populations, developed recreation sites), dispersed recreation sites, remote areas, and spot control of individual plants and small patches.

Watershed condition indicators.—Minor soil and vegetation disturbance would occur from the small amount of manual noxious weed control conducted annually. This would result in negligible sediment effects. This method is very target specific and would have a negligible effect on riparian habitats. Beneficial effects would be expected from the reduction of noxious weeds encroaching on and invading riparian areas, wetlands, and streams.

Channel condition, water quality, and habitat condition indicators.—Minor soil and vegetation disturbance would occur within riparian areas and along stream banks from manual noxious weed control. Any adverse impact to sediment and stream bank stability is expected to be negligible because prescribed buffers will result in only a minor area of disturbance. A reduction of noxious weeds in riparian areas and along stream banks would benefit native plant species and improve stream bank stability and riparian condition. No adverse effects attributed to manual control are expected to occur to these indicators because the area affected is small (less than 25 acres per Section 7 watershed), and because prescribed buffers will minimize the amount of riparian areas and plants that are affected.

Biological Control

Biological methods of vegetation treatment use living organisms to selectively suppress, inhibit, or control herbaceous and woody vegetation. This method is viewed as one of the more natural processes because it requires the proper management of plant-eating organisms and precludes the use of mechanical devices, chemical treatments, or burning of undesired vegetation. Biological weed control activities include the release of insect agents that are parasitic to target noxious weeds. This activity includes the collection of beetles/insects, development of colonies for collection, transplanting parasitic beetles/insects, and supplemental stocking of populations. Development of biological control insect colonies (nursery sites) for collection purposes would often not have active weed control, because these sites would be managed for propagation of insects. Controlling the host noxious weed species would reduce the insects food supply and cause a decline in the numbers of these beneficial insects that would be available for transplanting efforts.

Watershed condition indicators.—This method is very target specific and would have no adverse effect on riparian species. Beneficial effects would be expected from the reduction of noxious weeds encroaching on and invading riparian areas, wetlands, and streams.

Channel condition, water quality, and habitat condition indicators.—A reduction of noxious weeds in riparian areas and along stream banks would benefit native plant species and improve riparian condition. No adverse effects attributed to biological control are expected to occur to water temperature, suspended sediment, deposited sediment, or from water contamination.

Rehabilitation, Seeding, Plantings – Mechanical Control

After weeds are controlled on a site it is beneficial to establish desirable vegetation that would compete with noxious weeds and restrict or prevent additional infestations. These treatments may involve ground or aerial application of seeds. Mechanical treatment is normally limited to raking by hand, or ATV drawn drag rake.

Watershed condition indicators.—Broadcast seeding (aerial or ground) would result in no short-term adverse effects to watershed condition indicators. Long-term benefits would occur from establishment of desirable vegetation that would reduce adverse erosion and sediment.

Channel condition, water quality, and habitat condition indicators.—A reduction of noxious weeds and establishment of desirable vegetation would reduce potential for future noxious weed encroachment into riparian areas. No adverse effects attributed to rehabilitation and/or use of mechanical equipment would occur to water temperature, suspended sediment, deposited sediment, or from water contamination. Potential for increased erosion/sediment is considered negligible and

would be undetectable in live waters. Long-term benefits from reduced erosion/sediment would occur from establishment of desirable vegetation.

Cumulative Effects

It is reasonably certain that on-going herbicide application programs implemented by other federal, state, county and private land managers/owners that have been conducted within the proposed action area are likely to continue. The full scope of their programs is not known to the PNF. The State of Idaho, Counties, Idaho Transportation Department has in the past and continues to conduct an active spray program for controlling noxious weeds. At this time it is difficult to determine the amount of total herbicide use by federal, state, and county agencies and private landowners within a particular watershed.

Other land management activities which are reasonably certain to continue into the future, and which may affect implementation of the proposed action at some level include livestock grazing, agriculture, timber harvest, road and other facilities maintenance, recreation, prescribed fire, emergency fire rehabilitation, and other surface-disturbing activities. These actions, which take place on other federal, state and private lands within the proposed action area, may actually contribute to the need to maintain or increase current levels of noxious weed treatment for many years into the future. The USFS (and presumably other federal and state agencies) manage lands with goals to maintain and enhance natural resources, which would include mitigating actions that should be conducive to preventing or reducing weed infestations. As such, implementation of this proposed action in addition to other land management activities is not expected to contribute significantly to a continuing need to treat noxious weeds at site-specific locations into the future. Proper implementation and monitoring of all land management activities is expected to have a beneficial effect to the long-term treatment of noxious weeds. The levels of types of activities that take place on private lands and their impact to the PNF's ability for long-term noxious weed control, is unknown. It is reasonable to expect that the cumulative effects of private land management activities, as with other federal and state activities, would be as various as the landowners and the lands being managed. However, in the absence of cooperative agreements between federal/state and private landowners, it is expected that activities on private lands, particularly on lands upstream, adjacent, and intermingled with public lands, would continue to present challenges to weed management for the PNF.

4. DIRECT AND INDIRECT EFFECTS OF PETROLEUM PRODUCTS

Should fuel or other petroleum products enter live water, they would affect water quality and invertebrates and would directly affect the listed fish, should petroleum products come in contact with them. Fuels and other petroleum products can directly poison salmonids and their aquatic invertebrate food source. Fuels and petroleum products are moderately to highly toxic to salmonids, depending on concentrations and exposure time (Gutsell 1921). Free oil and emulsions can adhere to gills and interfere with respiration, and heavy concentrations of oil can suffocate fish (McKee and Wolf 1963). Evaporation, sedimentation, microbial degradation, and hydrology act to determine the fate of fuels entering fresh water (Saha and Konar 1986). Sources of mortality to the listed fish from the types of effects described above can be density independent.

Fuel-related mitigation keeps fuels as far as possible from live water, and includes measures to reduce the likelihood of uncontained spills. The risk of fuel-related effects is reduced to very low levels because of these factors.

5. DIRECT AND INDIRECT EFFECTS OF GRAZING

The effects of grazing on fish habitat can include altered stream banks and riparian areas, which can result in sediment loading, increased water temperatures, and altered water tables and flow regimes (Platts 1991). Increased sediment from grazing is usually the result of bank trampling, overused trail crossings and overgrazed riparian areas. The threshold level at which fines begin to adversely affect the emergence and survival of salmonid embryos is somewhere between 10-15% (particle diameter less than 6.3 mm) and 20% (particle diameter including 6.3 mm) (Irving and Bjornn 1984).

Increased water temperatures can result from the removal of stream bank vegetation that provides shade, and from shallow, slow-moving reduced water flows through open stream areas. Salmonid species do not usually persist in waters where maximum temperatures consistently exceed 22°C, although they can withstand brief periods of temperatures as high as 25°C if nighttime cooling occurs (Behnke and Zarn 1976).

Grazing prescriptions such as rest rotation and deferred rotation, especially if improvements occur across the watershed, have fair to good stream rehabilitation potential (Platts 1991, Kondolf 1993). A recent 7-year study compared cattle grazing prescriptions and effect to impacted riparian areas (Myers and Swanson 1995). The study showed that deferred rotation grazing allowed much improvement of aquatic and riparian habitats, but the improvement was limited by the presence of roads, which apparently added sediment to the streams. Deferred rotation grazing in the absence of roads produced the second most improvement, and complete rest showed the most improvement. Pool habitat recovery lagged substantially behind improvements in bank stability and cover (Myers and Swanson 1995). No similar study has been conducted for sheep, but the general relationship between livestock grazing, riparian effects, and impacts to fish habitat is assumed to be similar for this analysis. A 30% utilization strategy in riparian areas provides stream bank protection and decreased sediment delivery to streams (Clary and Webster 1989). Rest-rotation systems can degrade previously ungrazed streams, and one year's rest can allow vegetation growth that subsequently attracts heavy grazing (Platts and Nelson 1985). Limited monitoring (Tables 3 & 4) has shown compliance with grazing standards, while sediment deposition has increased marginally in lower Deep Creek. Sediment sources are believed to be non-grazing, probably from old roads and previous mining activity. Therefore, we expect the effects from sheep grazing to remain the same or decrease, with little effect on sedimentation or other parameters.

6. EFFECTS OF SEDIMENT ON SALMONIDS

Removal of vegetation, mechanical disturbance, and topographic alteration increase the erodibility of forest soils and, consequently, both the amount of soil available for transport and the likelihood of transport down-slope and into streams. Once in streams, fine sediments (most frequently regarded as those smaller than 6.3mm in particle diameter) may be transported further downstream or deposited in slow water areas and behind obstructions, locally altering fish habitat conditions. In particular, fine sediment has been shown to fill the interstitial spaces among larger streambed particles, which can eliminate the living space for various microorganisms, aquatic macroinvertebrates, and juvenile fish. Potential problems associated with excessive sediment have long been recognized in a variety of salmonid species and at all life stages, from possible suffocation and entrapment of incubating embryos (see e.g., Coble 1961; Phillips et al. 1975; Hausle and Coble 1976; McCuddin 1977; Cederholm and Salo 1979; Peterson and Metcalfe 1981; Irving and Bjornn 1984; Tagart 1984; Reiser and White 1988), through loss of summer rearing and overwintering cover for juveniles (see e.g., Bjornn et al. 1977; Kelley and Dettman 1980; Hillman et al. 1987; Griffith and Smith 1993), to reduced availability of invertebrate food for resident adults (see e.g., Tebo 1955; Nuttall 1972; Cederholm and Lestelle 1974; Bjornn et al. 1977; Alexander and Hansen 1986).

B. DEEP CREEK WATERSHED

Effects to individual habitat elements were analyzed using the effects matrix (Appendix 3) for all programmatic and new actions occurring in this subwatershed.

1. DIRECT AND INDIRECT EFFECTS FROM FEDERAL ACTIONS

a. Miscellaneous Forest Products

Reduced shade and availability of recruitable LWD, ground disturbance yielding sediment delivery, and a fuel spill contaminating waters, are potential effects of MFP activities. In general, refueling equipment, fuel storage, and activities that could disturb soil and vegetation will not occur within LRMP RCA buffers; therefore, effects to WCI's will be negligible. Public contact and education through signing will help minimize illegal removal of firewood from RCA's. Activities within LRMP RCA buffers will only occur after a journey level fisheries biologist and hydrologist has insured that all of the mitigations described in the Federal action are followed. If followed the mitigations will insure that

effects from activities in RCA's will be negligible because trees that could provide shade or LWD will not be removed and activities that could create measurable sediment delivery would not be allowed. Due to similarities in the mechanism and timing of effects miscellaneous forest products harvest and mistletoe control and precommercial thinning are described in the same effects matrix (Appendix 3).

b. Mistletoe Control and Pre-commercial thinning

Reduced availability of recruitable LWD, reduced stream shading, ground disturbance yielding sediment delivery, or a fuel spill contaminating waters are seen as potential effects of mistletoe control and pre-commercial thinning activities. Negligible effect on recruitable LWD or stream shading will occur because activities will not occur in RCAs unless both a fisheries biologist and hydrologist agree that trees removed do not provide shade to a stream and that trees removed are not needed to meet the WCI for future LWD recruitment. No measurable sediment delivery from this action is expected because should activity occur in RCAs, riparian vegetation must exist for effective sediment filtering, and disturbance that may generate sediment will be minimized by mitigation to not remove trees that would impact stream banks, to keep vehicles on existing open roads, and to not fall or bring trees across road cutslopes. Negligible risk of petroleum contamination is expected because refueling and fuel storage will occur outside RCAs where should a spill occur it could be dealt with well before entering a stream.

c. Fire Management Activities

This action is expected to have negligible effects on listed fishes and critical habitat. Discussion of these overall effects can be seen under the heading "Effects of Mitigations" in section V.A.3.c. (pg. 14).

d. Fish habitat and riparian sampling

The potential negligible effects of this action are related to disturbance of fish or eggs from turbidity or direct disturbance. The potential area for these effects is localized around the areas where surveyors are working. The required mitigation measures are intended to prevent these effects from occurring to WCIs in areas occupied by listed fish or eggs (Appendix 3). The fish habitat surveys involve walking in streams, which presents the possibility of personnel trampling redds, resulting in mortality or suspension of fine sediments but these effects are mitigated by training and avoidance. Where listed or sensitive fish species are present, short-term displacement from normal activities, such as feeding or breeding, is expected when personnel are present. However, these displacements are judged biologically negligible because of the extremely short duration of disturbance. Aquatic invertebrate sampling and sediment sampling procedures (core sampling, % fines, and free matrix) can all disturb fish and or resuspend sediments that could affect downstream redds. Any sediment that is generated is expected to settle out within the prescribed buffer distance (one stream width or within one habitat unit of any redd). The buffers are also judged to be effective in eliminating any potential harassment of adjacent fish. Because sampling will not occur closer than one stream width or one habitat unit, the potential for adverse effects are avoided as sediment is expected to settle-out within that distance.

