ENVIRONMENTAL ASSESSMENT

Brass Joe and Waterbrook Road Construction and Right-of-Way

EA# OR-117-08-05

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
MEDFORD DISTRICT
GRANTS PASS RESOURCE AREA

December 2009

Dear Reader:

We appreciate your interest in the BLM's public land management activities. Public involvement for the Brass Joe-Waterbrook project began in December 2007 when approximately 48 scoping letters were sent to the public. The scoping letter was sent to residents and landowners near or adjacent to BLM parcels within the planning area, to federal, state, and county agencies, and to private organizations and individuals that requested information concerning projects of this type, inviting them to contact the BLM with information, comments and concerns. One comment letter was received, which provided information to BLM for consideration in the environmental assessment (EA).

This project was developed under the 1995 Medford District Record of Decision and Resource Management Plan (RMP).

We appreciate your taking the time to review this EA. If you would like to provide us with written comments regarding this project or EA, please send them to me at 2164 NE Spalding Avenue, Grants Pass, OR 97526. Email comments may be sent to: Medford_Mail@blm.gov.

If confidentiality is of concern to you, please be aware that comments, including names and addresses of respondents, will be available for public review or may be held in a file available for public inspection and review. Individual respondents may request confidentiality. If you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act, you must state this clearly at the beginning of your written comment. Such requests would be honored to the extent allowed by law. All submissions from organizations or officials of organizations or businesses will be made available for public inspection in their entirety.

I look forward to your continued interest in the management of our public lands.

Abbie Jossie
Field Manager
Grants Pass Resource Area

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
MEDFORD DISTRICT

EA COVER SHEET

RESOURCE AREA: Grants Pass EA # OR-117-08-05
ACTION/TITLE: Brass Joe and Waterbrook Road Construction
LOCATION: T 35 S, R 5 W, Sec. 3 (Waterbrook) and T 34 S, R 5 W, Sec. 23 (Brass Joe) Willamette Meridian, Josephine Co., Oregon.

FOR FURTHER INFORMATION CONTACT: Abbie Jossie
Field Manager, Grants Pass R.A., Medford BLM
Grants Pass Interagency Office,
2164 NE Spalding Ave.
Grants Pass, Oregon 97526
(541) 471-6500

Interdisciplinary Preparers	**Title**	**Resource Values Assigned**	
Jon Raybourn	Fisheries Biologist	Fisheries	
Mike DeBlasi	Soil Scientist	Floodplains; Wetlands; Soils and Water	
Jason Reilly	Wildlife Biologist	Prime or Unique Lands; Wildlife,	
Jeanne Klein	Recreation Planner	Recreation; VRM	
Lisa Brennan	Archaeologist	Cultural Resources	
Robin Taylor	Botanist	Special Status Plants; Noxious Weeds	
Jim Roper	Roads	Roads; Project Lead	
Anthony Kerwin	Planning and Environmental Coordinator	Environmental Compliance; NEPA	

ENVIRONMENTAL ASSESSMENT
Brass Joe and Waterbrook Road Construction and Right-of-Way

TABLE OF CONTENTS

1.0 Introduction

The Bureau of Land Management (BLM), Grants Pass Resource Area, proposes issuance of a right-of-way for construction and authorization to haul commercial timber in the Brass Joe and Waterbrook Road Construction and Right-of-Way (ROW) project in the Jumpoff Joe watershed. This project implements the Bureau of Land Management's Medford District 1995 Record of Decision and Resource Management Plan (1995 ROD/RMP) for this watershed. Management direction set forth in the 1995 RMP provides direction for resource management on BLM-administered lands according to various land use allocations. The RMP was developed and overall effects of its implementation were analyzed and disclosed in the 1994 Final Environmental Impact Statement for the Resource Management Plan.

This Environmental Assessment (EA) will assist in the decision making process by assessing the environmental and human effects resulting from implementing the proposed project or alternatives. This EA will also assist in determining if an environmental impact statement (EIS) needs to be prepared or if a finding of no significant impact (FONSI) is appropriate.

The decision will also include a determination whether or not the impacts of the proposed action are significant to the human environment. If the impacts are determined to be within those impacts analyzed in 1995 FEIS, or otherwise determined to be not significant, a Finding of No Significant Impact can be issued and a decision implemented.

1.1 Conformance with Land Use Plans and Other Documents:

The actions proposed and analyzed in this EA were developed to be consistent with, and/or tier to the following documents:

1. *Final EIS/ROD for the Medford District Resource Management Plan* (RMP) (1995)
2. *Final Supplemental Environmental Impact Statement and Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (Northwest Forest Plan FSEIS 1994 and ROD 1994);
3. the *Final Supplement to the 2004 Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines* (FSEIS, 2007 and ROD, 2007);
4. *Final Supplemental Environmental Impact Statement: Management of Port-Orford-Cedar in Southwest Oregon* (FSEIS 2004 and ROD 2004);
5. *Medford District Integrated Weed Management Plan Environmental Assessment (1998*) and tiered to the *Northwest Area Noxious Weed Control Program* (EIS 1985).

In addition to the documents cited above, project planning drew from information and recommendations from the following:

1. District Analysis of NLAA Biological Assessment in Forested Habitat (2009) and Letter of Concurrence (Tails #13420-2009-I-0093)
2. Visual Resource Contrast Rating BLM Manual Handbook 8431-1
3. BLM Manual 6840 – Special Status Species Management (2008)
4. National Fire Plan (NFP) (2000)

5. National Fire Plan 10-year Comprehensive Strategy and Implementation Plan (2002)
6. Josephine County Integrated Fire Plan (2004)
7. U.S. Department of Interior, Bureau of Land Management, Western Oregon Districts, Transportation Management Plan (1996, updated 2002)
8. Watershed Analyses
    1. Jumpoff Joe Watershed Analysis (1998)
    2) Upper Jumpoff Joe and Louse Creeks Watershed Deferral Report (2007)

1.2 Purpose of and Need for Action

Josephine County has requested a ROW to construct two road segments, totaling approximately 330 feet, across BLM lands to access County Forest Lands for planned timber sales, fuel hazard reduction, brush field conversion and pre-commercial thinning. Due to a lack of reasonable access across private property, Josephine County's application also includes a request to haul approximately 1,150 thousand board feet (mbf) across the newly constructed roads and other BLM roads that access these lands. The two road segments would provide access to two future Josephine County timber sales, the Brass Joe and Waterbrook timber sales.

Additionally, Josephine County would provide access to BLM from the roads for the Brass Joe project to existing roads on County lands. This would allow BLM to access public lands across existing roads on Josephine County lands, and reduce additional road construction needs. Restrictions across private lands, and recent residential development now restricts access to the Josephine County parcels.

The Resource Management Plan (RMP) (p. 82) directs the BLM to make lands available for needed right-of-ways. Josephine County's parcels are isolated, surrounded by BLM and private lands. The EA will assist in the decision to accept or reject Josephine County's request for ROW access and road construction to access their property for both the Waterbrook and Brass Joe projects.

1.3 Project Location and Land Use Allocation

The Josephine County projects are in T 34 S, R 5 W, Sec. 34 (Waterbrook) and T 34 S, R 5 W, Sec. 24 (Brass Joe) and encompass 640 acres (110 acres of harvest) and 120 acres, respectively. Road construction on BLM lands would occur in T 35 S, R 5 W, Sec. 3 (Waterbrook) and T 34 S, R 5 W, Sec. 23 (Brass Joe). The project areas are approximately three miles apart and ten miles north of Grants Pass (Appendix A Map 1). The proposed road construction on BLM lands is in the Matrix land allocation.

1.4 Decision Factors

This Environmental Assessment (EA) will assist in the decision making process by assessing the environmental and human effects resulting from implementing the proposed project or alternatives.

This Environmental Assessment will provide the information needed for the authorized officer, the Grants Pass Resource Area Field Manager, to render a decision regarding the selection of a course of action to be implemented for the Brass Joe – Waterbrook projects. The Field Manager must decide whether to implement one of the Alternatives as proposed, or whether to select the no-action alternative. In choosing the alternative that best meets the project needs, the Field Manager will consider the extent to which each alternative responds to the purposes identified for this project.

The decision will also include a determination whether or not the impacts of the proposed action are significant to the human environment. If the impacts are determined not to result in significant effects beyond those disclosed in the 1994 Final EIS, or otherwise determined to not be significant, a Finding of No Significant Impact (FONSI) can be issued and a decision implemented. If we determine in the process of preparing this EA that the project will result in significant impacts beyond those analyzed and disclosed in the 1994 FEIS, then a project specific EIS will be prepared.

In choosing whether to issue a ROW and authorize road construction, the Grants Pass Field Manager would evaluate Josephine County's proposal on:

- Potential significant environmental effects
- Consistency with the Medford District Resource Management Plan

1.5 Issues

One organization outside the BLM, and BLM's interdisciplinary team raised a variety of issues and concerns during project scoping. In this EA, an issue is something unique to the project area that may need particular consideration and which may contribute to defining a particular action alternative. Issues considered, but not analyzed in detail are explained in Appendix B. Issues include:

- Road maintenance and construction may lead to water and sediment routing to creeks
- Loss of habitat due to vegetation clearing for road construction
- Possible noxious weed transport from heavy equipment operation
- OHV use may increase

2.0 Proposed Action and Alternatives

The decision to be made is whether to grant Josephine County's request for a right-of–way (ROW) and road construction. Therefore, this section presents two alternatives – the No Action, which would deny the request, and the proposed action, which would grant the ROW to haul commercial forest products, and allow issuance of a permit to Josephine County to build the roads. See section 1.1 above for details on these two projects.

2.1 Alternative 1: No Action

The no action alternative is defined as not implementing the proposed action, thus denying Josephine County's application. This would deny Josephine County request to construct a road on BLM land or use certain existing BLM roads to haul forest products from their lands.

The no action alternative serves as a baseline for evaluating the effects of the action alternative. Inclusion of this alternative is done without regard to whether or not it is consistent with the RMP. The no action alternative assumes a continuation of current environmental conditions and trends.

2.2 Alternative 2: Proposed Action

The proposed action is to amend Josephine County's reciprocal ROW permit to: a) use certain BLM roads for hauling of forest products and, b) construct approximately 330 feet (0.06 miles) of road across BLM lands (Appendix A, maps 1 & 2) in two segments. Specifically, Josephine County requested a ROW for road construction and a permit to haul timber across existing roads, and across

the new roads (Table 1).

A. Right-of-way for hauling commercial forest products

Josephine County requests use of the BLM roads listed in Table 1 to haul forest products. Josephine County would renovate the existing roads by surface blading, cleaning the ditches and culverts, and brushing roadsides as needed for safety and visibility. Road use would be restricted to dry periods. The permit would be for four years (2009-2013). The roads would also be used to conduct fuel hazard reduction, brush field conversion and precommercial thinning, although a ROW is not required for these activities.