e. Watershed and Fish Habitat Improvements and Maintenance

These actions are designed and expected to cause short and long term improvements in habitat conditions, such as fish barrier removal, increase in large woody debris, riparian planting, streambank stabilization, and reduction in sediment delivery. Mitigations described in the Federal actions will insure that any temporary degrading effects from these actions are negligible. For example, erosion control measures that have proven effective in capturing and storing sediment on the Payette National Forest, and restrictions on use of mechanized equipment within RCA buffers will insure that any soil, streambank, or streambed disturbance and associated sediment delivery to the stream channel is temporary and minimal so that effects to listed fishes are negligible. Furthermore, a journey level fisheries biologist will insure that activities do not proceed if there is potential for more than negligible effects to individual listed fish, or their eggs. In Appendix 3 the effects of watershed and habitat improvements and maintenance are combined with the fish habitat and riparian sampling because they have similar negligible to improving effects. Due to similarities in the mechanism and timing of effects (especially for sediment) watershed and habitat improvements and maintenance and fish habitat and riparian sampling are described in the same effects matrix (Appendix 3).

f. Noxious Weed Management

This action is expected to have negligible effects on listed fishes and critical habitat. Discussion of these overall effects can be seen in section V.A.3. above.

g. Road Management

The primary mechanism of effect from the road management action is sediment delivery to the channel. When mitigations are followed many road management activities, such as graveling, water barring, dust abatement, blading, and replacement of plugged or damaged culverts will result in less erosion and a reduction in sediment delivery to stream channels over not taking the road management action. This is especially true with expected future increases in public travel on Forest roads. Specific mitigation that will insure sediment delivery is negligible include erosion control on disturbed or exposed soil, restrictions on sidecasting material while blading or plowing snow, designing proper road surface drainage, proper maintenance of ditches, and for some actions mandatory approval by a journey level fisheries biologist, hydrologist, and in some instances the Level 1 team. A specific instance where the Level 1 team must approve an activity is if earth disturbance occurs, such as culvert replacement, in streams with listed fishes. This will give the Level 1 team the opportunity to insure the effects of these actions are not adverse. In all cases where road management activities run the risk of disturbing listed fishes in the immediate area (i.e., harassment, redd destruction) a fisheries biologist must first approve the activity by documenting the presence or absence of listed fishes, which reduces the likelihood of disturbance of listed fishes to negligible levels. With restrictions on removal of downfall and felled hazard trees from RCA's and direction to minimize brushing, along with the relative rarity that these actions occur, the effects from these actions on listed fishes or designated critical habitat will be negligible. Other mechanisms of effect include chemical contamination from salts used for dust abatement, and fuel spills. Due to restrictions on storing fuel or refueling equipment within RCA's, and requirements for containment the chance of fuel contaminants reaching listed fishes is minor. Dust-abatement additives such as $MgCl_2$ are not likely to reach water with listed fishes because of the strong tendency to bind to the road surface thereby minimizing displacement. Furthermore, effects would be negligible due to the low toxicity at the concentrations that may be expected (see Heffner 1996). In addition, spill containment is required; therefore, the likelihood of spilled dust abatement chemicals reaching streams with listed fishes is negligible.

Road management, trail maintenance and recreation and administrative site operation and maintenance and the travel plan are interdependent Federal actions; therefore, they will be discussed collectively in the effects matrix (Appendix 3).

h. Trails, Recreation and Administrative site operation and maintenance

This action and the travel plan Federal action are interdependent and therefore they will be discussed collectively in the effects matrix (Appendix 3).

Sediment delivery as a result of trail work or facility maintenance and repair is the primary potential effect of this activity. Potential exposure to petroleum products or other water contamination is also a concern, as is providing for passage of aquatic organisms at stream crossings.

Applying erosion control measures such as straw bales, erosion control matting, silt fence, seeding, and mulching on disturbed areas will serve to minimize sediment movement from disturbed areas and speed re-vegetation and soil stability. Measures implemented during trail maintenance or construction such as not sidecasting soils where they can be delivered to streams, placement of waterbars and rolling dips to move water off trails and into vegetation where sediment can be filtered, minimizing trail length perpendicular to stream crossings which may direct sediment toward streams, placing woody debris below rolling dips and waterbars to dissipate water flow and minimize erosion and sediment movement, and constructing short inclines to bridges to inhibit sediment movement onto bridge and eventually into streams are measures expected to minimize sediment entry into streams. Minimal sediment delivery associated with culvert placement/replacement is expected due to measures such as placing erosion control prior to other activities to catch sediment that may move, removing and

storing fill material where it won't be delivered to limit sediment sources, and seeding and mulching site to speed site re-vegetation and stabilization.

Petroleum products from mechanized equipment presents the potential for water contamination. To minimize potential for effects due to petroleum contamination, mechanized equipment must have no oil or fuel leaks, equipment must be serviced outside RCAs, fuel for equipment will be stored outside RCAs in US DOT approved containers, and refueling of motorized equipment will occur as far from streams as is practicable, and on ground where a fuel spill would be easily contained. Spill containment equipment will be available. These measures are expected to minimize the potential for petroleum contamination and effects on listed fishes by and ensuring equipment is clean when near streams, and by having spill containment equipment available and putting distance between fuel/oil sources and waters thus providing the means and area for spill containment. Also, a journey level fisheries biologist will approve equipment fording to ensure machines are clean, and that fording occurs at times and places to minimize effects on listed fishes.

Wood preservative chemicals that may leach from materials used for bridges, raised trail treads etc. may also contaminate waters. Because all treated wood used shall be produced and used in compliance with "Best Management Practices for the use of wood in aquatic and other sensitive environments" (Western Wood Preservers Institute, 2006), and research has found that there are no measurable impacts on aquatic organisms if the wood is properly treated and installed, negligible effects are expected.

Minimal risk of sewage contamination is expected because most toilets used are vault style which are impermeable and do not leak into surrounding soils, and any replacement of septic systems will meet applicable DEQ and District of Health requirements.

At new and rebuilt trail culverts and fords, passage for aquatic organisms and all life stages will be provided for by using available tools (such as software) to determine necessary culvert specifications, (i.e., size, grade etc.), and placement of substrate as needed. In addition, to avoid effects to spawning fishes, fords will not be located where there is spawning habitat.

Overall, this action is expected to yield negligible effects on listed fishes or their habitat due to implementation of the above mitigation measures to minimize sediment delivery, minimize potential for petroleum or other chemical contamination, and provide for aquatic organism passage.

Road management, trail maintenance and recreation and administrative site operation and maintenance and the travel plan are interdependent Federal actions; therefore, they will be discussed collectively in the effects matrix (Appendix 3)

i. Travel Plan

Potential effects of this action are increased sedimentation in streams due to motorized and non-motorized use at road and trail stream crossings, adverse effects of petroleum spills, and physical harm to eggs that may be present in redds at trail fords and elsewhere. Soils on roads and trails at stream crossings will often be delivered to streams via wind, water, tires at fords etc. As described above (section V. A. 6.), additional sediment can reduce habitat quality and adversely affect incubating eggs, and petroleum products can directly poison salmonids and their aquatic invertebrate food source (section V. A. 4.). Mortality of listed fish eggs (take) can occur should a redd be trampled or driven over. Trampling can occur due to any foot or horse use in streams, including use from anglers, swimmers, people floating in watercraft, people hiking, and similar activities. There are approximately 41 stream trail crossings, of which approximately 20% are fords (Gary Elliot, personal communication). Fording, even off roads and trail, frequently occurs in spawning habitat because these are often the easiest places to cross a creek. Roberts and White (1992), found twice-daily wading throughout development killed up to 96% of trout eggs and pre-emergent fry, while a single wading just before hatching killed up to 43% of eggs.

Under the new travel plan action no motorized cross-country travel will be allowed. The reduction in fording and soil disturbance in RCAs (compared to baseline conditions) associated with restricting motorized cross-country travel will improve the sediment and substrate embeddedness WCI's by only negligible amounts because travel across streams will still occur on authorized motorized routes, and existing areas of erosion are not remedied with the action. Project Design Features and Best Management Practices will reduce sediment delivery during reroute or reconstruction of previously unauthorized routes to negligible levels. Road management, trail, recreation and administrative site operation and maintenance and the travel plan Federal actions are interdependent actions; therefore, they will be discussed collectively in the effects matrix (Appendix 3). Specific examples of methods to reduce sediment delivery to negligible levels include: construction and maintenance of water management structures such as waterbars, rolling dips, and bridges; reclamation of abandoned trails, and designing reroutes to meet current Forest Service standards. Over time, increasing public use of roads and trails and related increases in sediment yield will degrade the sediment and substrate embeddedness WCI's in the short and long term. Because of the proximity of listed fished and critical habitat to roads and/or trails in this analysis area, increases in sediment due to travel plan actions are expected to have adverse effects.

For the Travel Plan EIS (CD2: \Support Documents\Travel Plan [in Travel Plan.zip]) analysis miles of road and trails authorized for motorized use was used as an index of streambank condition with the assumption that the number of stream crossings would increase with mileage. Streambank condition related to road and trail crossings will improve because road and/or trail miles will decrease. Using the LRMP WCI definition of streambank condition, there will be a temporary improvement in the subwatershed when cross country motorized travel is restricted due to a reduction in the amount of fording and soil disturbance in RCAs. In the short and long term, streambank condition at existing crossings will degrade with increased public use. Road and trail maintenance (Section IV.) activities (with related mitigations) that reduce erosion and sediment delivery to stream channels will decrease the magnitude of degrading effects to sediment, substrate, and streambank condition WCI's from expected increases in public use, but will not alter the general increasing trend. Disturbance history and regime, and RCA WCI's will improve with the restriction on motorized cross-country travel.

Motorized recreation is the most likely source of petroleum contamination with this action. Because motorized trails ford Hazard Creek tributaries directly adjacent to occupied habitat in Hazard Creek, and roads also occur adjacent to and cross Hazard Creek, a fuel spill in these areas is likely to result in adverse effects to listed fishes. Adverse effects to listed fishes such as harassment or redd trampling are also likely to occur from fording streams on foot, horseback, or other non-motorized travel.

j. Livestock Grazing Allotments — Two Actions (Snake River/Indian Creek S&G, Deep Creek S&G)

The potential effects of this action are discussed above under *General Effects* (V-A). Sheep use is restricted to the headwaters of Copper Creek upstream of the South Peacock mine area, and headwaters of Deep Creek just below the 112 road. Negligible risk of disturbance to redds or spawning fish is expected because grazing occurs in these headwaters areas that are highly unlikely to provide spawning habitat for or support bull trout, and that are well away (~ 5+ miles) from habitat occupied by Chinook and steelhead.

Utilization and stubble height standards for riparian areas (mitigation described in the Federal action) will limit the amount of livestock use and impacts to levels that will not degrade WCI's such as shade providing riparian vegetation and streambank stability. Monitoring data show that utilization levels are being met (Zurstadt 2004; Zurstadt & Bonaminio 2005). Mitigations that restrict salting areas, corrals and other handling facilities to locations that protect WCI's, allow once only grazing, call for no trailing over grazed areas, and once only use of bedding and watering sites are expected to maintain WCI's such as sediment and temperature and yield negligible effects on listed fishes and critical habitat.

If future monitoring (range monitoring, MIS monitoring) indicates a degrading trend or the presence of sheep in the vicinity of spawning areas, grazing practices will be modified to avoid more than negligible effects.

Monitoring Results.—Future effects are expected to be similar to these monitoring results. The 2006 Fisheries–Range Monitoring Report (Nelson 2006) summarizes approximately 13 years of sediment and temperature monitoring at fixed sites in grazed watersheds (the actual length of monitoring records varies among sites) (site maps are available in monitoring reports [e.g., Nelson 2006]). In general, deleterious effects on salmonid habitat conditions from grazing were not evident, and most trends appeared to be in the direction of improving conditions (Nelson 2006); more detail is available in the annual monitoring report.

Deep Creek, Canyon Site (W065)

Embeddedness measurements were initially high at this site, but have since declined. This is not a granitic watershed, and even in 2005 the embeddedness observed (29%) would at best be indicative of FR conditions under LRMP default criteria. Statistical analysis found a significant downward (i.e., improving) trend. Free matrix counts have generally been low and consistent with embeddedness measurements. Data scatter suggest an upward trend, particularly since 1994 (Nelson 2006).

Temperatures were moderate, generally FR for anadromous rearing and FUR for bull trout at all life history stages.

k. Outfitter and Guide Activities on Federal Lands (Heaven’s Gate Outfitters)

Potential stock impacts to riparian areas, ground disturbance leading to sediment delivery, and redd trampling are concerns associated with this activity. Sedimentation and effects on riparian vegetation are most likely to occur at campsites, particularly those used each season, due to general disturbance such as camp set up, tents etc., and picketing or corralling, feeding and watering stock. Past inspections of campsites have found minor problems, moving a corral that was too close to a small tributary, and creating an off-site water trough for horses to remedy a small area of bank trampling (Gary Elliot, personal communication). Negligible effects from camp use are expected because past problems have been identified and remedied, and annual inspections will continue to see that camps are meeting LRMP standards and that changes are made should there be potential effects to fish or fish habitat. Hunting activity is highly unlikely to cause any measurable effects because it is widely dispersed throughout the analysis area, and is highly unlikely to occur to any substantial extent near Rapid River or the Lake Fork tributary where listed fishes occur. To further reduce the risk of redd trampling or other effects, training to avoid adverse effects will be provided to outfitters and guides.

2. CUMULATIVE EFFECTS, STATE AND PRIVATE

Due to the current condition there is a low risk of cumulative effects to the Deep Creek watershed. The major non-federal ownership within the watershed is the Red Ledge Mine. An attempt was made to reclaim the mine, but effluent continues to leak from the adits. Any reclamation performed in relation to this mine is likely to benefit listed fish species and their critical habitat, but is outside the administrative control of the Forest.

3. COMBINED EFFECTS, INCLUDING INTERRELATED AND INTERDEPENDENT FEDERAL ACTIONS

With the exception of Noxious Weed Management, and the Travel Plan, the actions maintain or restore each of the population and habitat indicators considered in the environmental baseline. The combined effect of these actions will be to slowly move the environmental baseline towards the condition described as “functioning appropriately”.

Both noxious weed management activities and actions to occur under the travel plan have more than a negligible potential to adversely affect listed fish species (Appendix 3).

Under the proposed travel plan, adverse effects would occur due to erosion and sediment generated by use of road and trail facilities and other uses including adverse effects to listed salmonids at fords and elsewhere in streams. The reduction in fording and soil disturbance in RCAs associated with

restricting motorized cross-country travel will improve the sediment and substrate embeddedness WCI by only negligible amounts because travel across streams will still occur on authorized motorized routes, and existing areas of erosion are not remedied with the action. In the short and long term, sediment delivery to streams from erosion on trails and roads related to increased motorized and non-motorized use is expected to surpass benefits from restricted travel and degrade habitat (Appendix 3).

Though motorized recreational use, and thus its associated sediment effects, is on an increasing trend, because watershed improvements, such as road obliteration, typically reduce or remove large sediment sources it is expected to offset travel plan sediment effects and maintain watershed sediment WCI. Overall, fish population WCI is expected to degrade because adverse effects on these indicators due to the travel plan action (i.e., redd trampling) and noxious weed treatment are expected to exceed improvements due to watershed improvement activities. In addition, adverse effects of chemical contamination from the Red Ledge mine will continue as there are no plans for cleanup there.

VI. MITIGATION MEASURES

No additional mitigation measures are needed other than those specified in the descriptions of the proposed actions.

VII. MONITORING AND EVALUATION

The only ongoing monitoring in the watershed is the monitoring of livestock grazing. No monitoring other than what is described as required mitigation for federal actions and ongoing grazing monitoring is proposed.

VIII. DETERMINATIONS

Table 16.—Determinations for various actions.

Federal Action	Listed Species or Critical Habitat					Expiration Date
	SpSFCS, SST			BT	WCT	
	Species	SpSFCS Habitat	SST Habitat	Species	Species	
Programmatic Actions						Dec. 31, 2017
Miscellaneous Forest Products	NLAA	NLAA	NLAA	NLAA	NE	
Mistletoe Control and Pre-Commercial Thinning	NLAA	NLAA	NLAA	NLAA	NE	
Fire Management Activities	NLAA	NLAA	NLAA	NLAA	NE	
Fish Habitat and Riparian Sampling	NLAA	NLAA	NLAA	NLAA	NE	
Watershed and Fish Habitat Improvements and Maintenance	NLAA	NLAA	NLAA	NLAA	NE	
Noxious Weed Control	LAA	LAA	LAA	LAA	NE	
Road Management	LAA	LAA	LAA	LAA	NE	
Trails, Recreation, and Administrative Site Operation and Maintenance	LAA	LAA	LAA	LAA	NE	
Travel Plan	LAA	LAA	LAA	LAA	NE	
Other Actions						
Deep Creek & Snake River/Indian Creek Allotments	NLAA	NLAA	NLAA	NLAA	NE	
Outfitter and Guide Activities on Federal Lands (Heaven's Gate Outfitters)	NLAA	NLAA	NLAA	NLAA	NE	

See Acronyms and Abbreviations (Appendix 4) document for explanation of species and determination acronyms.

A. RATIONALE

1. MISCELLANEOUS FOREST PRODUCTS

The considered action is **not likely to adversely affect** listed species or critical habitat and have **no effect** on westslope cutthroat trout. These activities are expected to yield negligible effects to fish or their habitat because required mitigation measures address fuel handling, and preclude actions in RCA's unless both a journey level hydrologist and fisheries biologist agree required mitigations are met. Because westslope cutthroat do not occur in the watershed, this action will have no effect on them. For a complete discussion of effects see sections V.A. and B. above.

2. MISTLETOE CONTROL AND PRE-COMMERCIAL THINNING

The considered action is **not likely to adversely affect** listed species or critical habitat and will have **no effect** on westslope cutthroat trout. These activities are expected to yield negligible effects to fish or their habitat because required mitigation measures address fuel handling, and preclude actions in RCA's unless both a hydrologist and fisheries biologist agree required mitigations are met. Because westslope cutthroat do not occur in the watershed, this action will have no effect on them. For a complete discussion of effects see sections V.A. and B. above.

3. FIRE MANAGEMENT ACTIVITIES

The considered action is **not likely to adversely affect** listed species or critical habitat will have **no effect** on westslope cutthroat trout. The federal action discussion, provides direction such as properly screening pumps, not dropping retardant in RCAs or streams, containing fuel, proper handling or use of chemicals, not removing RCA trees unless they present a hazard, rehabilitating disturbed areas (e.g., fireline, helispots, camps), to address potential effects. In addition, direction to see that fire personnel are briefed and familiar with fire management guidelines in this BA, and oversight and continued education/briefing of fire personnel on fires by resource advisors will be implemented. This action is expected to have negligible effects due to implementation of mitigation measures and guidelines, continued education of fire personnel, and use of resource advisors. Because westslope cutthroat do not occur in the watershed, this action will have no effect on them. For a complete discussion of effects see section V.A.2. above.

4. FISH HABITAT AND RIPARIAN SAMPLING

The considered action is **not likely to adversely affect** listed species or critical habitat and will have **no effect** on westslope cutthroat trout. Required mitigation measures are intended to prevent adverse to listed fishes or eggs. Displacements due to personnel presence are judged biologically negligible because of the extremely short duration of disturbance. Sediment that is generated due to sampling is expected to settle out within the prescribed buffer distance (one stream width or within one habitat unit of any redd). Buffers are also judged to be effective in eliminating any potential harassment of adjacent fish. For a complete discussion of effects see sections V.B.1, above. Because westslope cutthroat do not occur in the watershed, this action will have no effect on them.

5. WATERSHED AND FISH HABITAT IMPROVEMENTS AND MAINTENANCE

The considered action is **not likely to adversely affect** listed species or critical habitat because the species and habitat criteria will be maintained or improved. The considered action will have **no effect** on westslope cutthroat trout because they do not occur in the watershed. Mitigations described in the Federal action will insure that any temporary degrading effects are negligible. Restrictions on use of mechanized equipment within RCA buffers will insure that any soil, streambank, or streambed disturbance and associated sediment delivery to the stream channel is temporary and minimal so that effects to listed fishes are negligible. Furthermore, a journey level fisheries biologist will insure that activities do not proceed if there is potential for more than negligible effects to individual listed fish, or their eggs. For a complete discussion of effects see sections V.A. and B. above.

6. NOXIOUS WEED MANAGEMENT

The considered action is **likely to adversely affect** listed species or critical habitat and will have **no effect** on westslope cutthroat trout. Mitigation measures are expected to minimize effects, but sub-lethal effects to listed fish and their food sources are probable, therefore adverse effects are expected from this action. Because westslope cutthroat do not occur in the watershed, this action will have no effect on them. For a complete discussion of effects see section V.A. above.

7. ROAD MANAGEMENT

Because this action is interrelated and interdependent with the Travel Plan action which has been determined to be likely to adversely affect listed fishes or critical habitat, this considered action is determined to be **likely to adversely affect** listed species or critical habitat. Because westslope cutthroat do not occur in the watershed, this action will have **no effect** on them. On its own, this action is expected to have negligible effect on listed fishes and critical habitat due to mitigation measures that address sediment delivery, removal of LWD from RCAs, and chemical contamination. In addition, where road management activities run the risk of affecting or disturbing listed fishes in the immediate area (i.e., harassment, redd destruction, sediment effects) a fisheries biologist must first approve the activity. For a complete discussion of effects see sections V.A. and B. above.

8. TRAILS, RECREATION, AND ADMINISTRATIVE SITE OPERATION AND MAINTENANCE

Because this action is interrelated and interdependent with the Travel Plan action which has been determined to be likely to adversely affect listed fishes or critical habitat, this considered action is determined to be **likely to adversely affect** listed species or critical habitat. Because westslope cutthroat do not occur in the watershed, this action will have **no effect** on them. On its own, this action is expected to yield negligible effects on listed fishes or their habitat due to implementation of mitigation measures to minimize sediment delivery, minimize potential for petroleum or other chemical contamination, and provide for aquatic organism passage. For a complete discussion of effects see sections V.A. and B. above.

9. TRAVEL PLAN

The considered action is **likely to adversely affect** listed species or critical habitat and will have **no effect** on westslope cutthroat trout. Because of the proximity of listed fishes and critical habitat to roads and/or trails in this analysis area, increases in sediment due to travel plan actions are expected to have adverse effects. Adverse effects to listed fishes such as harassment or redd trampling are also likely to occur from fording streams on foot, horseback, or other non-motorized travel. Because westslope cutthroat do not occur in the watershed, this action will have no effect on them. For a complete discussion of effects see sections V.A. and B. above.

10. DEEP CREEK AND SNAKE RIVER/INDIAN CREEK/SMITH CREEK ALLOTMENTS

The considered action is **not likely to adversely affect** listed species or critical habitat and will have **no effect** on westslope cutthroat trout. Negligible effect on spawning listed fish is expected due to use of bridges, and watering and fording in areas without listed fishes or with no spawning habitat. Mitigation measures that include utilization standards, salting areas, handling facilities, trailing, once only grazing, and use of bedding and watering sites are expected to yield negligible effects on listed fishes and critical habitat. Because westslope cutthroat do not occur in the watershed, this action will have no effect on them. For a complete discussion of effects see sections V.A. and B. above.

11. HEAVEN'S GATE OUTFITTERS

The considered action is **not likely to adversely affect** listed species or critical habitat and will have **no effect** on westslope cutthroat trout. Negligible effects from camp use are expected because past problems have been identified and remedied, and annual inspections will continue to see that camps are meeting LRMP standards and that changes are made should there be potential effects to fish or fish habitat. To reduce the risk of redd trampling or other effects, training to avoid adverse effects will be provided to outfitters and guides. Because westslope cutthroat do not occur in the watershed, this action will have no effect on them. For a complete discussion of effects see sections V.A. and B. above.