Table 1: BLM Haul Roads

Road No.	Surface Type	Length (miles)
34-5-14.1	Natural	1.82
34-5-14	Natural	1.74
34-5-15	Natural	1.04
34-5-9	Natural	3.53
Waterbrook	New construction	0.04
Brass Joe 1	New Construction	0.02

B. Road construction

The second part of the proposed action is to permit Josephine County to construct two segments of new road totaling approximately 330 feet (0.06 miles) (Appendix A, Maps 1& 2).

Road segments would be constructed at a maximum grade of 10%. The roads would have a 14 foot wide subgrade width (12 foot running width), and a 2% outslope for drainage. Vegetation would be cleared 15 feet vertically and horizontally from the roads. The right-of-ways would be 35 feet wide. The roads would be natural surfaced.

Waterbrook Project

Josephine County would construct one segment of road approximately 225 feet (0.04 mi) in length across BLM lands in the NE corner of T35S, R5W, Section 3. A new 24" culvert would be installed for road drainage near the edge of BLM lands in Section 3.

A total of approximately 750 mbf of commercial timber would be hauled across this road over a period of up to four years.

Brass Joe Project

Josephine County would construct approximately 105 feet (0.02 mi) of road in one segment. The road segment (Spur A) would branch off the 34-5-14.1 road (see maps).

Approximately 400 mbf of commercial timber would be hauled across this road over a period of up to four years.

2.2.1 Alternatives considered but not analyzed in detail

Two additional options were considered during development of the project, the construction of another road segment for the Brass Joe project, and use of a helicopter for access to Josephine County lands for logging. The rationales for not including these options in the EA are detailed in Appendix B.

2.3 Project Design Features

The following project design features (PDFs), based on BLM's best management practices would help prevent potential adverse impacts due to the project. These are applied to activities occurring on BLM managed lands.

- Road use would not occur when roads are wet enough to experience rutting. Road construction would not occur when roads are wet or during the wet season (Oct. 15-May 15) with the following exception:

Should the 34-5-9, 34-5-15, 34-5.14, 34-5-14.1 roads be needed for hauling during wet conditions, durable rock of sufficient depth would be present across the road surface to prevent road damage, offsite erosion, or stream sedimentation as determined by the Authorized Officer. Durable rock would be from a BLM approved source. Currently the road condition for these roads are adequately surfaced for dry season or extended season hauling only.

- Seasonal restrictions will be in place from March 1 through June 30 for roads which pass within ¼ mile of spotted owl nest sites to preclude disturbance to nesting spotted owls. Restrictions may be lifted if surveys show that owls are nesting further than ¼ mile from these road systems or are not nesting during the proposed hauling period.

- Slash created during clearing activities would be placed in a wind row below the road and within the ROW to help capture road related sediment.

- Snags felled for safety reasons or that are within the proposed ROW would be left on site.

- Construction equipment would be confined to roadway construction limits.

- Construction debris would be cleared from ditches and culverts prior to fall rains.

- Cultural surveys have revealed no sites. If cultural sites are found during project implementation, activities around the site would halt until a BLM cultural resource specialist reviewed the site and determined appropriate protection measures.

- Heavy equipment would be clean and free of leaks before any use adjacent to or within stream channels. Spill containment materials would be kept on site at all times. Equipment refueling would not occur within 150' of streams.

- During culvert installation, heavy equipment would be kept out of the stream channel to the greatest extent possible. Culvert outlets would be armored.

- Sediment entering the stream would be minimized through the use of filter fabric. Filter cloth would be used in culvert replacement and placement of rip rap.

- Newly constructed roads would be gated or barricaded to restrict OHV access to private lands.

All special status plant species would be buffered from project activities (RMP p.51) except as described below. The size of the protection buffer would be determined on a case-by-case basis depending on the species and its habitat requirements, but would be a minimum of a 20' radius for sensitive species. Burns in areas containing special status plant species would follow prescriptions that would result in cool burns which would minimize potential damage to plant populations. Prescribed fire operations would be done in manner which strives to reduce or eliminate burning through identified special status plant populations depending on the adaptability of each species to fire.

In accordance with section 7 of the ESA, the BLM analyzed project activities for their potential to affect to the following plant species; the endangered Gentner's fritillary (*Fritillaria* gentneri) endangered Cook's lomatium (*Lomatium cookii)*, endangered large-flowered woolly meadowfoam (*Limnanthes floccosa ssp. grandiflora*), and McDonald's rockcress (*Arabis macdonaldiana*). *In* September 2008, BLM prepared a BA to evaluate impacts to listed plant species. In September 2008 the USFWS gave BLM a letter of concurrence (LOC) (Tails # 13420-2008-I-0136).

Project design criteria (PDC) for T&E listed species (*Fritillaria gentneri* and *Lomatium cookii*) are in accord with the Letter of Concurrence:

- A minimum 25' radius buffer. No mechanized activity would occur in the buffer. Buffers can be treated manually (burning, hand brush/tree removal, sowing adapted native grasses etc.) during the dormancy period (September-February) for activities that benefit the species.
- Tree falling, yarding or anchor tree location would not occur in or across buffers.
- Construction of new landings would be at least 300' from known sites.
- Proposed logging road location, including temporary haul roads, would be surveyed and populations protected by a minimum 100' radius buffer. Use of existing roads within 100' of occurrence is allowed.
- Firewood collection would not occur in buffers.
- Cut material would be piled outside buffers.
- No tree planting or mechanical scalping would occur within 75'of the buffer edge (100' from occurrence).

Critical habitat for Cook's desert parsley (*Lomatium cookii*) and large flowered wooly meadowfoam (*Limnanthes floccosa* ssp. g*randiflora*) was proposed on July 28, 2009 (Federal register, Vol. 74, No. 143, pp. 37314-37392). This project is outside CH for large flowered wooly meadowfoam and Cook's desert parsley; therefore, there are no effects to the proposed critical habitat.

Noxious weeds would be treated using an integrated pest management approach (RMP pp. 92-93). Management objectives are to contain or eradicate populations of listed noxious weeds. Populations of noxious weeds would be contained using appropriate methods based on species and conditions as directed in the Medford District Integrated Weed Management Plan (PA-OR110-98-14). All treated noxious weed populations would be monitored for treatment effectiveness.

- All heavy equipment, including brushing machinery, would be pressure washed to remove all dirt and debris prior to entering BLM lands and when moving from infested to non-infested areas within the project area. This includes a thorough cleaning of the undercarriage in a designated cleaning area. Cleaning areas would be subsequently monitored for infestation and weeds would be treated.

- Haul truck turn-arounds would not be constructed in known noxious weed populations (BLM map to be provided).
- Equipment and material would not be stored in known weed populations (BLM map to be provided).

- Temporary roads would not be constructed through known weed sites unless the area is treated for noxious weeds prior to road construction.

- Roadsides disturbed by project implementation (culvert and road shoulder work) would be re-vegetated after implementation.
- Seed and straw used for restoration, replanting of bare soil, and post treatment throughout the project area would be native species and weed free to prevent the further spread of noxious weeds. All seeding would be contingent on seed availability.

3.0 Environmental Consequences, Including Cumulative Effects

This section provides the basis for the comparisons of the alternatives and the reasonably foreseeable environmental consequences to the human environment of the alternatives for the proposed action. These consequences can be beneficial, neutral, or detrimental. This analysis considers both the direct effects that are caused by the action and would occur at the same place and time, and the indirect effects that are caused by the action but would occur later in time or offsite (40 CFR 1508.8).

The decision will also include a determination whether or not the impacts of the proposed action are significant to the human environment. If the impacts are determined to be within those impacts analyzed in 1994 Final EIS, or otherwise determined to be not significant, a Finding of No Significant Impact (FONSI) can be issued and a decision implemented.

These effects will be analyzed and described in context by describing and identifying what would take place if no action is taken; effects analysis will consider the present conditions on the land that were produced by past actions and what effects will take place from other present and reasonably foreseeable future actions. The analysis of the effects of taking "no action" then provides the context for analyzing the "incremental effect" of taking action under each of the action alternatives by showing how the action alternative will change the conditions on the ground. This is the "incremental impact," in context with current conditions, which constitutes the "cumulative impact" as defined in the Council on Environmental Quality's (CEQ) regulations. (40 CFR § 1508.7) ("the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions…"). The temporal and spatial scales used in this analysis may vary, depending on the resource being affected.

The CEQ, in guidance issued on June 24, 2005, points out that the, "environmental analysis required under NEPA is forward-looking," and review of past actions is required only "to the extent that this review informs agency decision-making regarding the proposed action."

The CEQ stated in this guidance that "[g]enerally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions." This is because a description of the current state of the environment inherently includes the effects of past actions. The CEQ guidance specifies that the "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions." Following review of the guidance and examining the proposed project, the team found that an exhaustive listing of past projects and speculation on the effects of each would not provide needed data to make an informed decision.

Information on the current environmental condition is comprehensive and more accurate for establishing a baseline condition for a cumulative effects analysis than attempting to establish such a starting point by adding up the effects of individual past actions. This would provide a list of effects without addressing the changes or improvement in conditions since the action originally occurred; unlike current conditions, past actions and perceived effects can no longer be verified by direct examination.

Therefore, the affected environment and No Action effects section for each resource incorporates the current condition, and past present and reasonably foreseeable actions. Following the Code of Federal Regulations and CEQ guidance, the effects sections add the anticipated effects of this project to the current conditions, resulting in the cumulative effects analysis for the project. Cataloging and analyzing other present and reasonably foreseeable actions relevant to the effects of the proposed action *is* necessary; they are described below. These actions are incorporated into the affected environment and no action alternative descriptions in each resource section.

When encountering a gap in information, there is an implicit question in the Council on Environmental Quality regulations on incomplete and unavailable information: is this information "essential to a reasoned choice among the alternatives?" (40 CFR §1502.22[a]). While additional information would often add precision to estimates or better specify a relationship, the basic data and central relationships in the analysis in the EA are sufficiently well established that any new information would not likely reverse or nullify understood relationships. Although new information would be welcome, the team did not identify any missing information as essential for the Decision Maker to make a reasoned choice among the alternatives.

The planning team weighed the scientific evidence offered through public comments, as well as that gathered by each resource specialist. Environmental consequences of each alternative were analyzed utilizing the best scientific data available, knowledge of on-the-ground conditions, and professional expertise of each member of the planning team.

Only substantive site-specific environmental changes that would result from implementing the proposed action or alternatives are discussed in this chapter. Areas of Critical Environmental Concern (ACEC), Native American religious concerns, prime or unique farmlands, floodplains, and wilderness will not be affected by the proposed action alternatives.

Watershed Overview/History
The following overview provides a context in which to analyze the effects of the Brass Joe / Waterbrook Project Area. Specifically this context integrates past action, current conditions, and future foreseeable activities. Not only does this information provide needed data and content for effects analysis but also provides information on the context and intensity of activities occurring across the landscape. Further, the information puts the project in perspective and aids in comparison of the action alternative with the no action alternative (existing conditions coupled with current and future foreseeable actions).

Fifth Field Watershed: The projects lie within the Jumpoff Joe Creek 5th field watershed (69,382 acres). BLM manages 21,456 acres (30%) within the Jumpoff Joe Watershed. The remainder of the land base in the watershed is managed by private, state, and the county.

Oregon and California Railroad and Coos Bay Wagon Road Grant Land Act (O&C) lands account for 17,593 acres or 82% of federal land. There are no Late-successional Reserves or critical habitat units in the watershed. Jumpoff Joe is not a key watershed.

Harvest on BLM lands began in the mid-1950s, peaked in the 1970s, and declined in the 1990s. Since 1950, the BLM has harvested a total of 9,643 acres, representing 13% of the watershed. Of the 9,643 acres harvested, only 790 acres have been harvested since 1990. Approximately 3,412 acres were even-aged harvest (clear-cut, overstory removal, seed tree, etc.) and the rest are a varied mix of partial cuts (6,231 acres).

Equally important to past harvest history in understanding current conditions and trends in the watershed is the management regime shift resulting from the Northwest Forest Plan (NWFP). With the implementation of the Medford District RMP, which tiered to the NWFP, harvest was expected to decrease by 75%. Resource Plan evaluations found that harvest implementation occurred at 40-70% of the expected value in the NWFP. Further, the NWFP established 10 million acres of reserves to develop late-successional and riparian habitat. Effectively, in the Medford District, the reserves reduced the percent of acres available for harvest from 70% to 29% (RMP EIS 4-96). The NWFP and RMP also instituted the Aquatic Conservation Strategy (ACS) establishing a network of key watersheds, riparian reserves and aquatic restoration practices. Road decommissioning and improvement were integral to the ACS. A drastic reduction in harvest; establishment of a network of late-successional and riparian reserves; and implementation of the ACS and habitat restoration, has led to reduced soil disturbance and sedimentation, improved water quality, and maturing of terrestrial habitat. Because of these factors, there has been an improving trend in environmental conditions on public land.

Foreseeable Actions
Within the 69,382 acre Jumpoff Joe Watershed, BLM proposed 1,043 acres of commercial thinning harvest under the Granite Horse Landscape Management Project; the Granite Joe Landscape Management Project is currently being planned and may propose up to the following acres of commercial timber harvest: 132 acres of commercial thinning; 1,282 acres of commercial thinning/modified group select; 377 acres of structural retention harvest; and 786 acres of density management and restoration thinning. Collectively, BLM's and Josephine County's future harvest plans represent approximately 5.5% of the watershed. Consistent with the RMP (RMP EIS 4-5), the

analysis assumes that private land would be treated on a rotation basis averaging 60 years. Approximately 708 acres of fuel hazard reduction have been completed in the Granite Horse project. Additionally, after harvest of the Granite Horse project, activity fuels would be treated as appropriate to reduce fuel hazard. In addition, BLM will thin 441 acres of young stands in the watershed.

Only substantive site specific environmental changes caused by implementing the proposed action or alternatives are discussed in this chapter. If an ecological component is not discussed, it should be assumed that the resource specialists have considered effects to that component and found that the proposed action or alternatives would have minimal or no effects. In addition, unless addressed specifically, the following were found to be unaffected by the proposed action or alternatives: air quality, Areas of Critical Environmental Concern (ACECs), cultural and historical resources, Native American religious sites, recreation, prime or unique farmlands, floodplains, Wild and Scenic Rivers and wilderness areas. Port-Orford cedar does not occur in the project area.

Within this 5th field watershed, foreseeable actions include harvest on Josephine County and private lands. Josephine County is not currently proposing any additional harvest on their lands beyond the Brass Joe and Waterbrook projects. Effects analysis of Josephine County's harvest tiers to the RMP, which assumed that private lands would be extensively managed, with an average rotation of 60 years. The analysis also assumes that Josephine County would operate within the regulations of the Oregon Forest Practices Act, including standards and guidelines designed to minimize project effects. Project consistency with established state planning documents is beyond the scope of this analysis.

As helicopter access is possible for timber harvest in the Josephine County projects, the proposed road construction is not a connected action to Josephine County's proposals requiring analysis of Josephine County's projects (40 CFR 1508.25). Therefore, this analysis will be restricted to the proposed road construction and grant of right-of-way over existing BLM roads. While Josephine County could harvest timber via helicopter with an improvement in economics and timber prices, costs to perform fuel hazard reduction, brushfield conversion, or precommercial thinning would likely be prohibitive, reducing their options to manage their lands.

3.1 Soils and Hydrology

3.1.1 Affected Environment

The proposed road construction is located off BLM roads 35-05-03.00A (Waterbrook) and 34-05-14.1 (Brass Joe) in the Upper Jumpoff Joe Creek watershed. The terrain is generally steep and dissected by small tributaries draining to Jumpoff Joe Creek. Average annual precipitation is approximately 50 inches. The latter site is located in the transient snow zone (TSZ), commonly subject to rain on snow events. The OWAM graph (Governor's Watershed Enhancement Board 1999) (Figure 3, p. IV-11) shows that "Potential Risk" of peak-flow enhancement range from 25-35% of the watershed within TSZ openings. Neither of the two 7th field HUCs (Brass Joe, 17100310020103 and Waterbrook, 17100310020112) have openings above 8%.

Soil in the proposed road construction areas are Beekman-Colestine gravelly loam complex (6F), 50-80% north slopes (Brass Joe) and Beekman-Colestine gravelly loam complex (7F), 50-75% south slopes (Waterbrook). Beekman-Colestine complex soil depth is 20 to 40" to fractured

metamorphic bedrock. This moderately drained soil has a high erosion hazard under bare soil conditions due to steep slopes.

Cutslopes are generally stable, but minor failures can occur where bedrock is highly fractured. No seeps or springs were observed within the proposed road route. The soils are stable with no indication in the project area of steep unstable conditions (sliding or mass wasting).

The percent of the 6th field subwatershed in roads is at moderate levels, roughly 2%. In the Waterbrook 7th field there are 11.2 acres of road (4.6 miles /1.39%) and in the Brass Joe there are 32.5 acres (13.4 miles /0.98%). At this level of roads, alterations in streamflow and runoff are unlikely. For comparison, (Jones and Grant 1996, Jones 2000) found no statistically significant increases in peak flows attributed to roads when roads occupied 6% of the basin. Similarly, Wright et al. (1990) and Ziemer (1981), found no changes to the hydrograph when roads occupied 5% of the basin. Harr et al (1975) found that peak flow increases were detectable when 12% of a small watershed was compacted by roads and skidroads.

3.1.2 Environmental Consequences

Alternative 1: No Action

Under the no action alternative, there would be no change to the existing soils and runoff conditions. Current sediment regimes would continue unchanged.

Alternative 2: Proposed Action

Adding the proposed roads would add to the current roaded area slightly, but ongoing federal lands management activities are reducing road miles across the watershed consistent with NWFP and RMP direction. Alternative 2 proposes to add 0.04 miles of road on the BLM for Waterbrook and 0.02 miles of road for Brass Joe. The Joe Louse Sediment Reduction project proposed up to 20 miles of road for decompaction and closure of 2 miles of OHV trails/roads.

If subsurface water were exposed and flowing over newly exposed soil from road construction, runoff may transport fine sediment off-site. However, PDFs prohibiting wet season operations, subsurface drainage at wet areas, seeding and mulching road slopes, rounding the cutbanks where needed, and energy dissipation at the culvert outlets would greatly limit potential slumping and subsequent sediment transport. Further, the new roads' drainage design, placement of rock, windrowed slash below the road, and energy dissipaters at culvert outlets would limit road related overland water flow and capture any routed sediment. Due to these multiple design features, chances of sediment reaching the mainstem Jumpoff Joe Creek, over 0.42 miles (Waterbrook) and 0.91 miles (Brass Joe) from the road, are very unlikely. Therefore, there would be no change to Jumpoff Joe Creek's water quality or sediment regime.

There would be a small reduction in local soil productivity due to change of use from 0.05 acres (Brass Joe) and 0.10 acres (Waterbrook) of vegetation production to a roaded strip.

There is a potential for increased OHV use due to construction on new roads. The primary mechanisms of negative impacts to soils and hydrology from OHV use are improper trail construction and off-trail use. One of the most common and important effects of OHV activities is soil compaction (Liddle, 1997), which reduces water infiltration and increases rates of erosion from water and wind. As a result, soil moisture available for plant growth declines, precipitation runoff

increases (in volume and velocity) and soil erosion accelerates which leads to surface changes, including the formation of rills and gullies (Webb et al, 1978; Iverson et al, 1981; Webb, 1982; Hinckley et al, 1983; Wilshire, 1983b).

In addition, effects of OHV use on water quality include sedimentation (deposited solids) and turbidity (suspended solids). Sedimentation increases because compacted soils and reduced vegetation cover can lead to increased amounts and velocities of runoff; in turn, this accelerates the rates at which sediments and other debris are eroded and flushed to streams. Altering soil texture and reducing vegetation cover can increase the soil's susceptibility to erosion. Consequently, rates of sedimentation and turbidity levels can increase and alter the water quality of a watershed (Forman et al, 2003).

While it is impossible to predict the increase or the total amount of OHV use that may result from the two proposed new road segments, it is highly unlikely that any substantial increase of OHV use will occur because of the new road segments. Relatively few areas across the Resource Area receive regular OHV use and the proposed road locations are in areas that receive minimal, if any, use. We expect the two short segment lengths will have negligible affects on soils and hydrology.

Summary and Cumulative Effects

The proposed action would add approximately 0.15 acres of road surface in two non-adjacent 7th field HUC's. Given the small addition, roaded acres in the subwatershed would essentially remain at 2%, which is well below the level that research has detected measurable changes to streamflow. Due to the small area of disturbance combined with project design features there would be negligible erosion at the site and sediment would not be transported off-site. Therefore, there would be no cumulative effects from the ROW proposal to soils or water quality.

Cumulatively, past and future road reduction actions meets the intent and objectives for key watersheds included in the NWFP which directs a net reduction in road miles. The cumulative benefit of net road reduction is also consistent with the Aquatic Conservation Strategy objectives of maintaining and restoring water quality and sediment regimes.

3.2 Fisheries

3.2.1 Affected Environment

There are no fish bearing streams in or immediately downstream of the project area. Cutthroat trout are present in Jumpoff Joe Creek, over 0.42 miles (Waterbrook) and 0.91 miles (Brass Joe) from the proposed road segments. There is a natural barrier approximately 5 miles downstream of the Waterbrook segment which blocks upstream passage of anadromous salmonid species.

3.2.2 Environmental Consequences

The following analysis considers the likelihood that the proposed actions of the project would affect fisheries and aquatic resources, and then assesses the potential magnitude, duration, and nature of effects. The proposed actions are evaluated on how they would change fish habitat, and for this reason, the fisheries analysis is linked closely to the soil and water effects analysis (Soil and Hydrology section 3.1). The effects on habitat are in turn used to evaluate the potential of the proposed actions to affect fish populations through production and survival.

Alternative 1: No Action

As stated above in section 3.1, under the no action alternative, there would be no change to the existing soils and runoff conditions. Current sediment regimes would continue unchanged. Current conditions and trends of channel processes and water quality, and therefore fish habitat, would continue unchanged.

Josephine County could proceed with the Brass Joe and Waterbrook projects even though BLM would not construct the proposed road segments.