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X. APPENDICES

A. APPENDIX 1. PREVIOUS CONSULTATIONS AND EFFECTS

Volume & Title	Author & Year	Federal Action & Mitigation (page #)	Status	Effects
N/A Water Quality Improvement Plan at Red Ledge Mine.	Strach & Burns, 1992.	Proposed mitigation actions to prevent mine tailings and toxic mine effluent from entering Deep Creek. Pages 1 & 4.	Complete	Effects as expected in BA
N/A Deep Copper Timber Sale	Uberuaga & Burns, 1992	Harvest timber from 295 acres of suitable timber base damaged by the 1988 Eagle Bar fire. Pages 2 & 7.	Complete	Effects as expected in BA
N/A 1993-1995 Smith Mountain, Echols Butte, Deep Creek, and Snake River/Indian Mt. Allotments.	Jacobson & Burns, 1993	Ongoing sheep grazing within the Deep Creek Watershed.	Ongoing	Mitigations carried forward into Vol. 1, 1996.
Vol. 1 Grazing Domestic Livestock on the Deep Creek & Snake River/Indian Mt. Allotment.	Veach & Burns, 1996	Ongoing sheep grazing (1996-2000) with the Deep Creek Watershed. Mitigation measures on pages 8 & 9.	Ongoing	Effects as expected in BA
Vol. 2 Ongoing Projects in the Deep Creek Watershed, on Chinook Salmon & Steelhead	Veach & Burns, 1998	Ongoing projects, including Miscellaneous Forest Products, Travel Management, Trail Management, and Deep Creek & Snake River/Indian Mt. Allotments. Mitigation measures on pages 8-11.	Ongoing	Effects as expected in BA
Vol. 3 Ongoing Projects in the Deep Creek Watershed, on Bull Trout.	Uberuaga & Burns, 1998.	Ongoing projects, including Grazing Allotments, Watershed and Fish Habitat Improvements, Fish Habitat and Riparian Surveys, Fish population Presence/Absence Surveys, Road maintenance, Recreation Developments, and Miscellaneous Forest Products. Mitigation measures on pages 8-18.	Ongoing	Effects as expected in BA
Vol. 4 Ongoing Actions in the Deep Creek Watershed, on Chinook Salmon, Steelhead, Bull Trout & Westslope Cutthroat	Hogen & Burns 2001	Ongoing projects, including Fish Habitat and Riparian Surveys, Fish population Presence/Absence Surveys, Miscellaneous Forest Products, Noxious Weeds, Road Maintenance, Trails, Recreation and Administrative site maintenance, Travel Plan, Wildland Fire Suppression and Livestock Grazing. Mitigation measures on pages 13-43.	Ongoing	Effects as expected in BA

B. APPENDIX 2. ENVIRONMENTAL BASELINE

1. DEEP CREEK

Agency/Unit:	PNF, Council Ranger District	HU Code & Name	170601010102 - Deep Creek
Fish Species Present:	bull trout, Chinook, steelhead	Spatial Scale of Matrix	One 6 th level hydrologic unit
(Anad. Sp.) Population:	Chinook, steelhead	Subpopulation	Deep Creek
(Bull trout) Core Area:	Deep Creek	Local Population	Deep Creek
Management Action(s):	Multiple actions – Programmatic Ongoing Biological Assessment		
Pathways Indicators	Population and Environmental Baseline		
	Desired Condition	<input checked="" type="checkbox"/> = data Baseline ²	Discussion of Baseline – Current Condition
Subpopulation Character			
Subpopulation Size	Bull trout - Mean total local population size or local habitat capacity more than several thousand individuals. Adults in local population > 500. All life stages are represented within the local population.	Unknown	Steelhead and bull trout have been observed in Deep Creek (Eric Veach, personal communication) (T. Cochanaur, 2000). Chinook salmon eggs have been found near the mouth of Deep Creek (D. Hogen and L. Wagoner, 1999). No information on population size is available (Burns et al., 2005).
Growth and Survival	Bull trout - Local population has the resilience to recover from temporary or short-term disturbances (e.g., catastrophic events, etc.) or local population declines within 1 to 2 generations (5-10 years). The local population is characterized as increasing or stable. At least 10 years of data support this estimate.	FUR – PJ	No population data; difficult to assess local population resilience. Fluvial bull trout in Snake River provide means for re-colonizing after disturbance.
Life History Diversity and Isolation	Bull trout - The migratory form is present and the local populations are in close proximity to each other. Migratory corridors and rearing habitat (lake or larger river) are in good to excellent condition for the species. Neighboring local populations are large with high likelihood of producing surplus individuals or straying adults that will mix with other local populations.	FUR – PJ	No man made barriers other than the drainage from the Red Ledge mine occur in the watershed. Migratory form is present in the Snake River and may provide source for straying adults. Snake River habitat influenced by upstream dams. Local populations of unknown size occur in Granite, Sheep, and Wolf Creeks. These populations are ~ 8 to 48 mi. dns of Deep Creek.
Persistence and Genetic Integrity	Bull trout - Connectivity is high among multiple (5 or more) local populations with at least several thousand fish each. Each of the relevant local populations has a low risk of extinction. The probability of hybridization or displacement by competitive species is low to nonexistent	FUR – PJ	Abundance of migratory form is unknown. Migratory bull trout are present in the Snake River. Population sizes are unknown. Connectivity is present between populations in Sheep Creek, Granite Creek, Wolf Creek, and further downstream in the Imnaha and Grand Ronde Rivers (Burns et al., 2005).

Agency/Unit:	PNF, Council Ranger District	HU Code & Name	170601010102 - Deep Creek
Fish Species Present:	bull trout, Chinook, steelhead	Spatial Scale of Matrix	One 6 th level hydrologic unit
(Anad. Sp.) Population:	Chinook, steelhead	Subpopulation	Deep Creek
(Bull trout) Core Area:	Deep Creek	Local Population	Deep Creek
Management Action(s):	Multiple actions – Programmatic Ongoing Biological Assessment		
Pathways Indicators	Population and Environmental Baseline		
	Desired Condition	<input checked="" type="checkbox"/> = data Baseline²	Discussion of Baseline – Current Condition
Water Quality			
Temperature (7 day average. Maximum, °C)	<p>Steelhead, Chinook: 7-day average maximum. Spawning, rearing, and migration: 10 – 13.9°C</p> <p>Bull trout: 7-day average maximum in a reach during the following life history stages: Incubation (Sept-Mar): 2-5°C Rearing (year-round): 4-12°C Spawning (Sept): 4-9°C Migration (June-Sept): NTE 15°C</p>	<input checked="" type="checkbox"/> FA – M, PJ	<p>Monitoring site W065 (Zurstadt and Bonaminio, 2005) Deep Creek 2002: 16.4 (FUR) 2003: 16°C (FUR) 2004: 15.7°C (FUR)</p> <p>Temps (2002 – 2004) generally in 14 to mid 15°C range except for July and occasionally August. Oxbow Creek 2004: 13.8°C (Data on file at PNF SO) Watershed has seen relatively little management, temperatures are likely functioning appropriately.</p>
Sediment	<p>Steelhead/Chinook: Low turbidity is indicated by <12% surface fines (<0.85 mm)</p> <p>Bull trout: < 12% fines (< 0.85 mm) in gravel. Surface fines (≤6mm) ≤ 20%</p>	<input checked="" type="checkbox"/> FA - M	<p>Deep Creek Monitoring site W068 (Zurstadt and Bonaminio, 2005) 2003: 8.1 % fines (FA) 2004: 9.5 % fines (FA) 2005: 1.6 % fines (FA)</p> <p>Monitoring site W065 2003: 5.9 % fines (FA) 2004: 9.2 % fines (FA) 2005: 1.7 % fines (FA)</p> <p>Watershed has seen relatively little management, and sediment is likely functioning appropriately.</p>
Chemical Contaminants/Nutrients	Low levels of chemical contamination from agricultural, industrial, and other sources; no excess nutrients, no 303 (d) water quality limited water bodies.	FR – PJ	Acidic drainage from the Red Ledge Mine appears to prevent any aquatic biota from utilizing the stream near the Red Ledge Mine (Burns et al., 2005) and may be affecting areas downstream of the mine. The Forest has no administrative control over the mine. Efforts have been made to plug the adits and contain the effluent, with some success, but additional work is needed.
Habitat Access			
Physical Barriers	Any man-made barriers present in watershed allow upstream and downstream fish passage at all flows.	FR - PJ	Acid mine drainage from the Red Ledge Mine could cause a chemical migration barrier during low water periods.

Agency/Unit:	PNF, Council Ranger District	HU Code & Name	170601010102 - Deep Creek
Fish Species Present:	bull trout, Chinook, steelhead	Spatial Scale of Matrix	One 6 th level hydrologic unit
(Anad. Sp.) Population:	Chinook, steelhead	Subpopulation	Deep Creek
(Bull trout) Core Area:	Deep Creek	Local Population	Deep Creek
Management Action(s):	Multiple actions – Programmatic Ongoing Biological Assessment		
Pathways Indicators	Population and Environmental Baseline		
	Desired Condition	<input checked="" type="checkbox"/> = data Baseline²	Discussion of Baseline – Current Condition
Habitat Elements			
Substrate Embeddedness	Dominant substrate is gravel or cobble (interstitial spaces clear), or embeddedness is < 20%.	<input checked="" type="checkbox"/> FR – M, PJ	Substrate embeddedness levels within the watershed appear to be functioning at risk (Hogen and Wagoner, 1999) Deep Creek Monitoring site W065 (Zurstadt and Bonaminio, 2005; Nelson, 2006) 2002: 26.3 % embedded (FR) 2003: 20.9 % embedded (FR, barely) 2004: 32.1 % embedded (FUR) 2005: 28.5 % embedded (FR)
Large Woody Debris	>20 pieces per mile, >12 in. in diameter, >35 feet in length, and adequate sources of large woody debris for both long and short-term recruitment.	<input checked="" type="checkbox"/> FA - SR, PJ	Deep Creek 1998 – 1999 habitat surveys: Over 7 reaches surveyed, 25-72 pieces of LWD/mile recorded (FA) (data on file at PNF SO)

Agency/Unit:	PNF, Council Ranger District	HU Code & Name	170601010102 - Deep Creek																																																		
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Pool Frequency	<p>Pools have good cover and cool water, and only minor reduction of pool volume by fine sediment. Large woody debris recruitment standards for functioning appropriately are met and pool frequency in a reach closely approximates:</p> <p>Steelhead/Chinook</p> <table> <tr> <td>Channel width (m)</td> <td>No. pools/mile</td> </tr> <tr> <td>0 - 1.5</td> <td>184</td> </tr> <tr> <td>1.5 – 3</td> <td>96</td> </tr> <tr> <td>3 – 4.6</td> <td>70</td> </tr> <tr> <td>4.6 – 6.1</td> <td>56</td> </tr> <tr> <td>6.1 – 7.6</td> <td>47</td> </tr> <tr> <td>7.6 – 15.2</td> <td>26</td> </tr> <tr> <td>15.2 – 22.8</td> <td>23</td> </tr> <tr> <td>22.8 – 30.5</td> <td>18</td> </tr> </table> <p>Bull Trout</p> <table> <tr> <td>Wetted with m.</td> <td>No. pools/mile</td> </tr> <tr> <td>0-1.5</td> <td>39</td> </tr> <tr> <td>1.5-3</td> <td>60</td> </tr> <tr> <td>3-4.6</td> <td>48</td> </tr> <tr> <td>4.6-6.1</td> <td>39</td> </tr> <tr> <td>6.1-9.1</td> <td>23</td> </tr> <tr> <td>9.1-10.7</td> <td>18</td> </tr> <tr> <td>10.7-12.2</td> <td>10</td> </tr> <tr> <td>12.2-19.8</td> <td>9</td> </tr> <tr> <td>19.8-30.5</td> <td>4</td> </tr> </table>	Channel width (m)	No. pools/mile	0 - 1.5	184	1.5 – 3	96	3 – 4.6	70	4.6 – 6.1	56	6.1 – 7.6	47	7.6 – 15.2	26	15.2 – 22.8	23	22.8 – 30.5	18	Wetted with m.	No. pools/mile	0-1.5	39	1.5-3	60	3-4.6	48	4.6-6.1	39	6.1-9.1	23	9.1-10.7	18	10.7-12.2	10	12.2-19.8	9	19.8-30.5	4	<input checked="" type="checkbox"/> FA – SR, PJ	<p>Deep Creek habitat surveys (1998-1999) (data on file at PNF SO)</p> <p>1998</p> <table> <tr> <td>Reach 1: 6.1m ave. width</td> <td>50 pools/mile (FA)</td> </tr> <tr> <td>Reach 2: 4.5m ave. width</td> <td>15 pools/mile (FUR)</td> </tr> <tr> <td>Reach 3: 6m ave. width</td> <td>21 pools/mile (FR)</td> </tr> <tr> <td>Reach 4: 5.5m ave. width</td> <td>25 pools/mile (FR)</td> </tr> </table> <p>1999</p> <table> <tr> <td>Reach 2: 4.4m ave. width</td> <td>30 pools/mile (FR)</td> </tr> <tr> <td>Reach 3: 5.8m ave. width</td> <td>65 pools/mile (FA)</td> </tr> </table> <p>Though pool frequency low in some reaches, temperature, sediment and LWD are FA, and the drainages is relatively pristine.</p>	Reach 1: 6.1m ave. width	50 pools/mile (FA)	Reach 2: 4.5m ave. width	15 pools/mile (FUR)	Reach 3: 6m ave. width	21 pools/mile (FR)	Reach 4: 5.5m ave. width	25 pools/mile (FR)	Reach 2: 4.4m ave. width	30 pools/mile (FR)	Reach 3: 5.8m ave. width	65 pools/mile (FA)
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Reach 2: 4.4m ave. width	30 pools/mile (FR)																																																				
Reach 3: 5.8m ave. width	65 pools/mile (FA)																																																				
Pool Quality	Each reach has many large pools >3.28 feet (1 meter) deep. Pools have good cover and cool water, and only minor reduction of pool volume by sediment.	<input checked="" type="checkbox"/> FA - SR	Majority of pools recorded in 1998-1999 surveys over 1m deep (data on file at PNF SO)																																																		