Alternative 2: Proposed Action

Road construction has the potential to generate fine sediment which, under certain conditions, can be transported off-site. However, in this proposal, due to the implementation of PDFs directing the design, construction, and use of the roads, sediment is unlikely to reach Jumpoff Joe Creek (sec. 3.1). There would be no increases in stream substrate embeddedness, the amount of fine sediments in the gravel, or turbid water in fish habitat. Therefore, there would be no change to Jumpoff Joe Creek's water quality or sediment regime. There would be no effect on salmonid migration, spawning, egg incubation, rearing, and feeding. Downstream salmonid production and survival would be unaffected.

Summary and Cumulative Effects

The potential effects described above are negligible in this alternative because of the efforts to eliminate sediment delivery mechanisms and disturbance through PDFs. No effects were identified in the cumulative analysis of impacts to soil and water (See Section 3.1). Therefore, no effects to fish and aquatic habitats would be expected to result from the proposed action in this alternative at the project area, 6th or 5th field watershed scales.

Aquatic Conservation Strategy (ACS)

The Aquatic Conservation Strategy developed and identified nine objectives to maintain and restore the ecological health of watersheds and aquatic ecosystems contained within them on public lands. The strategy is designed to protect salmon and steelhead habitat on federal lands managed by the BLM within the range of the Pacific Ocean anadromy. The components of the ACS are *riparian reserves, key watersheds, watershed analysis, and watershed restoration* (RMP p. 22).

Riparian Reserves

Riparian reserve widths conform to the interim widths prescribed in the Northwest Forest Plan (p. C-20). Fish bearing streams would have a riparian reserve width of 330 feet (2 site potential tree heights), and perennial and intermittent streams and springs would have riparian reserve widths of 165 feet (1 site potential tree height). There are no streams, fish bearing or otherwise, in or immediately downstream of the project area.

Key Watersheds

The project is not within a key watershed (RMP p. 23). However, past and future road reduction actions meet the intent and objectives for key watersheds included in the NWFP which directs a net reduction in road miles. The cumulative benefit of net road reduction is also consistent with the Aquatic Conservation Strategy objectives in maintaining and restoring water quality and sediment

regimes (Soils and Hydrology analysis, Section 3.1.2).

Watershed Analysis
The actions proposed in the Brass Joe and Waterbrook Road Construction EA occur entirely within the Jumpoff Joe Creek 5th field watershed, analyzed in the Jumpoff Joe Watershed Analysis (USDI 1998). The actions proposed are consistent with the recommendations of the Watershed Analysis.

Watershed Restoration
As stated above under key watersheds, past and future road reduction actions meet the intent and objectives for key watersheds included in the NWFP which directs a net reduction in road miles. The cumulative benefit of net road reduction is also consistent with the Aquatic Conservation Strategy objectives in maintaining and restoring water quality and sediment regimes (Soils and Hydrology analysis, Section 3.1.2). The physical integrity of the aquatic system is expected to improve with a net reduction in road miles.

Based on the review of project effects at both the site and watershed scales and the nine ACS objectives, the Brass Joe and Waterbrook Road Construction proposal is consistent with the Aquatic Conservation Strategy (RMP EIS p. 2-5).

3.3 Wildlife

Only Special Status Species (Federally Listed, Federal Candidate, and Bureau Sensitive wildlife species) known or suspected to be present within the project area or adjacent BLM lands, and potentially impacted by the proposed actions are addressed in this EA. There is no habitat for former Survey and Manage species within the proposed right-of-ways; therefore, there is no further discussion of these species.

3.3.1 Affected Environment

Northern Spotted Owl (Federally Threatened)
Northern spotted owls (NSO) are closely associated with older forests for nesting, foraging, and roosting throughout most of their range (Forsman et al. 1984; Carey et al. 1990; and Solis and Gutierrez 1990). Spotted owl habitat within the Jumpoff Joe 5th field watershed was typed utilizing the McKelvey rating system. Suitable spotted owl nesting, roosting, and foraging habitat (NRF) is characterized by forested stands with older forest structure, multiple canopy layers, and a canopy closure of 60 percent or greater. The best quality NRF habitat has large old trees with cavities, broken tops or mistletoe platforms, large branches, dead standing and fallen decayed trees, and multiple canopies of shade tolerant hardwoods and conifers that support prey base. NRF habitat can also function as dispersal habitat. Dispersal-only habitat for spotted owls is defined as stands that have a canopy closure of 40 to 60 percent, and provides cover, food, and protection on a temporary basis to non-nesting owls moving between patches of NRF habitat (USDI, 2006).

Both of the proposed road locations are in spotted owl dispersal-only habitat. The nearest historic spotted owl site to the proposed road locations is approximately 0.6 mile northeast of the Waterbrook project area, and approximately 1 mile west of the Brass Joe project area.

Fisher (Federal Candidate)
Fishers are associated with low to mid-elevation forests with a coniferous component, large snags or

decadent live trees, large fallen trees for denning and resting, and complex physical structure near the forest floor, which provide habitat for fisher prey (Aubry and Lewis 2003). Suitable spotted owl NRF habitat also adequately describes suitable fisher denning habitat because there is a direct correlation between key habitat features captured by the McKelvey rating system and fisher denning habitat (high canopy cover, multi-storied stands, large snags, and large down trees on the forest floor). Neither of the proposed road locations are located in suitable denning fisher habitat, but are located in areas that could serve as foraging and dispersal habitat. Powell and Zielinski (1994) and Zielinski et al. (2004) suggest that habitat suitable for denning sites is likely more limiting for fishers than foraging habitat.

Forest carnivore surveys using bait stations with motion and infrared detection cameras have been conducted throughout the Grants Pass Resource Area and have detected fishers in the vicinity of Williams and the top of the Deer Creek drainage. No surveys have been conducted in the Jumpoff Joe watershed. The nearest photo documented fisher locations on BLM are approximately 22 and 25 miles south of the proposed action areas. Due to the natural (Rogue River) and the artificial (I-5, Grants Pass) barriers between the Jumpoff Joe watershed and the closest documented fisher locations, it is unlikely fishers occur within the Jumpoff Joe watershed.

Additional Wildlife

Down logs and snags are present within the proposed road route that may provide habitat for some special status species and land birds (neotropical birds and year round residents). Land birds use a wide variety of habitats, including late-successional forests, riparian areas, brush in recovering clear-cuts, and small trees in developing stands.

3.3.2 Environmental Consequences

Alternative 1: No Action

Stand conditions along the proposed road route would remain the same and no habitat modifications would occur. As no habitat modification or increased disturbance would occur, there would be no effects to special status wildlife species or their habitats from project activities.

Alternative 2: Proposed Action

Northern Spotted Owl (Federally Threatened)

Waterbrook Project

The proposed road construction on this route would remove < 0.5 acres of spotted owl dispersal-only habitat. This impact would be negligible because the surrounding BLM lands immediately adjacent to the proposed road construction would continue to function as dispersal habitat. The proposed action would not preclude owls from dispersing through the area or nesting in nearby suitable NRF stands on BLM lands. Additionally, seasonal restrictions listed as Project Design Features would prevent disturbance to potential adjacent nesting spotted owls during road construction and future hauling operations.

Brass Joe Project

The proposed road construction on this route would remove < 0.5 acres of spotted owl dispersal-only habitat. This impact would be negligible because the surrounding BLM lands immediately adjacent to the proposed road construction would continue to function as dispersal habitat. The

proposed action would not preclude owls from dispersing through the area on BLM lands. Additionally, seasonal restrictions listed as Project Design Features would prevent disturbance to potential adjacent nesting spotted owls during road construction and future hauling operations.

Fisher (Federal Candidate)

Collectively between both project areas, approximately 0.5 acres of potential fisher foraging and dispersal habitat would be removed as a result of the proposed action. However, the loss of habitat from the proposed action would be negligible and would not preclude fishers from using the adjacent BLM lands.

Project activity disturbance effects to fishers are not well known. Fishers may avoid roaded areas (Harris and Ogan 1997) and humans (Douglas and Strickland 1987; Powell 1993). Disturbance from the proposed action would be temporally and geographically limited. Fishers have large home ranges and would be able to move away from the action area while the disturbance is occurring, without impacting their ability to forage and disperse within their home range. The proposed action would not contribute to the need to federally list the fisher as threatened or endangered. Habitat features, such as large snags and coarse wood, as well as untreated late-successional forest habitat, would be retained in the adjacent BLM stands, and would continue to provide denning and resting habitat within the Jumpoff Joe 5th field watershed.

Additionally, the fisher is not suspected to occur within the Jumpoff Joe 5th field watershed. Therefore, the proposed road construction would not directly affect any individual fishers. The small loss of habitat would not preclude fishers from utilizing the remaining habitat across BLM lands within the Jumpoff Joe 5th field watershed in the future if fishers were to occupy the watershed.

Additional Wildlife

Collectively between both project areas, the proposed action would remove approximately 0.5 acres of potential habitat (conifers, hardwoods, brush, snags, and coarse woody material) for neotropical birds. However, this loss would be negligible due to the large amounts of suitable habitat retained on adjacent BLM and county land. Some individuals may be displaced during project activities. However, untreated adjacent BLM lands would provide refuge and nesting habitat, which would help minimize short term loss of habitat and temporary displacement during project activities. Additionally, the failure or loss of a nest during one nesting season would not be expected to reduce the persistence of any bird species in the watershed due to the small scope of the project.

Road construction could cause warmer, drier conditions in adjacent interior forest habitats because of reduction of the canopy closure and increased solar and wind exposure (Trombulak and Frissell 2000). This could result in reduced reproduction and survival of species with low dispersal capabilities, such as mollusks and possibly amphibians (Marsh and Beckman 2004). Species with greater dispersal capabilities could likely move to areas with more favorable microclimate conditions if suitable habitat were nearby. However, due to the small scope of this project, only negligible or undetectable effects to Bureau special status species are expected. The road construction is not expected to affect long term population viability of any known species or lead to the need to list sensitive wildlife species due to minimal habitat loss and the abundance of habitat nearby.

OHV Use

The largest impact to wildlife from OHV use is from trail construction and the associated habitat fragmentation caused by extensive road and trail networks (Reed et. al., 1996). Additional impacts from OHV activities include disturbance from noise, and can occasionally result in direct mortality. The magnitude of these types of effects on wildlife species and populations is correlated with the density, total surface area, and use of OHV trails (Forman et. al. 1998).

OHV use varies dramatically across the Medford BLM lands. While current policy allows for the open use of OHVs on BLM lands (unless specifically designated as closed to OHV use), relatively few areas receive regular or repeated use.

While it is impossible to predict the increase or the total amount of OHV use that may result from the two proposed new road segments, it is highly unlikely that any substantial increase of OHV use will occur as a result of the new roads. The locations are in areas that receive minimal, if any OHV use, and the short segment lengths will have negligible affects on forest fragmentation.