Agency/Unit:	PNF, Council Ranger District	HU Code & Name	170601010102 - Deep Creek
Fish Species Present:	bull trout, Chinook, steelhead	Spatial Scale of Matrix	One 6 th level hydrologic unit
(Anad. Sp.) Population:	Chinook, steelhead	Subpopulation	Deep Creek
(Bull trout) Core Area:	Deep Creek	Local Population	Deep Creek
Management Action(s):	Multiple actions – Programmatic Ongoing Biological Assessment		
Pathways Indicators	Population and Environmental Baseline		
	Desired Condition	<input checked="" type="checkbox"/> = data Baseline²	Discussion of Baseline – Current Condition
Off-Channel Habitat	Watershed has many ponds, oxbows, backwaters, and other off-channel areas with cover; side channels are low energy areas.	FA – SR, PJ	Survey notes show Deep Creek is a channel type that is entrenched and very confined where little off channel habitat would occur. Because the watershed has seen relatively little management, off-channel habitat is likely at a naturally low level. (data on file at PNF SO)
Refugia	Bull trout: Habitats capable of supporting strong and significant local populations are protected and are well distributed and connected for all life stages and forms of the species. Chinook/steelhead: Habitat refugia exist and are adequately buffered (e.g., by intact riparian conservation areas); existing refugia are sufficient in size, number, and connectivity to maintain viable populations or sub-population	FR – SR, PJ	Data indicate Deep Creek provides refugia habitat with the exception of a reach affected by the Red Ledge mine (Data on file at Supervisor's Office, McCall, ID). RCAs are expected to be intact as relatively little management has occurred in the drainage
Channel Condition and Dynamics			
Width/Maximum Depth Ratio	</= 10	<input checked="" type="checkbox"/> FA - SR	1998-1999 habitat surveys of 7 reaches w/max depth range: 3.7 – 5.9 (FA) (data on file at PNF SO)
Streambank Condition	>90% of any stream reach has stable banks relative to the percent of inherent stable streambanks associated with a similar unmanaged stream system. 90% of NCD mean for A channel metamorphic/volcanic streams = 88.2% stable	<input checked="" type="checkbox"/> FR – M, PJ	Range monitoring data (site 516) (Zurstadt and Bonaminio, 2005) 95% undisturbed bank (2002) (FA) 79% undisturbed bank (2003) (FR)

Agency/Unit:	PNF, Council Ranger District	HU Code & Name	170601010102 - Deep Creek
Fish Species Present:	bull trout, Chinook, steelhead	Spatial Scale of Matrix	One 6 th level hydrologic unit
(Anad. Sp.) Population:	Chinook, steelhead	Subpopulation	Deep Creek
(Bull trout) Core Area:	Deep Creek	Local Population	Deep Creek
Management Action(s):	Multiple actions – Programmatic Ongoing Biological Assessment		
Pathways Indicators	Population and Environmental Baseline		
	Desired Condition	<input checked="" type="checkbox"/> = data Baseline²	Discussion of Baseline – Current Condition
Floodplain Connectivity	Within RCAs, floodplains and wetlands are hydrologically linked to the main channel; overbank flows occur and maintain wetland/floodplain functions; and riparian vegetation succession.	FA - PJ	Floodplain connectivity is functioning appropriately based on field observations by Eric Veach (former Council district fisheries biologist) during 1998 and 1999.
Flow/Hydrology			
Change in Peak/Base Flows	Watershed hydrograph indicates peak flow, base flow, and flow timing characteristics comparable to an undisturbed watershed of a similar size, geomorphology and climatology.	FA – PJ	The watershed is relatively undisturbed, peak, and base flows expected to be similar to an undisturbed watershed (Hogen and Burns, 2001).
Drainage Network Increase	Zero or minimum change in active channel length correlated with human caused disturbance.	FA - PJ	The subwatershed is almost roadless (only 1 ½ miles) so drainage network should not have been increased (Hogen and Burns, 2001).
Watershed Conditions			
Road Density and Location	Total road density <0.7 miles/square mile of subwatershed, no road within RCAs.	<input checked="" type="checkbox"/> FA – SR, PJ	Total road density: 0.4 mi/mi ² (FA) RCA road density: 0.2 mi/mi ² (FA) (CD1: \Support Documents\Maps\total_roads.pdf)
Disturbance History	<15% ECA (entire watershed) with no concentration of disturbance in areas with landslide or landslide prone areas, and/or refugia, and/or RCAs.	FA – PJ	26% ECA (CD1: \Support Documents\Maps\eca_lsp.pdf), though ECA elevated, the watershed has experienced some natural wildfire, but has seen little management activity.

Agency/Unit:	PNF, Council Ranger District	HU Code & Name	170601010102 - Deep Creek
Fish Species Present:	bull trout, Chinook, steelhead	Spatial Scale of Matrix	One 6 th level hydrologic unit
(Anad. Sp.) Population:	Chinook, steelhead	Subpopulation	Deep Creek
(Bull trout) Core Area:	Deep Creek	Local Population	Deep Creek
Management Action(s):	Multiple actions – Programmatic Ongoing Biological Assessment		
Pathways Indicators	Population and Environmental Baseline		
	Desired Condition	<input checked="" type="checkbox"/> = data Baseline²	Discussion of Baseline – Current Condition
Riparian Conservation Areas	The riparian conservation areas within the subwatershed(s) have historic and occupied refugia for listed, sensitive or native/desired nonnative fish species which are present and provide: adequate shade, large woody debris recruitment, sediment buffering, connectivity, and habitat protection and connectivity to adequately minimize adverse effects from land management activities (>80% intact). All vegetative components are within desired conditions identified in Appendix A of the Forest Plan. RCA functions and processes are intact, providing resiliency from adverse affects associated with land management activities. Co	FA - PJ	The watershed is essentially undisturbed, riparian area function has not been altered (Hogen and Burns, 2001).
Disturbance Regime	Disturbance resulting from land management activities are negligible or temporary. Streamflow regimes are appropriate to the local geomorphology, potential vegetation and climatology resulting in appropriate high quality habitat and watershed complexity that provide refugia and rearing space for all life stages or multiple life-history forms. Ecological processes are within historical ranges.–Resiliency of habitat to recover from land management disturbances is high.	FR - PJ	Natural processes appear stable throughout most of the watershed (Hogen and Burns, 2001) but the Deep Creek reach immediately downstream of the Red Ledge mine will not be able to recover until the chronic sediment and acidic drainage into the stream are stopped.

Agency/Unit:	PNF, Council Ranger District	HU Code & Name	170601010102 - Deep Creek
Fish Species Present:	bull trout, Chinook, steelhead	Spatial Scale of Matrix	One 6 th level hydrologic unit
(Anad. Sp.) Population:	Chinook, steelhead	Subpopulation	Deep Creek
(Bull trout) Core Area:	Deep Creek	Local Population	Deep Creek
Management Action(s):	Multiple actions – Programmatic Ongoing Biological Assessment		
Pathways Indicators	Population and Environmental Baseline		
	Desired Condition	<input checked="" type="checkbox"/> = data Baseline²	Discussion of Baseline – Current Condition
Integration of Species and Habitat Conditions	bull trout, steelhead, Chinook - Habitat quality and connectivity among subpopulations is high. Disturbance has not altered channel equilibrium. Fine sediments and other habitat characteristics influencing survival and growth are consistent with the desired conditions for the habitat. The subpopulation has the resilience to recover from short-term disturbance within one to two generations (5-10 years). The subpopulation is fluctuating around an equilibrium or is growing.	FR - PJ	Through review of current WCI function above, This author has determined habitat condition is relatively good. The Red Ledge mine potentially creates a seasonal barrier to fish movement. Fish population condition is unknown (Burns et al., 2005).

1 – FA = Functioning Appropriately, FR = Functioning at Risk, FUR = Functioning at Unacceptable Risk, N = Not Applicable, M = monitoring data, SR = survey data, PJ = professional judgment, FR = field reviews

C. APPENDIX 3. MATRICES OF EFFECTS

1. DEEP CREEK

a. Miscellaneous Forest Products; Mistletoe Control and Pre-commercial Thinning;

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Miscellaneous forest products, Mistletoe control and pre-commercial thinning				
	Effects of the Management Action(s)				
Pathways & Indicators	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Local Population Character					
Local Population Size Unknown	M	*_	*_	*_	Negligible effects expected due to mitigation measures of no fuel storage or refueling within RCAs, and no activity in RCAs without meeting criteria and approval of a fisheries biologist and hydrologist.
Growth and Survival FUR	M	*_	*_	*_	Negligible effects expected due to mitigation measures of no fuel storage or refueling within RCAs, and no activity in RCAs without meeting criteria and approval of a fisheries biologist and hydrologist.
Life History Diversity and Isolation FUR	M	*_	*_	*_	Negligible effects expected due to mitigation measures of no fuel storage or refueling within RCAs, and no activity in RCAs without meeting criteria and approval of a fisheries biologist and hydrologist.
Persistence and Genetic Integrity FUR	N	None	none	None	No influence
Water Quality					
Temperature FA	M	*_	*_	*_	Mitigations and LRMP standards that would apply for actions within RCA, such as pre-commercial thinning or miscellaneous forest product removal, will insure that any reduction in stream shade is negligible.
Sediment FA	M	*_	*_	*_	Mitigations and LRMP standards that would apply for actions within RCAs, such as pre-commercial thinning or miscellaneous forest product removal, will insure that any sediment delivery related to the actions is temporary and negligible.
Chemical Contaminants and/or Nutrients FR	M	*_	*_	*_	Mitigative restrictions concerning refueling in RCAs, fuel and chemical spill prevention and cleanup requirements, will reduce the likelihood of chemical contamination to negligible levels.

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Miscellaneous forest products, Mistletoe control and pre-commercial thinning				
Pathways & Indicators	Effects of the Management Action(s)				
	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Habitat Access					
Physical Barriers FR	N	none	none	None	No influence.
Habitat Elements					
Substrate Embeddedness FR	M	*_	*_	*_	Mitigations and LRMP standards that would apply for actions within RCAs, such as pre-commercial thinning or miscellaneous forest product removal, will insure that any sediment delivery related to the actions is temporary and negligible.
Large Woody Debris FA	M	*_	*_	*_	Mitigations and LRMP standards that would apply for actions within RCA, such as pre-commercial thinning or miscellaneous forest product removal, will insure that any reduction of potential LWD recruitment is negligible. In some cases thinning encroaching conifers (e.g., grand fir) and moving the stand toward more historic conditions will improve the vigor of the remaining trees (e.g., ponderosa pine) which could accelerate recruitment of the larger size classes (>35 ft) of LWD.
Pool Frequency FA	N	none	none	None	No influence
Pool Quality FA	N	none	none	none	No influence
Off-Channel Habitat FA	N	none	none	none	No influence
Refugia FR	N	none	none	none	No influence

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Miscellaneous forest products, Mistletoe control and pre-commercial thinning				
Pathways & Indicators	Effects of the Management Action(s)				
	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Channel Condition and Dynamics					
Width/ Maximum Depth Ratio FA	N	none	none	none	No influence.
Streambank Condition FR	N	none	none	none	No influence.
Floodplain Connectivity FA	N	none	none	none	No influence.
Flow/Hydrology					
Change in Peak/Base Flows FA	N	none	none	none	Due to the small scale of the pre-commercial thinning, and miscellaneous forest product removal there would be no influence on the WCI.
Drainage Network Increase FA	N	none	none	none	No influence
Watershed Conditions					
Road Density and Location FA	N	none	none	none	No influence
Disturbance History FA	M	*-	*-	*-	The small scale of the actions along with mitigations and LRMP standards that would apply for actions (inside and outside of RCAs) such as pre-commercial thinning, and miscellaneous forest product removal, will insure that any alterations of WCIs that contribute to disturbance history are negligible or an improvement (e.g., moving toward LRMP desired vegetation conditions).