Summary and Cumulative Effects

Cumulative effects for wildlife species and habitat are primarily discussed at the 5th field watershed in order to capture the varying habitats, species home ranges, and varying degrees of species mobility. Fire suppression, road building, and timber harvest throughout the Jumpoff Joe 5th field watershed have resulted in habitat loss and fragmentation, and have changed the distribution and abundance of many wildlife species in the Jumpoff Joe 5th field watersheds.

The BLM is also planning the Granite Joe Landscape Management project which proposes commercial harvest of NRF and dispersal-only NSO habitat (see section 3.0 above for the extent and harvest type proposed). No timber harvest is planned immediately adjacent to the Waterbrook proposed road and therefore, lands adjacent to the road would continue to function as dispersal habitat. Timber harvest will likely be proposed on the lands immediately adjacent to the Brass Joe proposed road under the Granite Joe Landscape Management project, but the planned treatment would not reduce the habitat below that of dispersal (i.e. the adjacent habitat would still function as dispersal habitat post-treatment).

At the 5th field watershed level, late-successional forest habitat would be maintained throughout the Jumpoff Joe 5th field Watershed in Riparian Reserves, 100-acre KSOACs, and 15% late-successional forest retention areas. These reserve areas would continue to provide suitable habitat for late-successional forest habitat dependent species and would help maintain future connectivity throughout the watershed and between large Late-successional Reserves.

Even when the proposed road construction is added with the future foreseeable actions, it is highly improbable the road construction would reduce or diminish the survival or recovery of the spotted owl due to the small percentage of dispersal habitat affected compared to the provincial and the range-wide levels. The 0.5 acres of dispersal habitat removal represents <0.01% of the available dispersal habitat available on BLM lands within the Jumpoff Joe 5th field watershed. Considering the impacts from the other future foreseeable actions that will occur within the watershed (including the Granite Joe Landscape Management Project), over 3,800 acres of dispersal habitat would be

retained across the watershed and would continue to provide suitable dispersal habitat. These untreated areas would continue to facilitate owl dispersal within and throughout the watershed. Suitable dispersal habitat would also be found in untreated suitable NRF habitat within the project area. In addition, recent road decommissioning in the Jumpoff Joe 5th field watershed under the Joe Louse Sediment Reduction project would further reduce impacts to wildlife.

Even though the proposed actions may potentially disrupt local individuals, if present, during the road construction activity and remove 0.5 acres of habitat, this project is not expected to affect long-term population viability of any Federally Threatened or Endangered or Bureau Sensitive wildlife species or land birds known to be in the area. Due to the small scope of the project and abundant similar habitat found throughout the watershed, this project combined with other actions in the watershed would not contribute to the need to federally list any Bureau Sensitive wildlife species.

3.4 Botanical Species/Noxious Weeds

3.4.1 Affected Environment

The project area was surveyed for federally listed (T&E) plant species, Bureau Special Status (BSS) plant species, former Survey and Manage (S&M) species and Oregon State listed (STO) species during the 2008 field season. The project area is in the range of the federally listed species *Fritillaria gentneri* however, *F. gentneri* species were not found in the project area. During surveys for federally listed plant species, Bureau Special Status plant species, and Oregon State listed species, the project area was also surveyed for noxious weeds during the 2008 field season. Surveys did not document any occurrences of noxious weeds in the project area.

Alternative 1: No Action

Management and treatment activities would continue to occur on private lands where there are no laws or regulations to govern management of listed species. Plant species on federal lands would continue to be protected and conserved following policy and management guidelines. Populations on non-federal lands would most likely remain undetected and unprotected because there are no laws governing rare plants on non-federal lands. Because habitat and populations for botanical species are found throughout the resource area, district, and in southern Oregon on federal land, impacts associated with the project would not lead to the listing of any plant species. Conditions along the proposed road route would remain the same and no habitat modifications would occur. There would be no effects to T&E plant species, BSS plant species, STO species, former S&M species or their habitats.

Noxious weeds can out-compete native plants, reduce habitat for native insects and animals, and threaten biological diversity. They can alter soil fertility, dry up water supplies, poison animals, decrease agriculture production, increase fire danger, infest rivers, and reduce recreational value. Noxious weeds find disturbed sites favorable for habitat. Vehicles are a primary method for transporting noxious weeds and creating new populations of noxious weeds. Road maintenance, new and temporary road construction, tractor harvest, trails and landing construction present a potential risk for seed dispersal of noxious weeds from outside the project area as well as the spread of existing seed within the project area.

Current data for BLM lands along with verbal communication from other agencies, organizations, and communities in Josephine County has shown that noxious weeds have been found to occur

throughout the county. The numbers of species and known specific locations have not been recorded for Josephine County, Grants Pass Resource Area, and non-BLM land in the project area. Therefore BLM can only act on the assumption that 1) there is a source of noxious weeds on adjacent non-federal lands that can spread to federal lands, especially when the land ownership is checkerboard, as within the watershed; or 2) conversely, in considering effects of BLM action on adjacent non-federal lands that noxious weeds are not already established in these lands. Under either assumption, there is an equal need to reduce the risk of spread of noxious weeds from federal lands to the adjoining non-federal lands and *vice versa*. Seeds are spread by the wind, animal / avian vectors, natural events, and human activities. Additional human disturbance and traffic would increase the potential for spreading noxious weeds, but regardless of human activity, spread of these weeds would continue through natural forces. Thus, the BLM cannot stop the spread of noxious weeds to and from non-federal lands; it could only reduce the risk or rate of spread and control of known populations.

The No Action alternative would not create additional disturbance or access that may result in new weed populations. Existing populations will continue to increase in size and possibly spread to uninfected areas through vectors such as, wind, wildlife, water and unauthorized trail building and OHV use.

Alternative 2: Proposed Action

Federally listed plant species, Bureau Special Status plant species, and Oregon State listed species were not found in the project area; therefore, there would be no direct or indirect effects to these species. Implementation of this project would not contribute to the listing of vascular plants, non-vascular plants or fungi.

The proposed project would disturb <0.5 acres in habitat. The amount of habitat disturbance is inconsequential at the watershed level.

Project design features would be implemented to prevent the spread of noxious weeds and to prevent new populations from becoming established (Chapter 2). Monitoring and treatment are put in place if any noxious weeds are found in the project area. Treatment applications of noxious weeds would not affect listed species due to the methods of treatments which affect the noxious weed only; treatment would not occur to STO, T&E, Bureau Sensitive or former S&M botanical species.

Summary and Cumulative Effects

This project incorporates PDF's for the protection of STO, T&E, BSS and former S&M botanical species, and habitat from project activities. These protection measures are also utilized for other projects on the Grants Pass Resource Area and throughout the Medford District. Due to these protection measures, listed species are protected from potential impacts and project activities, and will not trend towards extinction or extirpation. As there will be no project level effects, there will not be additional effects that would add to the existing level of effects, therefore, there are no cumulative effects from this project.

Noxious weeds have started to impact plant communities, especially in drainages and along roadsides in the project area. Foreseeable activities in the project area are expected to be similar to

past and current activities: motor vehicle traffic, recreations use, development, timber harvest, and road construction. These types of activities would result in new disturbed sites available for colonization by existing noxious weed populations, and they offer the possibility of introduction of new noxious weed species under any alternative, including the No Action alternative. Noxious weed sites have not been found within the project area. Project design features have been put in place to eliminate any potential impacts that noxious weeds would have from any action that may occur from this project. Given unpredictable vectors for weed spread, such as vehicle usage by private parties, wildlife, water, and wind currents, it is not possible to quantify with any degree of confidence the rate of weed spread in the future, or even the degree by which that potential would be increased by the proposed actions. However, the proposed action, inclusive of PDFs, would minimize the spread of noxious weeds. The BLM is working to increase communication and treatment opportunities with other land owners, agencies, and organizations through the Josephine County Cooperative Weed Management Area with the hope of increasing the effectiveness of treatments and a cumulative decrease in the spread of noxious weeds.

3.5 Cultural Resources

3.5.1 Affected Environment

The Brass Joe and Waterbrook Road Construction project is situated in a region that has a rich history. Prior to Euro-American settlement in the 1850's, indigenous groups inhabited the region of the proposed project. The planning area is located within the homelands of the modern day Confederated Tribes of the Siletz, the Confederated Tribes of the Grand Ronde, and the Cow Creek Band of Umpqua Indians. These three groups occupied traditional areas located on the ridges, valleys and tributaries of the current day Jumpoff Joe Watershed. The three groups can be characterized as hunter-fisher-gatherers and followed a subsistence pattern of procuring food as it became available throughout different seasons.

Land settlement, railroad construction and hydraulic gold mining were the primary development activities taking place in the watershed during the late 1800's.

Gold was discovered in the Rogue Valley in 1851 bringing an influx of miners into the region. Gold mining began in the Jumpoff Joe watershed in the late 1800s and included placer and hard rock mining methods (USDI 1998:81). Mines such as the Lucky Queen Mine, Granite Hill Mine, Ida Mine, Jumpoff Joe Hydraulic Mine, Northern California Dredging Company, Swastika Placer and the Oro Fino were just a few of the gold mines in the area. The Jumpoff Joe and Louse Creek Mining Districts were established in 1897.

In response, small towns and post offices sprung up around the area. The town of Lucky Queen, located near the Lucky Queen Mine, opened a post office in December 1876 which closed July 1896. Another small town close-by was Mountain, Oregon, a small sawmill camp associated with the Three Pines Lumber Company. Flumes were constructed to move the timber down to the camp from the surrounding mountains. The Mountain post office was opened in 1908 and closed in 1913. The town of Winona was located on Jumpoff Joe Creek with a post office established in 1897 and closing in 1905.

Construction of the Oregon and California Railroad began in 1868 and in 1884 the railroad line was finally completed to the town of Grants Pass, Oregon.

Cultural resource inventories were completed in the project area in January and May of 2008 by the Grants Pass Resource Area BLM archaeologist. The area of the proposed roads had been previously included in the Granite Joe Landscape Management Project. No cultural sites were located during the survey of the proposed roads. There are no recorded sites within a mile of the project area.

3.5.2 Environmental Consequences

Alternative 1: No Action

Management activities would continue to occur on private lands. Cultural sites on non-federal lands would most likely remain undetected and potentially could be impacted and/or destroyed. Cultural sites on federal lands would continue to be protected and conserved following policy and management guidelines.

Alternative 2, 3 and 4

No cultural sites were located in the project area therefore there are no impacts to the resource.

Summary and Cumulative Effects

Management direction includes protecting and managing the integrity of all historic / prehistoric sites identified in the cultural survey for this and other projects. No sites were located during the survey, and with the inclusion of Project Design Features (PDFs), there are no direct or indirect effects anticipated to cultural resources.

PDFs include additional protection for cultural sites that may not have been detected during the survey. If any cultural sites, not located during the cultural resource survey, are found during project implementation, activities around the site would halt until a BLM archaeologist reviewed the site and determined appropriate protection measures.

3.6 Fire and Fuels

3.6.1 Affected Environment

Lack of recent wildfire has increased fuel loading and fire hazard in the Jumpoff Joe watershed. The increased fuel hazard trend is expected to continue in the absence of wildfire or fuel reduction activities. Roads are valuable in the suppression of wildfires due to the speed firefighters can arrive on scene to keep the fires small.

3.6.2 Environmental Consequences

Alternative 1- No Action

With no action, the current trend of increasing brush and fuels would continue, with resultant increase in fire hazard. There would be no direct effect to existing conditions from the no action alternative.

Alternative 2 – Proposed Action

The proposed action would add two new road segments to existing BLM roads totaling approximately 330 feet. The action would provide an additional 330 feet of drivable road to fire suppression personnel. In the event of a large wildfire the extra time saved could be beneficial to contain the fire.

Vegetation placed on the fill slope, cut from the ROW, would not increase fuel hazard. Standing brush and understory vegetation would be piled and rowed on the ground surface. This re-arrangement would reduce flame height and ladder fuels in the event of a wildfire.

Summary and Cumulative Effects
Future activities in the Jumpoff Joe watershed include 853 acres of fuel reduction treatment. Any future timber harvest on BLM lands likewise would not add to fire hazard as post harvest fuel treatments would occur. Combined, the increase in access with future fuel reduction activities would result in a decrease in fire hazard.

4.0 Agencies and Persons Consulted

4.1 Public Involvement

BLM sent 45 scoping letters to agencies, nearby residents and interested public in December 2007. BLM received one scoping response.

BLM consulted with the US Fish and Wildlife Service (USFWS) regarding project activities. Pursuant to the Endangered Species Act (ESA), consultation with the USFWS has been compelted and a Letter of Concurrence (Tails #1342-2009-I-0093) has been received from the USFWS. In terms of Consultation, both projects "*may affect, but would not likely adversely affect"* **(NLAA)** spotted owls. No suitable nesting, roosting, or foraging (NRF) habitat would be removed.

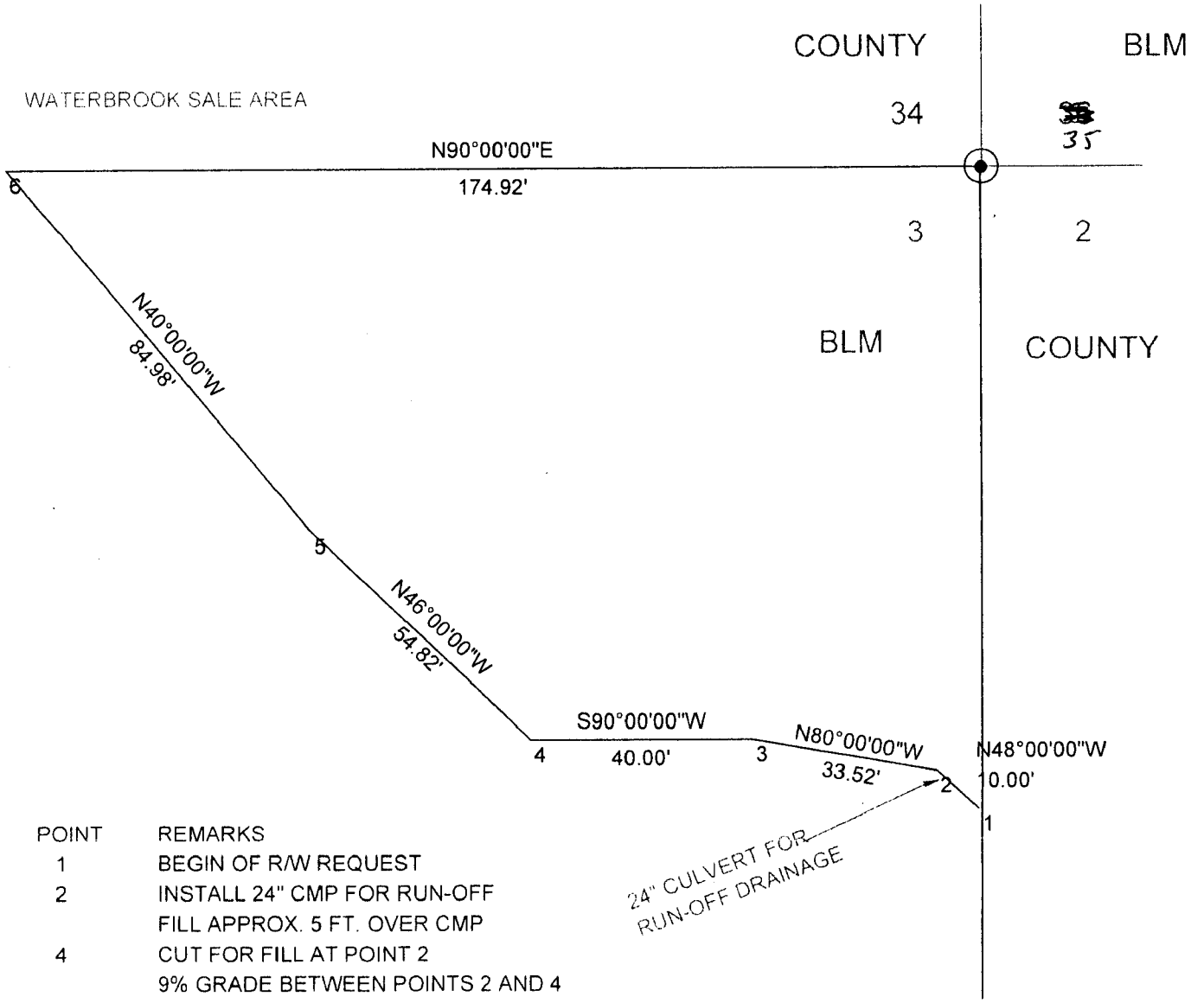
The following agencies were also consulted during the planning process: Josephine County, National Marine Fisheries Service, and Oregon Department of Fish and Wildlife.

4.2 Availability of Document and Comment Procedures

Copies of the EA will be available for public review in the Grants Pass Interagency Office. A formal 30-day public comment period will be initiated by an announcement in the Grants Pass Daily Courier. If you would like a copy of the EA, please stop by the office or contact Jim Roper, project lead, at (541) 471-6631 or Tony Kerwin, Environmental Coordinator at (541) 471-6564. Written comments should be addressed to Abbie Jossie, Field Manager, Grants Pass Resource Area, at 2164 NE Spalding Avenue, Grants Pass, OR 97526. E-mailed comments may be sent to Medford_Mail@blm.gov.

Appendix A. Maps

BLM O&C ROAD PERMIT REQUEST
WATERBROOK TIMBER SALE
SEC. 3, TWP, 35 S., RNG 5 W.

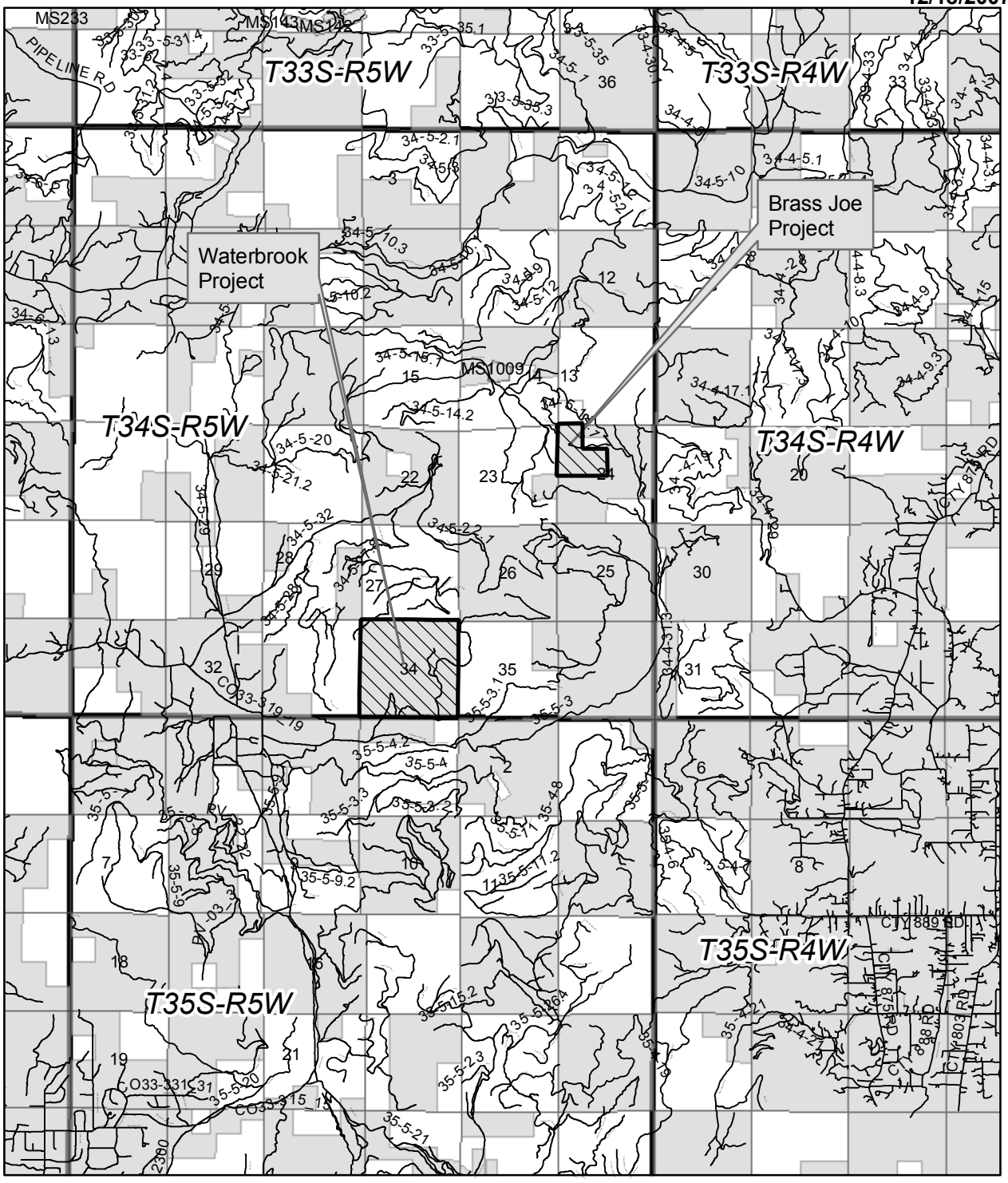


POINT	REMARKS
1	BEGIN OF R/W REQUEST
2	INSTALL 24" CMP FOR RUN-OFF FILL APPROX. 5 FT. OVER CMP
4	CUT FOR FILL AT POINT 2 9% GRADE BETWEEN POINTS 2 AND 4
6	2+25 END R/W REQUEST