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Miscellaneous forest products, Mistletoe control and pre-commercial thinning				
	Effects of the Management Action(s)				
Pathways & Indicators	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Riparian Conservation Areas FA	M	*_	*_	*_	Mitigations and LRMP standards that would apply for actions within RCAs, such as pre-commercial thinning or miscellaneous forest product removal, will insure that any alterations of WCIs that influence RCAs are negligible or an improvement (e.g., moving toward LRMP desired vegetation conditions, or releasing deciduous understory by thinning encroaching conifers).
Disturbance Regime FR	M	*_	*_	*_	Mitigations and LRMP standards that would apply for actions, such as pre-commercial thinning, and miscellaneous forest product removal will insure that any alteration of WCIs that influence disturbance regime will be negligible or an improvement (e.g., moving toward LRMP desired vegetation conditions).
Integration of Species and Habitat Conditions FR	M	*_	*_	*_	Mitigations and LRMP standards that would apply for actions, such as pre-commercial thinning, and miscellaneous forest product removal, will insure that any alterations of the WCIs listed above will be negligible or an improvement (e.g., moving toward LRMP desired vegetation conditions).

b. Fire Management Activities

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Fire management activities				
	Effects of the Management Action(s)				
Pathways & Indicators	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Local Population Character					
Local Population Size Unknown	M	*_	*_	*_	Fire management activities are expected to have negligible effects on these WCIs due to: (1) proper screening of pumps to prevent fish being impinged or sucked into pumps, (2) leaving trees fallen in RCAs to keep benefits of LWD there (3) avoiding fish mortality from toxic chemicals by not dropping of retardant in streams, proper use of chemicals, and having fuel in containment, (4) fire personnel being briefed and familiar with fire guidelines, (5) fire guidelines will be applied to both wildland and prescribed fire, (6) resource advisors providing input on camp locations and layout, ongoing education of fire personnel about guidelines and resource concerns, continual monitoring of suppression actions and addressing problems.
Growth and Survival FUR	M	*_	*_	*_	
Life History Diversity and Isolation FUR	M	*_	*_	*_	
Persistence and Genetic Integrity FUR	N	none	none	none	Current connectivity is affected by acid mine drainage and a natural falls. Fire management won't affect current connectivity.
Water Quality					
Temperature FA	M	*_	*_	*_	Prescribed fire that is allowed to back into RCAs, and fire line construction within RCAs would alter stream shade by a negligible amount in the temporary and short term. Monitoring has shown that large stand replacing wildfires have not adversely affected fish habitat quality (Minshall et al 1994, Royer and Minshall 1996, Bowman and Minshall 1999).
Sediment FA	M	*_	*_	*_	Resource advisors will provide input for camp location and setup to minimize potential sediment delivery and effects on RCA filtering ability. Fire personnel will be briefed and become familiar with guidelines, specifically "every effort should be made to minimize sedimentation". Resource advisors provide information and oversight to help meet this guideline. Post-fire rehabilitation of fireline, camps or other areas where soils is disturbed would be expected to result in negligible temporary sediment delivery. Monitoring has shown that large stand replacing wildfires have not adversely affected fish habitat

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Fire management activities				
	Effects of the Management Action(s)				
Pathways & Indicators	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
					quality (Minshall et al 1994, Royer and Minshall 1996, Bowman and Minshall 1999).
Chemical Contaminants and/or Nutrients FR	M	*_	*_	*_	Negligible risk of chemical contamination expected because fire personnel will be briefed and familiarized with guidelines, guidelines include no dropping of retardant in streams, proper use of chemicals, and fuel containment. Also, ongoing education of fire personnel and oversight by resource advisors will serve to minimize deviations during suppression activities.
Habitat Access					
Physical Barriers FR	N	none	none	none	No influence.
Habitat Elements					
Substrate Embeddedness FR	M	*_	*_	*_	Resource advisors will provide input for camp location and setup to minimize potential sediment delivery and effects on RCA filtering ability. Fire personnel will be briefed and become familiar with guidelines, specifically "every effort should be made to minimize sedimentation". Resource advisors provide information and oversight to help meet this guideline. Post-fire rehabilitation of fireline, camps or other areas where soils is disturbed would be expected to result in negligible temporary sediment delivery. Monitoring has shown that large stand replacing wildfires have not adversely affected fish habitat quality (Minshall et al 1994, Royer and Minshall 1996, Bowman and Minshall 1999).

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Fire management activities				
	Effects of the Management Action(s)				
Pathways & Indicators	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Large Woody Debris FA	M	*_	*_	*_	Trees may be fallen in RCAs during suppression activities. Negligible effect on this WCI is expected as number of trees fallen would be minor at the 6 th field HU, and as per guidelines, trees would be left in RCAs. Prescribed fire that is allowed to back into RCAs, and fire line construction within RCAs could alter LWD recruitment by negligible amounts in the temporary and short term. Monitoring has shown that large stand replacing wildfires have not adversely affected fish habitat quality (Minshall et al 1994, Royer and Minshall 1996, Bowman and Minshall 1999).
Pool Frequency FA	M	*_	*_	*_	Negligible effects on these WCIs are expected due to expected negligible effects on sediment and LWD WCIs.
Pool Quality FA	M	*_	*_	*_	
Off-Channel Habitat FA	N	none	none	none	No influence is expected on this WCI because (1) as, per guidelines, trees fallen in RCAs will be left in RCAs, and (2) negligible effect on flows are expected as vegetation removed during suppression will be minor at the 6 th HU scale, and as per guidelines, prescribed fire can not increase ECA above 15%,. In addition monitoring has shown that large stand replacing wildfires have not adversely affected fish habitat quality (Minshall et al 1994, Royer and Minshall 1996, Bowman and Minshall 1999).
Refugia FR	N	none	none	none	No influence.

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Fire management activities				
Pathways & Indicators	Effects of the Management Action(s)				
	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Channel Condition and Dynamics					
Width/ Maximum Depth Ratio FA	M	*_	*_	*_	Negligible effect on this WCI is expected due to expected effects on sediment & substrate & change in peak/base flow WCIs (this table).
Streambank Condition FR	M	*_	*_	*_	Negligible effects on this WCI are expected because fire personnel will be briefed and become familiar with guidelines, specifically "to expend every effort to minimize stream course disturbance", and resource advisors will provide information and oversight to help meet this guideline.
Floodplain Connectivity FA	N	none	none	none	No influence.
Flow/Hydrology					
Change in Peak/Base Flows FA	N	none	none	none	No influence is expected on this WCI because (1) as, per guidelines, trees fallen in RCAs will be left in RCAs, and (2) negligible effect on flows are expected as vegetation removed during suppression will be minor at the 6 th HU scale, and as per guidelines, prescribed fire can not increase ECA above 15%. In addition monitoring has shown that large stand replacing wildfires have not adversely affected fish habitat quality (Minshall et al 1994, Royer and Minshall 1996, Bowman and Minshall 1999).
Drainage Network Increase FA	N	none	none	none	No influence.
Watershed Conditions					
Road Density and Location FA	N	none	none	none	No influence.

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Fire management activities				
	Effects of the Management Action(s)				
Pathways & Indicators	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Disturbance History FA	M	*-	*-	*-	Negligible effect on this WCI expected as vegetation disturbance during suppression efforts, i.e., fireline, helispots, safety zones, etc. is relatively minor at the 6 th HU scale, and these areas are rehabilitated. Prescribed fire that is allowed to back into RCAs, and fire line construction within RCAs expected to alter vegetation there by negligible amounts in the temporary and short term. Prescribed fire will not increase ECA above 15% in corresponding 6 th level HUs. Prescribed fire would improve the WCI in the short and long term by moving vegetation towards the desired condition. Monitoring has shown that large stand replacing wildfires have not adversely affected fish habitat quality (Minshall et al 1994, Royer and Minshall 1996, Bowman and Minshall 1999).
Riparian Conservation Areas FA	M	*-	*-	*-	Depending on site-specific conditions, fire suppression can alter RCAs (move vegetation away from LRMP desired condition) by allowing encroachment of shade tolerant conifer species (e.g., grand fir), and suppressing deciduous understory, while prescribed fire can offset some of these effects. Prescribed fire that is allowed to back into RCAs, and fire line construction within RCAs would alter RCA vegetation by negligible amounts in the temporary and short term. In either case the small scale of prescribed fire and low frequency of wildfire in the analysis area along with mitigations make it unlikely that effects to RCAs would be more than negligible. Monitoring has shown that large stand replacing wildfires have not adversely affected fish habitat quality (Minshall et al 1994, Royer and Minshall 1996, Bowman and Minshall 1999).

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Fire management activities				
	Effects of the Management Action(s)				
Pathways & Indicators	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Disturbance Regime FR	M	*-	*-	*-	This action is expected to maintain watershed function and resiliency (i.e., ability to recover from land management disturbance). Negligible effect on vegetation as disturbance during suppression efforts, i.e., fireline, helispots, safety zones, etc. is relatively minor at the 6 th HU scale, and these areas are rehabilitated. Prescribed fire mitigation to not increase ECA above 15% in corresponding 6 th level HUs will be implemented. Prescribed fire would improve the WCI in the short and long term by moving vegetation towards the desired condition. Monitoring has shown that large stand replacing wildfires have not adversely affected fish habitat quality (Minshall et al 1994, Royer and Minshall 1996, Bowman and Minshall 1999).
Integration of Species and Habitat Conditions FR	M	*-	*-	*-	As fire management actions are expected to have no or negligible effect on all WCIs, negligible effects on listed fishes or critical habitat are also expected.

c. Fish Habitat and Riparian Sampling; Watershed and Habitat Improvements and Maintenance

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Fish habitat/riparian sampling, watershed & habitat improvements and maintenance				
Pathways & Indicators	Effects of the Management Action(s)				
	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Local Population Character					
Local Population Size Unknown	I	+	+	+	Watershed improvement projects that open up new habitat or reduce sediment delivery could increase local population size.
Growth and Survival FUR	I	+	+	+	The actions that reduce sediment delivery could improve growth and survival.
Life History Diversity and Isolation FUR	N	none	none	none	Habitat conditions downstream of Forest lands constrain life history diversity and isolation. The Federal actions will have no influence on life history diversity and isolation.
Persistence and Genetic Integrity FUR	N	none	none	none	Habitat conditions downstream of Forest lands and the presence of brook trout constrain persistence and genetic integrity. The Federal actions will have no influence on persistence and genetic integrity.
Water Quality					
Temperature FA		+	+	+	Watershed and habitat improvement will decrease summer stream temperatures in some areas. Mitigations will maintain temperature in all other actions.
Sediment FA	M	-*	-*	-*	<ul style="list-style-type: none"> • There may be negligible amounts of temporary sediment delivery from habitat improvement, but actions, such as bank stabilization and road obliteration with required mitigations, will decrease sediment delivery in the short and long-term by a greater amount than any temporary increase. • Sediment in the streambed may be stirred up and redistributed during fish habitat sampling, but there will be no net increase in sediment and the effect will be temporary and negligible.
Chemical Contaminants and/or Nutrients FR	M	-*	-*	-*	Restrictions concerning refueling in RCAs and spill prevention and cleanup requirements will reduce the likely hood of chemical contamination to negligible levels.

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Fish habitat/riparian sampling, watershed & habitat improvements and maintenance				
	Effects of the Management Action(s)				
Pathways & Indicators	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Habitat Access					
Physical Barriers FR	I	+	+	+	Removal or replacement of fish barriers, such as old culverts, will improve connectivity.
Habitat Elements					
Substrate Embeddedness FR	M	-*	-*	-*	<ul style="list-style-type: none"> There may be negligible amounts of temporary sediment delivery (which results in substrate embeddedness) from all actions described, but habitat improvements with required mitigations, will decrease sediment delivery in the short and long-term by a greater amount than any temporary increase. Sediment in the streambed may be stirred up and redistributed during fish habitat sampling, but there will be no net increase in sediment and the effect will be temporary and negligible.
Large Woody Debris FA	I	+	+	+	Watershed and habitat improvement may increase the current quantity of LWD and future recruitment in some areas. Mitigations will maintain LWD in all other actions.
Pool Frequency FA	I	+	+	+	Watershed and habitat improvement may increase pool frequency in some areas. Mitigations will maintain pool frequency in all other actions.
Pool Quality FA	I	+	+	+	Watershed and habitat improvement may increase the pool quality in some areas. Mitigations will maintain pool quality in all other actions.
Off-Channel Habitat FA	M	+	+	+	Watershed and habitat improvement may increase off-channel habitat in some areas by negligible levels. Mitigations will maintain off channel habitat in all other actions.
Refugia FR	N	none	none	none	The actions will have no influence on refugia.

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Fish habitat/riparian sampling, watershed & habitat improvements and maintenance				
Pathways & Indicators	Effects of the Management Action(s)				
	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Channel Condition and Dynamics					
Width/Maximum Depth Ratio FA	M	+	+	+	Watershed and habitat improvement may decrease width to depth ratio in some areas. Mitigations will maintain width to depth ratio in all other actions.
Streambank Condition FR	I	+	+	+	Watershed and habitat improvement may increase bank stability in some areas. Mitigations will maintain bank stability in all other actions.
Floodplain Connectivity FA	I	+	+	+	Watershed and habitat improvement such as RCA road obliteration may increase floodplain connectivity in some areas. Mitigations will maintain floodplain connectivity in all other actions.
Flow/Hydrology					
Change in Peak/Base Flows FA	I	+	+	+	Watershed and habitat improvement such as road obliteration may return peak and base flow to a more normative regime in some areas. Mitigations will maintain peak and base flow in all other actions.
Drainage Network Increase FA	I	+	+	+	Watershed and habitat improvement such as road obliteration, and appropriate road and trail maintenance will improve hydrologic processes and diffuse the drainage network in some areas. Mitigations will maintain drainage network in all other actions.
Watershed Conditions					
Road Density and Location FA	I	+	+	+	Watershed and habitat improvement, such as road obliteration, will reduce road density in some areas including RCAs. Mitigations will maintain road density all other actions.
Disturbance History FA	I	+	+	+	Watershed and habitat improvement, such as road obliteration, and removal of old culverts will cause a temporary disturbance, but will result in a short and long term decrease in anthropogenic disturbance. Mitigations will maintain disturbance history in all other actions.
Riparian Conservation Areas FA	I	+	+	+	Watershed and habitat improvement, such as road obliteration, or willow planting will restore RCA function (LWD recruitment, sediment buffering, root mass bank stabilization etc.) in some area. Mitigations will maintain road density all other actions.
Disturbance Regime	I	+	+	+	Watershed and habitat improvement, such as road obliteration in

Agency/Unit	USDA Forest Service / Payette National Forest	HU Code and Name	170601010102 - Deep Creek		
Fish Species Present	Chinook, steelhead, bull trout	Spatial Scale of this Matrix	One 6 th field HU (18926 acres)		
Core Area (Bull Trout)	Snake River	Local Population	Deep Creek		
Management Actions	Fish habitat/riparian sampling, watershed & habitat improvements and maintenance				
	Effects of the Management Action(s)				
Pathways & Indicators	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
FR					RCAs, and appropriate road and trail maintenance, will improve watershed resilience to disturbance. Mitigations will maintain the disturbance regime all other actions.
Integration of Species and Habitat Conditions FR		+	+	+	The actions with mitigations will improve, maintain or have no effect on all WCIs listed above; therefore, the integration of species and habitat conditions WCI will improve.

d. Noxious Weed Management

Agency/Unit	USDA Forest Service / Payette National Forest		Local Population	Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Noxious Weeds				
	Effects of the Management Action(s)				
Pathways & Indicators	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Local Population Character					
Local Population Size Unknown	N	none	none	none	No influence
Growth and Survival FUR	D	-	-	-	Sub-lethal effects to listed fish and their food sources are probable
Life History Diversity and Isolation FUR)	N	none	none	none	No influence
Persistence and Genetic Integrity FUR	N	none	none	none	No influence
Water Quality					
Temperature FA	M	_*	_*	_*	Shade and subsequent loss of riparian vegetation due to chemical application is negligible due to buffers.
Sediment FA	M	_*	_*	_*	Loss of negligible amounts of vegetation from the landscape due to herbicide application may cause un-measurable increases in erosion and sedimentation.
Chemical Contaminants and/or Nutrients FR	D	-	-	-	Sub-lethal effects to listed fish and their food sources are probable
Habitat Access					
Physical Barriers FR	N	none	none	none	No influence
Habitat Elements					
Substrate Embeddedness	M	_*	_*	_*	Loss of negligible amounts of vegetation from the landscape due to herbicide application may cause un-measurable increases in erosion

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Noxious Weeds				
	Effects of the Management Action(s)				
Pathways & Indicators	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
FR					and sedimentation.
Large Woody Debris FA	M	_*	_*	_*	LWD loss due to loss of riparian vegetation due to chemical application is negligible due to buffers.
Pool Frequency FA	N	none	none	none	No influence
Pool Quality FA)	N	none	none	none	No influence
Off-Channel Habitat FA	N	none	none	none	No influence
Refugia FR	N	none	none	none	No influence
Channel Condition and Dynamics					
Width/Maximum Depth Ratio FA)	N	none	none	none	No influence
Streambank Condition Fr	M	_*	_*	_*	Loss of negligible amounts of vegetation from the landscape due to herbicide application may cause un-measurable increases in erosion and sedimentation.
Floodplain Connectivity FA	N	none	none	none	No influence
Flow/Hydrology					
Change in Peak/Base Flows FAI	N	none	none	none	No influence
Drainage Network Increase FA	N	none	none	none	No influence
Watershed Conditions					
Road Density and Location FA	N	none	none	none	No influence
Disturbance History	M	_*	_*	_*	Loss of negligible amounts of vegetation from the landscape due to

Agency/Unit	USDA Forest Service / Payette National Forest	HU Code and Name	170601010102 - Deep Creek		
Fish Species Present	Chinook, steelhead, bull trout	Spatial Scale of this Matrix	One 6 th field HU (18926 acres)		
Core Area (Bull Trout)	Snake River	Local Population	Deep Creek		
Management Actions	Noxious Weeds				
	Effects of the Management Action(s)				
Pathways & Indicators	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
FA					herbicide application may cause un-measurable increases in erosion and sedimentation.
Riparian Conservation Areas FA	M	-*	-*	-*	Shade and subsequent loss of riparian vegetation due to chemical application is negligible due to buffers.
Disturbance Regime FR SR-Partridge, French FR	M	-*	-*	-*	Loss of negligible amounts of vegetation from the landscape due to herbicide application may cause un-measurable decreases in landscape stability
Integration of Species and Habitat Conditions FR	D	-	-	-	Loss of negligible amounts of vegetation from the landscape due to herbicide application may cause un-measurable changes in physical habitat, but sub-lethal effects to listed fish and their food sources are probable

e. Road Management; Trails, Recreation and Administrative Site Operation and Maintenance; Travel Plan

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Travel plan, road management, trails, recreation and administrative site operation & maintenance				
Pathways & Indicators	Effects of the Management Action(s)				
	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Local Population Character					
Local Population Size Unknown	D	-	-	-	<ul style="list-style-type: none"> Fording streams on foot, horseback, or other non-motorized travel is likely to result in bull trout redd trampling and egg mortality, which would degrade the WCI. Road management and trail maintenance will help reduce travel plan related sediment effects on local population size.
Growth and Survival FUR	D	-	-	-	<ul style="list-style-type: none"> Fording streams on foot, horseback, or other non-motorized travel is likely to result in bull trout redd trampling and egg mortality, which would degrade the WCI. Road management and trail maintenance will help reduce travel plan related sediment effects on local population size.
Life History Diversity and Isolation FUR	I	+	+	+	<ul style="list-style-type: none"> Road management related removal or replacement of fish barriers, such as old culverts, will improve connectivity. New or re-built trail culverts and fords will provide for aquatic organism passage.
Persistence and Genetic Integrity FUR	I	+	+	+	<ul style="list-style-type: none"> Road management related removal or replacement of fish barriers, such as old culverts, will improve connectivity. New or re-built trail culverts and fords will provide for aquatic organism passage.
Water Quality					
Temperature FA	M	-*	-*	-*	<ul style="list-style-type: none"> The travel plan will have no influence on temperature Mitigations in the road management and trail maintenance actions preventing excessive brushing and other alteration of riparian vegetation will result in negligible effects on stream shade and temperature
Sediment FA	D	+	-	-	<ul style="list-style-type: none"> Restricting cross-country motorized travel will result in fewer incidences of motorized stream fording and driving in RCAs. At some point in the long term sediment delivery from erosion on trails and roads related to increased motorized and non-motorized will surpass benefits from

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Travel plan, road management, trails, recreation and administrative site operation & maintenance				
	Effects of the Management Action(s)				
Pathways & Indicators	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
					<p>restricted travel.</p> <ul style="list-style-type: none"> Road management and trail maintenance will help reduce travel plan related sediment effects at all time scales.
Chemical Contaminants and/or Nutrients FR	D	+	-	-	<ul style="list-style-type: none"> As motorized travel increases there is likely to be petroleum spilled where roads and trails cross streams in motorized use areas. Restrictions concerning refueling in RCAs and spill prevention and cleanup requirements will reduce the likely hood of chemical contamination during road management and trail maintenance activities. Proper use of treated wood that meets BMPs will minimize potential for effects. The binding nature of dust-abatement salts, combined with restrictions on applications near waterways, low concentration of use and spill containment measures, reduce the likelihood of effects to negligible levels.
Habitat Access					
Physical Barriers FR	I	+	+	+	<ul style="list-style-type: none"> Road management related removal or replacement of fish barriers, such as old culverts, will improve connectivity. New or re-built trail culverts and fords will provide for aquatic organism passage.
Habitat Elements					
Substrate Embeddedness FR	D	+*	-	-	<ul style="list-style-type: none"> Restricting cross-country motorized travel will result in fewer incidences of motorized stream fording and driving in RCAs. At some point in the long term sediment delivery from erosion on trails and roads related to increased motorized and non-motorized will surpass benefits from restricted travel. Road management and trail maintenance will help reduce travel plan related substrate embeddedness effects at all time scales.

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Travel plan, road management, trails, recreation and administrative site operation & maintenance				
	Effects of the Management Action(s)				
Pathways & Indicators	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Large Woody Debris FA	M	-*	-*	-*	Mitigations will prevent more than negligible effects to LWD recruitment from road management and trail maintenance.
Pool Frequency FA	N	none	none	none	No influence
Pool Quality FA	D	+	-	-	<ul style="list-style-type: none"> Restricting cross-country motorized travel expected to reduce sedimentation in pools in the short-term due to less ground disturbance and fewer incidences of motorized stream fording and driving in RCAs. At some point sediment delivery from erosion on trails and roads related to increased motorized and non-motorized use will surpass benefits from restricted travel. Road management, and trail maintenance will reduce the travel plan related effects on pool quality.
Off-Channel Habitat FA	N	none	none	none	No influence.
Refugia FR	N	none	none	none	No influence.

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Travel plan, road management, trails, recreation and administrative site operation & maintenance				
Pathways & Indicators	Effects of the Management Action(s)				
	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Channel Condition and Dynamics					
Width/Maximum Depth Ratio FA	D	+	-	-	<ul style="list-style-type: none"> Travel plan related degradation of streambank condition and the sediment WCI expected to degrade width to maximum depth ratio adjacent to road and trail crossings. Road and trail maintenance will reduce travel plan related degradation of streambank condition thus reducing effects to width/maximum depth ratio.
Streambank Condition (Travel Plan) FUR	M	_*	_*	_*	No change in miles of road or trail.
Streambank Condition (LRMP) FR	D	+	-	-	<ul style="list-style-type: none"> After a temporary decrease from restricting cross-country travel, the travel plan will result in short and long term degraded streambank condition where roads and trails cross streams. Road and trail maintenance will reduce travel plan related degradation of streambank condition.
Floodplain Connectivity FA	N	none	none	none	No influence.
Flow/Hydrology					
Change in Peak/Base Flows FA	N	none	none	none	No influence.
Drainage Network Increase FA	N	none	none	none	No influence.
Watershed Conditions					
Road Density and Location FA	N	none	none	none	No influence.
Disturbance History	I	+	+	+	Restricting cross-country motorized travel will result in fewer incidences of resource damage to landslide or landslide prone areas.

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Travel plan, road management, trails, recreation and administrative site operation & maintenance				
	Effects of the Management Action(s)				
Pathways & Indicators	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
FA					and to RCAs.
Riparian Conservation Areas FA	I	+	+	+	<ul style="list-style-type: none"> Restricting cross-country motorized travel will result in fewer incidences of resource damage to RCAs Mitigations will minimize road management and trail maintenance related riparian disturbance to negligible levels.
Disturbance Regime FR	I	+	+	+	Restricting cross-country motorized travel will result in fewer incidences of resource damage across the landscape.
Integration of Species and Habitat Conditions FR	D	+	-	-	<ul style="list-style-type: none"> The travel plan will result in improvement to some WCIs and degrade others. Road management and trail maintenance will reduce some of the degrading effects of the travel plan.

f. Livestock Grazing Allotments

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Deep Creek S & G, Snake River/Indian Creek S & G				
Pathways & Indicators	Effects of the Management Action(s)				
	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Local Population Character					
Local Population Size Unknown	M	*_	*_	*_	Negligible risk of disturbance to redds or spawning fish is expected because grazing occurs in headwaters areas that are highly unlikely to provide spawning habitat for or support bull trout, and that are well away (~ 5+ miles) from habitat occupied by Chinook and steelhead.
Growth and Survival FUR	M	*_	*_	*_	Negligible risk of disturbance to redds or spawning fish is expected because grazing occurs in headwaters areas that are highly unlikely to provide spawning habitat for or support bull trout, and that are well away (~ 5+ miles) from habitat occupied by Chinook and steelhead.
Life History Diversity and Isolation FUR	N	none	none	none	No influence
Persistence and Genetic Integrity FUR	N	none	none	none	No influence
Water Quality					
Temperature FA	M	_*	_*	_*	Mitigation that limits utilization which maintains vegetation that provides streambank stability and shade, expected to maintain this WCI. Monitoring data indicate this WCI is being maintained.
Sediment FA	M	*_	*_	*_	Mitigations that limit ground disturbance to minimize sediment, and limit utilization which maintains vegetation that provides soil stability, sediment filtering, and streambank stability are expected to maintain this WCI. Grazing monitoring data indicate this WCI is being maintained.
Chemical Contaminants and/or Nutrients FR	M	*_	*_	*_	Live stock waste in stream channels will have a negligible influence on this WCI. Mitigations and restriction on use will minimize the effects.