Traverse PC

Brass Joe and Waterbrook Road Construction

Vicinity Map
Ex. A
12/18/2007

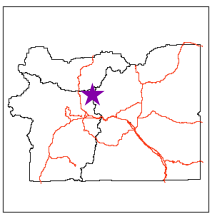


Legend

BLM

Non BLM

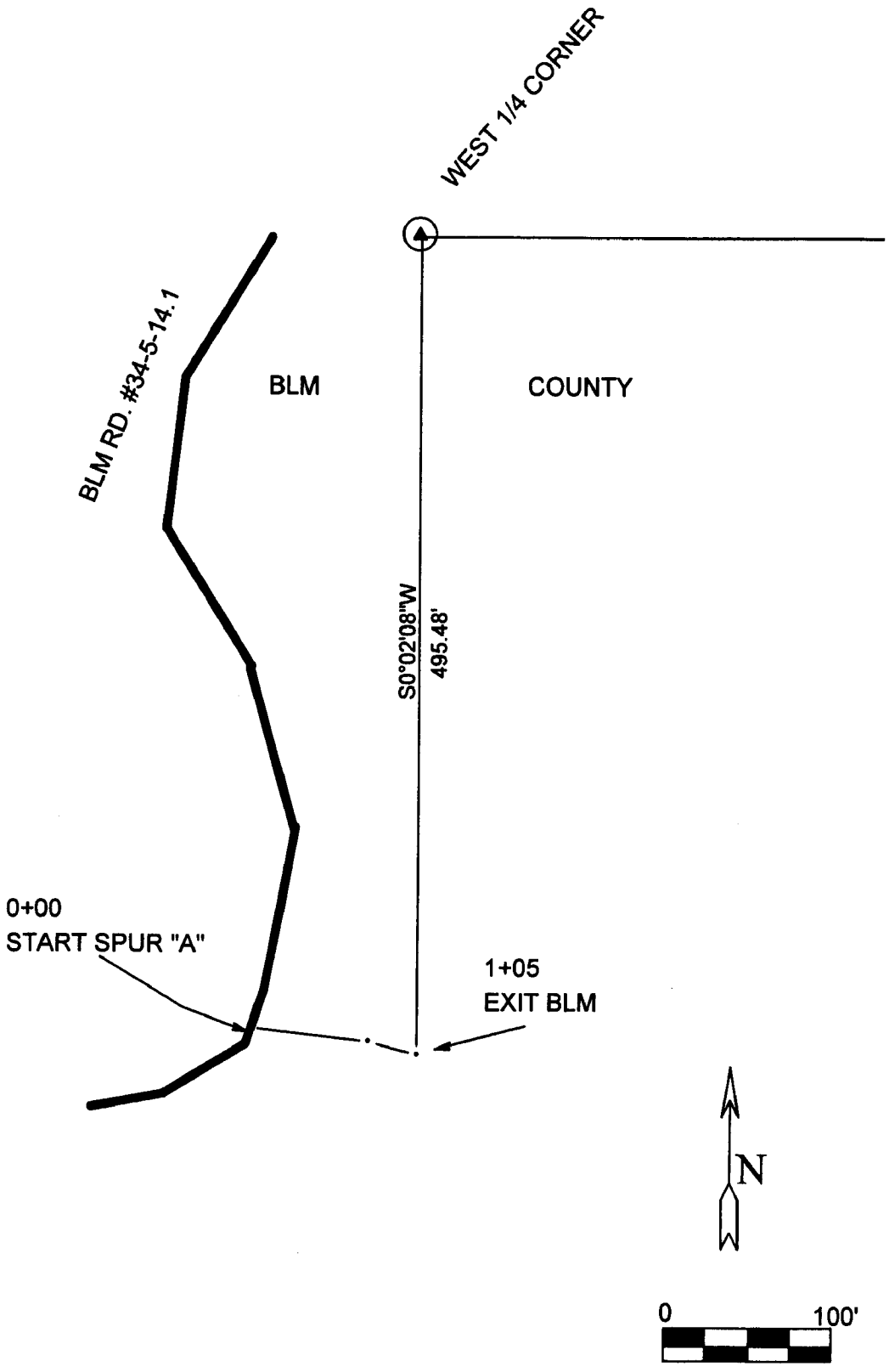
Road



Universal Transverse Mercator Zone 10 N
North American Datum of 1983

Mxd: D:\home\dglover\adhoc\Projects\Realty\BrassJoeWaterbrook_ExhibitA.mxd
Last Modified: 12/18/2007 1:29:41 PM

BLM ROAD CONSTRUCTION REQUEST
BRASS JOE TIMBER SALE
SPUR "A"



Traverse PC

Appendix B. Alternatives and Issues considered but eliminated from detailed analysis

Josephine County requested two roads for construction to access the Brass Joe project. The second spur for this project, totaling approximately 254 feet was accessed off an unnumbered road which branches off the 34-5-14 road. This road was decommissioned under the Joe Louse Sediment Reduction Project (EA OR117-06-06), and will not be rebuilt under this project. Josephine County is no longer considering use of this road to access the Brass Joe project; therefore, it is no longer part of the proposed action.

Helicopter logging is an option for logging Josephine County lands. Given the current timber market and fuel prices, helicopter logging is not economically feasible at this time; however, with an improvement in the economy and timber prices, this could be an option in the future. Additionally, fuel hazard reduction, brush field conversion and precommercial thinning are not economical via helicopter operations. Therefore, helicopter logging, while a viable option, is not considered as an alternative in this proposal.

Concern over salmonid habitat and species, which occur downstream of the project area was highlighted as an issue during initial project development. This was removed as an issue which would shape an alternative, however, because the nearest salmonid fish habitat is over 0.42 miles (Waterbrook) and 0.91 miles (Brass Joe) downstream from the proposed road segments. Furthermore, there are no fish bearing streams in or immediately downstream of the project area. No effects to fish or aquatic habitats would be expected to result from the proposed action at the project area, 7^{th}, 6^{th}, or 5^{th} field watershed scales. Downstream salmonid production and survival would be unaffected. See the Fisheries section (Section 3.2) for the effects analysis on salmonids.

Appendix C. References Cited

Amaranthus, Michael P and David E. Steinfeld, September, 1997. *Soil compaction after Yarding of Small-Diameter Douglas Fir with a Small Tractor in Southwest Oregon.* Pacific Northwest Research Station, USDA-Forest Service. PNW-RP-504.

Beschta, R.L., M.R. Pyles, A.E. Skaugset, and C.G. Surfleet. 2000. *Peakflow responses to forest practices in the western Cascades of Oregon, USA.* Journal of Hydrology 233:102-120.

Best, D.W.; Kelsey, H.M.; Hagans, D.K.; Alpert, M. 1995. *Role of fluvial hillslope erosion and road construction in the sediment budget of Garrett Creek, Humboldt County, California.* In: Nolan, K.M.;

Kelsey, H.M.; Marron, D.C., eds. Geomorphic processes and aquatic habitat in the Redwood Creek Basin, northwestern California. Professional Paper 1454. Washington, DC: U.S. Geological Survey; M1-M9.

Marshall, K. and D. Goheen. 2003. Monitoring effectiveness of roadside sanitation treatments to decrease likelihood of spread of *Phytophthora lateralis* in Southwest Oregon (unpublished report). Initial findings present at the Western International Forest Disease Work Conference (WIFDWC), 2003. USDA Forest Service, Southwest Oregon Forest Insects and Disease Center, Central Point, Oregon.

Gucinski, Hermann; Furniss, Michael J.; Ziemer, Robert R.; Brookes, Martha H. 2001. *Forest Roads: A Synthesis of Scientific Information.* Gen. Tech. Rep. PNWGTR- 509. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Luce, C. H., Black, T. A., 2001, *Spatial and Temporal Patterns in Erosion from Forest Roads.* In: Wigmosta, M. W. and Burges, S. J., editors, Influence of Urban and Forest Land Uses on the Hydrologic-Geomorphic Responses of Watersheds. American Geophysical Union, Washington, DC.

Megahan, W.F, 1974. *Erosion Over Time on Severely Disturbed Granitic Soils: A Model.* Research Paper INT-156, United States Department of Agriculture, Forest Service, Ogden, Utah, 14 pp.

Moore, R.D. and S.M. Wondzell. 2005. *Physical hydrology and the effects of forest harvesting in the Pacific Northwest: a review.* Journal of the American Water Resources Association, pp. 763-784, August 2005

Neary, Daniel G., Carole C. Klopatek, Leonard F. DeBano and Peter F. Ffolliott, 1999. *Fire effects on belowground sustainability: a review and synthesis.* Forest Ecology and Management, Vol 122 (1-2) pg 51-71.

Oregon Dept of Environmental Quality, 1999. TMDL Assessment Report: Riparian Shade, Williams Creek.

Rashin, Edward, B., Casey J. Clishe, Andrew T. Loch, and Johanna M. Bell, 2006. *Effectiveness of Timber Harvest Practices for Controlling Sediment Related Water Quality Impacts.* JAWRA 42:1307-1327.

Rothacher, J. 1971. *Regimes of streamflow and their modification by logging.* In: Proceedings of a symposium: forest land uses and stream environment, J. T. Krygier and J. D. Hall (Editors). October 19-21, 1970 Oregon State University, Corvallis, Oregon. Forest Extension, Oregon State University, Corvallis, Oregon, pp. 40-54.

Scott, D. F. and D. B. Van Wyk, December 1990, *The effects of wildfire on soil wettability and hydrological behaviour of an afforested catchment.* Journal of Hydrology, Volume 121, Issues 1-4, 15 Pages 239-256

Stednick, J.D., 1996. *Monitoring the effects of timber harvest on annual water yield.* Journal of Hydrology 176: 79-95

Swanston, D.N., 1974 *Slope stability problems associated with timber harvesting in mountainous regions of the western United States.* USDA Gen. Tech. Report. PNW-21. Portland, OR, USA.

Switalski, TA, JA Bissonette, TH DeLuca, CH Luce, and MA Madej, 2004. Benefits and impacts of road removal. Frontiers in Ecology and the Environment 2(1): 21-28.

USDI, BLM. Record of Decision for Density Management and Conversion Treatments and Attaining Riparian Reserve Function: Management Direction Concerning Silvicultural Activities Inside the Riparian Reserves. Coos Bay Dist. Office, North Bend, OR

USDI, BLM. 1996. Williams Creek Watershed Analysis. Medford District BLM, Grants Pass Resource Area.

Wemple, B. C., F. J. Swanson, J. A. Jones. 2001. *Forest roads and geomorphic process interactions, CascadeRange, Oregon.* Earth Surf. Process Landforms 26, pp. 191-204. John Wiley & Sons, Ltd. 2001.

Watershed Professionals Network (WPN). 1999. *Oregon Watershed Assessment Manual*. June 1999. Prepared for the Governor's Watershed Enhancement Board, Salem Oregon.

A.C. Kendig and Co. and Cedarock Consultants, Inc. 2003. *Best Available Science Literature Review and Stream Buffer recommendations*. City of Renton. Project No. 182. Renton, WA. http://www.ci.renton.wa.us/ednsp/images/caostrea.pdf

Ziemer, Robert R. 1981. *Storm flow response to road building and partial cutting in small streams of northern California.* Water Resources Research 17: 907-917.

Alexander, John. 2005. Personal Communication. Executive Director, Klamath Bird Observatory. Ashland, Oregon.

Aubry, K.B. and J.C. Lewis. 2003. Extirpation and reintroduction of fishers (*Martes pennanti*) in Oregon: implications for their conservation in the Pacific states. Biological Conservation 114 (1):79-90.

Buermeyer K.R., and C.A. Harrington. 2002. Fate of Overstory Trees and Patterns of Regeneration 12 Years After Clearcutting with Reserve Trees in Southwest Washington. *Western Journal of Applied Forestry* 17 (8): 78-85.

Carey, A.B., J.A. Reid, and S.P. Horton. 1990. Spotted owl home range and habitat use in southern Oregon coast ranges. *Journal of Wildlife Management* 54:11-17.

Chappell, C. B. and Kagan J. 2001. Southwest Oregon mixed conifer-hardwood forest, in Wildlife-Habitat Relationships in Oregon and Washington. Johnson, D. H. and O'Neil, Thomas A., eds. Oregon State University Press, Corvallis, Oregon.

Courtney, S.P., J A Blakesley, R E Bigley, M L Cody, J P Dumbacher, R C Fleischer, A B Franklin, J F Franklin, R J Gutiérrez, J M Marzluff, L Sztukowski. 2004. Scientific evaluation of the status of the Northern Spotted Owl. Sustainable Ecosystems Institute. Portland, OR.

Douglas, C.W. and M.A. Strickland. 1987. Fisher. *In* Wild furbearer management and conservation in North America. M. Novak, J.A. Baker, M.E. Obbard, Eds. Toronto, Ontario: Ontario Ministry of Natural Resources. Pp. 511-529.

Forsman, E.D., E.C. Meslow, and H.M. Wight. 1984. Biology and Management of the northern spotted owl in Oregon. *Wildlife Monographs* No. 87: 1-64.

Forsman, E.D., R.G. Anthony, E.C. Meslow, and C.J. Zabel. 2004. Diets and Foraging Behavior of Northern Spotted Owls in Oregon. *J. of Raptor Res*. 38(3):214-230.

Hagar, Joan and Shay Howlin. 2001. Songbird Community Response to Thinning of Young Douglas-fir Stands in the Oregon Cascades - Third Year Post-treatment Results for the Willamette National Forest, Young Stand Thinning and Diversity Study. Department of Forest Science, OSU.

Harris, J. E., and C. V. Ogan. Eds. Mesocarnivores of Northern California: Biology, Management and Survey Techniques, Workshop Manual. August 12-15, 1997. Humboldt State University. Arcata, CA. The Wildlife Society, California North Coast Chapter. Arcata, Ca. 127 p.

Janes, Stewart W. 2003. Bird Populations on the Panther Gap Timber Sale, 1994-2003: Short and Long term Response to Commercial Thinning. Technical Report submitted to Medford BLM.

Mellen, Kim, Bruce G. Marcot, Janet L. Ohmann, Karen Waddell, Susan A. Livingston, Elizabeth A. Willhite, Bruce B. Hostetler, Catherine Ogden, and Tina Dreisbach. 2006. DecAID, the decayed wood advisor for managing snags, partially dead trees, and down wood for biodiversity in forests of Washington and Oregon. Version 2.0. USDA Forest Service, Pacific Northwest Region and Pacific Northwest Research Station; USDI Fish and Wildlife Service, Oregon State Office; Portland, Oregon. http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf

Powell, R.A. 1993. The Fisher: Life History, Ecology and Behavior. 2nd ed. Minneapolis, MN. University of Minnesota Press. 237 p.

Powell, R. A. and Zielinski, W. J. 1994. Fisher. In The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine: 38-73. Fort Collins, Colorado, USA: USDA Forest Service, Rocky Mountain Forest and Range Experimental Station.

Sakai, H.F., and B.R. Noon. 1993. Dusky-footed woodrat abundance in different-aged forests in northwestern California. *Journal of Wildlife Management* 57(2):373-382.

Sakai, H.F., and B.R. Noon. 1997. Between-Habitat Movement of Dusky-Footed Woodrats and Vulnerability to Predation. *Journal of Wildlife Management* 61(2):343-3350.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey, Results and Analysis 1966-2003. Version 2004.1. USGS Patuxent Wildlife Center Laurel, Maryland.

Sherwin, R. 1998. Townsend's Big-eared bat. *In* Western Bat Working Group, Bat Species Accounts. Available online at: http://www.wbwg.org/

Siegel R.B, and D.F. DeSante. 2003. Bird Communities in Thinned Versus Unthinned Sierran Mixed Conifer Stands. *The Wilson Bulletin*: Vol. 115, No. 2 pp. 155–165.

Solis, D.M. and R.J. Gutierrez. 1990. Summer habitat ecology of northern spotted owls in Northwest California. *Condor* 92:739-748.

USDA, Forest Service and USDI, Bureau of Land Management. Interagency Special Status/Sensitive Species Program (ISSSP) website. www.fs.fed.us/r6/sfpnw/isssp/planning-tools/

USDA, Forest Service, and USDI Bureau of Land Management. 1994a. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl. Government Printing Office.

USDA, Forest Service and USDI, Bureau of Land Management. 1994b. Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old Growth Forest Related Species Within the Range of the Northern Spotted Owl. Appendix J2 Results of Additional Species Analysis. Portland, Oregon.

USDA, Forest Service and USDI, Bureau of Land Management. 1995. Southwest Oregon Late-successional Reserve Assessment.

USDI, Bureau of Land Management, 1998. Jumpoff Joe Watershed Analysis.

USDI Fish and Wildlife Service. 2002. Birds of Conservation Concern 2002. Division of Migratory Bird Management, Arlington, VA. http://migratory birds.fw.gov/reports/bcc2002.pdf

USDI Fish and Wildlife Service. 2003. Rogue River/South Coast Biological Assessment FY04-08 for Activities that may affect listed species in the Rogue River/South Coast Province of Medford District, Bureau of Land Management, Rogue River and Siskiyou National Forests, Biological Opinion FWS Ref. #1-15-03-F-511.

USDI Fish and Wildlife Service. 2003. Washington, DC. Federal Register. February 6, 2003 Vol. 68 (25) 6179.

USDI Fish and Wildlife Service. 2003. Washington, DC. Federal Register. July 10, 2003 Vol. 68 (132) 41169-41174.

USDI, US Fish and Wildlife Service. 2004. Washington, DC. Federal Register April 8, 2004 Vol. 69 (68) 18769-18792.

USDI Fish and Wildlife Service. 2006. Rogue River/South Coast Biological Assessment FY06-08 for Activities that may affect listed species in the Rogue River/South Coast Province of Medford District, Bureau of Land Management, Rogue River and Siskiyou National Forests, Biological Opinion FWS Ref. #1-15-06-F-0162.

USDI Fish and Wildlife Service. 2006. Washington, DC. Federal Register. Sept 12, 2006 Vol. 71 (176) 53777.

USDI Fish and Wildlife Service. 2007. Washington, DC. Federal Register. July 9, 2007 Vol. 72 (130) 37346 -37372.

Sauer, J. R., J. E. Hines, and J. Fallon. 2008. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2007. Version 5.15.2008. USGS Patuxent Wildlife Research Center, Laurel, MD*

Vargus, Mark. 2006. Personal Communication. Wildlife Biologist, Oregon Department of Fish and Wildlife. Rogue Watershed District Office, 1495 E. Gregory Road. Central Point, OR 97502.

Verts, B. J., and L. N. Carraway. 1998. Land Mammals of Oregon. University of California Press. Berkeley, CA.

Wender, B.W., C.A. Harrington, J.C. Tappeiner. 2004. Flower and fruit production of understory shrubs in western Washington and Oregon. *Northwest Science* 78(2): 124-140.

Zielinski, W. J., R. L. Truex, G.A. Schmidt, F.V. Schlexer, K. N. Schmidt, and R.H. Barrett. 2004. Home Range Characteristics of Fishers in California. *Journal of Mammalogy*. 85(4): 649-657.

Atzet, Thomas; Wheeler, David L. 1982. Historical and ecological perspectives on fire activity in the Klamath Geological Province of the Rogue River and Siskiyou National Forests. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region.

Graham R.T. et. al. 2004, Science Basis for changing Forest Structure to Modify Wildfire Behavior and Severity. General Technical Report RMRS-GTR-120, Rocky Mountain Research Station.

Pullen, R. 1995. Overview of the environment of native inhabitants of southwestern Oregon. Late rehistoric era. Pullen Consulting, Bandon, OR. USDA Forest Service, Siskiyou National Forest. Unpublished Report.

Van Wagner, C.E. 1968. Fire behavior mechanisms in a red pine plantation; field and laboratory evidence. Department of Forestry and Rural Development, Canada. Publication No. 1229. 30 pp.

Pollet, J. and P. N. Omi. 2002. Effect of thinning and prescribed burning on wildfire severity in ponderosa pine forests. International Journal of Wildland Fire 11: 1-10.

Omi, P. N. and E. Martinson. 2002. Effect of fuels treatment on wildfire severity. Final report submitted to the Joint Fire Science Program Governing Board, March 25, 2002.

Thomas, T. L. and Agee, J., 1986. Prescribed fire effects on mixed conifer forest structure at Crater Lake, Oregon. Doi;10.1139/cjfr-16-5-1082

Moore, E.B., 1955. Wildfire Damage Reduced on Prescribed-Burned Areas in New Jersey. Journal of Forestry; 47:378-382

Reed, Rebecca A., Julia Johnson-Barnard and William L. Baker. 1996. Contribution of Roads to Forest Fragmentation in the Rocky Mountains: Conservation Biology, Vol. 10, No. 4, pp. 1098-1106.

Forman, R.T.T., and Alexander, L.E., 1998, Roads and their major ecological effects: Annual Review of Ecology and Systematics, v. 29, p. 207–231.

Forman, R.T.T., Sperling, D., Bissonette, J.A., Clevenger, A.P., Cutshall, C.D., Dale, V.H., Fahrig, L., France, R., Goldman, C.R., Heanue, K., et al. 2003. Road ecology—Science and solutions: Washington, D.C., Island Press, 481 pp.

Hinckley, B.S., Iverson, R.M., and Hallet, B. 1983. Accelerated water erosion in ORV off-road vehicle-use areas, *in* Webb, R.H., and Wilshire, H.G., eds., Environmental effects of off-road vehicles—Impacts and management in arid regions. New York, Springer-Verlag, pp. 81–96.

Iverson, R.M., Hinckley, B.S., and Webb, R.M. 1981. Physical effects of vehicular disturbances on arid landscapes. Science, v. 212, no. 4497, pp. 915–917.

Liddle, M.J., 1997. Recreation ecology—The ecological impact of outdoor recreation and ecotourism. London, Chapman and Hall, 666 pp.

Webb, R.H., Ragland, H.C., Godwin, W.H., and Jenkins, D. 1978. Environmental effects of soil property changes with off road vehicle use. Environmental Management, v. 2, no. 3, pp. 219–233.

Webb, R.H. 1982. Off-road motorcycle effects on a desert soil. Environmental Conservation, v.9, no. 3, pp. 197–208.

Wilshire, H.G. 1983b. The impact of vehicles on desert soil stabilizers, *in* Webb, R.H., and Wilshire, H.G., eds., Environmental effects of off-road vehicles—Impacts and management in arid regions. New York, Springer-Verlag, pp. 31–50.