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Deep Creek S & G, Snake River/Indian Creek S & G				
Pathways & Indicators	Effects of the Management Action(s)				
	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Habitat Access					
Physical Barriers FR	N	none	none	none	No influence
Habitat Elements					
Substrate Embeddedness FR	M	*_	*_	*_	Mitigations that limit ground disturbance to minimize sediment, and limit utilization which maintains vegetation that provides soil stability, sediment filtering, and streambank stability are expected to maintain this WCI. Grazing monitoring data indicate this WCI is being maintained.
Large Woody Debris FA	N	none	none	none	No influence
Pool Frequency FA	N	none	none	none	No influence
Pool Quality FA	N	none	none	none	No influence
Off-Channel Habitat FA	N	none	none	none	No influence
Refugia FR	N	none	none	none	No influence
Channel Condition and Dynamics					
Width/Maximum Depth Ratio FA	M	*_	*_	*_	Streambank condition will continue to be altered by livestock use. Mitigations and restrictions on use will limit effects to negligible levels.
Streambank Condition FR	M	*_	*_	*_	Streambank condition will continue to be altered by livestock use. Mitigations and restrictions on use will limit effects to negligible levels.
Floodplain Connectivity FA	N	none	none	none	No influence
Flow/Hydrology					

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Deep Creek S & G, Snake River/Indian Creek S & G				
	Effects of the Management Action(s)				
Pathways & Indicators	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Change in Peak/Base Flows FA	N	none	none	none	No influence
Drainage Network Increase FA	N	none	none	none	No influence
Watershed Conditions					
Road Density and Location FA	N	none	none	none	No influence
Disturbance History FA	M	*_	*_	*_	Mitigations that limit ground disturbance and limit utilization which maintains vegetation are expected to limit effects on ECA and landslide or landslide prone areas to negligible levels.
Riparian Conservation Areas FA	M	*_	*_	*_	RCA vegetation will remain altered from livestock use in RCAs. Mitigations and restrictions on use will limit effects to negligible levels.
Disturbance Regime FR	M	*_	*_	*_	Mitigations such as % utilization in RCAs, and restrictions on use to limit ground disturbance are expected to limit effects to negligible levels.
Integration of Species and Habitat Conditions FR	M	*_	*_	*_	Mitigation measures that limit ground disturbance to minimize sediment, and limit utilization which maintains vegetation that provides soil stability, sediment filtering, streambank stability, and shade are expected to maintain WCIs.

g. Outfitter and Guide Activities on Federal Land (Heaven's Gate Outfitters)

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Outfitter and guide activities on federal land (Heaven's Gate Outfitters)				
Pathways & Indicators	Effects of the Management Action(s)				
	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Local Population Character					
Local Population Size Unknown	N	none	none	none	No influence
Growth and Survival FUR	N	none	none	none	Hunting activity is highly unlikely to cause any measurable effect on this WCI because it is widely dispersed throughout the analysis area, and is highly unlikely to occur to any substantial extent near Rapid River or the Lake Fork tributary where listed fishes occur. To further reduce the risk of redd trampling, training to avoid adverse effects will be provided to outfitters and guides.
Life History Diversity and Isolation FUR	N	none	none	none	No influence
Persistence and Genetic Integrity FUR	N	none	none	none	No influence
Water Quality					
Temperature FA	M	*_	*_	*_	Annual camp inspections to see that riparian vegetation is not adversely affected are expected to yield no or negligible effects on stream shading vegetation and temperature.
Sediment FA	M	*_	*_	*_	Annual inspections are expected to ensure that no or negligible camp related sediment delivery is occurring. If a client or guide crosses the stream on foot or with livestock there may some minor alteration of the stream bank leading to sediment delivery to the channel, but the amount of sediment and effects to listed fishes would be negligible.
Chemical Contaminants and/or Nutrients FR	N	none	none	none	Annual monitoring of campsites will ensure that no chemical/nutrient contamination is occurring.

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Outfitter and guide activities on federal land (Heaven's Gate Outfitters)				
Pathways & Indicators	Effects of the Management Action(s)				
	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Habitat Access					
Physical Barriers FR	N	none	none	none	No influence.
Habitat Elements					
Substrate Embeddedness FR	M	*_	*_	*_	Annual inspections are expected to ensure that no or negligible camp related sediment delivery is occurring. If a client or guide crosses the stream on foot or with livestock there may some minor alteration of the stream bank leading to sediment delivery to the channel, but the amount of sediment and effects to listed fishes would be negligible.
Large Woody Debris FA	N	none	none	none	No influence.
Pool Frequency FA	N	none	none	none	No influence
Pool Quality FA	N	none	none	none	No influence
Off-Channel Habitat FA	N	none	none	none	No influence
Refugia FR	N	none	none	none	No influence

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Outfitter and guide activities on federal land (Heaven's Gate Outfitters)				
Pathways & Indicators	Effects of the Management Action(s)				
	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Channel Condition and Dynamics					
Width/ Maximum Depth Ratio FA	M	*_	*_	*_	Annual inspections are expected to ensure that no or negligible camp effects on stream banks is occurring. If a client or guide crosses the stream on foot or with livestock there may some minor alteration of the stream bank leading to sediment delivery to the channel, but the amount of sediment and effects to listed fishes would be negligible.
Streambank Condition FR	M	*_	*_	*_	Annual inspections are expected to ensure that no or negligible camp effects on stream banks is occurring. If a client or guide crosses the stream on foot or with livestock there may some minor alteration of the stream bank leading to sediment delivery to the channel, but the amount of sediment and effects to listed fishes would be negligible.
Floodplain Connectivity FA	N	none	none	none	No influence.
Flow/Hydrology					
Change in Peak/Base Flows FA	N	none	none	none	No influence
Drainage Network Increase FA	N	none	none	none	No influence
Watershed Conditions					
Road Density and Location FUR	N	none	none	none	No influence
Disturbance History FA	N	none	none	none	If a client or guide crosses an RCA on foot or with livestock there may some minor alteration of the vegetation, but the effects to listed fishes would be negligible. Requirements to avoid areas where listed fishes are known to occur further reduce the likelihood of effects.

Agency/Unit	USDA Forest Service / Payette National Forest		HU Code and Name	170601010102 - Deep Creek	
Fish Species Present	Chinook, steelhead, bull trout		Spatial Scale of this Matrix	One 6 th field HU (18926 acres)	
Core Area (Bull Trout)	Snake River		Local Population	Deep Creek	
Management Actions	Outfitter and guide activities on federal land (Heaven's Gate Outfitters)				
	Effects of the Management Action(s)				
Pathways & Indicators	Effects	Expected Trend (improve/degrade/maintain/no effect)			Discussion of Effects
		Temporary	Short-term	Long-term	
Riparian Conservation Areas FA	M	*_	*_	*_	Annual inspections are expected to ensure that no or negligible camp effects on riparian vegetation is occurring. If a client or guide crosses an RCA on foot or with livestock there may some minor alteration of vegetation.
Disturbance Regime FR	N	none	none	none	No influence
Integration of Species and Habitat Conditions FR	M	*_	*_	*_	Effects on WCIs expected to be negligible to none.

D. APPENDIX 4. STANDARD ACRONYMS, ABBREVIATIONS, AND CONVERSIONS

1. ACRONYMS

a. General

AMP	Allotment Management Plan
AOP	Annual Operating Provisions
AUM	Animal Unit Month
BA	Biological Assessment
BE	Biological Evaluation
BLM	Bureau of Land Management
BMP	Best Management Practices
BNF	Boise National Forest
BO	Biological Opinion
BR	Brownlee Reservoir or Brownlee, a PNF ESA §7 Watershed
C&H	Cattle and horse, a grazing allotment use designation
CFR	Code of Federal Regulations
CWA	Clean Water Act
DC	Deep Creek, a PNF ESA §7 Watershed
DEIS	Draft Environmental Impact Statement
EFSFSR	East Fork South Fork Salmon River
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FCRONRW	Frank Church River Of No Return Wilderness
FDR	Forest Development Road
FEIS	Final Environmental Impact Statement
FH	Forest Highway
FT	Forest Trail
FONSI	Finding Of No Significant Impact
FR	Federal Register
HM	Head Months
HU	Hydrologic Unit, used in the form “Brownlee Reservoir 4 th level hydrologic unit”
HUC	Hydrologic Unit Code, used in the form “the 4 th level hydrologic unit code is 17050201”
IDE	Idaho Division of Environment
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game.
IDL	Idaho Department of Lands
IDWR	Idaho Department of Water Resources
INCD	Idaho Natural Conditions Database
IWWA	Inland West Watershed Assessment
LOC	Letter of Concurrence.
LRMP	Land and Resource Management Plan; also called Forest Plan
LSR	Little Salmon River, also used for the PNF ESA §7 Watershed of the same name
LWD	Large Woody Debris
MBF	Thousand Board Feet
MFSR	Middle Fork Salmon River
MFT	Middle Fork Tribs or Middle Fork Salmon River Tributaries, a PNF ESA §7 Watershed
MMBF	Million Board Feet
MSSE	Main Salmon SE or Main Salmon River Tributaries (Southeast: South Fork Salmon River to Middle Fork Salmon River), a PNF ESA §7 Watershed
MSSW	Main Salmon SW or Main Salmon River Tributaries (Southwest: Little Salmon River to South Fork Salmon River), a PNF ESA §7 Watershed
MYOP	Multi-Year Operating Plan
NFPR	North Fork Payette River, also used for the PNF ESA §7 Watershed of the same ame

NFS	National Forest System (e.g., NFS lands).
NMFS	National Marine Fisheries Service
NPNF	Nez Perce National Forest
NPT	Nez Perce Tribe
O&M	Operation and Maintenance
PNF	Payette National Forest
RA	Resource Area
RCA	Riparian Conservation Area
WCI	Riparian Management Objective
ROD	Record of Decision
RPA	Reasonable and Prudent Alternative
S&G	Sheep and goat, a grazing allotment use designation
SBT	Shoshone-Bannock Tribe
SFSR	South Fork Salmon River, also used for the PNF ESA §7 Watershed of the same name
SUP	Special Use Permit
TES	Threatened, endangered, sensitive
TS	Timber Sale
TSI	Timber Stand Improvement
USC	United States Code
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WFU	Wildland Fire Use
WR	Weiser River, also used for the PNF ESA §7 Watershed of the same name

b. Fish Species

BT	Columbia River bull trout (<i>Salvelinus confluentus</i>)
EB	Eastern brook trout (<i>Salvelinus fontinalis</i>)
LT	Lake trout (<i>Salvelinus namaycush</i>)
MS	Mottled sculpin (<i>Cottus bairdi</i>)
PL	Pacific lamprey (<i>Lampetra tridentata</i>)
RB	Redband trout (<i>Oncorhynchus mykiss gairdneri</i>)
RBT	Rainbow trout (<i>Oncorhynchus mykiss irideus</i>)
SP	Splake (<i>Salvelinus fontinalis</i> x <i>S. namaycush</i>)
SpCS	Spring chinook salmon (<i>Oncorhynchus tshawytscha</i>)
SpSCS	Spring/summer chinook salmon (<i>Oncorhynchus tshawytscha</i>)
SpSSFCS	Spring/summer and fall chinook salmon (<i>Oncorhynchus tshawytscha</i>)
SST	Snake River summer steelhead (<i>Oncorhynchus mykiss gairdneri</i>)
WCT	Westslope cutthroat trout (<i>Oncorhynchus clarki lewisi</i>)
YCT	Yellowstone cutthroat trout (<i>Oncorhynchus clarki bouvieri</i>)

c. Determinations—Listed Species and Critical Habitat

LAA	May Affect, Likely to Adversely Affect
NE	No Effect
NLAA	May Affect, Not Likely to Adversely Affect

d. Determinations—Species and Critical Habitat Proposed for Listing

LJ	Likely to Jeopardize
LRDAM	Likely to Lead to Destruction or Adverse Modification
NLJ	Not Likely to Jeopardize
NLRDAM	Not Likely to Lead to Destruction or Adverse Modification

e. Determinations—Sensitive Species

LLL	Likely to Lead to Listing
NLLL	Not Likely to Lead to Listing

2. ABBREVIATIONS

a. Units of Measure

ac	acre.
a.e./L	acid equivalents per liter.
ai/ac	active ingredient per acre.
ai/ac/year	active ingredient per acre per year.
cfs	cubic feet per second.
cms	cubic meters per second.
ft	feet.
ha	hectare.
hr	hour.
km	kilometer.
km²	square kilometer.
lb	pound.
lb/ac	pounds per acre (alternatively lb/acre).
lb/ai/ac	pounds of active ingredient per acre.
m	meters.
mg/L	milligrams per liter.
: g	microgram.
: g/L	micrograms per liter.
mi	mile.
mi²	square mile.
ppm	parts per million.

b. Toxicology

ai	Active ingredient.
a.e.	Acid equivalents.
EC₅₀	Toxicant concentration causing an observable effect in 50% of test organisms.
EEC	Estimated environmental concentration.
LC₅₀	Lethal concentration that kills half of a test population.
NOEC	No-observable-effect concentration.
NOEL	No-observable-effects limits.

3. CONVERSIONS

The following were used to convert between English and metric units of measure:

ac	= ha * 2.4710
ha	= ac * 0.4047
in	= cm * 0.39
cm	= in * 2.54
mi	= km * 0.622
km	= mi * 1.609
mi²	= km ² * 0.386
km²	= mi ² * 2.589
mi/mi²	= km/km ² * 1.609
km/km²	= mi/mi ² * 0.622
cms	= cfs * 0.02832